



Inventory of Indigenous Technical Knowledge in Agriculture

Document 1



Mission Unit

Division of Agricultural Extension
Indian Council of Agricultural Research
New Delhi 110012

Inventory of Indigenous Technical Knowledge in Agriculture

**Mission mode Project on
*Collection, Documentation and Validation of
Indigenous Technical Knowledge***

DOCUMENT 1

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Preface

The spectacular performance of Indian agriculture, witnessed during the past forty years against the rising demographic pressure is a vivid demonstration of the effectiveness of our agricultural research and development system with committed researchers, extension personnel and hard working farming community. However, there are concerns for uneven development and degradation of natural resources across the regions, crops, and also different sections of farming communities. The agricultural challenges are four fold: enhance production and productivity, address issues of equality and uneven development, issues of sustainability and enhance profitability in agriculture. India is to support 16% of human and 15% of farm animal population of the world with 2% of the geographical area, 1% of rainfall, 0.5% of forests and 0.5% of grazing land. The national policy on agriculture, formulated recently, seeks to actualize¹ the vast untapped growth potential of Indian agriculture on one hand, while on the other to provide technically sound, economically viable, environmentally non-degrading and socially acceptable use of country's natural resources - land, water and genetic endowment to promote sustainable development of agriculture.

The concept of sustainable agriculture in Indian agricultural scenario has aroused interest in indigenous technical knowledge (ITK). These ITKs are based on experiences which gathered momentum through generations and are being developed and improved through informal experimentation. Thus, ITKs are based on the experiences, tested in most cases over centuries, and endowed with best adaptability to local environment. These are dynamic, holistic, eco-friendly and sustainable; and interwoven, and assimilated in the cultural life of the people.

Indian Council of Agricultural Research (ICAR) has launched a nationwide Mission Mode Project on Collection, Documentation and Validation of Indigenous Technical Knowledge under National Agricultural Technology Project (NATP) during 2000. Information on ITK have been collected from the primary sources through the voluntary disclosure. Simultaneously, an effort has been made to collect and compile the practices on ITK from the available literature, books, journals, thesis, etc. so as to make them accessible at one place. The present volume on Inventory of Indigenous Technical Knowledge in Agriculture - Document 1 is aimed at providing easy accessibility to such information in agriculture and allied areas.

The ITKs compiled in the present volume have been classified under different subject matter areas, viz rain water management, soil and water erosion, tillage and intercultural management, crops and cropping systems, pest and disease management, soil fertility management, farm implements, post-harvest technology, grain/seed storage, horticultural crops, veterinary science and animal husbandry, fisheries, ethno-botany and agro-biodiversity, weather forecasting, food product development, agro-animal based yarns/natural dyes and weaves, and low cost housing materials. An effort has also been made to provide additional information like scientific/botanical names, common names in different languages, short description of its use and geographical indicators of the plant species being used in ITKs. The document acknowledges the sources of ITKs and the references and the literature cited have been attempted to record.

PREFACE

The Mission Unit is indebted to Dr R. S. Paroda, former Secretary, DARE and Director General, ICAR for providing guidance and support for developing the project proposal. The Mission Unit expresses its gratitude to Dr Panjab Singh, Secretary, DARE and Director General, ICAR, New Delhi for his interest in the project, support and encouragement. The guidance received from Dr A. Alam, Dy. Director General (Agri. Engg.) and Chairman, ITK Information Committee and all the members of the Committee is highly acknowledged. We are thankful to Dr P. L. Gautam, former National Director; and Dr K. P. Agrawal, National Coordinator (MM) of NATP for providing constant support and encouragement. We acknowledge all the communicators, authors, and all those who were consulted while compiling the present volume.

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(P. DAS)
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Introduction

The advent of the concept of sustainable agriculture in late eighties in Indian agricultural scenario has evoked interest on indigenous technical knowledge (ITK) that has the element of use of natural products to solve the problems pertaining to agriculture and allied activities. Indian farmers, over centuries, have learnt to grow food and to survive in difficult environments, where the rich tradition of ITK has been interwoven with the agricultural practices followed by them.

India, a country spreading over 3287.26 thousand sq. km. and inhabited by about 1000 million people has been nurturing a tradition of very rich civilization over a period of five thousand years. India's ancient scriptures consisting of 4 Vedas, 108 Upanishads, 2 epics, Bhagwad Gita, Brahmasutras, 18 Purana, Manu Smriti, Kautilya Shashtra and Smritis as well as the teachings of innumerable sayings, proverbs and sages contain profound literature of ideas, concepts and practices which are designed to address the process of building harmonious relationship among man, animal and nature. The enhancement of the quality of life of the Indians who in great majority live in and depend on agricultural production systems would be impossible by keeping this rich tradition of ITK aside. The special features of indigenous knowledge are (World Bank, 1998):

- **local** in that it is rooted in a particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities. Separating the technical from the non-technical, the rational from the non-rational could be problematic. Therefore, when transferred to other places, there is a potential risk of dislocating indigenous knowledge.
- **tacit** knowledge and, therefore, not easily codifiable
- **transmitted** orally, or through imitation and demonstration. Codifying it may lead to the loss of some of its properties.
- **experiential rather than theoretical knowledge.** Experience and trial and error, tested in the rigorous laboratory of survival of local communities constantly reinforce indigenous knowledge.
- **learned through repetition**, which is a defining characteristic of tradition even when new knowledge is added. Repetition aids in the retention and reinforcement of indigenous knowledge.
- **Constantly changing**, being produced as well as reproduced, discovered as well as lost; though it is often perceived by external observers as being somewhat static.

The term indigenous knowledge has been defined as Indigenous Knowledge refers to the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area (Gremier, Louise 1998). Indigenous Knowledge

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is the local knowledge - knowledge that is unique to a given culture or society. IK contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision in agriculture, health care, food preparation, education, natural resource management, and a host of their activities in rural communities (Warren, 1991). Indigenous knowledge is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic, and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Flavier et al. 1995). The term indigenous technical knowledge is often camouflaged with the belief that is associated with forthcoming happenings and the innovations made by the farmers to solve specific problems. Some of the related terms are:

Indigenous Knowledge (IK): is the participants' knowledge of their temporal and social space. Indigenous knowledge as such refers not only to knowledge of indigenous peoples, but to that of any other defined community.

Indigenous knowledge system (IKS): delineates a cognitive structure in which theories and perceptions of nature and culture are conceptualized. Thus it includes definitions, classifications and concepts of the physical, natural, social, economic and ideational environments. The dynamics of IKS takes place on two different levels, the cognitive and the empirical. On the empirical level, IKS are visible in institutions, artifacts and technologies.

Indigenous Technical Knowledge (ITK): is specifically concerned with actual application of the thinking of the local people in various operations of agriculture and allied areas.

Belief: change in behaviour of insects, animals and vegetation indicating a forthcoming event without any scientific rational but could be true in happening.

Innovation: outside the arena of ITK, but scientifically based development of practices using the locally available resources to solve specific problems.

Bisht and Bhatt (2001) drew differences between Iraditional knowledge system and western scientific system as indicated below.

Traditional knowledge system	Western scientific system
1	2
All parts of the natural world are regarded as animate, all life forms as interdependent	Human life is generally regarded as superior, with a moral right to control other life forms
Knowledge is transmitted largely through oral media.	Knowledge is transmitted largely through the written word
Knowledge is developed and acquired through observation and practical experience	Knowledge is generally learned in a situation, which is remote from its applied context

1	2
Knowledge is holistic, intuitive, qualitative and practical	Knowledge is essentially reductionist, quantitative, analytical and theoretical.
Knowledge is generated by resource users in a diachronic (long term) time scale	Knowledge is generated largely by specialist researchers on a synchronic (short term) time scale
The nature and status of particular knowledge is influenced by socio cultural factors such as spiritual beliefs, and is communally held	The nature and status of particular knowledge is influenced by peer review, and is held by individual specialists
Explanations behind perceived phenomena are often spiritually based on subjective	Explanation behind perceived phenomena are essentially rational and objective
Knowledge is used to make suitable decisions under variable conditions	Knowledge is used to put forward hypothesis and to verify underlying laws and constants

Since, information on ITK are seldom documented, it often happens that such information are lost, if not passed on from generation to generation or protected and practiced by the local people. Hence, in today's concept of IPR regime, it is all the more imperative to document and protect our valuable ITK for posterity. In the context of agricultural sustainability, ITK is also required to be properly documented for the benefit of researchers, planners and development officials. Validation of ITK is a logical step to qualify and quantify effectiveness of the practices. Suitable modifications of the local practices, through research and development will help to develop appropriate and acceptable technologies that are more suited to our farming situations. Considering this, a Mission Mode project on Collection, Documentation and Validation of Indigenous Technical Knowledge has been launched in 2000 by Indian Council of Agricultural Research (ICAR) under the National Agricultural Technology Project (NATP) with the following objectives:

- Identify, collect, classify and document ITK and its variants in different agro-climatic regions in respect of production systems, farming systems and situations;
- Catalogue and characterize the information for developing a data base;
- Ascertain the propensity of the extent and level of use of various ITK by the farmers in the management of various farming systems;
- Validation of ITK through a quick screening method and through formal experimentation, wherever needed; and
- Evolve a mechanism to protect property rights and facilitate the process of sharing the benefit by the farming community.

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For the purpose of documentation information on ITK were collected from various literatures which are available in different forms, and through voluntary disclosure by the users of ITK or through facilitators. The information collected from the literature have been put together in the form of Document 1. It is understood that the publication have not been able to cover all the published information. Needless to mention that such efforts are to be made on continuous basis.

The information on ITK have been presented theme-wise in different chapters of the present document.

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Rain Water Management

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Summer ploughing for moisture conservation	Off season ploughing during February - March (before onset of monsoon) is carried out by the farmers with <i>baliram</i> plough up to 20 to 30 cm deep and 20 to 30 cm wide. This practice helps in conserving soil moisture, minimizing the soil loss and weed and pest populations (Nanaj, North Sholapur, Maharashtra).	Anonymous (2000d)
2	Harrowing for soil and moisture conservation	Harrowing with bullock-drawn harrow is done in ploughed lands after loosening of clods. The depth of the harrowing varies from 8 to 10 cm with width of 60 to 75 cm. This practice helps to remove weeds, attain proper seed bed condition and also conserve rain water in soil (Sholapur, Maharashtra).	Anonymous (2000d)
3	Tillage across the slopes to reduce runoff	The farmers in Bijapur and Bhagalkot of Karnataka do ploughing as part of land preparation activity across the slopes to form preparation activity across the slopes to form miniature barrier for reducing the velocity of runoff water. It provides more opportunity time for rainwater to infiltrate into the vertisols. Above 28–30% increase yield of <i>rabi</i> sorghum and sunflower was observed by the farmers as compared to cultivation along the slopes (Bijapur and Bhagalkot, Karnataka).	Anonymous (1999b)
4	Submergence bundh for run off harvesting	In this system water is impounded in heavy black soils by constructing big dykes at lower elements of the slope. The soils are generally medium to deep with 1 to 3% slope. The height of the dyke could be 2 to 5 m with 10 to 12 m base and 1.5 to 2.0 m top dimension, slope being 1.5:1. These bunds could be 2 to 3 m long and at 2 to 4 m vertical interval. These will help in ground water recharge. Such a system is called <i>haveli</i> or bundh. These bundhs are put to permanent vegetation like <i>Acacia nilotica</i> (Madhya Pradesh, Uttar Pradesh).	Dhruvanarayana (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	A run off farming by <i>Khadin</i> practice	Khadin is a unique land - use system developed centuries ago by the farmers of West Rajasthan, where rocky catchment and valley points occur in proximity. The harvested water stands in the Khadins throughout the monsoon season and crops such as wheat, chickpea, rapeseed and mustard are sown by the first week of November after the water recedes. Any surplus water is discharged through sluice before sowing. Soil moisture and fertility are well maintained in khadin by deposition of fine sediment as a result of earthen bund and crops mature without irrigation. The depth of water trapped in Khadin varies from 50 to 125 cm depending upon the catchment characteristics, rainfall pattern and storage capacity of Khadin bed (Jaisalmer, Rajasthan).	Singh and Khan (1999)
6	<i>Ad-Bandh</i> for rain water harvesting	This is a method of rainwater harvesting in the arable black soils of Gujarat. In slopes of 1.0 to 2.0 %, the runoff water moves as a sheet. It is collected at the lower reaches with the help of a bund with wasteweiir/spill way. The spread of water is very large, the depth of submergence varying from a few cm to even 1.0 to 2.0 m. As the water recedes cropping is introduced. In a way it is recession cropping starting with sorghum, pearl millet, short pulses, cotton, sunflower, mustard, chickpea and finally wheat (Gujarat).	Singh and Khan (1999)
7	<i>Khatiri</i> : A water harvesting structure	The <i>Khatiri</i> is generally located at the foot hills, made up of hard and strong <i>supada</i> (cutstone). It is constructed by digging a horizontal tunnel of 3–4 m length, followed by a vertical basin at the inner end. The tunnel is provided with steps going down the basin. On a particular hill <i>Khatiri</i> can be dug at different points but at the same level. The basic purpose is not to harvest the surface run-off but the rain water that flows through the rocks and soils of hilly regions. Rain water seeps in to the <i>Khatiri</i> through mountain slopes. Good quality of water is collected in the basin, as the water filters down through the sand stone into the <i>Khatiri</i> . The capacity of the <i>Khatiri</i> varies between 30,000 to 50,000 litres. It is used for storing drinking water (Kangra, Himachal Pradesh).	Chandan (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
8	Rela farming, a traditional irrigation system	This is a diversion system in a situation where a potential arable area lies adjacent to an ephemeral stream. But if the banks are on higher elevation with respect to flow level, a more intricate dam needs to be built to first raise the water level and subsequently divert it to get spread the ephemeral stream flow of rainy season (kharif) on to the adjoining fields. This kind of diversion is practiced in Sanchor Tehsil of Jalore district in West Rajasthan. It is called Rela farming. The prerequisites for the success of Rela farming are: (i) the stream bed should not be sandy and (ii) stream must be in a spate with the monsoon rains (Rajasthan).	Khan (1997)
9	Hill-side conduit systems to channelize runoff water	In arid Rajasthan, stone wall conduits are built to collect and channelize the runoff water. The runoff would be in sheets over a catchment of sloping surface. Then it would get dispersed and infiltrate and lost before reaching the agricultural fields. In Jodhpur district of West Rajasthan under such conditions, farmers build numerous conduit channels to concentrate and channelize the runoff water. This helps in increasing the velocity of the runoff and reduce transit loss. The conduits are of either stone walls or ditches. In the submountain/mountainous region of North-Western Himalayas (Jammu & Kashmir, Himachal Pradesh, North-Western Uttar Pradesh) similar conduit formations would be seen as Gools or Kuhls. These are narrow channels connected to the naturally occurring springs located on higher elevations. The inflow varies with the season, being more in the rainy season. The transmission losses are also heavy (Rajasthan).	Kolarkar and Singh (1990)
10	Tobas : Water harvesting for grazing land	The pastoralists based on their centuries of experience developed a unique method of water harvesting for most effective utilization of their grazing lands and also for ensuring their survival and growth during successive years. With the commencement of rains the population is divided into different caste groups and dispersed to their tobas (small dug out ponds) along with their livestock. The tobas are situated within the confines of the village boundaries but outside the settlement. If water in one toba is exhausted, its users are not allowed to come back to the village. They had to make use of another toba	Malhotra (1988)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		where water and fodder might still be available. These groups have a convention allowing the facility of using water and grazing resources to the neighbouring groups, if available. When water in all tobas is exhausted, the entire population, along with their stocks return to the village proper and are allowed to use the water in the village tank and lush growth of grasses around the village is created. Severe penalties are imposed on grazers for violation of regulation designed to control grazing and water use from tobas (Rajasthan).	
11	Conservation ditches	The ditches are something like inverted contour bunds. They are constructed between fields of farmers of the Vidarbha region in deep black soils of medium to high rainfall region. These ditches are maintained by the adjoining farmers in alternate years by a mutual agreement. These ditches not only collect runoff but also some sediment (up to 1.0 to 1.5 tonnes/ha). The water stored in these ditches is primarily used by livestock and/or spraying (Maharashtra).	Patnaik et al. (1987)
12	Traditional earthen bunding	Earthen bunding is done during the off-season. In bunding for arresting Anantapur region, bunds of 0.3 m cross section run off water are made. In many places bunds are covered with local grasses, legume and vegetables of cucurbitacea family which strengthen and stabilize the bunds. In some places diversion channels are made for safe channelizing the water to nearby ponds. This practice is useful to conserve the soil and also for runoff water management. It is useful in areas having slope up to 5% (Anantapur, Hyderabad, Warangal, Andhra Pradesh).	Anonymous (1999a)
13	Using murram for soil and water conservation	The farmers in this region use murram for bund formation for preparation of bund instead of soil in medium to deep black soils. This practice helps to avoid frequent breaches as in case of earthen bunds. The top fertile soil which is otherwise used for construction of the bund is not disturbed in this practice (Bijapur and Bhagalkot, Karnataka).	Anonymous (1999b)

RAIN WATER MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
14	Stone waste weir for safe disposal of surplus water	The farmers in the Patkul, Pennur and Solapur of Maharashtra construct the wasteweirs with stones by using manual labour with locally available stones. Dimensions of the wastewear varies from field to field. It involves putting the stone in the gully across the slope to enable safe disposal of runoff water. It prevents soil loss and improve crop yields by moisture conservation (Patkul, Pennur and Solapur, Maharashtra).	Anonymous (2000d)
15	Strengthening of bunds by rowing crops	A mixture of Kodra (<i>Paspalum scorbiculatum</i>), Nagli (<i>Eleusina coracana</i>) and Bhindi (<i>Hibiscus cannalinus</i>) seeds are broadcasted on the bunds for soil conservation (Kapadwanj, Dehgam and Thasara, Gujarat).	Patel (1993h)
16	Traditional tillage practices for in-situ moisture conservation	The important practices for in-situ conservation of moisture used by the farmers before seeding rainy season (kharif) crops are: (i) deep tillage deep ploughing during summer in black soils of Maharashtra for effective trapping of early showers, (ii) shallow tillage during pre - monsoon period with blade harrow in red soils of Andhra Pradesh for breaking surface crust and trapping subsequent rainfall (iii) short-term fallowing during early part of the rainy season (Anantapur and Bangalore) for conservation of early rains, (iv) furrowing as a part of seeding operation in castor and sorghum in red soils of Ranga Reddy of Andhra Pradesh, (v) cross ploughing in standing crop of castor, (vi) frequent shallow interculture operation in groundnut in Anantapur and for castor in Ranga Reddy (Andhra Pradesh) and (7) tie ridging as a part of interculture operation in maize and pigeonpea (Andhra Pradesh and Karnataka).	Subba Reddy and Singh (2001)
17	Vegetative barriers for soil and water conservation	The use of vegetation to moderate erosivity of rainfall both in natural stream and also in slopy arable fields is an age old practice in rainfed agriculture. The farmers in Shekhavati region of Rajasthan, North Gujarat semi-arid region and South Karnataka plant <i>Saccharum munja</i> , <i>Euphorbia caducifolia</i> and <i>Nasehallu Pennisetum honekeri</i> , respectively along the field boundaries to reduce the runoff and soil loss. In Kandi area, plant species of Spurs (<i>Ipomea imperata</i> , <i>Vitex negundo</i> , <i>Arundo donex</i>) are planted	Venkateswarlu (2000)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
		along the field boundaries. Thus a vegetative barrier used by the farming community are highly location-specific in terms of establishment and further use beside conservation measures. In Shekavati region of Rajasthan, S.munja is used for planting on bigger bunds, 1 m high or more to stabilize them as they are sandy soils. Choues and spurs plant species are used for effective conservation of moisture in soil (Rajasthan, Gujarat, Karnataka and Punjab).	
18	Application of groundnut shell to conserve moisture	Leftover groundnut shells, after decortication of pods, are uniformly spread and incorporated @2–3 tonnes/ha at the time of preparatory cultivation. This is usually practiced by big farmers. This is done in rotation, part of the land area is covered in one year and the rest in subsequent years depending upon the availability of shell. This practice is also used in orchards to reduce the evaporation losses (Anantapur, Andhra Pradesh).	Anonymous (1999a)
19	Use of finger millet husk as mulch	Fingermillet husk used as mulch is less affected by termites, checks evaporation and weed growth. Termites fail to get a foot hold and hence their incidence is reduced (Karnataka).	Anonymous (1999c)
20	Pebble mulching to control runoff	A uniform layer of pebble is spread on the surface of the red soil to reduce the evaporation losses. This practice also helps to control the runoff and reduce the formation of gullies in the field. The yield of the crops can be increased by 75–80% (Bijapur and Bhagalkot, Karnataka).	Anonymous (1996b)
21	Use of dry leaves for mulching in cardamom	Mulching with dry leaves in cardamom helps in retaining moisture in soil by reducing evaporation and to check weeds and coceal capsule from vertibrate pests (Karnataka).	Anonymous (1999c)
22	Use of tree needles and grasses for mulching for conservation of soil moisture	Covering the soil surface with Chilgoza tree needles and grass from the Kandas (hill top) not only conserves soil moisture but also helps in moderation of soil temperature. In this way, hydrothermal regime of the soil is improved (Kinnaur, Himachal Pradesh).	Verma (1998)

RAIN WATER MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
23	Zabo system of rice cultivation	It is indigenous method of water harvesting used by the farmers in Nagaland (Phek District). Zabo means impounding of water. It is an excellent system of rain water harvesting. It is generally practiced in holdings of 2.0 to 2.5 ha. The catchment area is under permanent vegetation. Water body is 0.2 ha area pond of 1.5 to 2.5 m depth (shallow) located below the catchment area with a suitable silt trap. The bottom and sides of the pond are rammed and compacted to reduce seepage losses. The water so stored is let into the rice fields located in the lower elements of the slope. This area would be 0.2 to 0.8 ha (Nagaland).	Prasad and Sharma (1994)
24	Planting of banana to protect young coconut plant from wind erosion	Tank silt and farm yard manure are used to improve the soil fertility. Very young seedlings, less than six- months-old, with 2 leaves are transplanted. Vertical and lateral bore holes are made in the wells for managing water under drought. Efficient soil and water management practices are followed in these soils. Farmers also plant two banana suckers next to each coconut seedling to provide shade and protection from the wind (Chidambaranar, Tamil Nadu).	Manoharan and Kombairaju (1995)
25	Intercropping as vegetative barrier	It is widely practiced by the farmers in Anantapur during rainy season (kharif) in red soils. Pulses are mixed with pigeonpea and are intercropped with groundnut in 20:1 or 40:1 ratio. Because of spreading nature and close growing habit of groundnut, this practice covers the ground quickly and completely. It reduces the splashing effect of raindrops by acting as a vegetative cover (Anantapur, Andhra Pradesh).	Anonymous (1999a)
26	Curved land ploughing for soil conservation and water retention	Ploughing sloppy lands in a sword like pattern from the bottom to the top ensures proper land preparation which includes proper ploughing of the corners which otherwise would have remained unploughed. This practice helps in soil conservation by checking the loosened soil strata falling from the upper side to the lower and is useful in maintaining infiltration rate of water which otherwise gets wasted with sudden runoff (Cold deserts of Western Himalayas).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
27	Set row planting for better plant growth	Set row planting and wide row spacing of 90 cm is a traditional practice followed by the farmers in rainfed black soils of Saurashtra region. Farmers have adopted the practice of planting groundnut year after year in same furrows. This practice is useful for conservation of rainwater and also improves the fertility of soil (Gujarat).	Lakshmana (2000)
28	Cover cropping to control soil loss	Majority of the farmers in Madhubavi and Bijapur of Karnataka whose fields are nearer to the city are growing cucumber, ridge gourd, bitter gourd and greengram which act as cover crops in rainy season (kharif). The farmers incorporate the biomass of cover crops after harvest and take up rabi crops like chickpea and safflower. The cover crops cover the ground quickly because of spreading nature and close canopy. This reduces the splashing effect of rain and is useful as a barrier to reduce the runoff (Madhubani and Bijapur, Karnataka).	Anonymous (1999b)
29	Intercropping of maize and groundnut for rain water conservation	Sowing of two lines of maize after every four lines of groundnut is practised by the farmers. The furrows made after harvesting of maize are used to collect rainwater. It is sprinkled on the adjoining four lines of groundnut. Farmers felt that this practice also facilitates the easy harvesting of groundnut (Gujarat).	Lakshmana (2000)
30	Ownership of plots in different pockets for risk distribution	Farmers in rainfed areas prefer to own the land in different pockets which may vary in soil depth, topographical features, access to runoff water etc. Owning fields in uplands and lowlands (as in Eastern states), in shallow and deep black soils (as in Central states), in catchment and command areas of the tanks (as in Southern states) are some of the typical examples to illustrate this point. In most of these cases, the same risk factor (eg. drought or excess rainfall) does not affect all types of fields in the same manner (All rainfed states).	Sanghi (1993)
31	Kuhl water for running water mills	In cold desert of Himachal Pradesh kuhls (water channels) are built along the hill gradient for maintaining proper gravity for irrigation. Kuhls are also used for running wheat flour mills. The wooden channels are generally made by making notches at the natural water sources and the water is diverted to the water mill, using natural gravitational flow of	Verma (1998)

RAIN WATER MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
		water. Granite stone are used for grinding food grains. Long wooden channel placed at steep gradient is used for maintaining the high speed of the water flow required for running the wheel of the water mill (North Eastern Region).	
32	Irrigation method for use of Khul water	Khuls are time tested community made water channels for sharing the glacial water for ensuring out percent irrigation. The fields are generally divided into small compartments by making earthen bunds to allow water to stand in the field for a longer duration for saturating the soil. At the first turn of irrigation first compartment is irrigated followed by second and so on. On the second turn of irrigation, these compartments are irrigated in reverse order. The management of water in a particular field is regulated by apportioning into different compartments. The mouth of the first compartment is closed to regulate the flow of water towards the second compartment (Upper Kinnaur, North West Himalayas).	Verma (1998)
33	Construction of Kuhls (water channels) for irrigation	It is one of the common ways to channelize water to a crop from a water channel of the river up to some distance of upstream and led along a contour so that it can flow to the fields by gravity. In dry temperate zones kuhls (wooden water channels) are made by making notches at the natural water sources and water is diverted to the fields to different terraces using natural gravitational flow of water. In lower areas of Himachal Pradesh, bamboo pipes are commonly used as irrigation channels on small depressions/small nala. In upper Kinnaur, khuls are simply dug in ground to regulate the flow of water (Himachal Pradesh).	Verma (1998)
34	Dividing the fields into sub-plots for irrigation water management	Fields are divided into smaller sub-plots for irrigation, otherwise land being sandy, water percolates immediately through one large plot. To stop water, sub-plots are made on slopping land. The same practice is also observed during vegetable cultivation in the Spiti valley (Spiti and Kinnaur of Himachal Pradesh).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
35	Use of Pang (Spang) grass for controlling seepage and side losses in water tanks and irrigation Kuhls	Pang (Spang) grass is used as inner laying of Zings (water ponds) and irrigation kuhls for checking percolation losses owing to its non-permeability properties similar to that of polythene sheet or cement lining (Ladakh, Jammu and Kashmir).	Verma (1998)
36	Pitcher irrigation for establishment of seedlings	It is a technique of water management, wherein earthen pitchers with holes on one side are embedded near the rootzone of newly planted seedlings to provide it with the required amount of water in a steady way. This technique prevents the loss of water due to evaporation or seepage and helps in better plant stand. Some farmers bury bushes in a chess board pattern to protect the melon plants from getting buried by shifting sands in arid Rajasthan (Rajasthan and Andhra Pradesh).	Subba Reddy and Singh (2001)
37	Nadi (village pond) for water harvesting	Nadi (village pond) is constructed for storing water available from adjoining natural catchments during the rainy rainy season (kharif). It is the oldest practice practiced by the farming community as a common source of water harvesting. The capacity of Nadis generally ranges between 1200 to 1500 m ³ depending upon physiographic conditions and rainfall pattern. This nadi improves the ground water table. The tank bed of the nadi is used for sowing of crops later when the water recedes. This system is implemented in three phases—(i) digging and spreading the soil in phased manner, (ii) digging the basement at the mouth of the nalah and (iii) construction of Pucca wall on nala for removal of excess water. This system is useful for providing life-saving irrigation for rainy season (kharif) crops or pre-sowing irrigation to winter season (rabi) crops (Rajasthan).	Singh and Khan (1999)
38	Indicators of irrigation requirement	(i) A thin bamboo stick is placed vertically in standing crop. If it does not fall, it indicates that the crop is severely in need of irrigation. (ii) If there is a crack in land and curling and tubular folding leaves occurs it indicates that crop needs irrigation. (iii) If plants start wilting and leaves yellowish in colour the crop needs irrigation (Himachal Pradesh).	Verma (1998)

RAIN WATER MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
39	Moisture measurement with Belcha (spade)	Optimum irrigation is regulated by farmers of Ladakh by inserting a belcha (spade) in the soil. If it is completely inserted (front portion), the land is considered to be properly irrigated. Similarly, in few other cases, mud is thrown in the air. Its splitting into pieces shows proper irrigation. Complete insertion of the front portion of belcha (spade) or throughing of mud in the air and its consequent splitting into pieces indicate the soil-moisture level at field capacity (Ladakh, Jammu and Kashmir).	Verma (1998)
40	Methods of in situ moisture conservation and run-off management	Different indigenous technologies such as mulching in turmeric before planting, summer ploughing, construction of brush wood structures, ploughing across the slope, sowing the seeds along the furrows, sowing the seeds behind the plough and planting the seedlings along the ridges were found to be effective in Kandhamal district of Orissa.	Subudhi and Mishra (2002)
41	Vetiver grass for controlling soil erosion	Vetiver grass are used for several centuries as a medicinal plant and as a source of essential oils for scenting perfumes and soaps. Vetiver grass also was known to be useful in strengthening the banks of ponds, rivers, canals, and rice paddies. A vetiver grass hedge is permanent enough that it can be used as a legal boundary marker in some places. The spread of the use of vetiver hedges with contour farming is relatively recent (Lowlands in North of Delhi).	Puffer, Paula (1994)

Methods to Check Soil and Water Erosion

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Bench terracing for rain water management	The terraces are constructed across the slopes (along the contour). The size of the terrace is decided by the prevailing degree of slope and are supported by risers of suitable height and width. The risers are sometimes made up of loose boulders supported by grasses which provide strength to the risers owing to the binding action of the roots. The roots of grasses help to drain excess water. Usually farmers keep the risers towards inner slopes, whereas in paddy growing areas they are erected to facilitate the ponding of water in the field. The bunds are used for growing palatable grasses for livestock and trees such as bael, shisham, mango etc are raised for fuel, fodder and fibre. Sometimes on the risers khus grass is also established. In lower regions the terraces are known as khet (Hilly areas of Western Himalayas).	Verma (1998)
2	Grassed water ways to avoid water logging in terrace farming	It is a common practice during preparation of a field, the slope is kept inside which is provided with channel to take excess water from the field to a safer place and dispose to stream or nala through grassed water ways. This grassed water ways are positioned in such a way that they don't hinder any agricultural activity such as ploughing, hoeing and harvesting. This practice helps to avoid waterlogging during torrential rains which is a requirement for growing maize, capsicum and tomato in rainy season (Upper North West Himalayas).	Verma (1998)
3	Interplot stone bunding for soil conservation	Cultivation of sloppy lands is done by constructing terraces comprising of plots and sub-plots by using small stones. Stone wall fencing is also constructed for individual land holdings. Terracing of sloppy lands helps in conserving soil and moisture and prevents soil erosion. This also helps to carry out other field operations including proper use of irrigation water for checking the surface runoff (cold deserts of Western Himalayas).	Verma (1998)

METHODS TO CHECK SOIL AND WATER EROSION

S. No.	Title of ITK	Details of ITK and rationale	Reference
4	Vegetative barriers for control of sheet erosion	Fibrous rooted shrubs and grasses are planted as hedges along the contour of the land to slow the runoff,weaken the erosion power of water and result in deposit of its load of valuable soil behind the hedge rows. As a result, the run off proceeds gently down the slope where hedges have been planted at the correct vertical interval without erosive effect, thus reducing the sheet erosion. In the foot hills, erosive capacity of stream flow is reduced by spurs of loose boulders (Forest areas of the West Himalaya region).	Verma (1998)
5	Ash for softening of hard soils	Upper layers of hard soils are softened by putting ash obtained from cowdung, sheep/goat manure, fuelwood etc. The fertility status of the soil is also improved (Nubra Valley, Himachal Pradesh).	Verma (1998)
6	Sand bags for gully check	This is done in off season before the onset of monsoon in red soils of Anantapur. Empty fertilizer and cement bags filled with sand are piled one above other in five rows fitting to the gully width. Whenever the sand bags are damaged they are replaced. This practice is done by the community, for runoff management and gully control. Gully has a capacity of water storage of 1.5 m ³ /gully width of 5metres in a single rainfall event (Anantapur, Andhra Pradesh).	Anonymous (1999a)
7	Methods for control of gully erosion	Gully erosion control is done in a 3-tier-system, where the first check is attempted by vegetative (Ipomea sp.) barrier across the gully. The second and third tier is done by bamboo structure and loose boulders (Lower areas of Western Himalayas).	Verma (1998)
8	Palm leaf for removing salinity	Palm leaves are incorporated in the field and kept bare for 60 to 70 days. Later the farm is ploughed. Palm leaves absorb salts from soil and thus facilitate soil reclamation (Pondicherry).	Pillai (2000-2001)
9	Loose boulders for soil and water conservation	Use of loose boulder spurs in small nalla is made for reducing the cutting effect of steam flow.Loose boulders are also used in construction of dams across the streams with spil way in the center (Lower areas of Himachal Pradesh).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
10	Conserving top soil by autumn irrigation	The practice of irrigating fields in autumn to prevent the top layers being eroded in West Himalayan cold deserts. It also eases ploughing in the spring by keeping the soil moist. This technique helps in timely ploughing and meeting the requirements of short growing season. The moist upper layer of soil which gets frozen in winter also serves as protection against wind erosion (Cold deserts of Western Himalayas).	Verma (1998)

Tillage and Intercultural Management

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Ploughing in standing maize for better stand establishment	The inter spaces standing maize fields in Mandi area of Himachal Pradesh are ploughed, when it has attained a height of 15 to 30 cm for weed control. Ploughing strengthens the root system of the maize crop by loosening the soil which enhances aeration and water infiltration. It also helps in thinning of densely cropped maize. The farmers also take up gap filling during this operation. The whole process is known as halod by the local farmers (Mandi, Himachal Pradesh).	Verma (1998)
2	Minimum tillage for rabi crops after rainy season (kharif) fallowing	In Lahaul area wheat and barely are sown directly after single ploughing. No second ploughing is undertaken. Lands are kept fallow in rotation. Minimum tillage ensures least disturbance to the soil thereby reducing soil loss by surface runoff. The nutrient losses are also curtailed. Consequently soil water holding capacity, chemical properties, nutrient availability, microbial population are improved (Lahaul valley, Himachal Pradesh).	Verma (1998)
3	Summer ploughing in groundnut	Farmers plough their groundnut fields immediately, after the monsoon crop and keep the furrows exposed till the onset of next monsoons. They believe that fine soil and dust deposited on the furrows by wind during summer benefits the groundnut being planted in a next season in same furrows (Gujarat).	Lakshmana (2000)
4	Land preparation for groundnut cultivation	Farmers plough their groundnut fields immediately after the monsoon crop and keep the furrows exposed till the fine soil and dust deposited on the furrows by the wind during summer benefits the groundnut being planted in the following season in the same furrows. Sometimes farmers incorporate small pieces of bricks in the soil as an alternative to trap wind-borne soil. There, the farmers expected chickpea residue to move with the wind and get deposited in the open furrows (Amreli, Gujarat).	Desai (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	Mahuda to facilitate land preparation	Turmeric and ginger, grown in winter require fertile and well-drained soil. To make preparation of the heavy soil easier, farmers spread leaves and twigs of Mahuda (<i>Madhuca indica</i>) over field and burn them. The fields are then tilled and irrigated before sowing. This practice has existed for at least 25 to 30 years. Farmers use Khakhra (<i>Butea monosperma</i>) leaves along with mahuda for improving soil texture (Rena, Punchmahal, Gujarat).	Sartanbhai (1993)
6	Soil management through cultural practices	In West Himalayan region in March/April when snow melts and weather condition improves the bunds and corners of the fields are dug out and weeds and grasses are removed with the help of spade and clods are beaten to separate the soil which is collected in lower fields and thereby, improving the fertility of soil. This practice enables not only better weed control but also does not waste the area under cultivated crops (West Himalayan region).	Verma (1998)
7	Management of direct seeded rice	Direct dry sown paddy crop is ploughed in standing water at 25 to 30 days after sowing. After receipt of heavy rainfall or impounding water in the fields, this operation is performed. After ploughing, the planking is done invariably except in very heavy soils. Due to non-availability of effective and cheap chemicals weed control, the practice has found place in cultivation. The weeds get ploughed in and standing water help in their rotting. Though not clean control but suppression effect (Himachal Pradesh).	Singh et al. (1996)
8	Halod or bushening in standing paddy	Halod or bushening is a practice of ploughing in dry sown paddy in standing water at 25 to 30 days after sowing. This is useful to suppress the weeds and thinning the excessive plant population. Thus the weeds and excess rice seedlings get incorporated into the soil leading in way to green manuring (Hilly areas of Himachal Pradesh, Ranchi of Jharkhand).	Singh (2000)
9	Shallow ploughing in standing pearl millet	Farmers in Rajasthan do shallow ploughing in standing pearl millet around 45 days after sowing to uproot the excess plants and to enhance the tillering. Similar practice is also done in Tamil Nadu for finger millet grown under rainfed conditions (Rajasthan and Tamil Nadu).	Subba Reddy and Singh (2001)

TILLAGE AND INTERCULTURAL MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
10	Mixing of sand with seeds for uniform plant stands	The farmers in Southern parts of Andhra Pradesh usually mix sand with small seeded crops like sesamum and tobacco (50:50), while sowing for getting uniform plant stands in alluvial soils (Andhra Pradesh).	Subba Reddy and Singh (2001)

Crops and Cropping Systems

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Reducing plot size for efficient water management in carrot	Mr. Umedbhai Patel altered the carrot planting method for increasing yield. Generally, in North Gujarat, the size of the plots is large (20'-30' × 6'-8'). He says that root crops like carrot require soft and loose soil. And large plots retain larger quantity of water that compacts and hardens the soil. So he experimented with deep tillage in small plots (10'×3') in his field based on its slope and ensured that soil did not harden due to irrigation. Also, the greater number of bunds thus created in the field made the soil soft and conducive to root growth. Small plots also helped in reducing the requirement of irrigation water. Umedbhai's production went up from 2500 to 3000 kg/ha to 3500 to 4000 kg/ha because of this practice. The quality of carrots also improved with increase in girth and length (Mahesana, Gujarat).	Patel (1997)
2	Sprinkling honey for better pollination in ridge gourd	Ridge gourd is a cross pollinated crop. Its fruit setting is directly affected by bees and other pollinating insects. Approximately 100 ml of honey is mixed with 10 litres of water and sprinkled over the crop in the evening. This increases the pollination of flowers because of the increased visits by bees and other insects which are attracted by the smell of honey (Jaipur, Rajasthan).	Sharma (1996c)
3	Soil burning (<i>sudu mannu</i>) to raise vegetable nursery	Soil is burnt to reduce damping off of seedlings and the weed population, sterilize soil and to have priming effect (Hilly and Coastal zones of Karnataka).	Anonymous (1999c)
4	<i>Kharif</i> fallowing for assured <i>rabi</i> crop	In black soils of low rainfall regions, where raising of successful crops involves high risk in rainy season (<i>kharif</i>), farmers keep the land fallow during rainy season. This practice, besides conserving moisture for <i>rabi</i> crops is useful to distribute peak demand of labour, draft power, build up native fertility and efficient management of weeds (Western Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka).	Subba Reddy and Singh (2001)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	<i>Kharif</i> fallowing for better <i>rabi</i> crop	The farmers in low rainfall areas keep the land fallow during rainy season (<i>kharif</i>) and <i>rabi</i> crops are taken on receding moisture. This practice reduces the risk, distribution of peak demand of labour and draft power, build up of native fertility and management of weeds. This practice is more prevalent in deep black soils with low rainfall, in regions of Western Maharastra or high rain fall areas of Madhya Pradesh (Maharashtra and Madhya Pradesh).	Sanghi (1993)
6	Testing of viability of seeds	For testing the germination of crop, farmers put the seeds inside the petiole of cucumber leaves and close the cut portion of petiole. After 36 to 48 hr the seeds inside the petiole germinate (Gonda, Uttar Pradesh).	Anonymous (2000c)
7	Hot water for better germination of paddy seeds	Farmers immerse the seeds of paddy in hot water for a day. Soaked seeds are heaped on the ground. The entire heap is covered by neem leaves and small wheat straw for four days. Water is sprinkled frequently over the entire heap during these four days. After four days seeds germinate and are used for sowing in the nursery (Banaskantha, Gujarat).	Anonymous (1991h)
8	Salt water solution for better germination of cumin seed	A coat of salt water is applied to cumin seeds to ensure better germination. About 250 g of salt dissolved in a half litre of water is used for treating 10 kg of cumin seeds. This treatment is also believed to increase yield (Surendranagar, Gujarat).	Sanghani (1997)
9	Improving germination of finger millet	Goat penning practice is followed soon after sowing of finger millet on land ploughed across the slope in Dongar (Orissa).	Parasar (1994)
10	Soaking of paddy to remove chaff of paddy seed	Soaking of paddy seeds is done when the chaff float on the surface of water. Water is drained and the seeds are taken in a gunny bag and the mouth of the gunny bag is covered by paddy straw for free flow of air inside. This is kept overnight to be broadcasted in the nursery fields on next morning (Irulas Nilgiris, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
11	Lime solution for better germination of groundnut	Seeds of groundnut are smeared with lime solution before sowing. It is believed that it provides the necessary heat for early germination of groundnut seed (Junagarh, Gujarat).	Reddy (1992)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
12	To increase germination of crops	Soaking the seeds overnight in water before sowing improves seed germination and crop stand (Dharwad, Karnataka).	Anonymous (2000b)
13	Determining quantity and uniformity broadcasting of seed	One handful of seed is uniformly broadcast by women of West Himalayan cold desert areas in three to four equal lots. The quantity of seeds is determined by the distance of furrows made during ploughing. For verification of properly spaced broadcasting a handful of soil is picked up at random from any part of the field and if in each pick there are seven seeds it is indicative of proper broadcasting (Himachal Pradesh).	Verma (1998)
14	Removal of chaffy seeds before sowing	Chaffy seeds are removed before sowing by immersing it in water (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
15	Circular/ rectangular sowing for increasing crop yield	Farmers in the hilly areas grow a crop in a circular or rectangular pattern of rows instead of straight line sowing. This method requires more seeds. Farmers believe that this method of sowing gives more yield due to higher plant population (Banaskantha, Gujarat).	Taral (1991)
16	Sowing of whole groundnut pods to facilitate germination after rain	In Saurashtra, land-holdings are generally large because of low value of land and lower population density. A farmer, on an average, cultivates groundnut in about 20 to 30 <i>bighas</i> (about 3 to 5 ha). This requires large quantities of seeds for sowing. It is believed that seeds separated from pods by threshers have low germination rates because threshing damages the embryo. Hence women spend 2 to 3 weeks time manually separating seeds from pods for sowing. In some regions of Jamnagar district, where minor irrigation facility is available, groundnut is grown before the monsoon. Others noted that pods that remain in the soil after harvesting germinated automatically after a shower and accordingly decided to sow whole groundnut pods instead of seeds. After furrows were covered by light planking, the fields were irrigated lightly before the rain (Jamnagar, Gujarat).	Godhani (1995)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
17	Hot water for better germination of wheat and plant protection	Hot water is stored in a vessel with a wide open neck, which is to be left uncovered. In the morning the seeds are soaked for some time before sowing. This ensures that the seeds sprout quickly and also protect the crop from pest attacks (Trichy, Tamil Nadu).	Anonymous (1991f)
18	Coated seed for better germination of pulse crop	To increase the nutrient content, drought tolerant capacity, germination percentage and vigour of pulse seedlings grown after paddy crop in the same field, locally available leaves are used to treat the seeds. Leaves of <i>Calotropis karuvel</i> (<i>Acacia nilotica</i>), <i>pongam</i> (<i>Pongamia pinnata</i>) and neem are crushed and dissolved in water. Pulse seeds are mixed well with the leaf extract. The seeds are kept aside overnight for uniform coating of the extracts on the seeds. Next day the solution is drained and the seeds are dried in sun for two hours. These seeds are then broadcasted in the field (Pondichery).	Babu (2000–2001)
19	Seed soaking in water/kerosene oil for better germination of cotton	Cotton seeds are soaked in water a night before the sowing. The soaked seeds are treated by the soil which is collected from the termite burrow. Some farmers of the arid Banaskantha immerse the seeds in kerosene oil for better germination (Surendranagar, Gujarat).	Anonymous (1991g)
20	Crushing of coriander seeds for better germination	Coriander seeds in Kinnaur of Himachal Pradesh are crushed by trampling upon by leather shoes before sowing for better germination. While the exact use of this technique is a subject for research, it appears that this mechanical exercise exerts just the right pressure to break the hard testa without causing any injury to seed itself thereby facilitating germination (Kinnaur, Himachal Pradesh).	Verma (1998)
21	Soaking of chickpea and wheat seeds for better germination	The chickpea seeds are soaked in the water for a night before sowing where farmers in Western Haryana feel the moisture is limiting for seed germination. The same method is also followed for wheat when sowing is delayed. This practice helps in early germination (Western Haryana).	Khatana (1991)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
22	Crop selection through seed germination test	On the day of the <i>Ugadi</i> festival, farmers in the border area of Karnataka and Tamil Nadu perform <i>pooja</i> (worship) of the plough. This festival is just before the sowing season and during this time, the farmers decide which seeds to sow. Two ploughs are joined together. A packet of arecanut sheath is made by joining them. This packet is filled with soil and manure. Farmers sow five types of cereals and nine types of pulses in this packet. After nine days, the packet is removed and seed germination is observed. Crops of the germinated seeds are selected for sowing in that season (Karnataka, Tamil Nadu).	Prasad (1998)
23	Reducing inbreeding by selection of seeds from different villages	Seeds for future cultivation are collected from selected plots manifesting vigour, early maturity, disease resistance and higher productivity. After three to four years the seed source is shifted to other villages without diluting the selection criteria. This avoids inbreeding (West Himalayan cold deserts, Himachal Pradesh).	Verma (1998)
24	Creation of microenvironments for different crops	Farmers in Gulbarga of Karnataka form small terraces in <i>gullies</i> and water courses with a view to grow crops like paddy during rainy season (<i>kharif</i>) and chickpea in <i>rabi</i> on rainfed lands. In Anantapur, tankbeds are used for cultivation of <i>rabi</i> crops under residual moisture conditions. The farmers cultivate shade crops of castor + chillies, maize+turmeric, maize+soyabean to protect against frost and high temperature. They also burn the waste material near the field to create a smoke cover to minimize the crop losses against frost in mustard in parts of Haryana (Karnataka, Andhra Pradesh, Tamil Nadu).	Sanghi (1993)
25	Cultural practices for minimizing the risk	The farmers in southern Telangana region of Andhra Pradesh sow sorghum in <i>Rohini karthi</i> (onset of monsoon) and practice delayed sowing of castor in <i>Arudra Karthi</i> (first fortnight of July). These practices help to avoid the incidence of the shoot fly and earhead bug in sorghum. Farmers experience vigorous crop growth and good yields of sorghum by sowing with the onset of monsoons. Farmers prefer to sow the castor in <i>Arudra Karthi</i> to reduce the incidence of red hairy caterpillar and semilooper. The farmers of Maharashtra and Andhra Pradesh grow compact block cultivation of the same crop. The	Subba Reddy and Singh (2001)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
		rationale behind this practice is to minimize the risk due to bird damage in sensitive crops like sorghum, maize, pearl millet and sunflower. This practice is very easy and low cost for protecting the grain against birds. In Palampur region of Himachal Pradesh the practice of <i>Sakehar</i> sowing of maize is done by the farming community. This practice involves dry sowing of maize during first fortnight of June to avoid delayed sowing which results in drastic yield reduction. The seeds are sown deeper and planking is done (Andhra Pradesh-Telangana region; Maharashtra, Vidharbha region, Palampur region of Himachal Pradesh).	
26	Enhancing germination of cotton seeds with castor as companion crop	It is generally observed that germination of cotton seeds is poor in saline and heavy black soil. If it rains, after the sowing, the top layer of the soil forms a hard crust which comes in the way of germination. Farmers believe that the seeds do germinate in the soil but fail to emerge through the hardened soil. To overcome this problem, farmers sow one castor seed/hill, while dibbling cotton seeds. Castor germinates more or less simultaneously with cotton. The castor seedlings break through the hard soil crust and make way for the cotton seedlings to sprout. A few days after germination, the castor seedlings are weeded out manually. At the very early stages of growth, the castor seedlings do not affect the growth of the cotton plants (Bhavnagar, Gujarat).	Kanani (1995)
27	Dry seeding of rice	The seeds are drilled sown just like any other dry crop. Seed beds are not prepared, but pre-sowing wetness of one day is normally preferred. The seeds apparently rot if these are put in a seed bed. Sowing is done in August and requires only 4 months to mature. It is believed that cold temperature of December is not conducive. Fertilizer is normally not applied. The variety used is <i>Salubatta</i> or <i>Kempubatta</i> which are as tolerant as finger millet or sorghum to drought. The yield achieved is 1.2 tonnes/ha under best rainfall conditions and with application of manure. The minimum yield would be at least 0.4 tonne/ha, irrespective of the rains and fertilizer application (Chickmagalore, Karnataka).	Subramaniam (1992)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
28	Wet rice cultivation on terraces	Indigenous rice varieties, of long duration (190 to 278 days) with an average of 220 days are grown. Nursery is raised in February and its duration ranges from 60 to 80 days. Beds are prepared wet and sown with dry seeds @75 to 80 kg/ha. Puddling and leveling are done manually with the help of indigenous wooden tools called <i>Sampaya</i> and <i>Mideing Hiita</i> . Single rice seedlings are transplanted at a spacing of 20×25 cm on terraces (Subansiri, Arunachal Pradesh).	Prasad and Sharma (1994)
29	Optimization of maize population by appropriate spacing	Maize is the major crop grown during rainy season. It is recommended to sow maize in lines with 60 cm row to row and 20 cm plant to plant distance. But the farmers sow maize behind plough by <i>Kera</i> method (hand-dropping of seeds behind plough) with row to row distance of 20 cm and dropping the seeds in the furrow at step to step distance. Due to small size of fields in hilly areas, the majority of farmers are using bullocks for ploughing and sowing and practically it is not possible to maintain a row to row distance of 60 cm with bullocks. When seeds are dropped at a step distance (approx. 60 cm) plants/m ² area come to be same as that of recommended practice (Hamirpur, Himachal Pradesh).	Thakur <i>et al.</i> (2000)
30	Protection of groundnut from salty air in coastal region	Some farmers are following the practice of cultivating sorghum and/pearl millet on the border of groundnut field. Purpose seems to be to protect the groundnut crop from the salty air in the coastal areas as wind break (Saurashtra region, Gujarat).	Mane (1992)
31	Deep sowing of maize and planking	In Himachal Pradesh, maize is mostly grown under rainfed conditions. Time of sowing is most critical factor for its productivity. Slight delay results in drastic yield reduction. Last week of May to first fortnight of June is widely acceptable time of maize sowing in hills. Still it depends on the pre-monsoon rains but if it fails by this time, the farmers go for sowing in dry soil having insufficient moisture for germination. The seeds are sown deeper and planking is done. As and when it rains, the seeds germinates (Himachal Pradesh).	Singh <i>et al.</i> (1996)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
32	Broadcasting of seedling	Farmers broadcast the seedlings of the finger millet (<i>Eleusine coracana</i>) crop on well puddled <i>kyari</i> land. Broadcasted seedlings establish in the soil easily (Valsad, Gujarat).	Patel (1992k)
33	Osoconditioning of pea seeds by seeding before snow	In Kannaure, Spiti and higher reaches of Shimla in Himachal Pradesh the garden pea is a significant commercial crop. The crop when sown in October to November, before it snows, shows relatively better/early germination compared with seeds sown in March/April. Sowing in winter allows adequate time for the physiological activities to occur within the seed, resulting in an early crop. The early germination may also be attributed to a better hydrothermal regime during February to March for the crop sown October-November. The additional advantage is that the produce can be transported to the plains to secure excellent economic returns (Kinnaure, Himachal Pradesh).	Verma (1998)
34	Traditional rainfed farming for soil conservation by cultivating close growing crops	The traditional rainfed farming is done irrespective of land with respect to slope and other characteristics. During rainy season there are chances of sheet erosion but with traditional knowledge, crop rotation is adopted in such way that during peak runoff period sowing of close growing crops provide protection to the soil. The crops are chosen as per their nutritive value (protein rich pulses and also coarse grains like <i>Phaphra</i> and <i>Chulai</i>) (Valley regions, western Himalayas).	Verma (1998)
35	Establishment of localized greenhouse conditions in grape cultivation	Grapes are cultivated in the <i>Nubra</i> valley by regulating the temperature of basins using local stone (brick), grasses, warm clothes, gunny bags or wooden baskets. Grapes are grown only in sunny niches. Pits are filled with locally found stone, grasses and soil. The white brick pieces help in warming the otherwise cool sandy soils in the basin. Grape vines are covered with warm clothes or gunny bags or wooden baskets to shield them against the cold and animal attacks especially during the initial two years (Nubra Valley, Himachal Pradesh).	Verma (1998)
36	Plantation of potato crop on sloppy lands	Practice along-the-slope plantation of rainy season (<i>kharif</i>) potato gives more yield in comparison to across-the-slope plantation (Orissa).	Parasar (1994)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
37	<i>Pagadi</i> planting in finger millet	Finger millet seedlings are transplanted at equidistant spacing of 22.5 × 22.5 cm under rainfed conditions to ensure vigorous growth and high yield and also to facilitate intercultivation in both directions, conserve moisture, control weeds and to enhance tillering leading to higher yields, especially during drought years (Karnataka).	Anonymous (1999c)
38	Sowing of <i>rabi</i> sorghum after first three days of <i>Lokhandi Charan</i> of <i>Hasta Nakshatra</i> to avoid seedling damage due to high intensity rain	The recommendation for sowing of <i>rabi</i> sorghum in second fortnight of September. In some areas farmers sow <i>rabi</i> sorghum during last week of September to first week of October. The intensity of <i>Hasta Nakshatra</i> in <i>Lokhandi Charan</i> (first 3 days) which generally occurs during last week of September is high. Due to impact of high intensity rains, the splashing of soil particles takes place which jam the growing shoots of sorghum seedlings. At the point where soil particles jam, the process of decaying starts and seedlings die on large scale (Solapur, Maharashtra).	Anonymous (2000d)
39	Compact block cultivation to avoid bird damage	It is adopted by the farmers by sowing crops like sorghum, maize and pearl millet in compact area at the same time by the concerned farmers to thinly distribute the bird damage besides making it easier to carryout scaring of birds/parasites (Rayalaseema and coastal uplands of Andhra Pradesh).	Subba Reddy and Singh (2001)
40	Sowing castor by dibbling	Farmers are experimenting with cultivation of castor as a ratoon crop (lopping off a plant but leaving enough base for regrowth) by dibbling (manual soil drilling for seeding) the seed at 240 cm × 240 cm in pits of 30 cm × 30 cm filled with manure, castor cake and diammonium phosphate. Farmers also grow Lucerne (<i>Medicago sativa</i>) as an intercrop for seed production (Jangra, North Gujarat).	Patel (1992i)
41	Establishment of crop stand under rainfed conditions by early seeding, dry seeding and transplanting	Early sowing is crucial requirement for majority of rainfed crops during rainy season (<i>kharif</i>). Farmers tend to sow much area with first soaking showers. Farmers practice broadcasting seeds of paddy, finger millet in uplands of Orissa. Dry seeding of rainy season (<i>kharif</i>) sorghum in black soils of Malwa plateau is done in Madhya Pradesh. Transplanting of cotton seedlings (with spot irrigation) about 7 to 10 days before monsoon rains is done in Vidharba region.	Subba Reddy and Singh (2001)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
		Plough and plant system is done by Telangana farmers for sorghum to save additional ploughing operation after soaking rains (Orissa, Maharashtra, Madhya Pradesh and Andhra Pradesh).	
42	Sowing of finger millet seed with fertilizer for saving labour and nutrient supply in root zone	Finger millet seeds are mixed with granular DAP or complex fertilizers at 1:3 (weight basis) and sown in rows by using Saddle and Seed drill. It saves labour and ensures nutrients to the root zone (Karnataka).	Anonymous (1999c)
43	Use of higher seed rate for early maturity of wheat	The farmers of Junagarh have developed an understanding that use of higher seed rate of wheat (about 200 to 250 kg/ha) enhance the vegetative growth of the crop and reduces the duration by at least 8 to 10 days. This has been ascribed and acclimatized to the factor that water level in the wells goes down towards the maturity of wheat crop, particularly at the beginning of summer season and number of watering due to early maturity of wheat can be reduced (Junagarh, Gujarat).	Mane (1992)
44	Crop rotation with barley and buckwheat	Rotation starts with barley in the first year and buckwheat during the second year. The rotation sequence is governed by the quantity of available manure. Usually one third of the total holding is thoroughly manured during the year for barley cultivation. In the following year the soil retains a good deal of fertility for buckwheat for which no additional manure is added. In the third year, in the same field wheat is sown. The remaining two thirds of the holdings are similarly treated in succession. Barley requires heavy doses of organic manure. However the organic content of the soil after the harvesting of barley is sufficient to raise a good produce of millets, followed by wheat (Lahaul valley, Himachal Pradesh).	Verma (1998)
45	Maintaining soil fertility by crop rotation	In the first year during the rainy season (<i>khariif</i>) maize (<i>Zea mays</i>) is taken the following year rice (<i>Oryza sativa</i>) or blackgram (<i>Phaseolus munga</i>) is sown and in the third year castor (<i>Ricinus cummunis</i>) is sown (It is a deep rooted plant) and fourth year groundnut (<i>Arachis hypogaea</i>) is sown. This ensures a good feeding in all the layers of the soil as the crops have varied root depth (Banaskantha, Gujarat).	Kalabhai (1999)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
46	Crop rotations for maximising resource utilization	Under irrigated conditions of Lahaul valley, paddy is grown in sequence with wheat. On unirrigated fields, yielding one crop a year, wheat or barley rotates with maize and/or blackgram. However, in cold where paddy can't be grown and two regular crops are not practicable, cultivation of barley or wheat is followed by a fallow period during winter. Millet and maize or buckwheat are planted in the following year. Usually maize is followed by wheat, buckwheat or blackgram is followed by wheat or maize. Where maize is not cultivated, wheat and barley crops are generally raised. This crop rotation helps in maintaining soil productivity. Legumes fix nitrogen and different crops due to their root systems conserve soil. Crop diversification controls pests and pathogens. Fallowing preserves and restores soil fertility (Lahaul valley, Himachal Pradesh).	Verma (1998)
47	Snow management for raising double crops	Lahaul valley remains snow bound from December to April and as such no agriculture is possible. But Pattan valley, where in one season two crops are raised, one barley and other buckwheat, snow is melted off the fields by covering it with earth for timely ploughing and sowing of seed. In upper portions of Chandra and Bhaga valleys where snow lasts longer than in the rest of Lahaul and the crops are liable to be damaged by early snowfall ploughing and sowing operations are delayed (Lahaul valley, Himachal Pradesh).	Verma (1998)
48	Rotational farming with pulse crops for soil fertility and disease management	At the relatively lower altitudes of the Western Himalayan cold deserts, rotational farming is traditionally practiced for enhanced production. Barley, pea and wheat constitute common rotation. This practice balances soil fertility and avoids spread of diseases from one crop to another. Pea cultivation after barley help to fix atmospheric nitrogen. Soil compactness induced by barley cultivation also serves as check against wind erosion (West Himalayan cold deserts, Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
49	Higher yield of cumin following pearlmillet	North Gujarat is famous for cumin cultivation. Mr. Chaturbhai Bhikhabhai Parmar who owns 5 ha land observed that cumin (locally called <i>jiru</i>) grows well in the field, where pearl millet has been grown as previous crop. He divided one of his fields of 12 ha into two parts last year and grew pearlmillet in one part and sorghum in another during monsoon. After harvesting both the plots he grew cumin in winter. He gave identical treatment to both the crops and recorded yield of both the fields systematically. He found only 165 kg yield from the plot where sorghum was the previous crop, while in the plot where pearl millet was grown, the yield was 301 kg. He suggests that the results of his experiment confirm a popular local saying about cultivation of cumin <i>Jirujane Bajari, Mai Jani Vodali</i> , i.e. cumin follows pearlmillet crop and I (farmer) follow the clouds (Mahesana, Gujarat).	Parmar (1997a)
50	Mixed cropping for crop diversification and risk distribution	Cultivation of maize with millets and pulses is done as mixed crop. In addition leguminous pulses (greengram and blackgram) are also cultivated on the available land along the edges of plot. Mixed cropping provides the advantages of crop diversification along with value addition. It provides shield against the particular crop damage. It also maintains soil fertility and productivity besides conserving soil (West Himalayan cold deserts, Himachal Pradesh).	Verma (1998)
51	Risk distribution farming under dryland conditions	In coastal Andhra Pradesh, farmers diversify the land-use by growing sesamum, pearlmillet and groundnut to reduce the risk of crop failures. The basic perception among the farmers is that the cyclonic rainfall in July to August may completely destroy the maturing crops of sesamum without much effect on productivity of groundnut or pearlmillet (Coastal Andhra Pradesh).	Subba Reddy and Singh (2001)
52	Increasing land-use	Growing of pigeonpea and greengram on the bund of paddy field in low-lying area (Gonda, Uttar Pradesh).	Anonymous (2000c)

S. No.	Title of ITK	Details of ITK and rationale	Reference
53	Millet helps <i>Murraya</i> grow better	Leaves of the plant <i>Mitho limdo</i> (<i>Murraya koenigii</i>) are used as additive in cooking. Farmers of Amerli district of Saurashtra use a traditional but innovative method, while transplanting saplings of <i>mitho limdo</i> for its successful establishment. A few seeds of pearl millet (<i>Pennisetum americanum</i>) are sown around the sapling when it is transplanted. After a few days, seeds of pearl millet germinate. When pearl millet plants attain a height of 15-20 cm, these are cut off at the ground level. Roots of the cut off plants are allowed to dry (Amreli, Gujarat).	Bayal (1997)
54	Intercropping of maize and groundnut	Farmers sow two lines of maize after every four lines of groundnut in the rain season (<i>kharif</i>). Maize is harvested earlier since it matures earlier. The furrows made after harvesting maize are used to collect the rainwater. It is sprinkled on the adjoining four lines of the groundnut. Farmers also assume that this practice facilitates the harvesting of the groundnut. Harvesting and recycling is done in different ways according to the local situations (Sabarkantha, Gujarat).	Patel (1992d)
55	Private and community fodder wood blocks	Fodder tree forests in the vicinity of villages either on the forest land or community lands/private lands are jointly managed by the managers to meet their fodder need for cattle during lean months, ie winter season. Few species thus managed are <i>Quercus</i> spp. (oaks), <i>Grewia ooptiva</i> (buel), <i>celtis australis</i> (khirak), <i>Bauhinia variegata</i> (kachnar), <i>Albizia chinensis</i> (ohi) etc. (Mid and high hills, foot hills and sub mountaineous regions of Himalayas).	Verma (1998)
56	Mixed cropping to meet family needs and risk distribution	Intercropping in fingermillet is done with sorghum, pigeonpea, <i>avare</i> , niger, mustard to meet family needs and also to use land and light efficiently, to insure against the risk, crop failure, mustard is planted as trap crop (Karnataka).	Anonymous (1999c)
57	Indicator plants to determine irrigation requirement	Some plants like sunflower are sown along with the main crop to be used as indicators for determining irrigation requirement. These plants determining irrigation requirement. These plants are sensitive to water deficiency and hence show symptoms of drying under water stress. The farmers can thus predict the time of irrigation (Pondicherry).	Panduinathan Govindaraju (2000-2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
58	Cropping systems adopted by <i>Malis</i> of Koraput district and it's improvement	Koraput district, located in the Southern part of Orissa is dominated by tribals belonging to different Tribes. Besides, a laborious group called <i>Malis</i> who have settled near the perennial streams are the main crop growers of the district. They invariably take up multiple cropping as an insurance against total crop failure. Although the crop yield and total return is not very alluring but the farmers are convinced of getting assured return for their sustenance. A number of multiple cropping systems, those have been practiced by the above farmers in villages like <i>Malidoliamba</i> , <i>Chalonput</i> , <i>Pakjhola</i> and <i>Tentuliguda</i> are ginger + maize + brinjal + runner bean; cabbage + potato + mustard + greens + chilli; brinjal + onion + maize + pea + runner bean; and okra + chilli + radish + greens + runner bean (Koraput, Orissa).	Das <i>et al.</i> (2002)
59	<i>Jhuming</i> or shifting cultivation	It is also known as <i>podu</i> cultivation that involves cultivation of crops on steep slopes by clearing forest, bushes etc. upto stump level in December to January, leaving the cut material for drying and then finally burning it to make the land ready for dibbling of seeds of different crops before the onset of rainy season. After two to three years the area is abandoned for regrowth and a new site is selected to repeat the process. Earlier this system was good but now due to increase in both the population and the effective area under this farming syatem, it is considered to be hazardous because it is leading to resource degra-dation and ecological imbalance due to defforestation, increase of soil erosion and silting of reservoirs, which further lead to floods. Various research institutes of ICAR, Government of India and State Governments of North-eastern parts are recommend-ing agro-horti-silvipastural system as an alternative to shifting cultivation. Yet this system forms an integral part of the socio-cultural fabric of triabal life of North-eastern parts (Hills of North East India).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
60	Sesame sown after summer crop yields more	After the harvest of pearl millet (<i>Pennisetum typhoides</i>) in summer, it is ideal to sow sesame (<i>Sesamum indicum</i>) during the monsoon. This increases the productivity of the crop. Sesame is sown after the harvest of pearl millet particularly when the chances of rainfall are less. The residues of pearl millet (like the stem) after harvesting the heads are incorporated in soil by ploughing. These residues provide ample organic manure for the sesame crop, thus resulting in a better yield. Most of the farmers in Jhanda village follow this practice (Kheda, Gujarat).	Patel (1999d)
61	Increasing productivity and income through mixed cropping	Farmers cultivate sorghum (<i>Sorghum vulgare</i>) in one row, while cultivating mustard to increase the productivity of the crop. While, cultivating potato, particularly during the end of the season fennel (<i>Foeniculum vulgare</i>) is also grown. Growing fennel gives the farmers a profit of Rs 50,000/ha (Uttar Pradesh).	Ram Pratap and Rajput (1999)
62	Cattle grazing before heading for higher yield of finger millet	Cattle are allowed to graze the top of finger millet crop before heading to enhance earhead size as well as grain filling and to control leaf disease. It also reduces evapotranspiration and induces heading (Karnataka).	Anonymous (1999c)
63	Risk distribution farming under rainfed conditions	In order to minimize risk, the farmers of Haryana, give equal importance for growing mustard and chickpea during <i>rabi</i> season. The frost in December- January may damage mustard but not chickpea. On the otherhand the incidence of terminal drought may heavily reduce the yield of long duration crop of chickpea without having much effect on mustard. In Vidharba region of Maharashtra, the farmers distribute the cultivated area under greengram, sorghum and cotton to distribute the risk among various crops. Heavy rainfall incidence during July and August may completely destroy the greengram without much effect on sorghum. The terminal drought years may badly affect on the productivity of cotton but farmers can get assured yeilds of greengram or sorghum (Haryana; Vidharba, Maharashtra).	Subba Reddy and Singh (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
64	Traditional crop production systems	(i) In the uplands of the gangetic plains in Nadia and Murshidabad districts of West Bengal, farmers often grow aus rice in mixture with pigeonpea. (ii) Rainfed upland rice intercropped with legumes reduced 46-54% weed population in rice, followed by oilseed crops (10–25%). (iii) A suitable intercropping in poly-crop systems will reduce the pest incidence or minimize the risk involved in monoculture as observed in Sabarkantha district of Gujarat (iv) Growing of cucurbits/jatropa in castor fields minimises the incidence of semilooper on castor. (v) Raising pigeonpea on bunds of upland paddy fields enriches soil fertility and enhances total productivity.	Rao <i>et al.</i> (2002)
65	Spread, adaptability, merits and demerits	A survey was conducted in 5 tribal dominated villages, viz., Karnada, Kilakia, Katimahan, of traditional mixed/Rupagaon and Nedipadar-Kerengali of intercropping systems Kandhamal district of Orrisa to study the mixed/ in tribal belt of Orissa intercropping systems practiced under rainfed upland conditions, analyse merits and demerits of each system and find out thrust areas of research to augment productivity. A total 100 farmers, 20 from each village, were thoroughly interviewed. A total of 42 systems comprising of 17 upland rice-based, 10 maize-based, 6 pigeonpea- based, 5 turmeric-based, 3 groundnut-based and 1 fingermillet-based were noted. The respective percentage area under these systems were 51, 28, 11, 6, 3 and 1%, respectively. The farmers established these systems either by sowing/ planting wide spaced/large seeded crops behind the plough or broadcasting closely spaced/small seeded crops. These systems provided insurance against total failure of a susceptible crop during drought years. The productivity of the systems was low due to use of local genotypes, improper crop combination and crop geometry and no use of fertilizers (Orissa).	Behera <i>et al.</i> (2002)
66	Hay/dry grass storage techniques in fields	The grass is cut after the dew has evaporated and swaths are left in the form of bundles (<i>poola</i>) to dry in the field itself by different methods so that its green colour and leaf characters are retained. After drying the grass it is stored either in a circular or elongated form as per the quantity. The base is first constructed	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		with stones arranged in a circle. The first layer consists of poor quality grass or thorny bushes. The bundles of grasses are then so arranged and placed that their weight completely falls on another, while maintaining the circular or elongated shape. In case of circular shape the width is more at the base which starts decreasing from the middle of the structure called ' <i>talent</i> ' and ultimately it takes the shape of a circular pyramid. Earlier a cloth made from yak's hair called ' <i>thobi</i> ' was used to cover it but now a days layer of green-thorny bushes or poor quality long grass is used as a cover along with wheat or rajmash straw. Stone or heavy wood logs are used for pressing and holding the <i>ghor</i> in place. This practice protects the grass from rain and snow and strong winds. In winter grass is removed from <i>ghor</i> which remains completely dry and warm and is relished by the livestock (Lahaul valley, Himachal Pradesh).	
67	Rainfed paddy in <i>Jal</i> lands	<i>Jal</i> lands are those lands which suffer from water logging problem in semi-arid red soils due to the lateral movement of underground water in the root zone during rainy season (<i>kharif</i>). Farmers in these lands grow rainfed paddy, which helps in diversifying the cropping programme and reducing the production of risk (Andhra Pradesh).	Sanghi (1993)
68	Judicious selection of cropping sequences utilizing both indigenous and modern agricultural knowledge in conserving and management of resources	Farmers initially have their own knowledge of agriculture which they inherit from their ancestors, society: addition and alteration to this take place time to time. Similarly, selection of crops or cropping sequence by a farmer is also guided by his traditional belief and disbelief, ethos, his socio economic conditions, resources available, and of course by the crop or cropping sequence economics. A case study was undertaken to identify (i) The crops and cropping sequences operated in area, (ii) How many of these crops/sequences are governed by the traditional knowledge of agriculture of the farmers (iii) How the economics of the cultivation is changing with the change of crops or cropping sequences and (iv) How judicious is the conservation and utilization of resources (both natural and human) in these crops and cropping sequences. Thirty different cropping sequences were identified which can broadly be categorized into three groups (a) cropping sequences	Sarkar and Sahu (2002)

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		which are based on modern agricultural technology/knowledge (b) cropping sequences based on traditional knowledge/belief of agriculture and (c) cropping sequences, where one has used modern knowledge providing due consideration to traditional knowledge and belief on agriculture. Crop/crop sequence economics along with the utilization of human resources and requirement/conservation of water has been studied for different sequences. The study concludes that cropping sequences based on combination of both traditional knowledge/belief with modern knowledge of agriculture are no inferior than the modern knowledge of agriculture alone.	
69	Niger and sesamum as border crops to protect sorghum against cattle grazing	Farmers of Shidaganatia village grow niger and sesamum as border crops surrounding sorghum. Both niger and sesamum are bitter to the cattle and other livestock (Dharwad, Karnataka).	Anonymous (2000b)
70	Increasing land use through mixed cropping	The <i>Korku</i> tribals of Chopan village follow mixed cropping of upland paddy, sorghum, pigeonpea and sesamum. The seeds are mixed and sown. Tribals know that the root systems of these crops are different and they mature at a different times and hence, there is proper utilization of nutrients and soil moisture at different soil depths (Amravati, Maharashtra).	Anonymous (1999–2000)
71	Increasing cropping intensity through sorghum and groundnut intercropping	Groundnut is sown as an intercrop between the two rows of sorghum. This increases the yield of sorghum. Farmers believe that groundnut improves fertility of soil through nitrogen fixation. But it does not benefit the companion crop so much as they do to subsequent crops (Panchmahal, Gujarat).	Patel (1992b)
72	Mixed cropping to reduce risk under rainfed conditions	Mixed cropping of compatible crops is done to minimize risks under rainfed conditions (Nilgiri, Tamil Nadu) (Nilgiris, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
73	Ecofriendly cropping systems	The rainfed farmers in Southern states are traditionally growing various crop combinations to reduce the pest and disease incidence. The groundnut–mustard cropping system, groundnut–wheat–mungbean, rice–garlic–maize–tomato, maize–marigold and tomato + marigold are grown to reduce the nematode population. Rice–tobacco, rice + tomato, cotton–groundnut and cotton–soybean + sorghum to reduce the root rot diseases. The sunflower + cotton is grown to reduce the leaf sheath and hopper damage; castor + cowpea in 1:1 to reduce the aphid damage. Sorghum + cowpea in 1:1 to control stem borer of sorghum, wheat + chickpea to reduce the podborer attack, castor + cowpea in 1:1 for minimizing the incidence of aphids and castor as a trap crop in cotton to reduce the cut worm larvae. Maize+marigold to reduce the nematode population and cotton –groundnut, cotton-soyabean + sorghum to reduce root rot diseases (Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu).	Subba Reddy and Singh (2001)
74	Intercropping and mixed cropping to minimize risk	This practice is used by the farmers mainly to minimize the risk of production in a given field. Intercropping of pearl millet and pigeonpea in Solapur (shallow black soils) is adopted by the farming communities for stable production. Greengram + pigeonpea system is practiced in shallow soils of Akola against the high rainfall during July and August. Mixed cropping of sorghum, pearl millet and pigeonpea is adopted in Telangana region of Andhra Pradesh. pearl millet + greengram systems is prevalent in Rajasthan. Mixed cropping of Sorghum + pigeonpea in Madhya Pradesh and Uttar Pradesh helps in reducing the risk of root nematode incidence. Mixed cropping with the crops like coriander, carrot were useful as the host plants for adults of many parasites (All rainfed regions).	Sanghi (1993)
75	Increasing cropping intensity through relay planting of cucurbits with wheat	Planting of cucurbits, viz cucumber, bottle gourd and bitter gourd as relay crop after cutting 75 cm wide strips of standing wheat crop at an interval of 2-3 m in the month of March is done in order to harvest early crop of cucurbits. The green wheat crop cut is used as fodder. The main focus of the system is that sowing of cucurbits is advanced considerably, and early marketing helps in fetching higher return from the harvest (Himachal Pradesh).	Singh (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
76	Increasing cropping intensity through maize + tomato inter-cropping	Maize crop is sown by keeping a row to row distance of 75 cm in the month of June and tomato (tall varieties) on ridges in between rows with onset of monsoon. Tomato is staked on maize plants by tying with polythene ropes. Maize cobs are harvested in the month of August or September, while the tomato crop is continued up to October. Rainy season tomato cultivation is becoming popular amongst the farmers of rainfed areas in the region. Farmers in this region have small holdings, hence they do not want to sacrifice maize. Also, staking material is a limitation in the area, therefore using maize as staked material is a plus point in practice (Hamirpur, Himachal Pradesh).	Thakur <i>et al.</i> (2000)
77	Increasing cropping intensity with a cover crop	Farmers grow seeds of <i>karingada</i> (<i>Citrullus lanatus</i>) in the castor/sorghum fields at the beginning of monsoon. The vines of the <i>karingada</i> cover almost the entire surface of the field by the end of monsoon. This helps in conserving the moisture for the castor plant. After the rainy season and harvest of the crop, the <i>Karingada</i> fruit serves as a good feed for the animals. This system conserves higher soil moisture in the top layer of the soil. The reason can be that the broad leaves of the crop spread closely, might have acted as live mulch. Secondly, <i>karingada</i> root system penetrates deep into the soil very fast and it does not compete with the main crop for getting soil moisture from the same top layer (Sabarkantha, Gujarat).	Patel (1992g)
78	Ratooning of rice	Economically poor farmers in this region first harvest early paddy by beheading the panicles and leave the plant as such. If there is good late rain, they get the second crop from the tillers which has not flowered earlier. And if there is no rain only straw is harvested. In the first crop, approximately 1.75–2 tonnes/ha yield and from the second crop 0.5-0.75 tonnes/ha yield is harvested (Faizabad, Uttar Pradesh).	Maurya (1992)
79	To induce branching in castor by planking	Before receiving the last rainfall, farmers perform deep interculture in the castor fields. Thereafter, farmers do planking with the help of bullocks on the standing crop of castor. According to them this practice enhances the branching in the castor which finally increases the yield (Mehsana, Gujarat).	Rathod (1991)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
80	Pruning in chilli for inducing flowering	The practice of pruning branches in chilli enhances plant life and yield by inducing flowering (Karnataka).	Anonymous (1999c)
81	Use of local variety of paddy– <i>Samba</i>	Paddy requires daily irrigation and the farmers generally use higher quantities of fertilizer than recommended. The local <i>Samba</i> variety, which is a red rice, is preferred (Chidambaranar, Tamil Nadu).	Manoharam Kombairaju (1995)
82	Optimization value addition to fodder crops by mixed cultivation of barley, lucerne and <i>methi</i>	Lucerne is a traditional winter fodder crop in Saurashtra. There is tradition of mixing little quantity of barley and <i>methi</i> (<i>Trigonella foenum - graecum</i>) seed along with lucerne seeds and mixture is broadcasted. There are couple of reasons for this. Firstly, barley germinate and grow earlier than lucerne and sufficient green matter is obtained even in the first cutting when lucerne is thinly growing. Secondly, the belief of the farmer indicates that both the barley and <i>methi</i> helps animals to enhance the palatability and digestion process of the lucerne, besides adding to the nutritive value of the fodder as such (Saurashtra, Gujarat).	Mane (1992)
83	Increasing production of maize	Removal of maize tassel with top 2–3 leaves during grain filling stage. This practice is believed to increase grain yield of maize (Gonda, Uttar Pradesh).	Anonymous (2000c)
84	<i>Khakhra</i> mulching in maize for moisture conservation in soil, addition of organic matter and termite control	Germination of maize is delayed when there is less rainfall. In order to retain the moisture of the soil the farmers in Banaskantha region follow a practice which has dual purpose. The leaves of <i>khakhra</i> (<i>Butea monosperma</i>) are spread in the field in which maize has been sown. These leaves retain the moisture in the soil and induce quicker germination. Later on, the leaves decompose to form organic manure for the maize crop. The leaves are spread throughout the season in the field. The leaves also deter the attack of termites on the crop (Banaskantha, Gujarat).	Dungaisa (1999)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
85	Curing of tobacco by layering with twigs of <i>Calotropis</i>	Farmers make small bundles of harvested tobacco leaves and keep them in logs for about 10–15 days to improve its quality. Bundles of tobacco are layered on <i>Calotropis</i> twigs spread on the ground. Again, <i>Calotropis</i> twigs are kept and tobacco leaves are spread over it. Farmers are of the opinion that this system of making alternative layers of <i>Calotropis</i> and tobacco leaves improves the quality of the tobacco during curing. These layers are kept for about 10 days, till a peculiar smell emanates from them indicating ripening of leaves (Jaipur, Rajasthan).	Srisuvalal (1996b)
86	Prevention of shedding of boll of cotton by use of castor oil	Flowers and young bolls are often shed in cotton crop due to high temperature. To minimize this problem, farmers pour castor oil (approximately 50 ml) near the stem in the soil believing that it would cool the soil (Bharuch, Gujarat).	Karamiya (1992)
87	Use of <i>magha</i> rain water as growth promoter	Farmers store rain water received during the <i>magha</i> in the monsoon for future use. They believe that it works as growth promoter on the standing crop. According to them, the stored water does not get spoiled (Rajkot, Gujarat).	Kapadia (1997b)
88	Prunning for higher boll formation in cotton	Cotton plants grow tall in the highly fertilized field with good rainfall. Farmers cut the top branch of the plant which check the erect growth of the plant. It is believed that such practice imparts good flowering and retards vegetative growth (Surendranagar, Gujarat).	Patel (1991f)
89	Minimizing the effect of frost in cotton by fumigation and irrigation	Farmers practice fumigation and irrigation in the fields of cotton when they anticipate frost. Fumigation is done by cowdung cake, used engine oil or waste grass. They have been practicing this for the last 20 years. Some farmers make tall hedges around the field to protect the crop from frost (Mehsana, Gujarat).	Dayabhai (1992)
90	To induce lateral branching in chickpea by nibbling by sheep	Farmers get their chickpea crop nibbled by sheep, apparently to encourage lateral branching. This method is to check apical dominance, auxins present at shoot apex are removed by branching (Mahendragarh, Haryana).	Anonymous (1991a)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
91	Ratoon crop of okra	Cotton, a major crop in the Vadodara and Surat districts in Gujarat, is being replaced by vegetables owing to the high incidence of infestations by various insects pests and diseases in cotton over the last few years. Some farmers took to cultivating vegetables because transportation facilities to surrounding urban markets are very good. Okra is an all season crop but farmers prefer to grow it in the premonsoon (May) and prewinter (September) periods. Most okra growing farmers sow the crop more or less at the same time which leads to a market glut and causes the price to fall sharply. Okra, cannot be stored to be sold later when better prices can be had. The problem also bothered the growers and they were constantly on the lookout for a way to regulate the harvest of okra. One day when bullocks were tied to posts on the buns of the okra field, they chewed away some okra plants leaving behind the stubble-like stems, about one foot tall. Much to surprise soon each stubble sprouted six to seven lateral branches. After a few days these branches bore fruits and that too far more profusely than the branches of normal plants. Taking the clue from this chance finding, Shashikantbhai began to prune his okra plants when market prices fell (Vadodara, Gujarat).	Patel (1995g)
92	Nipping the side branching of neem for erect growth	Neem trees prove to be a good source of wood and fetch a good price, if allowed to grow for 15 years. A neem seedling can be grown straight at least to a height of 10–11 feet. Usually farmers remove all side branches leaving the top leaf bunch. Instead of pruning, the side branches internode bud are nipped. If the bud is allowed to emerge then this will grow into a strong branch which will affect the value of the neem tree (Madurai, Tamil Nadu).	Vivekanandan (1999a)
93	A new variety of groundnut developed by a farmer	A variety renamed as Thakarshi, in honour of Thakarshibhai Savalia, has following characteristics of the cultivar, (i) Flexibility in sowing time if the rain is early or regular, i.e., before or around 15th June, it should be grown at a distance of 90 cm and if the rain is delayed, it should be grown at a distance of 45 cm, (ii) as compared to other cultivars, it matures 15–20 days earlier. It takes 95–100 days to mature. (iii) it can thrive in scarcity of rain as well as excess rain. It does not turn yellowish under the	Savaliya (1996)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
		condition of excess rain, (iv) as compared to spreading type of groundnut, its height is more. It has big thick leaves, (v) it has not been found infected by seedling rot or any other diseases so far, (vi) in 1993, there was no rain in the last phase of the monsoon season. The yield of other varieties of groundnut had reduced drastically but by the harvest of this varieties was about 2200 kg/ha pods which was more than double the harvest of other varieties grown in his region (Junagadh, Gujarat).	
94	Transplanting of castor for gap filling	Castor is sown with seed drill. A few days after germination, young seedlings from the thickly populated rows are uprooted and transplanted in thinly populated rows to maintain uniform population (Mehsana, Gujarat).	Patel (1992i)
95	Rolling barrel increases onion productivity	An empty barrel is rolled over onion crop to increase productivity. This is done 15–20 days before ripening. Usually a 20 litre capacity barrel is used. This causes the onion plants to lean over to their side and the nutrients from the leaves are transferred to the root, thus increasing the yield. This method also increases the storage life of onions (Rajkot, Gujarat).	Pethani (1997)
96	Control of weeds in rice by using leaves of <i>Krada</i>	Leaves of <i>krada</i> plants are placed in the standing water of paddy as a result of which the water becomes blackish in colour. It is believed that it kills <i>Gundhi</i> bug and some aquatic weeds of paddy (Bhubaneswar, Orissa).	Panda (1992)
97	Cuscuta weed management in niger	Results of a three-year-trial on cuscuta management in niger (<i>Guizotia abyssinica</i> cv. Deomali) conducted in the farmers fields of the adopted villages of KVK, Koraput during rainy season (<i>kharij</i>) of 1999 to 2001 revealed that <i>Cuscuta chinensis</i> , Damk, the stem parasitic weed emerged with germinating niger seedlings and parasitizing the niger crop reduced the crop yield upto 50%. Although the weed could be controlled effectively by herbicide application but it is a costly practice for the poor tribal farmers. While the improved practice of cultural management i.e sieving through 20 mesh sieve, followed by hand weeding at 25 and 45 days after sowing produced the highest seed yield of 2–6 q/ha without any cuscuta infestation, the ITK method of cuscuta control i.e soil drenching with jack fruit leaf extract @1–25 litres	Dixit <i>et al.</i> (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		diluted with 1000 litres of water 2–3 days after sowing produced 39.6 % higher seed yield than the farmers practice of occasional weeding (1.3 q/ha), with the highest return per rupee spent (Rs 9.1). Another ITK, i.e. seed treatment with kerosene oil @ 3 ml/kg seed and kept over night before sowing produced 1.6 q/ha seed yield (17 % more than the F.P) with a return of Rs 6.65 per rupee spent. Thus the ITK methods are cost effective, socially acceptable and eco-friendly under the small production system of Koraput region (Koraput, Orissa).	
98	Scaring of birds by <i>Handor</i>	The tribals prepare the scaring devices of difference types using bamboo. Bamboo strips are used to prepared <i>Handor</i> . Different shapes and sizes are prepared and put in the field. The <i>Handors</i> prepared out of earthen pot like head of a man and clothed are commonly used in various other parts of the country. However, bamboo <i>handors</i> prepared by <i>Dharni</i> tribals are typical. Bamboo rings are also prepared to reflect the birds (Amravati, Maharashtra).	Anonymous (1999–2000)
99	Control of weeds by crop rotation with wild sesamum	For weed control, practices like interculturing and hand weeding are not so convenient due to the reasons like broadcast sowing, large size of land holding and sloppy as well as undulating land topography. Ramtal (wild species of sesamum) is grown in the field for suppressing the growth of weeds. Growing it once can reduce more than 50% of weed population. Ramtal plant grows faster in the initial stage and suppresses the growth of weeds (Bharuch, Gujarat).	Vasava (1992a)
100	Scaring of birds by pooling bamboo strips	Bamboo strips are tied to the big trees, where the birds usually gathers and attack the crop. By pooling the bamboo strip, the branches of the tree are shaken and thus the birds can be scared to protect the crop from their attack (Amravati, Maharashtra).	Anonymous (1999–2000)
101	Control of wild rice by growing coloured variety of paddy	Wild rice being identical to cultivated rice plants in morphology, it is not possible to distinguish between the two before seed maturity. At maturity, the ripened seeds keep on shattering and therefore, it becomes practically impossible to eradicate this weed. Farmers grow purple coloured rice variety, 'R-575'. This variety has dark purple coloured foliage which is	Singh <i>et al.</i> (1996)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
		distinctly different from wild rice. Thus wild rice becomes easier to identify and weed out at early stages of growth. This method works wonderfully as there is no other way to control this weed. Once, a field gets infested with wild rice by continuous cultivation, the coloured variety is grown for 3-4 years in that field and all the plants with green foliage are removed manually (Himachal Pradesh).	
102	Control of weeds in maize	Ploughing by <i>desi</i> plough in maize crop at knee height stage to control weeds which also ameliorates physical condition of soil for proper growth and yield of the crop (Gonda, Uttar Pradesh).	Anonymous (2000c)
103	Control of crops damage caused by wild pigs by erecting barricades	The tribals have very well understood the behaviour of wild pigs. Wild pigs destroy crops on large scale. Hence the tribals have developed their own technique by providing bamboo fencing. It is reported that when pigs come across any barricades at the height of their head (Approx 1.5 ft.) they return back. In view of this behavioral aspect, the tribals prepared the bamboo compound putting two three horizontal bamboos approximately at the height of 1.5 ft. As soon as the head of pig touches the bamboo, the pig immediately go back (Amravati, Maharashtra).	Anonymous (1999–2000)
104	Control of striga in sorghum	(i) Seeds of <i>suva</i> (<i>Anthemum graveolens</i>) are incorporated with sorghum seeds approximately 3 to 4 kg/ha at the time of sowing to avoid the emergence of striga. <i>Suva</i> has very slow growth. Its growth is suppressed at later stages due to shortage of light, water and nutrients. Hence, there is no detrimental effect on the growth of sorghum. ii) Farmers divert the harvested rainwater of adjoining fields into the striga-affected fields in Saurashtra. Cut branches of <i>Calotropis</i> (<i>Calotropis</i> sp) are kept at the entrance of the rain water channel. This practice reportedly minimizes the striga population to a great extent, if repeated for several times during rainy days (Bharuch, Gujarat).	Ganchi (1992b)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
105	Control of algal growth in paddy field by using twigs of pigeonpea	The paddy crop normally suffers from algal problem due to stagnant water in the fields. The stagnant water causes the growth of algae. The algae forms a layer and stops the air circulation. In Sandila, farmers use twigs of pigeonpea (<i>Cajanus cajan</i>) and make a bundle of these twigs. These twigs are made to flow along with water cutting through the algal layer (Uttar Pradesh).	Ram Pratap and Rajput (1999)
106	Control of <i>kerada</i> (<i>Capparis decidus</i>) weed by covering the root with earthen container	<i>Kerada</i> is one of the noxious weed which perhaps has deep roots. It comes up again even after removing the above surface growth. Farmers dig out whole plant from the soil. An earthen container is put over the root. The container is locally called as <i>ramaiya</i> . Whole container is buried in the soil and the soil is leveled up (Surendranagar, Gujarat).	Lal (1991)
107	Technique to scare away birds	A bamboo device called as <i>lodan</i> is used for scaring of birds. Approximately 6 ft. long vertically cut in two parts without detaching the parts at the broad end (Rattle type). It is then tied to five feet wooden pole fixed in the field. The upper half of the bamboo is attached to 30 to 40 m. bamboo rope, stretching from the hut. This rope is supported by some wooden poles with 'V' shape upper ends in between. These poles help the rope slide backward and forward very easily. A persons sitting in the hut pulls the rope to obtain the strike of the two halves of the bamboo placed in the field producing very big and typical sound which scares the birds. The bamboo strip or the rope also acts as the reflector and hence, helps in scaring the birds to some extent (Amravati, Maharashtra).	Anonymous (1999–2000)
108	Control of weeds through mulching	Farmers use mango leaves for mulching to control <i>motha</i> weed (Gonda, Uttar Pradesh).	Anonymous (2000c)
109	Fertilization of lucerne by mixing during with irrigation water	Farmers with irrigation facility separate the well decomposed dung of cattle from the litter material. The separated dung is mixed with running water in water channel with help of hands. The suspension is then applied to the plots of lucerne. This practice is followed at the time of first irrigation after harvesting of first forage cutting. Farmers believe that this method helps uniform tillering and growth of the crop and lants become juicy and greenish in colour (Surendranagar, Gujarat).	Patel (1991b)

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
110	Soil management by crop residue harvesting	Soil is softened by light irrigation a day before harvest of the crops and the plants are pulled out along with complete root system. Wheat is often pulled, out while standing, but kneeling or squatting is practiced for barley. These plants after harvesting are piled up. Thus this practice helps in uprooting weeds, soil loosening and porosity maintenance for the next crop. Other practice is to harvest crops as close to the ground as possible. The roots are made to stay in soil for humus production so that very little plant material is left in the soil as a protective measure against the soil borne diseases. This practice increases the fodder resource in winters. Retention of roots in soil contributes towards humus production which improves the soil porosity, structure and water holding capacity (Zanskar and Ladakh).	Verma (1998)
11	<i>Prosopis cineraria</i> in agroforestry system	The practice of agroforestry viz. cultivation of species in the alley spaces of trees and shrubs has been traditionally practiced by the desert dwellers. Raising of <i>Prosopis cineraria</i> cultivated ber in range lands is common in arid and semi arid Rajasthan. These farmers harvest fodder for livestock from the trees and shrubs and also believe that crop growth is increased under their canopy. Most desert dwellers follow mixed farming to minimize the risk in which animal husbandry is an important component (Rajasthan).	Shanker (1988)
112	Nitrogen fixing trees in tea gardens for shade and soil enrichment	In Khangra valley of Himachal Pradesh, tea gardens are managed under the canopy of <i>Albizia chinensis</i> unlike traditional system of growing on waste and marginal lands. <i>Albizia</i> fix atmospheric N and enrich the soil through decomposition of leaf litter. Similarly in Assam and West Bengal the tea gardens are managed under <i>Alnus nepalensis</i> (Kangra valley of Himachal Pradesh, Assam, West Bengal).	Verma (1998)
113	Propagation of <i>Euphorbia</i> rooting of stem cuttings	Milky liquid (latex) oozing out of <i>eleaklli</i> (<i>Euphorbia nerrifolia</i>) is applied on the cut end of stem cuttings. These stem cuttings are then planted in soil treated with salt. This practice is believed to enhance growth of roots (Karnataka).	Basavaraju (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
114	Multipurpose trees on the crop land for enhancing land use	Farmers usually cultivate wheat, pea, potato, cauliflower, mustard etc during winter and maize, tomato, chillies etc. during summer under permanent terraces prepared across the hills. Multipurpose trees namely <i>Grewia optiva</i> (Buel), <i>Celtis australis</i> (Kherak) <i>Bauhenia variegata</i> (Kachnar) <i>Albizia chinensis</i> (Ohi), <i>Toona ciliata</i> (toon), <i>Morus alba</i> (toot), <i>Ulmus laviegata</i> (Meryano) etc. are grown on the bunds of the terraces for fodder, fuel and timber purposes. In the regions of mid-hill sub-humid and high-hill temperate wet zones of Himachal Pradesh agricultural crops like pea, cabbage, colacasia, turmeric and pulses are grown in the interspaces of fruit trees such as <i>Malus domestica</i> (apple), <i>Prunus domestica</i> (Plum), <i>Prunus armeniaca</i> (apricot), <i>Prunus persica</i> (Peach), <i>Prunus deueis</i> (almond) and <i>Pyrus communis</i> (pear). In some areas of this zone agri-horti-silviculture system is also followed besides providing fruits/fuelwood/fodder, trees grown along the bunds check the erosion (Himachal Pradesh).	Verma 1998
115	Agri-silviculture with bamboo	Bamboo is grown with other agricultural crops along the streams and drainage channels owing to its enormous uses in building small farmhouses, goat sheds, piggery enclosures, small baskets and string making. Bamboo pipes are used as water conveyors in irrigation or drainage systems. Its leaves serve as an excellent winter fodder for goats. Bamboo stumps or culms protect water channel from erosion. Most commonly used bamboo species are <i>Dendrocalamus hamiltonii</i> and <i>Dendrocalamus sikkimensis</i> (Sikkim and other North eastern hill states, Palampur of Himachal Pradesh).	Verma 1998

CROPS AND CROPPING SYSTEMS

S. No.	Title of ITK	Details of ITK and rationale	Reference
116	Traditional agroforestry systems	The farmers in low rainfall areas practice traditional agroforestry systems involving <i>Prosopis cineraria</i> (as a perennial crop), and pearl millet and clusterbean as annual crops in drier parts of Rajasthan. And <i>Butea monosperma</i> as a perennial crop is a common practice in southern parts of India. Growing of palmyra trees in combination with sorghum/pearl millet/cotton/groundnut/pulses is practiced in Andhra Pradesh, Karnataka and Tamil Nadu. Growing of sunflower/pulses with <i>kappas</i> tree, that gives high quality fibre, and custard apple with cereals and pulses is common in parts of Andhra Pradesh and Karnataka. <i>Acacia nilotica</i> (kikar) + <i>Butea monosperma</i> (dak) is widely grown in Kandi area of North West region (Andhra Pradesh, Karnataka, Rajasthan and TamilNadu).	Subba Reddy and Singh (2001)
117	Growing hedge crop as wind break	Plants of <i>Gliricidia</i> grown as hedge around the field act as wind break. After summer season, the branches are heavily pruned. Longer and stronger branches are used for supporting the creepers the farmers grow. Leaves are used as manure in the field (Surendra-nagar, Gujarat).	Kanjibhai (1991)

Pest and Disease Management

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Control of termite by growing castor	Farmers grow castor in fields severely infested with termites. This is believed to decrease termites appreciably in the next year. The root of castor plant may have unknown power to kill termites (Surendranagar, Gujarat)	Patel (1991d)
2	Termite control in sweet melon	Melon creepers that become dry are often attacked by termites. The attack occurs mostly when creepers are one- and a half- month old. Some farmers use a mixture of tobacco powder, cow's urine, buttermilk and neem leaves to tackle the menace. About 25 to 30g of tobacco powder and a pinch of compost fertilizer are mixed with seeds of each creeper. Twenty to twenty five days after sowing, a solution is prepared with one kg tobacco in 10 litres water, one litre cow's urine, one kg neem (<i>Azadirachta indica</i>) leaves and 1 litre sour buttermilk, and it is left undisturbed for 2 days. On the third day this solution is filtered and sprayed over the creeper after adding twenty litres of water and some soap solution (Kutch, Gujarat).	Shah (1997)
3	Control of termite by use of <i>Thor</i> milk	Twenty kg of seeds can be protected by 200 ml of <i>Thor</i> milk diluted in 1 litre water. For horticultural crops, 1 litre of <i>Thor</i> milk diluted with 200 litres of water is enough for protecting the crops from termites. The solution is poured near the roots when given to newly planted crops, it is believed that crops grew faster (Sabarkantha, Gujarat).	Patel (2000b)
4	Control of termite by using extract of <i>Calotropis</i>	<i>Akada</i> (<i>Calotropis giguntia</i>) plant material is soaked in water for at least 24 hr then filtered. This liquid is poured on termite infested soil. Effectiveness is evaluated by placing pieces of wood at various points in the field. If wood remains free from termites attack for a week, it is effective. It is used by 25–35% of the farmers in the area (Baroda, Gujarat).	Balusinh (1992)
5	Protection of sugarcane from termites	Protect sugarcane against termites attack by placing 1 kg powdered salt below the selt at planting (Bareilly, Uttar Pradesh).	

PEST AND DISEASE MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
6	Termite control by using <i>Euphorbia</i> species	After pearl millet harvest, the straw is stored in bundles. The farmers of Palol village call such a storage place <i>Khala</i> . The bundles stored are used as cattle feed during <i>rabi</i> and are also used as roughage for the cattle. Termites sometimes attack such stored bundles. <i>Kharsadi</i> (<i>Euphorbia tirucalli</i>) is used to control termites. Termite infested straw cannot be used as fodder for the animals. Clean <i>khala</i> with a shovel and its floor is layered with <i>kharsadi</i> . Typical smell of milky sap of the plant repels termites. To prevent termite attack in standing crop, use same plant, i.e. <i>kharsadi</i> there. The crushed plants is kept in the main irrigation canal. The water passing over <i>kharsadi</i> stems is supposed to help in controlling termites in wheat at the third irrigation when wheat is most susceptible to their attack (Kheda, Gujarat).	Parmar (1999b)
7	Soil treatment with salt, juice of lemon and castor cake to control termite	Salt, juice of lemon and castor cake added to hot water poured inside the termite mound (nest) after digging them up to some depth to control termite (Mahesana, Gujarat).	Gajera (1994)
8	Termite control by herbal pesticide	Cut approximately 5 kg each of <i>Calotropis</i> and) twigs into small pieces and put them in an earthen pot or other container. About one kg of salt and 10 litres of urine of either human or cattle are added to it. This container is closed air tight and kept in manure pit for 15–20 days. The suspension is filtered through cotton cloth and filtrate is applied as an insecticide along with irrigation water. Approximately 10 litres of this is required for 1 ha to control termites (Jaipur, Rajasthan).	Srisuvalal (1996c)
9	Waste oil to control termite	Bamboo strips are used to support tender saplings. Termite attack is common in sandy regions. First it is on bamboo strips and then on young saplings. The farm-attendants at Gram Bharati Gram Vidyapith in Amrapur, Mehsana district experimented with oil waste for controlling the termite menace. The attendants applied oil waste from oil wells of ONGC on the bamboo strips before using them as supports. Since then, there has been no termite attack in the kitchen garden (Mehsana, Gujarat).	Patel (1998b)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
10	Control of termite by attracting them to empty maize cobs and use of kerosene	Make small holes of about one cm diameter all around in the earthen pot. Empty maize cobs (<i>sitto</i>) are kept inside. It is covered with narrow necked earthen pot (<i>surai</i>). Several such pots are kept at various places in soil at the depth of about one metre and covered with soil carefully. Termites love empty maize cobs and hence get lured to pot. After 3–4 weeks colonies are found in the pot. These pots are removed carefully and destroyed. Some farmers make small deep pits in the field at various places in summer and add cattle-dung in them. Then also the termites get drawn to the pits. After a few days, spray kerosene over them and destroy termites (Jaipur, Rajasthan).	Sharma (1996b)
11	Termite control by using kerosene with irrigation water	Farmers use 2.5 litres per acre of kerosene oil at the time of irrigation (Gonda, Uttar Pradesh).	Anonymous (2000c)
12	Preventing termite attack in dry fodder storage by use of salt and ash	In North Gujarat, farmers arrange bundles of pearl millet and sorghum straws in a beautiful shape on the ground. This structure is locally shape on the ground. This structure is locally called as ' <i>aangali</i> '. It has very steep roof so rain-water runs off quickly and does not stay long enough to penetrate into it. Sometimes the top is also covered with husks of pearl millet or wheat as an added means of preventing the percolation of rain water into <i>aangali</i> . Besides damage from rain, there is problem of fodder damaging termite. To check termite infestation, ash and salt are mixed and layered on the storage site before fodder is arranged in different layers on it. Sometimes salt is dusted between layers of stored fodder in the stock (Bhavnagar, Gujarat).	Koradiya and Koradiya (1994)
13	Control of termite by use of tobacco wastes	Farmers collect residue of tobacco after harvesting. This waste material is incorporated into soil to control termite (Surendranagar, Gujarat).	Mansukh (1992)
14	Control of termite by burning grass	In summer, useless grass and roots of plants are gathered and burnt in the field.	Anonymous (1991e)
15	Termite control by <i>Calotropis</i>	<i>Calotropis</i> leaves are immersed in water for two days. Later, the extract of this is diluted with water and applied at the place of termite attack. This method is quite cost effective (Pondicherry).	Vairakannu (2000-2001b)

PEST AND DISEASE MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
16	Control of termite through sorghum soaked water	Farmers place the green cut plant of sorghum in the main water channel. The water passing over it is believed to minimize infestation of termite. HCN contained in sorghum stalk of one month or 40-days-old has toxic effect on termites (Banaskantha, Gujarat).	Desai (1991c)
17	Control of termite	Root of <i>Nagali</i> (<i>Eleusine coracana</i>) and leaves of Naffatiya (<i>Ipomoea fistulosa</i>) are boiled and cooled. Decoction is filtered and sprayed on termite affected plants. Sometimes it is poured on the base of stem so that it slips into root area (Dang, Gujarat).	Pandubhai (1992)
18	Termite control by use of <i>neem</i> cake	Neem cake as top-dressing controls termites (Gonda, Uttar Pradesh).	Anonymous (2000c)
19	Control of nematode in turmeric by intercropping with marigold	When marigold (<i>Tagetes erecta</i>) is grown as an inter crop with turmeric (<i>Curcuma longa</i>), nematode pests disappear (Madurai, Tamil Nadu).	Vivekanandan (1999b)
20	Control of nematodes in wheat by mixed sowing with carrot	Farmers used to broadcast seeds of carrot along with wheat. Carrot plants are removed during first and second weeding, once the wheat gets established. Many farmers of Jaipur believe that carrot prevents nematodes infestation (Jaipur, Rajasthan).	Sharma (1996a)
21	Control of ants in climbers by use of kerosene oil	Cotton cloth dipped in kerosene is tied to control the movement of ants on the climbers. Due to irritating effect of kerosene, ants and other insects get repelled (Pondicherry).	Vairakannu (2000–2001a)
22	Seed treatment to control ants by use of kerosene oil	Dip cucumber and bean seeds in kerosene before sowing as kerosene acts as an insect repellent (Karnataka).	Anonymous (1999c)
23	<i>Bajagun</i> weed for reducing rat menace	Common cowitch <i>Mucuna prurita</i> (<i>bajagun</i>), a leguminous herbacious annual plant is found throughout the plains of India. Its turgid pods are covered with dense pale brown or grey stinging bristles (trichomes) which upon coming in contact with the skin cause discomfort and itching. This is attributed to the presence of a histamine-liberating proteinase, mucunain. The effect persists for 3–5 minutes. These hair also contain serotonin which causes cutaneous pain, besides itching. An age old	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		practice is to powder leaves and pods of the plant and scatter it over men-ways and in live burrows to drive rats away from cultivated fields (Plains of Himachal Pradesh).	
24	Crab management in paddy by use of <i>hing</i>	<i>Asafoetida</i> (1kg/10m ²) at 45 days of planting in paddy fields controls crabs by emitting strong odour (Karnataka).	Anonymous (1999c)
25	Control of crabs in paddy fields by use of <i>Butea</i>	Spread crushed and dried <i>Muthuga</i> (<i>Butea monosperma</i>) in paddy fields to control crab incidence (Karnataka)	Anonymous (1999c)
26	Rat control by smoking with dry chillies	Smoking rat burrows with paddy husk and dry chillies causes suffocation and kills rats. This method is cost-effective (Karnataka).	Anonymous (1999c)
27	Rodent control by use of camel dung	Farmers use to place 4–5 pellets of camel dung nearby rat burrows in field and home. Rats move away from that area without causing any destruction (Sabarkantha, Gujarat).	Rathod (1992b)
28	Rodent control by groundnut cake	Cake is prepared out of groundnut seed and flour of <i>Kidamari's</i> (<i>Aristolochia bracteata</i>) ear head. This cake is put near the burrows of the rat. The problem of the rat is minimized to some extent (Surendranagar, Gujarat).	Patel (1991a)
29	Rodent control through live wire	Some farmers use electric current around the field. They switch on the electric circuit during night time only. Rats coming in direct contact with the current and are killed on the spot (Bhavnagar, Gujarat).	Patel (1991)
30	Rodent control through pearl millet pellets	Pellets of pearlmillet flour are prepared incorporating few hairs of goat in it. These pellets are placed near the rat burrows to control it (Rajkot, Gujarat).	Bharwad (1991)
31	Rodent control by colouring with vermillion	Some farmers of Saurashtra use <i>sindur</i> powder to control rats. A bread or any other eatable is kept inside an iron-cage. The cage is used to trap rats. A little quantity of <i>sindur</i> (vermillion) is mixed either in water or milk. The mixture is poured on to one or two rats caught in the cage. These coloured rats are left at the place where rat damage is observed. The other rats run away from these coloured rats (Rajkot, Gujarat).	Vasoya (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
32	Rodent control by cement action	Small quantities of cement and sugar are mixed with maize flour and placed near rat burrows. It is believed that when a rat drinks water after eating this mixture, cement becomes hard in the stomach, leading to its death (Zalawad).	Ramgopal (1996a)
33	Saving sugarcane crop from wild animals by <i>Madhuca</i> trap	Jackle and other such animals harm cane crops by biting cane about one foot above the ground. The cane is eaten less but damaged much more. Farmers place <i>Madhuca</i> flowers in an earthen pot tied to a pole. There is also a rope trap attached to earthen pot so that when pulled it ties a noose around the neck of the animal. In the night animal gets attracted by <i>Madhuca</i> flowers. Once they put their mouth in, they can not take it out. When the pot is pulled, the rope noose tighten around the neck. In the morning the farmers kill the animal and hangs it in the field to deter animals (Faizabad, Uttar Pradesh).	Maurya (1993)
34	Rodent control by using alternate repellent food	Pluck fruits of <i>kaitha</i> (<i>Limonia acidissima</i>), and scatter pieces around the field. Rats get attracted to these pieces, but when they eat, they get retracted from them and leave the crop (Faizabad, Uttar Pradesh).	Maurya (1993a)
35	Rodent control by sharp-edged barrier	Spread the leaves of Sarpat (<i>Cenchrus munjo</i>) around field border. These leaves are sharp edged. When rats move over them, they get injuries on stomach and die (Faizabad, Uttar Pradesh).	Maurya (1993a)
36	Rodent control	Use <i>Ipomea cornea</i> in paddy fields to control rats as well as insects (Gonda, Uttar Pradesh).	Anonymous (2000)
37	Control of rodent by growing sunflower with wheat	When sunflower is cultivated as a mixed crop in wheat, it controls rats, particularly at the stage of grain development and maturity. Because sunflower attracts owl at night which preys on rats. Hence the rat movement is reduced or does not take place (Bharuch, Gujarat).	Mane (1991)
38	Control of fruit borers in tomato, brinjal and okra by using seed extract of <i>kochilla</i>	The seed extracts of <i>Kochilla</i> (<i>Strychnos nux-vomica</i>) are made to indigenous pesticide by two different methods. The Tomato fruit-borer (<i>Helicoverpa armigera</i>) could be controlled within 48 hours when tomato pieces treated with indigenous pesticide over 60 min and above were fed to borers. Indigenous	Mishra <i>et al.</i> (2002)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		pesticide was found effective in controlling more than 75% of brinjal fruit-borer (<i>Leucinodes orbonalis</i>) and fruit borer of okra (<i>Earias vittella</i>) when treated for 60 min. and 15 min. Soil application of the indigenous pesticide @ 1.5 g/plant at an interval of 20 days and two times was found efficient in controlling fruit borer of tomato (Ganjam, Orissa).	
39	Control of rodent	Dead rats (4–5) are buried in field. The smell emanating from these scare away others (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
40	Thwarting <i>Neelgai</i> attack	<i>Guava</i> orchards are attacked by hordes of bucks. To stop losses <i>guava</i> is taken and the inner pulp of the fruit is removed. A sulphose tablet is put inside the fruit and the opening is sealed with wet dough. All the while the gas emitted by the sulphose tablet keeps on accumulating inside the fruit (Mainpuri, Uttar Pradesh).	Ranjan Ramesh (1999)
41	Crab control using tamarind seeds	After 30–35 days of transplanting, rainy season (<i>khariif</i>) paddy crop is prone to attacks by crabs that cut stems. Crabs also break bunds of the field by harrowing, and thus water percolates out of field through crab holes. To control crab menace, soak seeds of <i>imli</i> (<i>Tamarindus indica</i>) in water for 24 hours and feed these to crabs. This is observed that the seed gets firmly lodged in crabs mouth and this causes death within a day or two. This practice has been in use for the last 30 years. Broadcast tamarind seeds on bunds and hedges of the field also. Approximately 800 g to one kg seeds are required for one hectare of paddy (Valsad, Gujarat).	Patel (1994f)
42	Rat control by use of <i>Ipomoea</i>	Leaves of <i>Ipomoea fistulosa</i> are boiled in water and filtered. Sorghum grains are boiled in this extract and placed near the rat burrows. It is believed that rats die after eating it (Zalawad).	Ramgopal (1996b)
43	Controlling crabs in paddy by using flower of <i>Butea</i>	After first rain, the she-crab brings along young ones and leaves them in shallow waters in the farm. Crabs damage the crop more in the initial days of the monsoon after transplantation. They snip off stem near the surface of the ground. They also make multiple holes in small earthen bunds of the plots. The bunds may breach and water may not stay in plots.	Gamil (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		The flowers of <i>khakhra</i> (<i>Butea monosperma</i>) are crushed and allowed to dry. The crab-holes in bunds are covered and blocked by the flower powder. Results can be seen within 12–24 hrs (Valsad, Gujarat).	
44	Combating the menace of birds and monkeys	Birds and monkeys are commonly found vertebrate pests which cause tremendous damage to some ripening crops and fruits. Most bird species are protected by law and monkeys can also not be killed due to religious sentiments. Alternatively the practice of driving them away by beating drums and using well trained dogs has been used since long. Locust swarms are also warded off by beating drums (Himachal Pradesh).	Verma (1998)
45	Sling and karban for scaring birds and stray animals	In wet temperate zones, sling (<i>gulel</i>) and karban are commonly used for scaring birds and stray animals for protecting maize, fruits and vegetables (wet Himalayan regions, Himachal Pradesh).	Verma (1998)
46	Treating seeds with <i>celerodendrum</i> leaves	Sorghum seeds are treated with <i>Arani</i> (<i>Celerodendrum multiflorum</i>) leaves prior to sowing to deter stray animals planting. <i>Arani</i> leaves are believed to be highly toxic, killing animals almost immediately upon consumption. Farmers also use this practice to control smut disease but, of course, do not use this in fields near homes, where their own cattle, may enter (Kheda, Gujarat).	Solanki (1993)
47	Seed treatment with eucalyptus seed extracts to control pest and disease	<i>Avare</i> and pigeonpea seeds when treated with eucalyptus seed extracts prevent damage by insects and soil-borne pathogens as p-phenol in eucalyptus seed act as insect repellent and antifungal agent (Karnataka).	Anonymous (1999c)
48	Seed treatment of groundnut with latex of <i>Euphorbia</i> for control of insect and disease	Groundnut seeds are smeared with latex of <i>Euphorbia</i> spp. to avoid infestation by <i>talkidi</i> insect and <i>ratada</i> disease. Approximately 100 g of latex is required to smear 10 kg of seed. However, because of its stickiness, this treatment may not be popular with farmers now (Jamnagar, Gujarat).	Sidabhai (1993)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
49	Control of pest attack in <i>Avare</i> by seed treatment with red soil and ash	<i>Avare</i> seeds are soaked in water for few minutes and then mixed with wet red soil and wood ash. They are sown after drying under sun. This prevents pest infestation during crop growth (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
50	Treatment of finger millet and sorghum by <i>Ashwagandha</i> and <i>Datura</i> for healthy seedling	<i>Ashwagandha</i> (<i>Withania somnifera</i>) roots 250 g and <i>Datura</i> (<i>Datura metel</i>) leaves 50 g are pounded well by adding water. This diluted mixture is sufficient for soaking 1 kg of seed. The seeds are dried in shade before sowing. Treated seeds produce vigorous seedlings, free from pests (Tarekere, Tamil Nadu).	Mallapa (2000)
51	Seed treatment to deter insect and stray animals	Seed of <i>Ram tal</i> (black sesame) are treated with juice of crushed leaves of <i>kidamari</i> (<i>Aristolochia bracteata</i>) and <i>Arani</i> (<i>Clerodendrum multiflorum</i>) to keep stray animals and insects away. It is believed that this treatment makes the plant poisonous (Bhavnagar, Gujarat).	Thaloda (1994)
52	Seed treatment to control wilt	Use curd for seed treatment in pigeonpea/chickpea for 24–48 hr to protect them against wilt disease (Gonda, Uttar Pradesh).	Anonymous (2000c)
53	Control of <i>kharia</i> disease of paddy	To control <i>kharia</i> , pigs are made to move through field. <i>Sada Bahar</i> plants are planted on a particular day in the fields early in the morning. Sometimes salt is sprinkled on the field. The efficacy of these methods remains to be seen (Faizabad, Uttar Pradesh).	Maurya (1993b)
54	Control of early stem-borer in rice by spraying <i>neem</i> oil	Spray <i>neem</i> oil at 0.2%, applied thrice after appearance of pest, i.e. one month after transplanting. The active ingredients (limonoids), particularly azadirachtin and melatriol are known to work as pest repellent (Ganjam, Orissa).	Das <i>et al.</i> (1999)
55	<i>Neem</i> leaves as nursery to control pest and disease	In the paddy nursery site (before sowing of paddy seeds) <i>neem</i> leaves incorporate into soil and puddle and allow them to decompose for two weeks. After this treatment paddy seeds are believed to become resistant to pest and disease (Pondicherry).	Jeyarajkumar (2000-2001)
56	Control of earhead bugs in rice by use of <i>Cycas</i>	Flowers of wild cactus, Sanramboo (<i>Cycas cercinalis</i>) are tied in a cloth and are placed in rice field to serve as repellent against earhead rice field to serve as repellent against earhead bugs (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
57	Control of stem-borer and gall flies in rice with <i>neem</i> cake	<i>Neem</i> -cakes are filled in gunny bags and immersed in irrigation channels to control stem-borer and gall flies (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
58	Control of pests and diseases in paddy	Spraying fresh cowdung extract to control bacterial leaf blight of paddy has been found very efficient; practised by 15% of farmers. Ten percent farmers follow planting <i>Charade</i> and <i>Kochi</i> twigs in rice field to control case-worm and leaf-folder effectively. Leaves incorporation to soil suppresses algal parasite. Use of dried <i>neem</i> leaves in paddy storage has been found effective. The practices of ploughing and sowing during 7th–9th days of <i>sadh</i> (June-July) and distribution, lending and sowing of seeds before <i>Bihana hhina Yatra</i> (June) are still forbidden in the district (Kalahandi, Orissa).	Hossain and Mishra (2002)
59	Root dipping for healthy paddy seedlings	Uprooted rice seedling roots are dipped in powdered solution of groundnut-cake and <i>neem</i> -cake before transplantation. The solution is prepared by soaking the cakes in water overnight. Small quantity of this solution is poured in field in the irrigation channel. The seedlings so treated establish easily and are less vulnerable to pest attack for some period. The process is slightly difficult to follow, as it is laborious and time-consuming (Pondicherry).	Sambandam (2000-2001)
60	Control of brown plant hopper in rice	Leaf extract of <i>Mukudda</i> (<i>Lasiosiphon eriocephalus</i>) is very effective in controlling brown planthopper menace in paddy. One kg of leaves is boiled in 10 litres of water. It is filtered and diluted to a ratio of 1:10 and is then sprayed on crop, once during nursery stage and again after transplantation (Karnataka).	Dinesh (1998)
61	Control of leaf-roller and paddy case-worm by bamboo shoots, kolathia, suan or wolf spider	Insect pest of paddy, paddy leaf-roller and paddy case-worm can be controlled by cut pieces of bamboo shoots, <i>kolathia</i> (a local weed), <i>suan</i> (minor millet) and wolf spider (a predator) (Orissa).	Parasar (1994)
62	Use of <i>Bana</i> plant twigs in paddy fields to control pests and diseases	Peg 5-10 <i>Bana</i> twigs in canal area after transplanting of paddy. This protects the crop against endemic diseases and insect pests (Himachal Pradesh).	Subba Reddy and Singh (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
63	Control of <i>gundhi</i> pest of paddy by burning	To save paddy crops from <i>gundhi</i> bug, farmers take a discarded tyre and burn it. They drag it bicycle tyre around the field and put it on the windward side. The smoke and smell is assumed to repel the pest (Faizabad, Uttar Pradesh).	Maurya (1993a)
64	Control <i>mashi</i> in paddy	<i>Green</i> and <i>black mashi</i> (aphid) insects sit on <i>aakda</i> (<i>Calotropis procera</i>) leaves. These leaves when placed in paddy fields, attract <i>mashi</i> insects, which will sit on them instead of paddy leaves. Long branches and leaves of <i>aakda</i> trees should be placed at distances of 15 feet in paddy fields. Around 25 to 30 branches are required in one <i>bigha</i> . The branches dry up in ten days. These <i>aakda</i> branches are changed thrice during which life span of <i>mashi</i> comes to an end (Anand, Gujarat).	Rathod (1998)
65	Control of earhead bug in rice by using kerosene mixed rice	Rice-bran (4–5 kg) is mixed with 1 litre of kerosene and sprayed in paddy field during early morning. The limitation of this method is that its bran cannot be used on a large scale (Pondicherry).	Ganeshan (2000–2001a)
66	Stem borer control in paddy by use of branches of cashew nut	Farmers in Tamil Nadu cut cashew tree branches and place it in field to prevent movement and boring action of stem-borer larvae in rice fields boring action of stem-borer larvae in rice fields (Tamil Nadu).	Rath (1992)
67	Control of red leaf spot disease in paddy by seed treatment with <i>pudina</i> leaf extract	Paddy seeds are soaked in 20% <i>pudina</i> leaves extracts (<i>Mentha sativa</i>) for 24 hours before sowing. This increases germination rate and vigour of seedlings (Vattalakuntu, Tamil Nadu).	Kupusamy (2000)
68	Efficacy of the plant <i>Polygonum hydropiper</i> against brown planthopper of rice	The tribal belt of Balasore and Mayurbhanj districts of Orissa represents a group of tribals known as <i>Santhals</i> who possess a rich knowledge of botanicals to be used for mangement of different pests. Water pepper (<i>polygonul hydropiper</i>) widely used by tribals for different pest control purposes.They name it as <i>Gotkinamaru</i> (cattle-tick-killer).It is commonly known as <i>Kalatadi</i> or <i>Galpudi</i> by the locals. Leaves of the plant is used for killing ticks on cattles and buffaloes, for catching fish from muddy water and for controlling insect pests of rice. This is a lowland weed, grown annualy in canal and river banks and swampy and marshy lands. Its leaf extract was found	Mayabini (2002)

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		to exhibit insecticidal action. Results obtained from experiments showed that plant can prove itself a suitable tool for the management of brown plant cropper (Orissa).	
69	Control of leaf - folder and grass hopper in rice by use of extract of <i>Garadi</i> leaf	<i>Garadi</i> leaf (<i>Cleistanthus collinus</i>) extract is prepared by using 10 kg leaves soaked in 10 litres of water for 8 days. The supernatant is separated by decanting and is used at 10 % solution. Content of alcohol and chloroform (oduvn group) in leaves of <i>garadi</i> plants may be the acting agent(s) in inactivating/killing the leaf folder and grasshopper in rice (Seoni, Madhya Pradesh).	Das <i>et al.</i> (1999)
70	<i>Calotropis</i> traps for control of aphid in rice	Some had observed an aphid colony on the leaves of green gram <i>akda</i> (<i>Calotropis gigantea</i>), a wild plant that grows naturally on the common lands. It was deduced that <i>akda</i> leaves can be a good trap for attracting aphids. They brought some green twigs of <i>akda</i> and planted them in paddy field at the distances of 10–15 feet. Within a few days they found a concentration of aphids on green leaves and twigs of <i>akda</i> planted in the field. They repeated this practice again next year and found very good results (Kheda, Gujarat).	Rathod (1997a)
71	Blast control in paddy by use of extract of <i>karala</i> bark	Two or three kg of <i>karala</i> bark is crushed in water and sprayed to paddy fields to control blast disease (<i>Karnataka</i> disease) (Karnataka).	Anonymous (1999c)
72	Control of <i>gundhi</i> bug in rice by burying of old tyres and tubes	Burning of old tyres and tubes in the windward direction of paddy fields controls insect pests owing to smell of burnt rubber which drives away the <i>gundhi</i> bug (Karnataka).	Anonymous (1999c)
73	Protection of rice from epidemic disease and insect- pests by <i>Bana</i> twigs.	<i>Bana</i> (<i>Vitex</i> sp.) twigs (5–10) are pegged in one <i>kanal</i> (1 ha = 25 <i>kanal</i>) area after transplanting/halod in paddy fields. <i>Bana</i> leaves might be acting as repellent anti-oviposition against paddy stem borer and <i>hispa</i> . The leaves do contain aroma which might be the main cause (Himachal Pradesh).	Singh (1996)
74	Control of pests in rice by use of neem cake	Apply <i>neem</i> cake at 25 kg/ha along with fertilizer. It controls pests (Karnataka).	Anonymous (1999c)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
75	Control of case-worm in rice by burning bicycle tyre	Each bicycle tyre is cut into 4 pieces, requiring 20 tyres for 1 hectare. The tyre pieces are tied in pegs above vegetation heads and are burned in the evening during last week of August and first week of September. The light attracts insects (Shahdol, Madhya Pradesh).	Das <i>et al.</i> (1999)
76	Control of green grass hopper by use of branches of <i>salai</i>	Green grass hopper attacked the crop is brushed with branches of <i>salai</i> (<i>Boswellia serrata</i>) with more leaves, and branches are also placed in field at the distance of 6–8 m. This is done in evening and at that time some water should be available in the field; 70–80% success has been reported (Eastern Uttar Pradesh).	Gupta (1993)
77	Control of insect pests in paddy by use of <i>Calatropis</i> branches	Placing <i>Calatropis</i> branches at the water inlet of paddy fields controls insect pests because of the alkaloid present in latex acts as a repellent (Karnataka).	Anonymous (1999c)
78	Control of <i>Banka</i> and rice <i>gundhi</i> bug in paddy by light trap	One meter high stands are erected in the affected crop. During night one earthen lamp is placed on the stand after covering it with a funnel shaped iron shieve. Insects are attracted and get collect around the stand. Early in the morning farmers collect these insects and put under soil (Eastern Uttar Pradesh).	Gupta (1993)
79	Control of <i>Khaira</i> and blight diseases in paddy	Farmers broadcast 20 kg salt/ha (Gonda, Uttar Pradesh).	Anonymous (2000c)
80	Control of <i>gundhi</i> bug in rice	The green leaves of the <i>gundhi</i> tree is spread in the affected field and 1–2 cm of water level is maintained in the field to control <i>gundhi</i> bug in paddy (Eastern Uttar Pradesh).	Gupta (1993)
81	Control of banka (grasshopper) and rice <i>gundhi</i> bug in paddy by use of <i>kodo</i> straw	The straws of <i>kodo</i> (<i>Paspalum scrobiculatum</i>) and) are burnt near affected fields. Insects get collected and die. Some left alive are gathered physically and killed (Eastern Uttar Pradesh).	Gupta (1993)

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82	Control of rust in wheat by use of pearl millet flour	Haribhai Narola of Bhavnagar district has been using pearl millet (locally called <i>bajra</i>) flour instead of chemical fertilizers as basal treatment in soil before sowing. The yield of wheat was found higher by 250 kg/ha in the plot treated with <i>bajra</i> flour. Small patches of rust is observed in DAP-treated plot, while the other remained healthy (Bhavnagar, Gujarat).	Narola (1996)
83	Prevention of fungal pathogen rust through milk in wheat	Wheat seeds are immersed in milk before sowing to avoid rust disease. The neutral to alkaline pH of milk not only washes off fungal spores from surface but also the adhesive property of milk fat prevents any further invasion by spores and formation of postules. The low pH of whey milk may prevent germination of fungal spores, avoiding possible secondary infection (Banaskantha, Gujarat).	Desai (2000)
84	Control of rust in wheat by seed treatment with milk	Farmers immerse the seeds of wheat in the milk before sowing to avoid rust in the crop (Rajkot, Gujarat).	Solanki (1991a)
85	Control of rust in wheat by controlling irrigation water	Farmers give minimum irrigations to wheat and that too at night for controlling rust (Banaskantha, Gujarat).	Desai (1991a)
86	Control of rust in wheat by use of bones of camel	Rust affects wheat crop at spike formation. To control it, bones of camel are buried in irrigation channel before irrigating crop. It is believed that rust can be controlled within 10–15 days by this method (Sabarkantha, Gujarat).	Zala (1994)
87	Use of fruit of <i>Simta</i> for control of insect-pest in maize	Fruits (2–3 kg) of <i>Simta</i> vine are cut into small pieces and mixed with water (10–12 litres) in a container and stirred well. After a few minutes, the suspension is filtered through cotton-cloth. Filtered suspension is sprinkled over maize with the help of bamboo leaves/small branches to control insect pest infestation. Suspension is extremely bitter in taste. Tribal people use this fruit because it has an extremely pungent taste. Maize is susceptible to larval insect pest which damage leaf, pollen and cob. They do not have any idea that this suspension either kills the insect pest or keeps away the pest by acting as a repellent. Sometimes these fruits are used to cure endo-parasite infecting intestine of calf. This endoparasite is locally known as <i>karmiya</i> .	Vasava (1992b)

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		Approximately 4–5 fruits are fed with grass to suffering calf for 4–6 days continuously. <i>Simita</i> is a creeper and bears oblong green fruit. It fruits during August to June. It grows in hedge (Bharuch, Gujarat).	
88	Control of insects in maize by releasing kerosene treated beetle	Sometimes maize is infested by <i>hungo</i> (local name of insect -pest). This pest damages maize pollen. Tribals in the forest use several physical methods to control its infestation. Sometimes adult insects (may be beetle) are soaked for few minutes in kerosene and released again in field. (This treatment is also believed to causing sterility in insects) (Bharuch, Gujarat).	Vasava (1992c)
89	Control of pests in maize by tobacco	Mix 1 kg of tobacco powder with 5 kg of sand. The mixture is made moist by sprinkling 200–250 ml of water. Twenty days after sowing the crop the mixture is slowly put in the crown of the crop. Six kg of this mixture is sufficient for 1 hectare for controlling <i>gabhmar</i> insect (stem-borer). Similar treatment is given on the 40th day (from sowing). The cost of using this technique comes to about Rs 25/ha (Modasa, Gujarat).	Patel (2000c)
90	Control of diseases and pests in maize by use of onion juice	Painted grasshopper pests attack maize in its early stage. Parasites such as striga and diseases like leaf curl virus also attack leaves and are causing high damages. Generally these pests attack during monsoon. Juice of 2–3 kg peeled onions (after dilution) is sprayed on one <i>bigha</i> (0.24 hectare) to control pests (Panchmahal, Gujarat).	Rathod (1997)
91	Use of leaves of Dhumas (<i>Combretum ovalifolium</i>) to control pests in maize	Maize is infested by <i>sunga</i> (local name of insect pest), which is like a blister bittle, which sucks juice from maize pollen and ultimately affect cobs setting. Collect <i>Dhumas</i> (<i>Combretum ovalifolium</i>) leaves from degraded lands or common lands. About 5–7 persons stand in a row and keep leaves of this plants in individual bags on their back. They start moving from one side of the field to the other in the direction of wind. On the way, they catch 1–2 <i>Sunga</i> from the air and crush these with 2–3 leaves by rubbing palms of hands. Peculiar smell comes from this mixture. According to user of this practice, <i>Sunga</i> will fly away in the direction of wind due to peculiar odour. As soon as the smell is over or reduced from material	Kalibhai (1992)

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		(after 2–4 minutes), fresh insects and leaves are crushed to repeat the treatment continuously. All the insect fly away in one direction quickly. This practice is followed collectively to some extent. Farmers of adjoining fields also pursue this practice along with their family members at the same time. All the people start from first field and move in the wind direction. One farmer suggested the use of leaves of another plant (<i>keji</i>) instead of <i>Combretum ovalifolium</i> . <i>Keji</i> can be found in hedge and bears small leaves, According to him 5–7 persons are required for 1 acre of crop. This practice is very common for maize and pearl millet crops (Vagalkhor).	
92	Smut control in sorghum by cow urine	Cow urine is used for treatment of sorghum seed with a belief and experience that seed borne diseases can be controlled and also help in proper germination. The scientific reason behind this may be that the sulphur content in the cow urine help to control the seed borne disease like grain smut. The urine has a smell which may repel the insects, damaging the seed. Biuret content of urine enhance seed germination (Maharashtra).	Parmar (1997b)
93	Disease control in sorghum by ghee smoke	Farmers always keep firewood on hand to protect their sorghum from <i>ratda</i> disease. The wood is burnt in the affected field and ghee (clarified butter) is added to produce smoke that brings the disease under control (Kavachiya, Valiya).	Choudhary (1993a)
94	Control of surface grass hopper in sorghum by extract of <i>Aag Futla</i> fruit	Surface grasshopper, locally called <i>khapedi</i> , infests sorghum during the monsoon. Fresh <i>Aag Futla</i> , fruits are collected when they are still green, crushed in water and then filtered. The liquid is sprayed on the crop. The fruit is a berry and resembles the fruit of <i>tindola</i> (<i>Coccinica grandis</i>) (Bharuch, Gujarat).	Vitthalbhai (1993)
95	Control of pests in sorghum and pulses by fence crops	Sowing pearl millet on East-West and niger on North-South boundaries acts as trap crops and reduces pest incidence on the main crop of sorghum and pulses (Dharwad, Karnataka).	

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S. No.	Title of ITK	Details of ITK and rationale	Reference
96	Controlling blister beetle in pearl millet by releasing coloured insect	<i>Kansia</i> attacks earhead of Pearl millet. A mixture of liquor and mercuric oxide (vermillion) is used to control this insect. Vermillion is added to 50 to 100 g of liquor till it becomes scarlet. The insects are hand picked, coloured by dipping in them in the mixture and released. Seeing the coloured insects or smell of liquor, the rest of the <i>kansia</i> insects flee the crop. Sometimes, instead of the above mixture, the leaves of a grass known as <i>kamdo</i> is also used. The leaves are crushed with hands as one moves around the farm in the direction of wind. <i>Kansia</i> insects fly away due to the strong smell of the crushed leaves (Kheda, Gujarat).	Pagi (1998)
97	Control of larval pest of pearl millet by spraying jaggery	A larva which attacks earhead of pearl millet eats away grains at the milk stage in the rainy season (<i>kharif</i>). About 25% crop damage is observed. To control this, solution 500 g of jaggery is dissolved in 10 litres of water and is sprayed on earhead. Perhaps, the jaggery attracts ants and other predators which then attack the larvae (Bhavnagar, Gujarat).	Bhikhabhai (1994)
98	Use of country wine to reduce infestation of pearl millet beetle	Farmers spray country-wine or kerosene on the pearl millet to reduce infestation of pearl millet beetle (Kagdipura).	Vasava (1992)
99	Controlling grasshoppers through <i>Sesbania</i>	To protect paddy from viruses, farmers grow <i>jayanti</i> (<i>Sesbania aegyptiaca</i>) as a hedge all round the field (Uttar Pradesh).	Ram Pratap and Rajput (1999)
100	Control of hairy caterpillar and <i>Helicoverpa</i> in pulse crops	Spray solution made out of 1kg crushed garlic and soaked in 200 ml of kerosene mixed with 2 kg green chilli paste dissolved in 200 litres of water, to act as contact insecticide and a repellent to hairy caterpillar and <i>Helicoverpa</i> in pulse crops (Karnataka).	Anonymous (1999c)
101	Control of Gujarat hairy caterpillar by boundary planting	Farmers grow 2–3 lines of clusterbean (<i>Cyamopsis tetragonoloba</i>) or sunhemp (<i>Crotalaria juncea</i>) surrounding crop boundary to avoid infestation of the larvae of Gujarat hairy caterpillar (Banaskantha, Gujarat).	Patel (1991h)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
102	Control of <i>Helicoverpa</i> larvae on chickpea by mixed cropping with sorghum	Farmers adopt mixed cropping of chickpea and sorghum. The purpose behind this is that birds are attracted towards sorghum. While perching on sorghum, <i>Helicoverpa</i> larvae on chickpea predated immediately (Solapur, Maharashtra).	Anonymous (2000d)
103	Control of larval pests in chickpea by extracts of <i>Adhatoda</i> and <i>Pongamia</i>	Leaves of <i>ardusa</i> (<i>Adhatoda vasica</i>) and <i>karanj</i> (<i>Pongamia pinnata</i>) are used for controlling larval pest in chickpea. About 5 kg each of <i>karanj</i> leaves and <i>ardusa</i> twigs with leaves are crushed in a stone or wood mortar to make juice. The juice is mixed with 10 litres of water and the solution is filtered three times through a cloth. Solution is further diluted with 1–5 litres of water and sprayed on the crop. About 8–10 litres of this solution is required for an acre. The early morning application in a week provide satisfactory results (Sabarkantha, Gujarat).	Vankar (1997)
104	Control of wilt in chickpea by seed treatment with kerosene	The disease is locally known as <i>Murchhai</i> . Chickpea seeds are smeared with kerosene oil before sowing to avoid <i>Murchhai</i> . Farmers believe that it also helps in germination of seeds (Surendranagar, Gujarat).	Lakhabhai (1992)
105	Seed treatment to prevent wilt in chickpea	Farmers practice to prevent wilt in chickpea is mixing of 100 ml of mustard oil with 40 kg of seeds before sowing (Gonda, Uttar Pradesh).	Anonymous (2000c)
106	Control of <i>Murkhai</i> disease in chickpea by seed treatment with kerosene	<i>Murkhai</i> is characterized by withering of chickpea, generally at the pod-setting stage. Farmers smear seeds of chickpea with kerosene, 3–4 days before sowing to check <i>murkhai</i> . Approximately 250 ml of kerosene is sufficient for treating 20 kg of seeds. This treatment renders seeds black. Farmers believe that almost 95% success can be achieved by this practice. Some farmers smear seeds first with kerosene and afterwards with DDT or BHC powder (Surendra-nagar, Gujarat).	Padhryar (1994)
107	Application of <i>karanj</i> for control of <i>Helicoverpa</i> in chickpea	One kg <i>karanj</i> (<i>Pongamia piñnata</i>) leaves and bark are soaked in 5 litres water and boiled for half an hour. It is strained and diluted in 15 litres water. This solution is used for spraying and is highly effective in controlling <i>Helicoverpa</i> pest in chickpea (Dahod, Gujarat).	Dangi (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
108	Control of podborer in chickpea through insect repellent crops	Podborer infestation in chickpea is effectively controlled by growing coriander and linseed along with, as these crops are insect repellent (Karnataka).	Anonymous (1999c)
109	Control of insects in cotton and pigeonpea by use of extract of <i>Ayani</i> and <i>Anuchhadi</i>	Growing primordials of <i>ayani</i> (<i>Clerodendrum multiflorum</i>) and <i>Anuchhadi</i> (a local name of plant) are collected and boiled in water. The boiled suspension is filtered through cotton cloth. Approximately 200 ml of this extract is mixed with 15 litres of water and the solution is sprinkled over cotton and pigeonpea to control insect pests. This practice is in use since time immemorial (Karshad).	Pashliya (1992)
110	Jaggery solution for control of <i>Helicoverpa</i> larvae in pigeonpea	The farmers spray 1–2% jaggery solution at flowering and pod formation stage of the crop, which helps in reducing pest damage on pigeonpea. They have the assumption that because of sweetness of jaggery, movement of black ants increases on pigeonpea which eat larvae of podborer pest complex, as a result of which there is reduction in pest intensity (Solapur, Maharashtra).	Anonymous (2000d)
111	Control of <i>Helicoverpa</i> larvae in pigeonpea by inverted harrow operation	Dragging inverted harrow on the standing crop of pigeonpea at pod-filling stage is helpful in minimizing larval population of <i>Helicoverpa</i> . This practice is less expensive and easy to operate (Solapur, Maharashtra).	Anonymous (2000d)
112	Control of pod borer in pigeonpea by spraying jaggery solution	Spraying of jaggery solution (0.4%) to pigeonpea controls podborer as ants and other insects attracted by jaggery destroys podborer eggs (Karnataka).	Anonymous (1999c)
113	Use of tobacco extract to control insect pests in pigeonpea	Dried leaves of tobacco are boiled in water (500g in 5–7 litres) till only half the volume is left. Approximately 15–25 g of ' <i>Morthuthu</i> ' (CuSO ₄ 2H ₂ O) is mixed in filtered decoction and used as insecticide. About 30–50 ml of the content is mixed in 12–15 litres of water and sprayed on the pigeonpea. It was used extensively on cotton 8–10-years back but now-a-days cultivation of cotton is reduced remarkably so the use of this treatment has also reduced. Most of the farmers are using <i>Naffatiya</i> leaves extract in pigeonpea. Sometimes residue of tobacco (stem,	Sangrol (1992)

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		small and fallen leaves) left in the field after harvesting are used. Residues are boiled in water. Filtered suspension is sprayed directly without any adulteration with water on the crop. This practice is in use for a very long time in this area and requires a lot of labour to prepare it. This extract is also used on seedlings of coconut and okra by some other farmers (Tuna).	
114	Control of pod-borer in pigeonpea	At the onset of pod formation in pigeonpea (<i>Cajanus cajan</i>) crop, the possibility of pest attacks also increases. The prominent pest of this plant is the green caterpillar (<i>Heliothis</i> spp). To control this pest citric acid is used. Approximately 10 g to 25 g of citric acid is dissolved in 15 litre water and this solution is used for spraying on the crop. This controls the incidence of green caterpillar without any side effects on the crop. There is yet another alternative which is spraying 10 ml of kerosene mixed in 10 litre of water to control the pests (Kheda, Gujarat).	Patel (1999c)
115	Control of pests in greengram	Toward off pest attack on greengram (<i>Phaseolus aureus</i>) some farmers dissolve 200g of tobacco powder, 2 litres of buttermilk and 2 leaves of Kuvaar' (<i>Aloe vera</i>), in 15 litres of water. The solution is left undisturbed for 15 days. Then it is filtered with a cloth and the filtrate is dissolved in water in the ratio of 100ml solution to 15 litres of water. This mixture is then sprayed on crop at an interval of 8–10 days. This operation increases productivity and controls 80% of greengram pest (Rajkot, Gujarat).	Kapadia (1997c)
116	Control of podborer in pigeonpea	Spray of <i>neem</i> +chilli+ garlic and bougainvillea extracts is done to control pod borer in pigeonpea (Mahboobnagar and Kurnool, Andhra Pradesh)	
117	Control of insects in pigeonpea by growing maize as bird attractant	Seeds of maize (250–375 g/ha) are grown in fields of pigeonpea. These plants are grown randomly to attract birds to eat maize grains. Actually the reason behind this practice is to make birds habituated to come to the field. After a few days, the limited stock of maize cobs would be over. Thereafter, habituated birds sit on maize plants in search of alternate food and find insect larvae on pigeonpea and pick it up as food. Thus larval population is minimized (Bharuch, Gujarat).	Ghanchi (1992)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
118	Pest control methods of pulses and gingelly	Mixing pieces of jaggery, husk of gingelly and cumbu, and sand (Tamil Nadu).	Parvathi <i>et al.</i> (2000)
119	Controlling green worm in <i>tuvar</i> by hairy extract of <i>Annona</i> and <i>Clerodendrum</i>	<i>Annona squamosa</i> and <i>Clerodendrum phlomides</i> leaves are used to control green worms (<i>Helicoverpa</i> spp). The leaves are boiled in water and filtered separately in a pan and cooled. About 200g of this filtrate is mixed with 10 litres of water and sprinkled on the crop. It remains effective 6–7 days (Bharuch, Gujarat).	Ghanch (1998)
120	Bird perch- A component in the management of <i>Helicoverpa armigera</i> on pigeonpea	Bird perches, constructed of galvanised iron wire, tied on four bamboo poles were fixed on four corners of a 5 hectare pigeonpea field, which formed a rectangular skeleton. The two opposite sides of the rectangular wire were tied with coconut coir rope of about half inches diameter. Such ropes were tied at a distances of 2 metre from each other to facilitate a comfortable perching site for the birds. Pigeonpea cultivars, Khargone-2 was sown in the last week of June 2001 at Zonal Agriculture Research Station, JNAU, Khargone, Madhya Pradesh. The chickpea pod borer, <i>Helicoverpa</i> : <i>Noctuidae</i>) larval population was recorded from 4th week of November, 2001 which was repeated at 3 days interval and continued upto fourth week of December, 2001 i.e. till the availability of <i>Helicoverpa</i> larvae. Simultaneously, another set of observations were recorded on pigeonpea, from the field where bird perches were not installed. Analysis of data revealed that throughout the period of study, significantly lower <i>Helicoverpa</i> larval population was recorded on pigeonpea, which harboured higher <i>Helicoverpa</i> larve population where bird perches were not installed. The birds recorded and whose visit were observed to be very frequent were Black Drango and Blue jay. The birds visited in large numbers during the morning and evevning hours of the day. Black dango used the perches as perching site and devoured the larvae by taking short flights and picked them from the pigeonpea plants. While, Blue jay walked in between the pigeonpea rows and fed on the larvae, which had fallen on the ground. The study indicated that the bird perches, a traditional indegeneous technology adopted by the farmers, play	Veda <i>et al.</i> (2002)

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		an important role in the effective management of <i>Helicoverpa armigera</i> larvae on pigeonpea (Khargone, Madhya Pradesh).	
121	Control of pod borer in pigeonpea by marigold	Cultivate marigold with pigeonpea. It controls pod-borer. Marigold acts as a trap crop for pod-borer (Karnataka).	Anonymous (1999c)
122	Protection of green gram and black gram from Bihar hairy caterpillar	Sesamum is sown as trap crop (Gonda, Uttar Pradesh).	Anonymous (2000c)
123	Manual control of <i>Helicoverpa</i> in pigeonpea	The practice of shaking and manual destruction of <i>Helicoverpa</i> is practised traditionally in Andhra Pradesh. Adoption of this practice in pigeonpea increases the yield from 20 to 100%. This traditional knowledge of shaking of plants, <i>neem</i> seed kernel suspension, tobacco decoction, chilli-garlic extract, bird perches and NPV were evaluated to control the pest complex of pigeonpea in Medak district by 14 field based NGO organisations. The results showed that use of IPM technique recorded additional 500 kg/ha as compared to the non-IPM technologies. The net profit was around Rs 11,000 per hectare as compared to non-IPM technologies (Rs 10,000 per ha) (Mahaboobnagar and Ranga Reddy, Andhra Pradesh Gulbarga and Raichur, Karnataka).	Chary <i>et al.</i> (1999)
124	Non pesticidal management in groundnut	The participatory extension trials of traditional knowledge on pests of groundnut (deep ploughing in summer, sunflower/castor as a trap crop/ collection and destruction egg masses, spraying of chilli, garlic extract, spraying of 5% <i>neem</i> kernel suspension, use of NPV @ 250 LE and erection of bird perches) as NPM practice showed that the farmers successfully manage groundnut pest complex with above ecofriendly technical knowledge. The farmers save about Rs 1500 per hectare from pesticide spraying costs with NPM technologies (Andhra Pradesh).	Chary <i>et al.</i> (1999)
125	Control of leafminer ingroundnut by flooding	Farmers control leafminer in groundnut by flooding field to submerge the crop overnight and letting out water on the next morning (Tungabhadra, Karnataka).	Reddy and Ghewande (1992)

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126	Asafoetida for controlling groundnut blight	Blight in groundnut can be prevented if seeds are treated with asafoetida before sowing. Twenty kg of groundnut seed is soaked in the solution prepared by mixing 250 g of asafoetida in 2 litres of water. The seeds are soaked for 12 hours (Banaskantha, Gujarat).	Ragnathbhai (1998)
127	Control of hairy caterpillar by using lemon and tamarind juice	Hairy caterpillar is controlled by application of a mixture of 150 ml lemon juice and 150ml juice of <i>ambli</i> (<i>Tamarindus indica</i>) mixed in 15 litre water in the affected field. This solution is sufficient for 0.25 ha. It is sprayed three times for effective control (Kheda, Gujarat).	Gadhavi (2000)
128	Control of insects in groundnut through trap crop	Farmers use cowpea for intercropping with groundnut. Being more succulent cowpea attracts sucking pests and thereby, reduces damage of groundnut (Coimbatore, Tamil Nadu).	Reddy and Ghewande (1992)
129	Use of castor shells as manure and for pest control	In Junagadh district of Gujarat, groundnut is the major crop during the monsoon. But owing to erratic rainfall over the last five years, some farmers have started growing castor (<i>Ricinus communis</i>) instead. This has resulted in large amounts of empty shells of castor pods being produced; the pods are looked upon as wastes. Two farmers developed an organic manure using shells of castor pods, leaves of mango and castor, cow dung and other farm litter. A pit is dug and at the bottom of the pit, leaves of mango, castor and farm waste are layered thinly. Above it, about two cart loads of animal dung and urine are deposited. About 800 to 1000 kg of empty shells of castor pods and gobar gas (biogas plant) slurry are alternately layered to bring it to the level of ground surface. Finally, a special kind of soil known as ' <i>tas-moram</i> ' is spread in a layer on it. Many farmers in Saurashtra incorporate ' <i>tas-moram</i> ' (a kind of gravelly soil) into the furrows of the field where groundnut is to be sown. They believe that it helps in loosening the soil and facilitates peg penetration during ploughing. The contents of the pit are allowed to decompose for about four to six months. Decomposed manure is loaded on the bullock cart or tractor and incorporated in the field before sowing of the next crop of groundnut. Last year Jethabhai applied about six to eight cart loads of this manure in one bigha (0.16 ha) of groundnut crop. He says that application of this	Kamariya and Kamariya (1995)

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		manure has increased the yield of the groundnut crop by about 100 kg per bigha which means an increase of 35 percent over the average yield. This could partly be attributed to pesticidal properties of the manure. Some other farmers found it to be effective against aphids and some fungal diseases which could cause yield loss ranging from 10-15 percent. It also helps in reducing termite infestation in following winter wheat crop (Junagadh, Gujarat).	
130	Control of aphids pests of groundnut	Black and green aphid of groundnut sucks the sap from the leaves. When cloudy atmosphere coincides with Southerly wind, the aphid population builds up. An innovative mixture of several poisonous plants and locally available chemicals to tackle the pest is prepared. The following are the ingredients of pesticidal mixture: (i) A filtered decoction of approximately 500g of custard apple (<i>Annona squamosa</i>) leaves boiled in down to one fourth of its original volume. (ii) About 50–60 ml latex of <i>Calotropis</i> . (iii) Seeds/pellets of <i>ariya</i> which can be brought from the village shop, heated in half litre of water and an extract is prepared. (iv) Half a litre of water in which 100g of tobacco leaves have been boiled and filtered. (v) The whitish fluid which deposits in biogas digester, it is generally removed at every 4–6 months, while cleaning gas plant. It collects in small quantities and gives off a foul smell like synthetic pesticides and (vi) About 100g of copper sulphate. All the ingredients are mixed in a container and resultant mixture is used as insecticide. This said quantity is enough for making 15 litres of spraying liquid. Only one spray is sufficient to control aphids in groundnut (Junagadh, Gujarat).	Desai (1994)
131	Control of <i>Tikka</i> disease in groundnut	<i>Tikka</i> disease <i>Cercospora arachidicola</i> affects the groundnut crop when it is four weeks old. Spots appear on the leaves of the plant and their colour fades. The reddish-ash coloured spots slowly increase in their size to spread on the entire leaf. With time, the leaves become dry and fall from the plant. As a result, pods do not set or do not develop nuts to full capacity (Banaskantha, Gujarat).	Choudhary (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
132	Control of larval pest in castor by pearl millet flour	Approximately 0.5 to 1 kg of pearl millet flour is mixed with 15 litres of water in an airtight container. This container is kept inside manure pit for 20 days. Thereafter, suspension filtered through a cotton cloth is used as insecticide (25ml in 12–15 litres water). Two sprays at an interval of a week, help in controlling green larval pest in castor. This larva, a voracious feeder, eats away green parts of leaves and later attacks midribs and tender inflorescence as well. It also migrates to other crops (Rajkot, Gujarat).	Paghdar (1995)
133	Control of <i>Haamdaiyal</i> in castor by lemon and tamarind juice	Castor pest locally called <i>Haamdaiyal</i> (<i>Achoea janata</i>), is seen on trees. Lemon juice (<i>Citrus limonia</i>) and sour tamarind (<i>Tamarindus indica</i>) are used for the control of <i>iyal</i> in castor. Around 150 ml lemon juice and 150 ml tamarind juice are mixed in 15 litres water. This is the amount prescribed for 1 <i>bigha</i> (0.16 ha). If results are not apparent, repeat the treatment (Kheda, Gujarat).	Gadhavi (1999)
134	Puffed sorghum to control semilooper in castor	Semilooper is a major pest in castor. It damages leaves by cutting across leaves. The larval stage is most infective. One kg of puffed sorghum for one <i>bigha</i> (0.16 ha) is spread for 3 days around the boundaries of the field, for attracting birds. The birds come to feed on these. While doing so they come across these semi-loopers and eat them (Mehsana, Gujarat).	Patel (1999b)
135	Control of caterpillars in castor by bird attractant	The hairy caterpillar (<i>Amacta</i> sp), locally known as <i>Lunkani</i> causes severe damage to castor during monsoon. Roasted seeds of maize or sorghum about 5 kg/acre are broadcast on field. Reportedly the caterpillar can be successfully controlled within a week (Kuriya, Mehsana, Gujarat).	Sitaji (1993)
136	Control of castor semilooper by use of goat urine and <i>neem</i> leaves	Normally semilooper (<i>Achaea janata</i>) attacks castor after 40–50 days of sowing. The larvae consume most of the foliage leaving just veins and petioles. To safe-guard crop against semilooper, goat-urine and leaves of <i>neem</i> is used. Two kg of <i>neem</i> leaves are soaked in 2–3 litre of goat-urine. This mixture is then distilled. About 500 ml of distillate is diluted with 15 litre of water and sprayed over crops. The solution is sprayed again after five days for higher efficiency (Bansakantha, Gujarat).	Darbar (2000)

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137	Control of aphids by <i>Calotropis</i> soaked in water	Leaves of <i>Calotropis</i> plant are immersed in water channel during irrigation to minimize aphid infestation (Banaskantha, Gujarat).	Thakor (1991)
138	Control of aphids in mustard by <i>neem</i> twigs in Folidol	Farmers prepare ash from leaves and small twigs of <i>neem</i> and incorporate it in Folidol (a chemical pesticide) powder. The mixture is dusted on mustard to minimize infestation (Banaskantha, Gujarat).	Desai (1991b)
139	Control of aphids in pulses by tobacco decoction	Application of tobacco decoction mixed with soap emulsion is done to control aphids in pulse crops (Many parts of the country).	
140	Control of aphids in lucerne by <i>Calotropis</i> soaked water	Farmers place freshly cut branches of Akada (<i>Calotropis gigantea</i>) in irrigation channels to control aphid infestation in lucerne (<i>Medicago sativa</i>). Akada with white and violet flowers is commonly found in uncultivated lands and it's latex irritates skin (Junagadh, Gujarat).	Alabhai (1992)
141	Control of aphids	A little quantity of castor oil is added during irrigation in the water channel for reducing aphid population (Ahemdabad, Gujarat).	Patel (1991c)
142	Control of aphids in lucerne by dusting ash	It is collected from either house <i>Chulah</i> or by burning cowdung cakes (Mehsana, Gujarat).	Bavabhai (1992b)
143	Control of <i>bania</i> or gaygwalan kida Scalping <i>Scallopandra</i> spp. in soyabean	Feeding of mahua flower solution renders pest inactive for 20–22 days during which farmers could safely grow soyabean (Chindwara, Madhya Pradesh).	Singh (2001)
144	Control of pest complex in cotton	<i>Helicoverpa</i> , spotted bollworm and aphid are generally found in cotton. Aphids are also common in brinjal, chilli and lucerne in Amreli district of Saurashtra. A mixture was prepared from dried tobacco leaves (250 g), <i>hirakasi</i> (300 g) and citric acid by boiling in 1-2 litres of water and filtered. Approximately 250 ml of the decoction was mixed in 15 litres (one pump full) water and sprayed over crop. Depending upon the growth and density of the crop, total quantity required varied; however three to four pumps were enough for cotton crop. After a week decoction was sprayed again. It could control pest complex in cotton and the growth of the plants also boosted (Amreli, Gujarat).	Kalyanbhai (1995)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
145	Control of <i>Talkidi</i> insect in cotton by onion soaked water	<i>Talkidi</i> a soil pest, attacks fully grown cotton plant. Affected plant withers in a short time. To control <i>talkidi</i> , farmers take 20–25 kg onions in a jute bag, crush them using a wooden mallet, and this bag is kept in water channels during irrigation (Bhavnagar, Gujarat).	Mathodiya (1994)
146	Pests and diseases control of cotton and <i>Barleria</i> spp	Leaves of agave, <i>Vettikottai</i> (<i>Strychnos nuxvomica</i>), <i>neem</i> , and cakes of <i>Pongamia</i> (<i>Pongamia pinnata</i>) and <i>neem</i> are pulverized together and soaked in cattle-urine. The resultant solution is diluted in water in 1:8 and sprayed against pests and diseases of cotton and <i>kanakambaram</i> (<i>Barleria</i> spp), an ornamental flowering crop (Sirakkapatti).	Thyammal (1994)
147	Control of pests in Cotton	(i) Mechanical control measures include cotton seed treatment with cow dung resulted in delineating of the seed (fibre free seed), followed by identification and removal of pink bollworm infested seeds and hand collection, destruction of larvae and infested plant parts leads to reduction in insect pest population. (ii) Cultural control measures includes field sanitations -clean cultivation during the entire cropping seasons which results in the reduction of insect fauna and weed flora in the field and intercropping or mixed cropping of cotton with sorghum/maize/greengram/blackgram for augmentation and conservation of natural enemies of major insect pests. (iii) Application of botanical pesticides include aqueous decoction of <i>neem</i> leaf (<i>Azadirachta indica</i>) or <i>neem</i> seed kernel or tobacco leaf (<i>Tobaccum solanum</i>) or alcoholic extracts of <i>neem</i> seed kernel against pest complex of cotton. (iv) Alternatively for pest management, application of ash water in which leather is soaked by cobbler against sucking pest or fermented butter milk or mixture of fermented farm animal urine + distillates of <i>neem</i> seed kernel or application of kerosene oil is practiced against insect pest complex of cotton (West Nimar, Madhya Pradesh).	Paliwal <i>et al.</i> (2002)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
148	Control of pests in cotton	Non-pesticidal management technologies include deep ploughing in summer, use of bonfires/light traps, nipping of the terminal buds to destroy eggs and larvae of spotted bollworm, selecting tolerant varieties for sucking pest complex, spraying of tobacco decoction, spraying of 5% <i>neem</i> seed kernel suspension, chilli garlic spray and spraying of cattle dung and urine, bird perches, collection and destruction of affected bolls. The farmers who practices this traditional knowledge gained more income as compared to the farmers who treated with pesticides (non NPM) in Warangal district of Andhra Pradesh. The farmers cultivating cotton in Warangal district with high pesticide load are prone to risk of negative returns as compared to the traditional practices. Farmers in Jalgaon/Jalna spent more money for pesticides which enhanced the cost of production while traditional NPM technologies reduced the cost of production by 25% (Warangal and Zaheerabad, Andhra Pradesh; Jalna and Bawalaeshwar, Maharashtra).	Chary <i>et al.</i> (2000-2000)
149	Control of white fly in cotton	White fly (<i>Bemisia tabaci</i>) is usually found on the dorsal surface of the leaves. The nymphs are small and flat with visible beaks that suck the plant sap. To get rid of these flies, papers pasted with castor oil/grease are hung at five or six places in the cotton field. Then air is blown using a sprayer over the crop. The disturbed adult flies (white fly) come out of the plant and stick to the oily paper. By this method 90% of white fly can be successfully reduced (Pondicherry).	Balalsubramanian (2000–2001)
150	Insect control measures in cotton	Concentrated solution of sugar (500 g in a litre of water) is prepared and allowed to ferment. Fermented solution is placed in open dishes at different locations between the rows of cotton. One or two drops of edible oil is added to the dish. The users say that adult insects (which can fly) are attracted towards this solution. The idea behind this practice is to kill the adult population and ultimately reduce the reproduction (Bharuch, Gujarat).	Sindha (1992)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
151	<i>Calotropis</i> for control of caterpillars in cotton	Caterpillar infestation can severely damage a cotton crop. Reportedly the latex of <i>Akda</i> (<i>Calotropis gigantia</i>), when diluted with 15 parts water and sprayed on the crop, effectively controls the pest within three days. The new growth after treatment is also free from infestation (Bhavnagar, Gujarat).	Jani (1992)
152	Control of green worm (<i>Heliothis</i> spp.) in cotton by <i>dhatu</i>	Of all the pests occurring in the cotton crop, greenworm (<i>Heliothis</i> spp.) is one of the most harmful pests. Leaves and stem of <i>Dhatu</i> (<i>Datura metel</i>) are used to control green worm. About 250 to 300 g of ' <i>Dhatu</i> ' leaves along with stem are dipped in 1 litre of lukewarm water. After cooling down, 250 to 300 grams of the solution is mixed with 15 litres of water and sprayed on the crop. Pests perish within a period of six to seven hours. Spraying the mixture when the crop is of one-month-old yields better results (Amreli, Gujarat).	Kaachhadiya (1998)
153	Control of disease in cotton by butter-milk	When red spots appear on cotton leaves (in July or August), farmers dilute buttermilk with water and sprinkle it on the crop. When the application is made during the early stages of the disease, control comes within a week. This practice can also be used as a preventive measure (Bhavnagar, Gujarat).	Pandya (1993)
154	Control of insects in cotton by kerosene	Farmers spray kerosene oil on the cotton crop at night to control larvae (locally known as <i>Lashkari</i>). Farmers believe that this pest remains in the soil, cracks during the day and attacks the crop at night. It attacks crops like cotton and lucerne in a cluster like an army brigade. This might have been the reason for giving it the name <i>Lashkari</i> . Some farmers mix kerosene in the irrigation water. They make a hole in the bottom of a tin of kerosene and hang it on the top of a water channel in such a fashion that the tin drops kerosene slowly at regular speed and uniform suspension goes to plot regularly. They believe that this is more effective than spraying because it kills all the larvae hidden in the soil cracks. Farmers realize that this practice also kills some of the beneficial organisms living in the soil. The practice is in use for more than 50 years and a large number of farmers are still using it (Surendranagar, Gujarat).	Rana (1992)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
155	Control of white fly in cotton by tobacco	Some farmers add tobacco powder/dust @ 30 g per 15 litres with insecticide solution mainly with the idea of controlling the attack of white fly (Gujarat).	Mane (1991)
156	Use of okra (<i>Ablemoschus esculentus</i>) as asacrifice crop for pest control in cotton	Farmers grow 2–3 lines of okra plant surrounding the cotton field. Cotton is more susceptible to insect pests like spotted boll worms (<i>Earias vitella</i>), <i>Spodoptera litura</i> , <i>Heliothis armigera</i> , pink ball worm (<i>Platyedra gossypiella</i>), jassid (<i>Amarasca biguttula</i>) etc. Farmers believe that pests prefer okra plant as compared to cotton plant and attack them first. Pest is controlled by simply eradicating/destroying the okra plants attacked by insect and pests (Surendranagar, Gujarat).	Patel (1991g)
157	Control of cotton boll worms and pod borer of chickpea and pigeonpea by <i>neem</i> seed extract	<i>Neem</i> seed extract solution (5%) is prepared and sprayed to control cotton boll-worm and pod borer of pigeonpea and chickpea (Yavatmal, Maharashtra).	Bhople and Lakbdibe (1998)
158	White fly control in cotton by seed extract of <i>Nerium</i>	<i>Arali</i> (<i>Nerium oleander</i>) seeds are pulverized, soaked in water overnight and filtered. This filtrate is diluted in water and sprayed on cotton fields. This practice provides 70% control (Thiruvadagam).	Murigesan (1994)
159	Control of white fly in cotton by jaggery solution	Some farmers use <i>gur</i> (jaggery) solution to control white fly. One kg <i>gur</i> is dissolved in 10-12 litres of water and filtered through a thick cotton cloth. Approximately 5-6 litres solution is sprinkled in one acre with the help of sprayer pump gently on the foliage. The tiny insects of white fly stuck on the leaf surface due to stickiness of the solution. All the stuck eggs of white fly are killed on the leaf surface which increases the possibility of occurrence of Madhiya disease. Hence they prefer to use this practice once only. This practice can achieve 40–50 percent control of white fly. This technique is used in the months of November-December (Bharuch, Gujarat).	Ahmedabadi (1992)
160	Insect control in cotton by tobacco and <i>neem</i> extract	Farmers in this region use boiled suspension of tobacco (leaf or seed) and <i>neem</i> seeds and leaves to control insects in cotton (Mehsana, Gujarat).	Patel (1991g)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
161	Control of white fly in cotton by kerosene and detergent	Mixture of kerosene oil and detergent powder (<i>Nirma</i>) is sprayed on the crop for minimizing the white fly infestation. This result in 50% control of white fly (Rajkot, Gujarat).	Khanpara (1991)
162	Control of bollworm in cotton by extract of <i>mahua</i> and tamarind	Certain pests like spotted bollworm and pink bollworm attack the cotton plant frequently. In order to control the infestation, a 500 ml stock solution is made with an equal amount of <i>mahua</i> (<i>Madhuca indica</i>) and tamarind (<i>Tamarindus indica</i>) bark. This solution is filled into a pump (with a capacity of 15 litre) and sprayed on the infested crop. If the attack is severe then the same solution is sprayed once again after a week. If used more than twice then there are chances of the roots getting burnt. This practice has been used for over 30 years. However, this needs to be used judiciously (Banaskantha, Gujarat).	Kodarvi (1999)
163	Control of white fly in cotton by extracts of <i>Gandhati</i> leaves	Three kg. of <i>gandhati</i> leaves are boiled in 20 litres of water for 3–4 hours or till the decoction has reduced to 5 litres. About 75–80 ml. filtrate is poured in to 15 litres water. When sprayed on the cotton crop it helps to control white fly. The decoction acts as an anti-feedant (Northern Gujarat).	Patel (2001e)
164	Control of insect pest of cotton crop by decoction of agave	Certain larvae attack the cotton during monsoon when crop is around 30 to 40 days old. To prevent it, local farmers use a decoction of a plant locally known as <i>Ketaki</i> (<i>Agave americana</i>). The leaves are crushed, boiled in water and the decoction is filtered. Approximately 200 ml filtrate is added in 15 litres water and sprayed over the crop. About five pumps of spray are needed for one <i>bigha</i> (0.16 ha) of land each time (Bhavnagar, Gujarat).	Vaghoshi (1994)
165	Lemon juice for aphid control in cotton	Aphid is locally called Molo in Surendranagar, Gujarat. Farmers say that it is generally not found during the monsoon. Aphids appear on four month old cotton crop and attach themselves normally to the undersides of the leaves of the plant and suck the sap. A black sticky substance is also found on the aphid infested leaves and this particular condition is known as <i>galo</i> (meaning sweet). Generally, yellow and green aphids are seen in cotton. If unattended, the condition persists till the end of the cotton season. It is believed that if an indigenous variety of cotton	Dholakia (1994)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		is grown as rainfed crop, aphid infestation does not occur. Juice of lemon is used to control aphids. Approximately 100 to 200 ml of lemon juice is mixed with 15 litres of water and sprayed it over the crop. The treatment is repeated after intervals of a week. thrice for successful control of the pest. About 18-20 pumps (15 litres capacity) are sprayed in one hectare (Surendranagar, Gujarat).	
166	Sugar solution for control of insects in cotton	Concentrated solution of sugar (500g in a litre of water) is prepared and allowed to ferment. Fermented solution is placed in open dishes at different locations between the rows of cotton. One or two drop of edible oil is added to the dish. Practitioners say that adult insects (which can fly) are attracted towards this solution and stick on the surface or sink in the solution. The idea behind this practice is to kill the adult population and ultimately reduce the reproduction (Saraj).	Sindha (1992)
167	Pest control in sugarcane	Farmers use onion juice to prevent white fly attack while sowing sugarcane. The sugarcane cuttings are coated with the onion juice. Then 20 kg of onion per <i>bigha</i> (0.16 ha) are packed in a gunny bag and smashed on the ground. The bag of smashed onions is placed at the entry point of the irrigation canal. The onion juice mixes with water and irrigates the crop, thus preventing pest attack (Bhavnagar, Gujarat).	Mavani (1997)
168	Control of stem borer in sugarcane	Earthing up operation in sugarcane at 40–50 days after planting controls stem borer by acting as physical barrier, checks weeds and also provides aeration and facilitates furrow for irrigation (Karnataka).	Anonymous (1999c)
169	Control of <i>Galo</i> disease in sugarcane by extract of <i>Calotropis</i>	<i>Galo</i> is a disease characterised by deposition of droplets of sticky, semi-liquid honey like dew on the leaves and stems of sugar cane in the winter. Long before winter sets in, farmers collect twigs of <i>Calotropis</i> and soak them in a tank filled with water and allow them to decay for months. The extract is then sprayed on the crop. This treatment cures the disease within two to three days. No side effect has been noticed; however, the cane should be washed before consumption. Even though this practice is	Chinubhai (1993)

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		laborious, about 30 to 40% of the farmers in this area have been using this method for the last eight to ten years (Amreli, Gujarat).	
170	Insect trap in sugarcane by sugarcane	Placement of small bundles of sugarcane in the field at random is done at 20 days after planting not only acts as insect trap especially for stemborer and moth but also serves as seed material for gap filling (Karnataka).	Anonymous (1999c)
171	Overcoming disease in sugarcane through lime and castor cake	A disease locally known as <i>ratdo</i> or <i>radiyo</i> since all the leaves and stem turn a reddish hue (may be it is the red rot of sugarcane,; Ed) spreads very fast from one field to another and causes great economic loss as crop withers within 8 to 10 days of infection. Generally, it strikes the crop when it is two or three months old and, if proper measures are not taken, the crop fails completely. To treat this condition, farmers make a mixture of equal quantities of lime and castor cake and sprinkle it between two rows of the crop and cover it with soil. The field is irrigated immediately after the treatment. The farmers who use this technique say that repeating the treatment after 8 to 10 days can save the crop altogether. About 15 to 20 kg mixture is required for one acre of land though it can vary great deal from farmer to farmer (Valsad, Gujarat).	Patel (1995a)
172	Use of cactus for prevention of insects in tobacco nursery	Leaves of cactus are placed around the tobacco nursery so that migrating larvae from adjacent fields first attack these leaves. The leaves along with the insect larvae are collected daily and fresh leaves are placed there (Rajupura).	Chauhan (1992)
173	Control of insects in tobacco by border crop of castor	It is also a common practice in Andhra Pradesh to grow castor as border crop in tobacco fields to keep <i>Spodoptera litura</i> under check, since the pest prefers castor leaves. The damage caused to tobacco is thus reduced (Andhra Pradesh).	Reddy and Ghewande (1992)
174	Indigenous method for insect and pest control in paddy ginger, and tomato	(i) Control paddy case-worm by broadcasting sand and kerosene or spreading <i>Kalra</i> (<i>Bauhinia</i> spp) branches in the affected fields. (ii) Control leaf blight in paddy and ginger by spraying fresh cow dung slurry. (iii) Control wilting in tomato by inter-cropping with marigold (Sambalpur, Orissa).	Samal <i>et al.</i> (2002)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
175	Protection of crop from pests and rodents	In the monsoon, insects and pests pose a menace to crops. Rather than making use of pesticides and insecticides, scarecrow (<i>storytelling statue</i> or <i>chaadiyo</i>) is used to control insects. An old bearing is installed on an iron stand. An empty galvanized tin is given the shape of a human. Strips are cut out from tin and bent in the shape of fan-blades. These 'arms' rotate when wind blows. Pieces of a broken mirror are stuck on the body of tin and it is painted yellow so that it reflects sun rays. These stop animals and birds to come near standing crops. Small bells attached to both sides of scarecrow's head rings continuously. This noise keeps rodents like rats away. Besides a sticky substance is applied on the surface of the tin. Insects flying near the crops get stuck and die. A lighted oil lamp is kept in tin at night to attract larvae, insects and white flies. They fly towards the lamp and drown in oil. In this way, a scarecrow prepared with minimum expense can save crops from damage caused by stray birds, animal and insects (Mehsana, Gujarat).	Patel <i>et al.</i> (1998)
176	Paddy seed treatment for enhancing germination	In direct sowing of rice, special treatment for 24 hrs to enhance the germination is given to paddy. Spread leaves of <i>Piludi</i> (<i>Salvadora persica</i>) at the bottom of a closely knit bamboo basket and fill it with paddy seeds; water (about 10 to 12 litres) is poured slowly over the basket. It is then covered with leaves of the same tree and weights are put on the basket to keep the seeds pressed. If necessary, a little water is sprinkled over basket a couple of times. Sometimes, leaves of <i>aval</i> (<i>Cassia</i> spp) are used instead. The basket is kept undisturbed for 24 hrs after which seeds are sown in nursery immediately. This is believed to help in early and vigorous germination. This is a traditional practice in this region but very few people practice it now. Shri Shankardan Gadhvi has used this practice consistently twice during last two years and found it effective (Kheda, Gujarat)	Gadhvi (1995)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
177	Paddy seedling treatment by <i>neem</i> and ash to control pest and disease	Before transplanting paddy seedlings are kept in small plots of standing water mixed with ash and pulverised <i>neem</i> seeds. For 15 sq.ft., half kg of <i>neem</i> seed and 1 kg of ash is sufficient for mixing with water to accommodate 50 bundles of seedlings at a time for 1/2 to 1 hr. Treated seedlings produce healthy crops, free from pests and diseases (Perambalur, Tamil Nadu.).	Selvarani (2000)
178	Indigenous agriculture knowledge in eastern India	Traditional technical knowledge on Beushening operation, in direct seeded rice crop has no other alternative in flood and drought prone rainfed lowlands. This system provides a minimum assured yield even in aberrant rainfall condition. Double transplanting is the answer to multiply rice seedlings in scarcity situation such as damage of established crop in field due to flood. This technology can be applicable for rice hybrids because their seed cost is prohibitive. Control of stink bug through non-chemical means assumes special importance because this pest damages the crop in grain filling stage. Trapping with rotten crabs or eels, repelling with the odour emanating from the peels of grape fruit and encouraging the predatory birds by providing support made of bamboo or wooden sticks are some solutions based on traditional knowledge. Scaring away sparrows from rice field is possible by putting the dark coloured pseudostem of <i>Colocassia</i> shaped like head of snake. Storing of rice seeds in containers made with several layers of paddy straw is ideal for maintaining viability. Pulse beetle can be managed by storing pulse grain mixed with dried leaves of <i>neem</i> . Traditional way of maintaining viability of bitter gourd seeds by storing inside cowdung cakes is another practise. It is easier to control rhinoceros beetles in coconut orchard by trapping into oily extract produced after boiling the ground castor seeds with water. Succulent pests like grubs of <i>Epilechna</i> beetle and nymphs of aphids can be controlled by dusting dried household ash during sunshine (Orissa).	Rautaray (2002)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
179	<i>Neem</i> powder for soil treatment to control aphids jassids and white flies	<i>Neem</i> fruits are collected and dried in the sun and ground by using a grinder. This <i>neem</i> powder is applied to the soil @ 100 g/plant at 10 cm depth. It controls aphids, jassids and white flies. To control nematodes of citrus the powder is applied @ 500 g per tree. Application of this powder @ 200 kg/acre during the last plough will control leaf feeders, stem bark and fungal disease of sugarcane. Before the onset of monsoon, application of the <i>neem</i> powder (1/2 kg/plant) at the trunk of the tree will enhance the yield of coffee and its quality (Tamil Nadu).	Muthusamy (1998)
180	Cycas flower as insect-pest repellent in paddy	During panicle formation stage in paddy, flowering occurs in <i>Cycas circinalis</i> , a wild plant in the western ghats. The cycas flower looks like a pineapple and is yellowish in color. The flowers are to be placed in paddy fields at 4/acre by tying them on sticks. The height of the flower should equal the height of paddy. The unpleasant odour emitted from the flower repels insect pests, especially earhead bug (Tamil Nadu).	Arunagirisary (1998)
181	Kerosene oil for killing borers	Farmers use kerosene to kill the tissue borers. A flexible metallic wire is inserted through the hole made by the borer into the gallery to clean it. Then a small bung made of cloth soaked in kerosene oil is inserted into the hole and finally it is plugged using a paste of cowdung and clay. The insertion of metallic wire into the gallery causes physical injury to the larvae and they are destroyed. The vapour of kerosene suffocates the pests (Himachal Pradesh).	Verma (1998)
182	Ploughing, hoeing and basin preparation for insect control	Cultural practices like ploughing, hoeing and basin preparation expose soil inhabiting insect, pests and other arthropods and nematodes to harsh weather and to natural predators. Insects are most vulnerable when in the pupal stages and most insect-pests pupate in the soil which furnishes a protective habitat. Birds like king crow, the myna, the starling etc pick up the exposed pupae following these cultural operations. Insects such as grasshopper, crickets, mole-crickets and borers lay their eggs in the upper layers of the soil. Their eggs subsequently dessicate. Many insects like cutworms, grubs of the root borer and white grubs which feed on the root system of the plants are also exposed to the vagaries of the elements during basin preparation and hoeing (Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
183	Control of sucking pests by powdered tobacco	Five kg of powdered tobacco leaves mixed with 10 litres of cow urine and 5 litres of water are allowed to ferment for 3 to 5 days. Then it is filtered and mixed with 80 litres of water and sprayed to control all sucking pests (Madurai, Tamil Nadu).	Vivekanandan (1999)
184	Control of insects by use of <i>neem</i> leaves	<i>Neem</i> leaves are used as an insect repellent (Kasaragod, Kerala).	
185	Hand picking of pests	Hand picking of pests and their destruction is another time tested method of pest control. Right from picking lice from human hair, clothes and even animals to the manual separation of pests from stored grain. This method can prove effective in curtailing pest incidence on some crops. Tobacco caterpillar, sugarcane top borer, epilachna beetle etc, can easily be eliminated. The handpicked insects are destroyed by immersing them in kerosinized water or by deep burying. Some insects are destroyed by light trap (Himachal Pradesh).	Verma (1998)
186	Control of insect by spreading leaves of <i>Calotropis</i>	Farmers spreading the leaves of <i>Calotropis</i> (<i>Calotropis sp.</i>) in the standing crop which is infested by <i>Katara</i> (local name of army worm type of curting insect larvae). <i>Katara</i> gather on the broadcasted leaves of <i>Calotropis</i> and next day they collect all the leaves along with insect larvae. Simultaneously, fresh leaves are replaced there. The collected leaves with larvae are destroyed immediately (Mehsana, Gujarat).	Raval (1992)
187	Use of red soil to prevent insect	Red soil is mixed with water and small pellets are made. These pellets are dried in sunlight and are mixed with pulses in the storing vessel. It is believed that red earth has some acidic character which repels the insect pest (Pondicherry).	Mutthu Arunachalam (2000–2001)
188	Control of <i>Spodoptera lilura</i> and <i>Heliothis armigera</i>	4 kg of <i>Kuvarpathu</i> (<i>Aloe vera</i>), 50 ml of <i>neem</i> oil and 500 g of tobacco powder are boiled in 20 litres of water for 3–4 hrs to make a 5 litres solution. Then 50 g of <i>aritha</i> (<i>Sapindus emarginatus</i>) powder is added to the solution and mixed thoroughly. To control the worms, 100–150 ml of this filtrate is added to 15 litres of water and sprayed on the crop (Northern Gujarat).	Patel (2001f)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
189	Control of insect by use of kerosene and interculture	Suspension of water and kerosene oil is sprayed on the castor plants for controlling infestation of ' <i>Lankani</i> ' (local name of the pest). Sometimes people carry out deep interculture operations, followed by heavy planking on standing crop to kill the pest (Mehsana, Gujarat).	Patel (1992)
190	Nematode control through trap crop in tomato and chilli	For control of nematode Chamanthi (<i>Chrysanthemum coronarium</i>), a flowering plant is raised on the borders of tomatoes/chillies fields (Vattalakundu, TamilNadu).	Kupusamy (2000)
191	Plant protection practices of tribals of eastern <i>ghat</i> region of Orissa	The practices relating to crop protection are as follows: seed treatment with hing; cow dung spray against cattle menace; use of dry fruits of <i>Lagenaria</i> spp. for storage of seeds; begunia leaves, <i>neem</i> leaves, turmeric leaves, bael leaves, custard apple leaves against storage pests, Mexican marigold against nematode diseases in tomato and brinjal; aphid control by tobacco decoction; use of red soil to increase the keeping quality of pigeonpea seeds, and use of a decoction of <i>Ranbeli</i> bark against fruit and shoot borer of brinjal (Koraput, Orissa).	Rath <i>et al.</i> (2002)
192	Extract of <i>Ipomea</i> leaves to control insect pest	The use of <i>Naffatiya</i> (<i>Ipomea fistulosa</i>) is extensive in the area near Valiya, (District Bharuch) where these plants can be found in abundance. However, this species is scattered throughout India. About 1 to 1.5 kg of leaves of this plants are collected and crushed in a container and then boiled in water (10–12 litres) till half of the volume is vapourized. Resulted suspension is filtered through cotton cloth and used as insecticide. About 15 ml of extract is mixed with 15 litres water and sprinkled over the pigeonpea crop to control the insect-pests population. Sometimes tobacco leaves are also mixed with it and according to users this type of mixture is more effective than the commercial synthetic pyrethroids available in the market. This method does not have any ill-effect on the crop. It requires a lot of labour to prepare the extract. Treated plants are not used for human or animal consumption till 36-48 hours. This method is equally effective in any crop against almost all insect pests. This practice is in use for the last 10 years and almost every farmer in this area is using it (Deshad, Gujarat).	Ghanchi (1992)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
193	Cultivation of maize as trap crop for vegetables cultivation	Maize when grown around vegetable gardens acts both as a physical barrier to cattle and trap crop for insects and thus prevents cattle and insect damage to the crop (Karnataka).	Anonymous (1999c)
194	Light lures insects like brown plant hopper	At night time, two torch lights are beamed in a 'v' shape in the centre of the paddy field. The person holding the torches walks from the centre to the edge of the field. The insects are attracted to the light and attempt to follow it. Thus they leave the paddy field. This process is repeated for two to three days in succession (Karnataka).	Basavraj (1998a)
195	Control of insect by deep furrows	Some farmers open the deep furrows surrounding the fields so that the larvae of the caterpillar trying to enter the field from adjoining plots/fields fall in these deep furrows. Next day these furrows are covered with soil thus destroying the pests.	Anonymous (1991d)
196	Control of insect by bonfire	Farmers in the irrigated area light fire in the night to attract the larvae of insects.	Anonymous (1991c)
197	Flowers to repel insects in various crops	Extract of <i>hippe</i> (<i>Bassia latifolia</i>) or <i>honge</i> (<i>Pongamia glabra</i>) flowers are used to control insect attack on pulses, lemon, and watermelon (Karnataka).	Basavaraju (1998b)
198	Control of crawling insects by boundary trenching	Farmers make trench of 1-1.5 feet broad and 1-2 feet deep surrounding the entire field. Trench is filled by water so that the crawling insects and larvae can not cross the trench (Surendranagar, Gujarat).	Malakia (19991)
199	Cultural practices to avoid pests	Early sowing of rainy season (<i>kharif</i>) sorghum is done to avoid shoot fly and July sowing to reduce semilooper incidence in castor. Short duration (110 days) sorghum to avoid earhead bug in red soils, medium to long duration pigeonpea to avoid <i>Heliothis</i> (<i>Helicoverpa</i>) in black soils. Use of bonfire to minimize certain pests at moth stage in groundnut in Rayalaseema region and sprinkling of boiled rice or with other food grains to attract birds as predators (Telangana, Andhra Pradesh).	Subba Reddy and Singh (2001)
200	Pest control by ploughing	Pest control is done by ploughing the field after harvesting of <i>rabi</i> crops (Gonda, Uttar Pradesh).	Anonymous (2000c)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
201	Management of striga in sorghum by trap crop of coriander	Sowing of coriander seeds between sorghum rows controls striga, a root parasite because the alkaloids in coriander root exudates inhibit the growth of striga (Karnataka).	Anonymous (1999c)
202	Control of insects in mustard	To save the mustard crop from insects, dusting of ash is done in the early morning (Tehari Garhwal, Uttaranchal).	Devi (2000)
203	Pest and disease control in groundnut, chilli and brinjal by a mixture of chilli, neem and castard apple	A herbal pesticide has been evolved for control of different insect pests and diseases of groundnut, chilli and brinjal. The mixture of various botanicals is prepared as follows. About 1.5 kg leaves of castard apple (<i>Anona squamosa</i>) are ground and approximately 200 ml of water is added to it, well mixed and filtered. The filtrate is kept aside. (ii) About 500 g of dry fruits of chilli (<i>Capsicum annum</i>) are soaked in water overnight and filtered. (iii) About 1.0 kg of neem fruits (<i>Azadirachta indica</i>) are crushed and soaked in 2 litres of water overnight and the extract is filtered. These 3 filtrates are added to 10 litres of water and mixed thoroughly and used as herbal pesticide and sprayed on the crop. Approximately 35-40 litres of this pesticide mixture is required for one spray in 0.16 ha of land. This home made preparation help farmers save Rs 800 which they would have otherwise spent on chemical pesticides (Junagadh, Gujarat).	Patel (1995e) 204
204	Prevention of insect infestation by border crop of sorghum	Farmers practice trap cropping by growing border rows of sorghum to prevent the incidence of insects and pests (Dharwad, Karnataka).	Anonymous (2000b)
205	Eucalyptus prevents aphid in fennel	Aphid attack on fennel (<i>Foeniculum vulgare</i>) is common when the crop is 2-3 months old, at times this may happen even at onset of seeds, and results in 70-80 per cent loss of crop. 'Nilgiri' (Eucalyptus spp) leaves are gathered together in a heap and burnt in the early hours of morning (about 8 am approximately) when wind velocity is not high. If needed this can be repeated after a week (Sabarkantha, Gujarat).	Parmar (1997a)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
206	Pest control methods of pigeonpea	Mixing red earth with red gram (Tamil Nadu).	Parvathi <i>et al.</i> (2000)
207	Control of root feeders and pests with ash	Wood ash is broadcast before ploughing the field to kill the root feeders and pests (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
208	Indigenous knowledge for crop disease and pest management in Koraput district of Orissa	Juice of fresh leave of Jackfruit (<i>Artocarpus heterophyllus</i>) is sprayed over the affected soil of niger (<i>Guizotia abyssinica</i>) plot after suitably mixing with water (1%) in order to restrict the germination of <i>Nirmuli</i> (<i>Cuscuta chinensis</i>), which is a major problem of niger crop. For controlling case worm of paddy, the tribal farmers spray the bamboo (<i>Bambusa</i> spp.) sprout soaked water (soaked for 12 hours) to get effective result. Application of <i>pinnata</i>) oilcakes controls damping off and red ants in vegetable nursery. Cowdung suspension spray proves effective and economical for control of bacterial leaf blight (BLB) in rice vis-à-vis normal antibiotics spray (Koraput, Orissa).	Pani <i>et al.</i> (2002)
209	Use of ash as insecticide	Ash is sprayed on the insect affected crops. The people also spray ash mixed with kerosene oil. Ash is ploughed into the soil to protect the crops from root borer (Kumaun hills, Uttaranchal).	Chander and Mukherjee (1994)
210	White grub control through lime	It is a severe problem especially in any monsoon crops. 40-50 kg lime is spread in the open for 2-3 hr. Because of the moisture in the air it becomes granular and smooth. This lime is broadcast in a field before the monsoon. It is incorporated in the soil through ploughing immediately afterwards. This controls the problem of white grubs in the following monsoon crop. Some farmers melt lime in water and give it with irrigation water instead of broadcasting. However, this treatment is feasible only in irrigated crop. According to him, white grub prefers to stay near the moist layer of soil, hence it is always found in the upper layer of soil during July. Any control remedy given during this period is found more effective (Sikar, Rajasthan).	Nehra (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
211	Digesting Calotropis and urea to control pest in different crops	Twigs of Calotropis are kept in the earthen pot and about 50 g urea is added to it. Approximately 1 litre of water is added and it is sealed air tight by plastering its mouth with clay soil. This container is kept in a manure pit for 2 months. By this time, Calotropis twigs get decomposed and get mixed with water. The extract is filtered and used for seed treatment of wheat, barley and chickpea. Crops treated in this manner do not get affected by termites. The same extract may be poured into pots of ornamental plants, to protect them from various soil pests and increase the growth. This insecticide reportedly does not affect the earthworms adversely (Jaipur, Rajasthan).	Sharma (1996d)
212	Surface grasshopper control through pulverizing clods	Surface grasshoppers attack the growing plumule of the groundnut seedling as it emerges from the earth. To tackle this, farmers of Amreli District collect twigs of baval (<i>Acacia nilotica</i>) and other thorny shrubs like kerda (<i>Capparis deciduas</i>) and bundle it into a roll called kanti. Inside the kanti they put stones, clay clods and other heavy materials to increase its overall weight, and they run it on the fields after the sowing, but before the emergence of the plumule. The farmers believe that this operation breaks up small clods of earth and helps in eradicating the pest which hides below the clods (Amreli, Gujarat).	Vaghela (1994)
213	Magha rain water keeps pests away	Farmers store rain water received during the magha constellation in the monsoons for future use. Some farmers of Baroda and Panchmahal districts of Gujarat smear the seeds of wheat with this water before sowing. Besides boosting the yield it also helps in keeping the crop free from disease (Baroda and Panchmahal, Gujarat).	Kapadia (1997b)
214	Controlling leaf curl with 'aritha'	100 gram fruits of 'aritha' (<i>Sapindus emarginatus</i>) are soaked in 1 litre of water for 2 to 3 days. The water is filtered and the filtrate is sprayed on the crops every third day. The user feels that this spray makes the leaves glisten and induces flowering (Rajkot, Gujarat).	Indrodiya (2000–2001)

S. No.	Title of ITK	Details of ITK and rationale	Reference
215	Control of soil pests of groundnut by decoction of <i>Solanum surattense</i> fruits and seeds	Soil pests such as white grub and termite damage groundnut crop and drastically reduce yields by thinning out the plant population. To prevent grub-induced damage, the fruit and seeds of a plant locally called 'bhoyringni' (<i>Solanum surattense</i>) is used. Approximately 500 g of fruits along with its seeds are crushed and boiled in water. The decoction is filtered and the filtrate is used to coat seeds of groundnut before sowing them. The decoction prepared with 500 g of the fruit and seed is enough for treating 20 kg of seeds (Sabarkantha, Gujarat).	Patel (1996c)
216	Control of blight in cumin by botanical mixture	Tender neem, kuvarpathu (<i>Aloe vera</i>) and aakdo (<i>Calotropis gigantea</i>) leaves are ground in equal proportion to make homogenous mixture. When the crop has grown for about 30 days, a mixture of 500 ml of the extract with 5 g of washing powder, diluted in 15 litres is applied. Water is sprayed at 8-10 days regular intervals which prevents blight (Surendra-nagar, Gujarat).	Rathod (2001)
217	Disease control in cumin through deposited dust in leaves	Farmers grow cumin (<i>Cuminum cyminum</i>) in outside field to take advantage of dust that settles on the crop. They believe that absorbs moisture and make the crop less vulnerable to diseases. For the same reason the crop is grown on sloping lands also (Gujarat).	Patel (1993c)
218	Control of blight in cumin by extract of kheemp	Approximately 5–7 kg branches of 'kheemp' are kept in an open water tank. After a week, the filtrate was sprinkled over the cumin crop. This result in about 80 percent control of the disease. (Ajmer, Rajasthan)	Kumhar (1996a)
219	Prevention of blight in cumin by sowing technique	Farmers generally sow cumin seeds by broadcasting. Cumin is often infected by blight disease and consequently suffers significant reduction in the yield. Blight makes plant turn black and wither away. A new method of sowing cumin seeds, ie. broadcasting seeds in the field and made small beds using a wooden multi-tool bar having 3 coulter known locally 'tarfen' or 'dantal' which is drawn through the field by a pair of bullocks. This makes long narrow ridges in the field and the seeds blend well with the soil and accumulate on the small bunds made by ridges. This contributes to a higher germination rate. The soil around the plants remains dry even during the severe cold when dew fall is very	Tavadiya (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		high. As a consequence, the incidence of blight is greatly reduced. Several other farmers of the same village have also begun to use this method of sowing cumin (Bhavnagar, Gujarat).	
220	<i>Kaliyo</i> disease control in cumin	Farmers generally believe that excessive moisture leads to various kinds of diseases in cumin. Devshiji Thakore has been irrigating his field judiciously to prevent his cumin crop from being infected with ' <i>kaliyo</i> ' disease. He made his plots small so that not much water is collected in the fields. A light irrigation is given right after sowing. The next irrigation is given after a gap of 7 to 8 days. And a third and final irrigation is given at the pre-flowering stage. Later, the irrigation is totally stopped. Last year many farmers of this area, who irrigated their crop 4 or more times, suffered due to the infection of ' <i>kaliyo</i> ' disease in their crop. Devshibhai's field remained unaffected. Devshibhai kept his crop free from dew also by using the following technique. Everyday, in the early morning hours, two persons holding a cotton or a coir rope between them, walk through the plants so that the rope gently touches the plants and the dew drops are knocked off (Mahesana, Gujarat).	Thakor (1997)
221	Prevention of wilt in cumin by smearing the seeds with castor oil	25 kg of cumin seeds are smeared with 2 kg of castor oil before sowing to prevent wilt in cumin crop (Banaskantha, Gujarat).	Thakor (1998)
222	' <i>Shangma</i> stone' for weed control	A bluish local stone called ' <i>Shangma</i> ' is used for weed control because it seems to possess toxic properties. Pieces of stones are spread over a small heap of soil in the middle of the field in the month of December. This soluble stone when mildly irrigated percolates into the field (Changthan area of Ladakh in Himachal Pradesh).	Verma (1998)
223	<i>Mendha</i> for controlling weeds in rainfed upland rice	In the rainfed uplands of the Mid Central Table Land Zone of Orrisa, the farmers practice one cross ploughing (<i>Mendha</i>) 3 days after sowing paddy with the help of a narrow wooden country plough, followed by laddering (<i>Garamai</i>) 3 days after <i>mendha</i> . Again work with a tooth harrow (<i>Bida</i>) 3 days after <i>garamai</i> is useful to control weeds (WCE 50%) compacts the soil, conserves moisture as well as helps in tillering	Sahoo <i>et al.</i> (2002)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
		(200 effective tillers/sq. metre). destroys the white ants and ultimately yields better (2,000 kg/ha) with a net return of Rs 1,400/ha (Orissa).	
224	Control of wilt in pigeonpea by common salt	Farmers apply common salt in soil for controlling wilt (locally known as 'Sukara') in pigeonpea (Kheda, Gujarat).	Hussain (1992)
225	Control of wilt by branches of Sinara and Phanas	Farmers of South Gujarat plant the branches of 'Sinara' and Phanas (<i>Artocarpus heterophyllus</i>) in fields for 8 days to avoid or control wilt (Valsad, Gujarat).	Ghedabhai (1992)
226	Control of wilt in Nagli (minor millet) by spraying goat milk	'Nagli' (<i>Eleusine coracana</i>), a minor millet grown in the tribal regions of South Gujarat, is sometimes affected by wilt (locally called 'tukara'), especially when the climate is hot and humid. Farmers spray goat's milk on the crop to control the disease (Valsad, Gujarat).	Tulshiram (1993)
227	Termite control in orchards	Termites and other ground dwelling pests including worms often pose a serious threat to young fruit trees in the orchards. Often small worms damage the roots of fruit trees similar to termite attack (Kheda, Gujarat).	Patel (1997a)
228	Control of fungal diseases by extract of Lantana in cow urine	5 kg of Lantana camara leaves are soaked in 5 litres of cow urine for 3 days. This is then diluted in 90 litres of water and sprayed against fungal disease (Erode, Tamil Nadu).	Sundara Raman (2000)
229	Control of fungal/bacterial diseases by spraying extract of Casuarina	20 kg/leaves of Casuarina (<i>Casuarina equisetifolia</i>) are boiled in water for 20 min and thereafter cooled and filtered. It is sprayed against fungal/bacterial diseases of crops in 1 acre (Dindugul, Tamil Nadu).	Sundara Raman (2000)
230	Seed treatment to prevent fungal diseases	To save the crop from fungal diseases farmers use Mattha (buttermilk)@5 litre/40 kg of seeds as seed treatment (Gonda, Uttar Pradesh).	Anonymous (2000c)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
231	Control of fungal and bacterial diseases by extract of <i>Lantana</i> in cow urine	A potent spray is made of the leaves of <i>unnichedi</i> . About 5 kg of <i>unnichedi</i> (<i>Lantana camara</i>) leaves are soaked in 5 litres of water and 10 litres of cow urine for 3-4 days in a mud pot. It is then filtered and diluted in 80 litres of water. This solution is then used for spraying. This spray is highly effective in controlling fungal/bacterial diseases. This is a very productive use of a serious invasive weed (Madurai, Tamil Nadu).	Vivekanandan (1999)
232	Control of nematodes in banana plantation by use of neem castor and ground nut cakes	Before planting banana suckers, apply 60 cartloads of well rotten compost manure/acre. Prepare fields by repeated ploughings. Beds are formed and suckers are planted in a 6' × 6' geometry. Then <i>neem</i> cake and castor cake in equal proportion is applied (25 - 30 g) around each sucker after 60 days of planting. Field should be irrigated regularly. During the 8th month, 50 g of groundnut-cake is applied. This ensures protection of banana plants from nematodes (Vidhudunagar, Tamil Nadu).	Sankaralingam (2000)
233	Control of late blight and bacterial wilt in potato tubers crop management	In Orissa, late blight (<i>Phytophthora infestans</i>) and Bacterial wilt (<i>Ralstonia solanacearum</i>) are the two major diseases of potato. In coastal Orissa potato tubers are planted in between 'Kartik Purima' and 'Prathamastmi' to escape late blight at the maximum vegetative growth phase of the crop. To reduce bacterial wilt and black-leg (<i>Erwinia caratovora sub sp. carotovora</i>) incidence, they grow sesamum sugarcane or summer vegetables after harvest. The popular cropping patterns in coastal Orissa are (i) upland paddy-potato-sesamum (ii) potato-sugarcane and (iii) upland paddy-potato-summer vegetables in every 2 to 3 years interval (Orissa).	Biswal <i>et al.</i> (2002)
234	Control of pest and diseases in ginger	Use of mulch at 6 q/acre reduces weed infestation, restricts disease incidence, provide nutrients and increases soil moisture in the rhizosphere of ginger plants. It also increases per unit profit from ginger and turmeric. <i>Karanj</i> oil cake at 100-150 kg reduces fungal and bacterial infection during the early growth of ginger. Besides, the farmers of this area use red mud and wood ash in equal proportion as paste to enhance keeping quality of seed ginger, by providing protection against scale insects (Orissa).	Dash <i>et al.</i> (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
235	Control of stem-borer in fruit trees by kerosene oil swap	Wherever stem-borer is seen doing damage, the kerosene soaked swap is put there. This practice is so effective that even the scientists and officers of horticultural departments advise this method to control the stem-borer (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
236	Control of cynodon dactylon	Dharo (<i>Cynodon dactylon</i>) is a noxious, perennial, grassy weed that grows on fertile patches and bunds in the fields. Even running a harrow for interculturing is very difficult in spots where the weed grows. The weeds are difficult to remove even manually. Dry stalks of the cumin plant are spread over the field in summer. In the monsoons, the rain water gets absorbed in the stalks before filtering down to the soil. It is believed that the water filtering through the cumin stalks prevents the germination and growth of the Dharo. It takes almost 1 year for the stalks to decompose (Mehasana, Gujarat).	Thakor (1996)
237	Cotton shells for control of <i>Cyperus rotundus</i>	<i>Cyperus rotundus</i> is a noxious weed. It grows in patches in black and sandy loam soils. It is locally called as 'chhaya' in Saurashtra and 'chidho' in middle Gujarat. It grows in patches in the field. Its roots go deep into the soil. Roots bear a gall like structure called 'nut sedge'. It is very difficult to remove this weed by interculturing. It regenerates when it is cut at the stem above the ground. Some farmers of Rajkot district use empty shells of cotton ball to control it. After removal of lint cotton from balls nutshells become waste. These nutshells are broadcast in the field where patches of 'chidho' are found. It is layered up to 3 inch thickness in these patches 1 month before rainy season begins. The field is then cultivated by plough to incorporate it well into the soil. Farmers believe that when it rains, the water infiltrates through shells. This burns or kills the root/sedge of the weed. By this practice, the field remains weed free for about 2-3 years (Rajkot, Gujarat).	Gami (1996)

Soil Fertility Management

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Improvement of soil texture and structure by use of clay, silt and soil	Use of inorganic inputs like clay, silt as well as soils are used to manipulate the texture and structure of soil (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
2	Weed as an indicator of soil fertility	Soil is more fertile if 'dharo' (<i>Cynodon dactylon</i>) and 'Kasdo' (weed plants) grow naturally in the field. This type of field is preferred for growing of crops requiring more plant nutrients like cotton and castor. Farmers of Kadi taluka believe that weeds like 'Gutari' (<i>Staria tomentosa</i>) grow better in light soil while 'Dabhdo' (<i>Desmostachya bipinnata</i>) and 'Dhaman' (<i>Cenchrus</i> sp) grow vigorously in fertile soil. Paddy gives more yield in the field where 'Samo' (<i>Echinochloa Colonum</i>) grows naturally (Mahesana, Gujarat).	Patel (1992a)
3	Enhancement of soil fertility through animal bones	Animal bones are buried in the basin area of the plants. The animal bones improve soil fertility by adding phosphorus to soil (Himachal Pradesh).	Verma (1998)
4	Improvement of soil fertility by animal staying	Staying the animals in the field for 1 or 2 nights is done to increase fertility of soils (Gonda, Uttar Pradesh).	Anonymous (2000c)
5	Improvement of soil fertility by residue incorporation	Incorporation of crop residues, stubbles and digested residues of hedges grown on the bunds are an integral part of organic fertilization (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
6	Use of river bed soils	River bed soils are rich in nutrients that eroded along with soils by water from hilly slopes and are deposited. Hence are used good for raising crops (Western Himalayas).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
7	Use of Sachik soil for higher crop yield	Yellow soil (Sachik) is used as manure for enhancing crop production. Yak loads of this yellowish/dark brown coloured soil are scattered in the field (Tagloom area, Himachal Pradesh).	Verma (1998)
8	Increasing yield of cotton by application of salt mixed with manure	20 to 25 kg of common salt is mixed with about 10 cart loads of natural manure and is applied in farm during Jyeshtha-Vaishakh (May). It would be more effective if the mixture is applied uniformly in all the furrows. 10 maunds of cotton/bigha is received (1/3 of acre). It is believed that the manure increases the crop's resistance to pests (Surendranagar, Gujarat).	Sanghani (1998)
9	Use of goat manure for improving millet production	Goat manure improves not only the millet production but also its taste. The physical properties like soil structure and waterholding capacity improve with the addition of goat manure in addition to enhancing soil fertility (Ladakh, Jammu and Kashmir).	Verma (1998)
10	Collection and usage of farm yard manure	Farmers in this region primarily keep their animals to meet the need of manure. It is collected from cow sheds either inside or outside the house. The dung is put outside the house in a heap in lower areas, whereas in upper areas it is directly put in heaps in the fields and covered with a thin layer of soil to avoid its dispersion by wind. Farmyard manure is transported to the fields in Kilta (bamboo container) by people's participation and also by horses. On an average 125–250 q/acre of manure is used by the farmers throughout the region. Cowdung is preferred mostly for farmyard manure compared to goat and sheep manure because the latter in large quantities leads to burning of crops due to the toxic effects of high levels of N (3%), P (1%) and K (2%) (Kinnaur, Himachal Pradesh).	Verma (1998)
11	Organic manuring, collection and management	The flocks of sheep and goats when taken for grazing are tied with small bags which cover their anal parts so that the excreta falls right into the bag and it is used as manure which contains 3% N, 1% P and 2% K (Himachal Pradesh).	Verma (1998)

SOIL FERTILITY MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
12	Technique of uniform distribution of organic manure	In Ladakh and other regions after every 7 steps taken by woman, 20-25 kg of organic manure is scattered in the fields. This technique aims at uniform distribution of organic manure. It is reported that the quantity of manure spread is optimum for the plot of land falling in the range of 7 steps taken by a woman (Ladakh, Jammu and Kashmir).	Verma (1998)
13	Nutrient recycling with ash, household waste and human excreta	Mixing of ash with household waste and human excreta aids in nutrient availability and recycling. Ash primarily meets the deficiency of K and also ensures P availability. In addition human excreta and household waste have good amounts of N, P and K (Ladakh, Jammu and Kashmir).	Verma (1998)
14	Recycling of organic matter by cattle grazing	The matured cobs of sorghum and maize are harvested and the cattle are allowed to graze here and then leave their dung and urine in the grazing land. It increases the organic matter content of soil in next season (Amravati, Maharashtra).	Anonymous (1999-2000c).
15	Compost preparation by use of Euphorbi	Traditionally farmers allow the urine and dung of livestock to ferment in a pit and then use it as manure. A 10 × 10 sq. ft. pit is dug and filled with organic kitchen waste, dry grass and leaves. A 6 cm high pile of all these is made. Then about 50-100 kg of Euphorbia nerrifolia plants are cut in to small pices of about 1 foot length each, and layered inside the pit. Cow dung is spread over these pieces and during the monsoon, rain water is allowed to flow into the pit. Once again a layer of dry grass, Euphorbia nerrifolia pieces and cow dung is put in the pit. The manure is ready for use by the next year. This manure is especially useful for wheat crop (Punchmahal, Gujarat).	Mundvada (1997)
16	Preparation of vermi compost	Preparation of earthworm compost is being followed in several villages of Karnataka. A simple procedure of earthworm compost preparation involves construction of mud tank and allowing the farm waste to rot and get digested by earthworms. Farmers use cow dung to solve problem of red ants. Cow dung mixed with turmeric and neem cake is used to coat the floor and sides of the tank. This method is effective in preventing ant attack, instead of neem cake any other bitter material is also equally effective (North Kanara).	Dasanakoppa (1999)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
17	Soil mixing with night soils for improving soil fertility	Soil with human excreta is mixed and broadcast over the fields during winter as it possesses immense manurial potential of the major plant nutrients like nitrogen, phosphorus and potassium. So, on addition of this along with the soil from cultivated field improves the soil fertility and the practice of collecting soil from the cultivated land helps in easy ploughing during summer cropping (Ladakh, Jammu and Kashmir).	Verma (1998)
18	Compost preparation from weeds	The tribals normally prepare the pits of 2 m × 2 m × 1 m size or as may be convenient to them. The weeds such as gokhru (<i>Xanthium strumarium</i>) and Tarota (<i>Cassia tora</i>) which are ample on the field bunds and adjoining areas are uprooted at the time of maturity and dumped in the pits. It is then covered with the help of dry leaves and soil. It is ready for application after 3 months (Amravati, Maharashtra).	Anonymous (1999-2000c)
19	Green leaf manuring with pongamia	Farmers in Karnataka collect the leaves of pongamia which grow on riverside, roadsides and in forests. These leaf materials are incorporated in waterlogged paddy fields before transplantation. The leaves get thoroughly mixed during puddling operation and decay within 2-3 days. Once they decay the smell from the waste repels paddy pests also (Karnataka).	Lakshmana (2000)
20	Application of Butea leaves to increase soil fertility	The leaves of khakhara (<i>Butea monosperma</i>) are used to increase the fertility of the soil. The leaves of khakhara are spread in the field where previously wheat was grown. Leaves of khakhara are burnt along with the residues of dried stalks of wheat. This ash when mixed with soil increases fertility of soil (Danta, Gujarat).	Solanki (2001)
21	Green manuring in paddy with biomass of wild bush	The practice of green manuring is localized in paddy growing areas. Leaves and twigs of wild bushes such as basuti and kaimal are used. Green manuring improves soil health and physical properties of the soil (Bharmour, Himachal Pradesh).	Verma (1998)

SOIL FERTILITY MANAGEMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
22	Mahua flower as manure to maize	The tribal farmers of Panchmahal district observed that, maize crop was growing healthy without any effects of diseases in the patches surrounding 'mahua' (<i>Madhuca indica</i>) trees. The corns were big in size and also more in the quantity in the shells. The reason was attributed to the continuous falling of flowers from the trees in these patches. Light cross- wise ploughing is first done in the field and then the mahua flowers are scattered in the field. After ploughing the field the land is ready for sowing if sufficient rainfall has occurred (Dahod, Gujarat).	Bhuriya (1998)
23	Green leaf manuring in paddy	Puddling paddy field and incorporation green leaf manure 2-3 days prior to planting instead of 15 days, keeps soil surface loose for transplanting, especially in sandy soils (Karnataka).	Anonymous (1999c)
24	Manuring of paddy by tamarind seeds	20 measures (about 30 kg/acre) of tamarind seeds are applied in the paddy field, 10 days after transplanting of paddy crop. The seeds will bulge and it will give an appearance of tea water. This will give dark green colour to leaves and give a boost to crop growth and yield (Sivagangai, Tamil Nadu).	Armugam (1999)
25	Paddy residue incorporation as manure	Paddy is harvested by removing only the earheads, leaving the long stalk and stubbles to remain in the field. The paddy straw is incorporated in to the soil by tractors ploughing, which is a manuring practice and reduces the cost of fertilizers (Pondicherry).	Jeyarajkumar (2000)
26	Sea weed as organic manure	Approximately 100 g sea weed is soaked in 500 ml water for 12 hours, boiled at low temperature for 45 min. The decoction is allowed to cool and filtered. Approximately 40 litre water is added to the filtrate and sprayed on the crop. It helps increase yields. Dry sea weeds, pounded and mixed with organic manure and incorporated into the soil is also beneficial. It decomposes within a month. It acts rapidly when sprayed as liquid. Seeds soaked in water extract of sea weed, germinate earlier (Valsad, Gujarat).	Nayak (1996)
27	Green manuring in chickpea by weed	Buin, a weed is used as green manure in chickpea (Hisar, Haryana).	

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S. No.	Title of ITK	Details of ITK and rationale	Reference
28	Use of weed as green manure	Farmers allow a weed called 'kherbi' to grow in the field since it is believed to help the main crop. In earlier times this weed used to be buried in the soil to provide manure to the main crop. Later on, some farmers noticed that it absorbs moisture from the deeper layer of the soil and helps in retaining it in the upper layers (Dang).	Jivanbhai (1993)
29	Increasing soil fertility by crop rotation	Farmers of village Machla followed a unique method of crop rotation to increase the productivity and maintain the fertility of the soil. In the first year during the rainy season (kharif) maize (<i>Zea mays</i>) is sown (it is a deep rooted crop). The following year rice (<i>Oryza sativa</i>) or black gram (<i>Phaseolus mungo</i>) is sown (these are shallow rooted plants). In third year castor (<i>Ricinus spp</i>) is sown (it is a deep rooted plant), and in fourth year groundnut (<i>Arachis hypogaea</i>) is sown. Groundnut and black gram ensure a good supply of nitrogen. This ensures a good mixing of all the layers of the soil as the crops have varied root depths (Banaskantha, Gujarat).	Kalabhai (1999)
30	Control of salinity in soil by growing mango and banana	Farmers cultivate mango and banana together in saline, alkaline soils to reduce salinity as banana absorbs soluble salts to bring down the soil pH (Karnataka).	Anonymous (1999c)
31	Soil reclamation with castor shell	Empty castor pods are incorporated into saline soils as part of reclamation. A noticeable improvement results within 1 or 2 years (Bhavnagar, Gujarat).	Popatbhai (1992)
32	Piludi for brackish soil reclamation	Accumulation of soluble salts in soil is known as salinization. The soil becomes very hard due to increase in the salt concentration. The infiltration rate of the soil becomes less and fertility also decreases. Leaves of piludi (<i>Salvadora persica</i>) are used to decrease the concentration of such salts. Approximately 20 to 25 baskets (one basket contains 10 kg of leaves) dry leaves of piludi are mixed in 1 bigha of land. The field is ploughed before the onset of monsoon during the rainy season (kharif). After the monsoon sets in the leaves decay and provide organic matter to the soil. These leaves gradually decrease the salts present in the soil. This occurs by leaching. Thus the soil is gradually made productive (Mehsana, Gujarat).	Thakor (1999)

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S. No.	Title of ITK	Details of ITK and rationale	Referen
33	Nutrient management technology in tribal areas of Chhattisgarh	Tribal farmers generally grow traditional rice varieties which are not N responsive and barring few pockets here and there nutrient application through fertilizers is very low. They adopt several indigenous techniques to meet the nutrient requirements of the crops. These techniques include application of FYM, Narayan Rao Pandari Pande (NADEP) compost, pig and poultry manures and growing of green manure crops in those fields where paddy is raised through the practice of transplanting. Besides, they also follow some of the practices like growing of greengram and blackgram as a mixed crop with rice and of pigeonpea with sugarcane, Mahua - (<i>Madhuca indica</i>) and neem - (<i>Azadirachta indica</i>) cakes are applied as manure, which also serve as pesticides. Wild rice (locally known as karga) and other weeds are buried in the field itself at the time of weeding and roguing so as to recycle the nutrients taken up by them. Cultural practice of ploughing the field immediately after paddy harvest and intermittently thereafter, facilitates the decomposition of crop stubbles and weeds and recycling the nutrients into the soil. In some of the areas agroforestry practice of maintaining 100-125/ha Babul (<i>Acacia nilotica</i> L.) as scattered trees inside rice fields is also followed which helps in increasing the soil organic matter and available nitrogen in rice fields. The pods of the Babul trees are also buried in the rice fields, which besides adding nutrients to the soil, are perceived by the farmers as having pesticidal value (Chhattisgarh).	Sharma and Sharma (2001)
34	Nutrient management practices of Madhya Pradesh	The indigenous practices relating to nutrient management in field crops in various parts of Madhya Pradesh are use of farm refuses and residues, organic manures, biofertilizers, green manuring, mixed cropping, agro-forestry, vermiculture and night-soiling as source of plant nutrients; use of mahua - (<i>Madhuca latifolia</i>), karanj - (<i>Pongamea pinnata</i>), neem - (<i>Azadirachta indica</i>), sal - (<i>Shorea robusta</i>) cakes for coating of urea, and conservation practices such as Haveli and Bandh cultivation, bunding, mulching etc. for conservation of nutrients and increased nutrient-use efficiency. The traditional practices adopted by the farmers evolved through experiences have scientific rationale and great deal	Gupta and Rajput (2001)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
		of relevance to available resources, and soil and climate conditions of a particular region (Madhya Pradesh).	
35	Indigenous knowledge of nutrient management in Western Rajasthan	Low rainfall, high temperature and light textured soils are the major constraints for crop production in western Rajasthan. A majority of the soils in the region are deficient in nitrogen, low to medium in phosphorus and high in potassium. The farmers are reluctant to apply fertilizers due to uncertainty of rainfall and insecure returns. However, based on the generations experience, the farmers have devised criteria for judging the suitability of land for cultivation of a particular crop and cropping systems. Depending upon the land quality, various management practices evolved by the farmers in the region help to regain the fertility of soil. 'Khadin' cultivation is an ancient system and very useful in soil as well as water conservation. The other important management practices like crop rotation, fallowing, crop residue incorporation, addition of pond sediments, agroforestry etc. are followed to maintain soil fertility (Western Rajasthan).	Sharma and Gupta (2001)
36	Traditional soil-nutrient management	Increasing cropping intensity, indiscriminate use of chemicals - insecticides, herbicides, fertilizers etc. and continuous use of rice-wheat crop rotation in Punjab is causing a serious concern of the maintenance of sustained productivity and arresting environmental pollution. At this stage it is very important to look back to the traditional soil-nutrient management techniques followed by our farmers but have been abandoned in the recent past. Some of the traditional practices commonly followed were recycling of nutrients through pond excavation, compost manure, animal-hay-bed technology, penning of cattle in the fallow fields, crop rotations including legume crops and their use as green fodder to the animals, relative uses of dung, fallow cultivation and straw mulch application (Punjab).	Hira et al. (2001)
37	INutrient management practices of Himachal Pradesh	In Himachal Pradesh the agro-climatic conditions are diverse on account of wide variations in altitude and undulating topography. These range from sub-tropical at lower elevations to dry temperate at higher altitudes. Fertilizer nutrient consumption in the state	Acharya et al. (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		is around 30 kg/ha, which is far below than the national average. Poor socio-economic conditions of the farmers and rainfed agriculture are the major reasons for low consumption of fertilizers. They have, however, developed over the years, location specific indigenous nutrient management technologies like use of wastes from cattlesheds, application of farm yard manure, use of ash and human excreta, green manuring with leaves and twigs, biofencing, use of forest soil, transportation of soil from river beds, growing pulse crops on bunds, use of kitchen ash, sheep, goat, and poultry manure etc. Some of these technologies and others like collection of droppings of sheep and goats by tying bags to cover anal parts are indicative of indigenous wisdom of the farmers (Himachal Pradesh).	
38	Nutrient management practices of Haryana	The average fertilizer consumption in Haryana is about 136 kg nutrients (N+P ₂ O ₅ +K ₂ O)/ha. About 9.73 million tonnes of animal dung is produced annually from the available livestock of the state. Among the various organic manures, cattle dung is one of the major sources. Some of the indigenous nutrient management practices followed by the farmers are: application of farmyard manure, slurry from gobar gas plant, incorporation of crop residues like cotton stocks, use of industrial and urban wastes, green manuring etc. The other indigenous practice of nutrient management being followed by the farmers of western part of Haryana is the maintenance of Jandi tree in the field (Haryana).	Gupta (2001)
39	Nutrient management practices of Gujarat	The state of Gujarat is endowed with a variety of agro-climatic conditions (arid to sub-humid), soils (inceptisols, vertisols, aridisols), tribes and settlements. The fertilizer use varies accordingly. The inhabitants of this region practice numerous indigenous technologies for nutrient management, It includes organic manuring, green manuring, use of local materials like tanch, pond silt, eolian sand, mulch, ash, spray of butter milk, permanent-furrow system etc. However, these indigenous practices are location-specific, cost-effective, have field validity and are a sort of appropriate technology for this region (Gujarat).	Golakiya et al. (2001)

S. No.	Title of ITK	Details of ITK and rationale	Reference
40	Nutrient management practices of Andhra Pradesh	Andhra Pradesh is endowed with vast potential of organic resources. The estimate of annual production of cattle dung in Andhra Pradesh is to an extent of 806 lakh tonnes. Farmyard manure (FYM) is the most readily available and traditional organic manure. It is usually applied to vegetables, commercial crops, etc. in good amounts. Penning is a common practice that ensures the use of sheep and goat droppings in the fields. The poultry litter generated in the state is estimated to be 13.70 lakh tonnes which is usually applied to commercial crops directly. Dhaincha, pillipesara, sunnhemp, cowpea etc. are commonly used as green manuring crops in rice and sugarcane fields. Some green manure trees like Gliricidia, pongamia and leguminous shrubs etc. are grown on field bunds and wastelands and their vegetative parts are utilized for green leaf manuring in rice fields. Weeds like ipomoea, lantana, waterhyacinth are also utilised for green leaf manuring in some areas. Oilcakes obtained as by-products are used mostly as cattle feed and partly as manure. Non-edible cakes of neem, karanj, mahua, castor are used as organic manures in upland crops, whereas, the edible cake like groundnut-cake is applied especially to vegetable crops. Groundnut hulls obtained during the shelling of groundnut pods are applied to paddy fields to improve soil structure. Tamarind fruit residues are also applied to paddy fields. The stalks of cotton, castor and chillies are generally used for fuel purpose or burnt in the field. Ash collected from households is applied selectively to crops like onion, tobacco and chillies. Tank silt which consists of a large proportion of finer soil particles (silt and clay) and organic matter carried by run-off water from the surrounding land to the tanks during heavy rains is applied to upland soils. Mixing of clay in sandy soils to improve physical condition of the soil and transporting soil to cultivated fields from waste-land areas is a common practice to restore soil fertility (Andhra Pradesh).	Subba Rao et al. (2001)
41	Nutrient management practices of Orissa	The technologies include use of organic manures, utilization of locally available plant materials for composting, recycling of organic wastes/excreta, green manuring, use of tank silt as soil amendment and use of salty soil for coconut plants (Orissa).	Moorthy et al. (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
42	Nutrient management techniques of northern transitional zone of Karnataka	The indigenous nutrient management practices existing in the farming community include use of farmyard manure (FYM), compost, green manuring, addition of tank silt and to some extent crop rotations (Karnataka).	Manjunathiah et al. (2001)
43	Nutrient management technology for TamilNadu	The farmers of Tamil Nadu have a wide variety of traditional farming practices. Manuring the soil with farmyard manure (FYM), compost and green manures or green leaves manures is an age-old practice. Sheep penning and adding tanks silt are common practices in some parts of the state. The main sources of organic manures are FYM and compost. For preparing compost, in addition to farm wastes, materials such as sugarcane trash, urban wastes like garbage, night soil, industrial wastes like coir waste and pressmud are used. Enriched FYM with P and K and bio-inoculants are popularly used in crop production. The increasing number of poultry units supplies considerable quantities of poultry wastes, which are used as source of nutrients, sludges and effluents form minor sources of organic manures (Tamil Nadu).	Selvakumari et al. (2001)
44	Nutrient management technology in selected agro-eco regions of Maharashtra	In all 16 indigenous nutrient management practices are in vogue in 9 agro-climatic zones of Maharashtra. The technologies refer to are use of dung-urine slurry, vermiculture through rishikrishi method, use of soil of ant-hill + cowdung + urine + biofertilizer smearing to seed, use of Gadhies (Buruji) soil or tank and well silt, feeding of banana suckers/pseudostem to sitting cattle in the field, practice of confining sheep/goats on uncropped land, practice of raising nursery on the place of sitting cattle/sheep/goat herd, burying of dead animals under fruit trees, rabbing in rice fields, burning of sugarcane trash in the field, use of rice husk, sorghum stubble, use of fish waste direct and after composting, practice of utera crop after rice, use of residual fertile soil for growing legumes on rice bund and utilization of organic residue (biomass) of greengram/blackgram in cropping system/intercropping (Maharashtra).	Malewar et al. (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
45	Technology for nutrient management in Jammu and Kashmir	Agriculture is the mainstay of the people of Jammu and Kashmir. The farmers of Jammu and Kashmir produce crops, rear livestock and majority of the farmers use organic manure prepared from dung and urine of the livestock. A number of farmers practice green manuring wherein dhaincha and sunnhemp are mainly used (Jammu and Kashmir).	Gupta et al. (2001)
46	Nutrient mangement practices of West Bengal	West Bengal has diverse agro-ecological zones. Farmers of the different zones follow various indigenous practices for nutrient management in their fields. These practices are mainly centered on the use of organics in different forms, viz., tank silt, fish-meal, night soil, sewage-sludge, leaf mold and green manuring. Besides, ingenuity in pattern of land use and crop rotations such as fallowing, paira cropping are also important indigenous practices followed by the farmers of the state to maintain soil health (West Bengal).	Mandal and Mandal (2001)
47	Nutrient management technolgy of Central Himalaya	Indigenous technology of traditional societies indicates, organic resource incorporation into the farming systems and composting of available resources (crop residue, by-product) as major nutrient management strategies in Central Himalaya (Central Himalaya).	Singh et al. (2001)
48	Nutrient management practices of North-Eastern Hill	Though, the North Eastern Region of India is endowed with rich natural resources, the faulty agricultural practices followed in the region have caused their fast depletion. Shifting cultivation has resulted in large-scale land and environmental degradation in the region. However, there exists some unique, ecofriendly and reasonably productive indigenous farming systems which have remained sustainable for centuries. These farming systems have in -built soil fertility management and soil and water conservation components. In Zabo system, followed in Phek district of Nagaland, the irrigation water from the main water collection tank is passed through animal yard and it carries all dung and urine of the animals to the field below the slope. Besides, farmers add succulent branches and leaves of trees in the field for enhancing soil fertility; Alder (<i>Alnus nepalensis</i>) land use system is followed in Kohima district of Nagaland. More than 200 years old trees	Sharma (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		of alder, a non-leguminous atmospheric N fixing tree, can be seen in the area. The branches of the trees are spread in the field and left for decomposition or burnt. The Apatani farmers of Arunachal Pradesh make use of farm and household wastes, tree leaves and forest litter for maintaining soil fertility. The rain water from hills, used for irrigation, also brings forest humus to the valley and lower slopes. The 'Wet Rice cultivation' or Panikheti farming system make use of tree leaves, cattle dung, pig and poultry droppings and farm wastes for improving soil fertility. Nutrient management in narrow valleys entirely depends on humus from the adjoining hills and semi-decomposed forest litter. The soil in the narrow valleys is generally brownish-black in colour due to high content of humus (North-Eastern Hill Region).	
49	Nutrient management practices of Kerala	Traditionally, farmers adopt many measures for maintaining and improving the organic matter content of the soils. For rice, cow dung and green leaves are applied before ploughing and thoroughly incorporated into the soil before transplantation. In the case of coconut, the basins are opened before the start of southwest monsoon and these organic manures are applied manually at the onset of monsoon. Vegetable cultivation is done with the use of fresh cow dung in the pits. Stubbles and dried leaves are collected, burnt and the ash is used for cultivation. Farmers also aim at improving the physical properties of the soil by using alluvial deposits and clay. Application of pure river sand to rice soils of lateritic origin improves the silica alumina ratio of the soil and reduces the Fe and Mn toxicity. (Kerala)	Sushama et al. (2001)
50	Technologies of nutrient management of Konkan region of Maharashtra	Poor economical conditions and credit facilities the farmers of Konkan region to adopt practices of nutrient management taught by their forefathers, which include recycling of crop residues, animal wastes/by-products, forest by-product and marine wastes (Maharashtra).	Talashilkar et al. (2001)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
51	Nutrient management practices of Andaman and Nicobar Islands	Fertilizer consumption in Andaman and Nicobar Islands is very low because of fragile environment, poor socio-economic status and small-land holdings of farmers. Farmers have been using indigenous technologies to meet the nutrient requirement of crops. Among these, biomass waste incorporation, weed incorporation, green leaf manuring from live fences and growing leguminous cover crops in plantations are very common. In rice-based cropping system, green leaf manuring, weed incorporation and application of FYM and poultry manure are common (Andaman and Nicobar Islands).	Ganeshamurthy et al.(2001)
52	Nutrient management practices of some eco-regions of West Bengal plains	In the plain lands of West Bengal, farmers follow a large number of indigenous nutrient management practices based on traditional wisdom derived from the experience of earlier generation over a period of several centuries. Some of these methods are preparation of FYM, in-situ decomposition of grasses and weeds, water hyacinth compost, application of oilcake, tank silt application, crop rotation and penning of sheep (West Bengal).	Ghosh et al. (2001)
53	Technologies for nutrient management of coastal Karnataka	As an indigenous approach, farmers use river silt, burnt soil, FYM and compost, besides rock phosphate to meet the nutrient needs of crops quite apart from maintenance of soil health. Several farmers in the coastal region practice indigenous nutrient management per se to grow paddy and some horticultural crops despite the low levels of crop yield (Karnataka).	Badrinath et al. (2001)

Farm Implements

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Hal for land preparation	This plough is made up of Babool, sal, sisham wood and mild steel. The body and handle are made from one piece, but the shoe is separate. It is operated by one pair of bullocks by fixing a rope to a yoke. The weight of the implement is 48 lbs and covers 0.8 to 1 acre/day with an average depth and width of 5 and 6 inches respectively in alluvial soils. The draught requirement for this tool is 185 lbs. This implement is used by 100% farming community in district (Meerut, Uttar Pradesh).	ICAR (E) (1960)
2	Wetland plough (Dammu Nagali) for land preparatio	The plough is made up of Babool, palmyra and mild steel. 30–40 kg in weight, operated with two bullocks and one man. It is hitched to the yoke by means of ropes for puddling in rice fields. It covers half an acre/day and has the average draught of 200-220 kg. The depth of the ploughing in black and red soils varies from 4-5 inches and width 5-6 inches. The repairs of this implement can be done locally and annual maintenance charges ranges Rs 0.5 to 1.0. The cost of operation with this implement is Rs 25 per hectare. Almost all the farmers in this region are using to puddle the paddy in coastal belt of Andhra Pradesh (Guntur and West Godavari, Andhra Pradesh).	ICAR (1960)
3	Guddala Negalu (for seed bed preparation)	This plough is made up of mathi, Babool wood and mild steel. Body and shoe are prepared from one piece and handle is separate. The implement is attached to the centre of yoke by means of rope. Source of power is bullocks and has draught of 140 lbs. The average depth of furrow created by this plough is 7 inches and width 9 inches in red laterite soils. Above 90% of the farming community use it for seed bed preparation to have the work rate of 2 acres per day (Hassan, Karnataka).	ICAR (E) (1960)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
4	Nangal plough for land preparation	The plough is made up of mango wood, sal wood and mild steel by local artisans for preparation of the seed bed in paddy. The implement is attached to the yoke with a rope. Its average weight ranges 20-25 lbs (1-2lbs with iron part, 21-22lbs with wooden part). It is operated by a pair of bullocks and 1 man covering 0.3 acre/day. It can plough to a depth and width of 3 and 4 inches, respectively, in alluvial soils. The draught is 100-120 lbs, and almost all the farmers in this region are using for preparation of seed bed in paddy (Nowgong, Cachar and Sibsagar, Assam).	ICAR (1960)
5	Desi Hal for land preparation	The plough is made up of bamboo, Babool and salwood and mild steel. The body and shoe are one piece and handle is separate and bent forward. It can be operated by a pair of bullocks and one man for land preparation in paddy. The beam of the plough is fixed to yoke by ropes. It has an average weight of 25-40 lbs covering 0.26-0.4 acre/day with an average depth of 2-4 inches and width of 4-5 inches depending upon soil conditions. It made by local artisans and is used by all the farmers. This type of plough is also in use in Trichur, Quilon, Kottayam and Trivendrum districts of Travancore-Cochin (Champan and Purnea central paraganas, Bihar).	ICAR (1960)
6	Nagar plough for land preparation	It is made up of Babool, salwood and mild steel. The body and shoe are in one unit and handle is separate. This plough is operated by double yoke with one pair of bullocks and one person for preparation of seed beds of various crops in black soils. The yoke is tied to the beam by means of a rope and has average draught of 308 lbs. The width and depth of ploughing is 10 and 5 inches respectively. It is heavy type of plough with coverage of 1 acre per day. The weight of the implement is 102 lbs, repaired locally by local artisans (Mumbai, Maharashtra).	ICAR (1960)
7	Rintey Madike or nagali for land preparation	The plough is made up of Babool/teak wood and mild steel. The body and shoe are prepared from one piece. Handle is separate. The beam is curved in to middle and it can be hitched to wooden yoke by a rope and operated with one pair of bullocks and one person. It can be manufactured and repaired by the local artisans. It has coverage of 0.33-0.5 acre/day. It can be used throughout the year by all the farmers of this	ICAR (1960)

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		region. It has 2-4 lbs of iron part and 46-64 lbs of wooden part. It can cut the width of furrow of about 8 inches (Telengana, Andhra Pradesh; Gulbarga, Bidar and Raichur, Karnataka).	
8	Chivettumaram for puddling	This implement is manufactured by village craftsmen with teak wood, 15 lbs in weight and covers 1 acre/day. It is used in a ploughed field under water to do puddling at least 2-3 times in the same field. The implement is connected to the yoke by means of a beam and is drawn by a pair of bullocks. About 50-60% farmers use this implement in this regions (South Malabar, Kerala).	ICAR (1960)
9	Duck footed plough for ploughing and puddling in paddy	It is made up of Babool, tendu, saraj wood and steel with 6 lbs of iron part and 34 lbs of wooden parts. The plough is attached to yoke by means of tying ropes between yoke and beam of the plough. The depth of the ploughing is 4 inches and width is 6 inches. It has a coverage of 0.75 acres/day and had source of operating power is two bullocks and one man. It is manufactured and repaired locally. Almost all the farmers in the region use this for ploughing and puddling in paddy fields. This type of plough is also used in Ranchi(Jharkand) and Saran (Bihar) (Raigarh, Madhya Pradesh).	ICAR (1960)
10	Sheopur plough for land preparation	This implement has a body and a handle made out of one piece. Shoe is separate. It is made up of Babool, kherwood and mild steel. The beam of the implement is attached to the yoke by means of rope, manufactured and repaired locally. It can be operated with one pair of bullocks and one person and has a work rate of 0.5 acre/day. The draught of this implement varies from 125-200 lbs in light soils with average depth and width of 5-6 and 8-9 inches respectively. The weight of the implement is 45-55 lbs with a service life of 2-4 years (Sheopur, Morina, Jhabua and Indore, Madhya Pradesh).	ICAR (1960)
11	Use of Nangar plough in black soils for land preperation	It is made up of Babool, teakwood and mild steel with a weight of 60 lbs. The yoke is tied to the beam by means of a rope to prepare seed beds of various crops in black soils. It can be operated with one pair of bullocks and one man with a work rate of 0.5-1 acre/day and has the average draught of 150-209 lbs.	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
		The width and depth of ploughing in black soil with this implement are 5 and 6 inches respectively. Repaired locally and used by 100% of the farmers in these regions (Ratnagiri, Maharashtra; Ahmedabad, Gujarat).	
12	Nangar plough for land preparation	This is made up on Babool, sal teak wood and mild steel and has weight of 60-100 lbs. The yoke is attached to the beam by means of rope and is operated by one pair of bullocks and one man. The shoe and body are in one unit and handle is separate. The handle is bent forward. The average draught is 154-200 lbs and penetrates to the depth of 5-6 inches with a creation of furrow with a width of 7-10 inches. It is used for the preparation of seed bed of various crops with a coverage of 1 acre/day. It is manufactured and repaired by local artisans and is used by 100% of farming community in these areas (Pune and Nasik, Maharashtra; Ahmedabad, Ahmednagar - Gujarat; Bijapur - Karnataka).	ICAR (1960)
13	Hal for land preparation	The plough is made up of wood and mild steel. The body and handle are prepared in one piece and shoe is separate. The implement is tied up to the centre of the yoke by a rope for operation with one pair of bullocks and one person. The average depth of the furrow is 4 inches and width 4-5 inches in alluvial soils. The draught of the implement is 224 lbs and covers 0.5 acre/day (Dehradun, Uttaranchal).	ICAR (1960)
14	Hal for monsoon ploughing	It is made up of Babool, dhavad and teak wood and mild steel. It has a handle, body and shoe in separate pieces having 3-4 lbs of weight of iron part and 40-52 lbs of wooden part. It can be operated with one pair of bullocks and one man and covers one acre/day. The yoke is tied to a beam by means of loop of rope, which is kept tight by means of wooden or iron pegs fixed to the beam. It can be repaired locally with annual maintenance charges of Rs 3/- and has service life of 5-10 years. Almost all the farmers in this regions use this implement for seasonal ploughing for pearl millet, sorghum and maize (Banas, Kantar, Mehsana and Kaira, Maharashtra).	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
15	Thathai (crow bar) for cutting sugarcane	It is made up of high carbon steel by village artisans, weigh about 10 lbs and used for cutting sugarcane. The flattened end of the crow bar is knocked against the sugarcane stem by repeated strokes. The cane stem is just cut off. The work rate of the implement is 0.066 to 0.083 acre/day and this is operated by a single person (North Arcot, Karnataka).	ICAR (1960)
16	Kudali (Spade) for digging and weeding	Made of material similar to Khilna with the exception that iron end is flat. Used for digging and weeding (Himachal Pradesh).	Verma (1998)
17	Plough for sandy clay loam soils	It is made up of wood and mild steel. The depth and width of the ploughing are 5 and 6-8 inches respectively. The draught is 170-180 lbs on an average and covers 0.75–0.9 acre/day. It is manufactured and repaired by local artisans and is adopted by 100% of the farming community in these regions (Tonk, Sawai Madhopur and Kota, Rajasthan).	ICAR (1960)
18	Wooden muna plough in Punjab for seed bed preparation	It is made with the materials of shisham, kikar, salwood and mild steel. It is used for seed bed preparation for various crops by hitching the implement with a beam to a pair of bullocks. The draught of the implement is 168 lbs and it covers an area of 1 acre/day. In alluvial soils the depth and width of the ploughing are 4 and 9 inches, respectively (Jallundur, Punjab).	ICAR (1960)
19	Mai for land levelling	This implement is made up of sal wood weigh about 21.5 lbs and operated with two bullocks and one person. It is used for clod crushing and thereby pulverizing the soil by hitching to yoke by means of rope. It covers 2 acres/day. All the farmers in this region use this implement as a part of land preparation (Keonjhar, Orissa; Shimoga Mysor, Karnataka).	ICAR (1960)
20	Plough for different farming situations	Ploughs used in drylands have triangular shoes whereas for wet land cultivation, the shoes are flat. The share is prepared from a mild steel bar of 0.6 - 0.75m in length and 1.5 - 2.5 cm in width fixed to the shoe or body with a U clamp or wing shaped clamp. The share point projects beyond the shoe by 5-7.5 cm. Beam generally vary in length from 2.4-3 m. (Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
21	Plough with separate shoe and body	The shoe and body of plough are separate parts which is preferred in soils with a great proportion of sand particles. This facilitates easy replacement of the shoe which wears out due to abrasive action of sand. The beam of the plough is joined to the handle instead of the body. This provides more clearance under the beam for easy passage over clods and stubble. Handle is 0.6 to 1m long, 5-7.5 cm thick, 7.5-12.5 cm wide, fitted to the body of the plough (Mandi, Chamba, Una and Kangra, Himachal Pradesh).	Verma (1998)
22	Use of broader plough in upper valleys	Ploughs are broadened by attaching flat wooden pieces to both sides of the iron blade. Ploughing with the broader plough stabilizes the loose sandy strata in only one ploughing action that suits the small terraces and also saves the labour requirement. Hence this indigenous plough is preferred over the one available in the market (Ladakh, Jammu and Kashmir).	Verma (1998)
23	Mai (wooden lader) for seed bed preparation	It is made by the farmers and also by village artisans with bamboo and its weight varies from 10-18 lbs and covers the area of 1 acre/day. It is used for breaking clods, levelling the seed bed preparation and puddling by hitching to pair of bullocks with jute ropes. As the implement is very light in weight it is not so effective in breaking the clods but is quite useful for puddling the fields (All districts except hill regions, West Bengal).	ICAR (1960)
24	Nada Negilu for land preparation	This plough is made up of pongamia/babool/neem/hone wood and mild steel. It is used for preparation of land for various crops and has the average draught from 100-260 lbs depending upon the soil conditions. The body and shoe are prepared in one piece and handle is separate. It can be operated by one pair of bullocks and one man. Similar ploughs are used in Champaran and Patna (Bihar), Guntur, West Godavari, Anantapur, Cuddapah, Chittoor, Srikakulam (Andhra Pradesh) and Koraput of Orissa (Kolar, Tumkur, Chitradurga, Shimoga, Mandya, Mysore and Bangalore (Karnataka)).	ICAR (E) (1960)

FARM IMPLEMENTS

S. No.	Title of ITK	Details of ITK and rationale	Reference
25	Ploughing with desi plough	Use of the indigenous plough is still prevalent in Spiti valley. During April, women first uniformly spread farmyard manure and then the fields are ploughed (Spiti valley, Himachal Pradesh).	Verma (1998)
26	Plough with one piece	The shoe and body make one piece. The joint between the shoe and body is avoided to make the plough more rigid and robust to work on gravelly soils with stones and other obstacles (Kullu, Solan, Shimla, Sirmour, Lahaul, Spiti and Kinnaur of Himachal Pradesh).	Verma (1998)
27	Pathal for crushing clods	The implement is made up of Babool wood for body and forged iron for rings. It weights about 130 lbs and operated by two pairs of bullocks and two person. One pair of bullock is yoke to each of the two rings fitted to the clod crusher. Two person stand on the implement to add more weight to it and control bullocks. It covers 2-3 acres/day by crushing the clods and planking the fields. It is popular in cotton tracts (Nagpur, Maharashtra).	ICAR (1960)
28	Haulbi (wet land harrow) for land preparation	It is made up of iron, bamboo and Babool wood by local artisans for preparation of the seed beds. It is hitched to the yoke by a rope for operation with a pair of bullocks and one man to cover 4 acres/day in red soils. The depth of penetration is 6 inches and average pull is 135 lbs. There are six iron tynes to this implement and is used by almost all the farming community in Bangalore area (Bangalore, Karnataka).	ICAR (1960)
29	Tyned hoe (Papattam) for interculture in upland paddy	The implement is made up of wood for beam and handle and mild steel bars are tynes. The weight of the implement 25-30 lbs, operated by a pair of bullocks and man and covers 2-3 acres/day in semi-dry paddy areas after light showers. The tynes of the implement resemble the simple hand hoe in shape and about 20% of the farming community use this implement for removal of weeds after initial rains in the early stages of paddy zone (Chengalput, Tamil Nadu).	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
30	Kopar, Pahata and Mai for planking	It is manufactured by local village carpenters with wood and weighs about 50-120 lbs. It is operated by four bullocks and two persons by connecting the implement to the yoke by means of ropes. It is used for levelling a ploughed land, breaking the clods thereby pulverizing the soil and covering the seeds after sowing of rainy season (kharif) crops (All districts in Madhya Pradesh except Sidhi and Shahdol).	ICAR (1960)
31	Clod crusher - cum-plank (Mai)	It is made up of bamboo, cane and jute crops, weighing 17 lbs and operated by two bullocks and one man for clod breaking. This implement is attached to the yoke by means of bamboo, cane or ropes and covers 5.33 acres/day. The average draught is 130 lbs. The width of the implement is 8 feet (Darang, Assam).	ICAR (1960)
32	Mayurbhanj for crushing clods	It made up of wood, used for clod crushing and pulverising the soil by hitching to the yoke with the ropes and operated by two bullocks and one man. The weight of the implement is 51.5 lbs and has work rate of 2-3 acres/day. About all the farmers in this region use this implement as a part of land preparation (Mayurbhanj, Orissa).	ICAR (1960)
33	Karah for land levelling	The implement is made up of shisham or sal wood and mild steel and weigh about 88 lbs. It is used for levelling uneven fields by hitching the implement to yoke with iron hooks by chains with a pair of bullock (Karnal, Haryana).	ICAR (1960)
34	Karah for land levelling	It is made up of iron, shisham, and Babool wood by village artisans and weighs about 40-80 lbs. It is operated by a pair of bullocks and one man by hitching to the yoke by hooks tied to the implement for levelling the fields by pushing the earth from higher levels to lower levels. The work rate of the implement is 1 acre per day and almost all the farmers in this region use the implement for land preparation (Rohtak, Haryana).	ICAR (1960)

FARM IMPLEMENTS

S. No.	Title of ITK	Details of ITK and rationale	Reference
35	Patela for blanking	This implement is made up of shisham, Babool wood and is used with a pair of bullocks and one man for planking and clod crushing after ploughing. The plank is hitched to the yoke by means of rope and covers 4 acres/day. The weight of the implement is 80 lbs and fabricated by village artisans. Almost of all the farmers in this region use this implement as a part of land preparation for different crops (Bareilly and Muradabad, Uttar Pradesh).	ICAR (1960)
36	Palli (spike tooth harrow) for land preparation	This implement is made of mild steel and wood by local artisan. The harrow is attached to the wheel and yoke to the pair of bullock. The average draught in sandy soil under ploughed condition is about 60-80 lbs. It covers the area of 0.5 acre/day with a depth of penetration 2-3". Above 95% of the farmers in this region use for cultivation of paddy only when the leveller is not used (Travancore, Cochin Quila, Kerala).	ICAR (1960)
37	Gnaveri or Maram for land levelling	The implement is used with one pair of bullocks or buffaloes and one man. It is made up of teak wood and weight of the implement varied from 40-50 lbs. It is connected to the yoke by two iron rings and fastening rope and operated by a person who keeps standing on flat surface of the leveller. It covers 0.5 acres/day for levelling fields after ploughing (Thiruchur, Tamilnadu; and Trivendrum, Kerala).	ICAR (1960)
38	Tanjore for land levelling	This implement is used for levelling for puddled fields. It is manufactured by local artisans. The weight of the implement is 20-30 lbs which requires two bullocks and one person for operation. The leveller is hitched to the yoke by a rope or by hooking a split bamboo shaft pole. (Thanjavur, Tirichy, Chengalput, Salem and Coimbatore, Tamilnadu; Karnal, Haryana; Cuttack, Orissa).	ICAR (1960)
39	Bida (harrow) for land preparation	It is made up of sal, bandan wood and mild steel by village artisans and weighs 46 lbs. It is hitched to the yoke and beam by ropes-operated power is bullock. The average draught is 130 lbs and is used for eradicating weeds, thinning operation for upland paddy. It covers 2 acres/day with a penetration depth of 1-2 inches. About 90% of the farming community use this implement in this area (Cuttack, Orissa).	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
40	Use of Maddim for field levelling	Maddim is a plain wooden structure used for levelling ploughed lands which enables good soil till, better seed and soil contact and thus good germination of crops. A heavy stone is put on the maddim for increasing the pressure required for levelling to help in improving the soil structure thereby, conserving the moisture (Western Himalayas).	Verma (1998)
41	Use of Mannargudi Kalapai for land preparation	It is a steel plough attached to wooden beam with 20 lbs weight. It is used in wet lands for puddling to a depth 2-3 inches in black soils. It is hitched to the yoke by a rope, manufactured and repaired by local people. It has the coverage of 0.5 acre/day and is operated by two bullocks and one man (Thanjavur, Tamilnadu).	ICAR (1960)
42	Urcha Palaki for land levelling	It is made up of teak wood and tamarind for shaft poles by village artisans and weigh about 30-40 lbs. The implement is connected to yoke by shaft pole and a handle is provided for effective proper levelling. It is used for levelling wet lands after puddling and before transplanting of paddy seedlings and covers 1.5 acres/day. About 15-20 % farmers in this region use this implement for levelling the paddy fields (South Malabar, Kerala).	ICAR (1960)
43	Roller for breaking clods	It is made up of wood weighing 205 lbs and used for breaking clods and pressing the soil. The implement is hitched to the yoke by ropes and is driven by a pair of bullocks. It covers 4 acres/day. Above 50% of the farming community use this implement to break the clods and pressing the soil (Bulandshahr, Uttar Pradesh, Karnal (Haryana), Sirmur (Himachal Pradesh).	ICAR (1960)
44	Hante machine for seed bed preparation	This implement is made up of nandi, mathi, kolly wood and weighs about 232 lbs, operated with two bullocks and one person for clod crushing, pulverizing and pressing the soil. It covers 2 acres/day (Coorg, Karnataka).	ICAR (1960)

FARM IMPLEMENTS

S. No.	Title of ITK	Details of ITK and rationale	Reference
45	Halube for breaking clods	It is made up of local wood and bamboo having 12 lbs in weight which can be operated by one or two persons to cover 1 acre/day. The depth of the penetration in sandy loam soil varies from 2 to 2.5 inches. It is used for breaking clots, to pulverize the soil and to collect weeds previously uprooted. It is also used for making cross furrows at a distance of 10-14 inches after making length wise furrows to sow seeds or to transplant the seedlings at a point where the length- and width-wise furrows cut (Coorg, Karnataka).	ICAR (1960)
46	Bakhar for secondary tillage	It is made up of mild steel and wood and is operated by a pair of bullocks for seed bed preparation for summer tillage before the onset of monsoon. The average draught in light black soils is about 130 lbs and covers 1 acre per day. The depth of penetration varies from 1-3 inches and is used by all farmers in Madhya Bharath. (Mandsour, Madhya Pradesh; Raipur, Chattisgarh; Akola and Usmanabad, Maharashtra; Chittorgarh, Rajasthan; Adilabad, Andhra Pradesh).	ICAR (1960)
47	Varadi for land preparation	It is manufactured by local artisans and is used as bullock source of energy in drylands for preparation of seed beds for dry paddy to cover the seeds after sowing. It hitched to the yoke by tying to beam with ropes. It covers the seeds upto 2 acres in day with a penetration of 4-6 inches in black soils. Average draught in black soils varies 90 to 120 lbs (South Malabar, Kerala).	ICAR (1960)
48	Mallot for breaking clods	It has a wooden block with a handle. Occasionally one end of the block is tapering. This is used for breaking clods (Himachal Pradesh).	Verma (1998)
49	Halubi for secondary tillage in red and lateritic soils of Karnataka	The materials used to fabricate the implement by the local artisans are mango, jackwood and hardwood. It is hitched to the yoke of two bullocks by ropes for preparation of seed bed for different crops. The average depth of penetration of this implement is 2 inches and the average pull is 140 lbs. This harrow covers the area of 3 acres/day. Similar type of harrows are used in Gulbarga, Coorg, Raichur (Karnataka) Medak, West Godavari, Srikakulum (Andhra Pradesh) Ferozpur (Punjab) Jabalpur, Balaghat	ICAR (1960)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
		(Madhya Pradesh). About 90% of the farmers in these regions use this implement for secondary tillage of various crops (Hassan, Banagalore, Tumkur and Mandya, Karnataka).	
50	Triangular harrow for breaking soil clods	This implement is made up of steel, shisham wood and it has weight of 105 lbs. It is operated by two bullocks and one man by hitching yoke to the harrow along with tail. The work rate of this implement is 6 acres/day. It is used for seedbed preparation, breaking soil crust in wheat, maize and cotton and also for weeding and hoeing in wheat (All the districts, Punjab).	ICAR (1960)
51	Charotahal for land preparation	The plough is made up of Babool, teak and mild steel. The handle body and shoe are in separate pieces. The shoe which is made up of steel is fixed by a means of wedge. It is tied to the yoke and beam by means of a rope of loop and is kept tied by means of wooden or iron pegs fixed to the beam. It can be operated with one pair of bullocks and one man in monsoon season in pearlimillet, cotton and tobacco crops with a work rate of 1 acre/day. All the farmers in Kaira district of Maharastra use this implement which can be repaired locally and has the service life of 10 years (Kaira, Maharashtra).	ICAR (1960)
52	Votti for land levelling	This implement is manufactured with Babool, vengaiwood for handle and HC steel or MS for levelling board. The weight of the implement ranges 35-40 lbs and operated by a pair of bullocks and one person. It is fastened to yoke shaft either by rope or chains and is provided with wooden handle for controlling the implement. It is used after harrowing to level the field just before sowing. The implement scoops the earth at a higher level and throws it to a lower level. It covers 1.5 acre/day. The steel boards are generally made from the side plates of sugarcane's pans for using in dry soils (Coimbatore, Tamil Nadu).	ICAR (1960)
53	Leveller (suhaga) for land levelling	The plank of the leveller is made of wood and shafts are made of bamboo sticks. Extra weight is added by placing stone on it or having persons ride on it. Used for levelling land (Himachal Pradesh).	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
216	Medicinal use of bamboo in cattle	Important parts of bans (<i>Bambusa arundinacea</i>) used are leaf and stem containing choline, betain, nuclease, urease, cyanogeenticand glucoside. Leaf acts as emmenagogue, stimulant, astringent, febrifuge, echbolic and diuretic and acts against leprosy, tympany/bloat, diarrhoea, retained placenta, thread worm,cough, cold in horses. Flowering occurs once in ten-twelve years. The plant dries after flowering.	Parabia et al. (2000)
217	Medicinal importance of zakhmehaiyat	Leaf juice of zakhme is medicinally valuable containing malic, isocitric and citric acids act as styptic, astringent and antiseptic. Pulp is applied on bruised wounds insect bites. When given internally cures diarrhoea, dysentery and lithiasis.	Parabia et al. (2000)
218	Medicinal use of Bastard teak	Seed, flower, stem bark leaf and gum are the medicinally valuable parts. Contains glucosides, kenotannic gallic acid and essential oils which act as astringent antihelmenthentic aphrodisiac and diuretic. Stem bark heals pthisis and haemorrhage, controls ringworm, conjusted and septic wounds, diarrohea, dysentery.	Parabia et al. (2000)
219	Medicinal uses of <i>Derris trifoliata</i> , <i>D.uliginosa</i>	Root, bark of banda (<i>Derris trifidiata</i>) contain lipeol, taraxerol, beta-sitosterol, scandenin, coumarin, resins, alkaloids, rotenone, saponin which are used as alterative, insecticide, cathartic, dysmenorrhoea, astrigent, narcotic,for wounds, rheumatism, menstrual troubles, remedy for consumption, asthma, mania and as a substitute for betelnut.	Parabia et al. (2000)
220	Medicinal uses of <i>Dendrocalamus strictus</i>	The leaf and other parts of kaban (<i>Dendrocalamus strictus</i>) which contain silicious matter are used as astrigent, ecbolics to animals.	Parabia et al. (2000)
221	Medicinal uses of <i>Datura metel</i> , <i>D.alba</i> , <i>D.fastuosa</i>	Leaf, root, fruit and ripe seed of sadah datura (<i>Datura metel</i>) contain alkaloids, hyoscamine, hyocine, atropine, scopalamine, allantoin, vitamin-C, are used for insanity, fever with catarrh and cerebral complication and fruit to get animal in to heat, prolapse of uterus/vagina.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
222	Medicinal uses of <i>Dalbergia sissoo</i>	Stem bark, root, leaf, mucilage of sisam (<i>Dalbergia sissoo</i>) which contain tannin, dalberginone, dalbergin, allylphenol of latitontype, 5,7,4-trihydroxy-s-methoxyisoflorone and are used for leprosy, boils, eruptions to allay vomiting, oil is used for cutaneous afflictions. Mucilage of leaves mixed with sweet oil is applied in excoriations.	Parabia et al. (2000)
223	Medicinal uses of <i>Cyperus rotundus</i>	Tubers of motha mutha (<i>Cyperus rotundus</i>) have essential oils, myristic and stearic acid, unstable alkaloid, b-seilinne, cyperenone and are used as diuretic, emmenagogue, anthelmintic, stimulant, tranquilizer, antipyretic.	Parabia et al. (2000)
224	Medicinal uses of <i>bergia</i>	Plant and leaf of <i>bergia odorata</i> are the medicinally valuable parts containing tannin used in cleaning teeth and are applied to broken bones. Poultice prepared from leaf heals sores and plant paste heals urticaria and allergic sores.	Parabia et al. (2000)
225	Medicinal use of opthalmic barberry	Root, stem bark, wood, stem of darhald/rasaut (<i>Berberis aristata</i>) are the useful parts containing tree alkaloid named berberine used as alterative, tonic and antiperiodic. Stem bark and root cures skin diseases, jaundice, dysentery, colic, nervous diseases, sores, copious discharge from womb, trachoma virus and amoebiasis.	Parabia et al. (2000)
226	Kachnar - an antidote to snake poison	Stembark, root, leaf, flower, seed and gum of kachnar (<i>Bauhinia variegata</i>) are the useful parts containing mainly tannins and glucose. Stem bark acts as alterative, tonic, astringent and cures cough, bleeding piles, hematuria and manorrhagia, malaria and primarily act as antidote to snake poison. Root is used as carminative and flower laxative and cures sore throat.	Parabia et al. (2000)
227	Medicinal uses of <i>Coriandrum sativum</i>	Leaf, fruit, seed and plant kottmir (<i>Coriandrum sativum</i>) contain coriantrol, oxalic acid, calcium, vitamin C, carotene, essential oil, tannin, malic acid and ash which are used as aromatic, stimulant, carminative, stomachic, antibilious, refrigerant, diuretic, aphrodisiac, correction of bad breathe, dyspepsia, flatulence, vomiting, indigestion, sore throat, bilious complaints.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
228	Medicinal use of Barleria cristata	Plant, leaf and root of barleria cristata are the important parts contains apigenin and naringenin. Leaf and root are used to reduce swellings, cures cough. Root decoction cures rheumatism. Plant acts against snake bite.	Parabia et al. (2000)
229	Cultivation of Seabuckthorn (Hippophae)	Seabuckthorn is widely distributed in an altitudinal range of 700 m to 5500 m and above, owing to enormous uses of its fruits in curing several ailments including skin tumor,digestive disorders and respiratory ailments, foot and mouth disease in cattle, besides it is used in agro forestry practices. Also it is major source of fuelwood, fodder for goats and cattle, fencing to protect fruit trees/nurseries/orchards, maintenance of irrigation channels apart from soil conservation, improving fertility, quality timber, useful for newly opened areas and subsidiary food items, medicinal products and alcoholic preparations.Hence, the development of seabuckthorn will help in vegetation rehabilitation,ecological sustenance and economic gains to local farmers (High hills, river beds, valleys,dry and cold mountain areas of Himachal Pradesh).	Verma (1998)
230	Medicinal importance of deku sindoor	Only root is essential part, heals swelling of legs, cholera, diarrohea and leaf paste heals yoke gall.	Parabia et al. (2000)
231	Ethno medical use of physic nut or fever nut	The useful parts of katkarnja (Caesalpinia bonduie) are seed, root, stem bark and leaf that contain bonducine, non alkaloid bitter principles and fatty oils. Seed, root and bark are used as antiperiodic antispasmodic antihelmenthic and febrifuge and cures intermittent fevers, asthma and colic.	Parabia et al. (2000)
232	Medicinal uses of Embelia ribes	Leaf, rootbark and fruit of Baberang (Embelia ribes) contain emblic acid, quercitol, christembine, resinoid, volatile oil are used in sore throat, infusion of root, cough and diarrhoea.	Parabia et al. (2000)
233	Medicinal uses of Enicostemma hyssopifolium, E.littorale, E.axillare	Plant of chota kirayat (Enicostemma hyssopifolium) has bitter glycoside and ophelic acid which is used as stomachic, tonic, laxative, carminative, blood purifier, dropsy, rheumatism, abdominal ulcers, hernia, swellings, itches and insect poisoning. Emperical use in diabetes.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
234	Medicinal properties of Eucalyptus globulus	Leaf, gum, exudation from stem, oil from leaf of Eucalyptus globulus possess sesquiterpene, tannin, resin, kino-tannic acid, catechin and pyro catechin and used as febrifuge, carminative, stimulant, expectorant, diaphoric, antiseptic oil antimalarial, powerful antiseptic, disinfectant, used to increase the flow of saliva, gastric intestinal juices, appetite and digestion, heart beat. Lowers arterial tension and quickens respiration. Useful in respiratory afflictions, diphtheria, fever, chronic cystitis.	Parabia et al. (2000)
235	Medicinal uses of Eugenia jambolana, E.jambos, Syn Syzigium cumini, S.jambos	Fruit, leaf, dried seed, stembark of mamon (Eugenia jambolana) contain jamboline, ellagic acid (phenolic acid), tannin, kino-like gum which are used as astringent, diuretic, stomachic, antidiabetic, diarrhoea, dysentery, sorethroat, spongygums.	Parabia et al. (2000)
236	Medicinal properties of Euphorbia hirta	Dudhi (Euphorbia hirta) contains gum, resin, alkaloid, wax, caoutchouc, tannin, sugar, calcium oxalate, mucilage, carbohydrates, albuminoids, essential oil, gallic acid, quercetin, new phenolic substances that are used as demulcent, antispasmodic, local parasiticide, cough, coryza, hay asthma, bronchial afflictions, bowel complaints, respiratory diseases, worms, kidney stones.	Parabia et al. (2000)
237	Medicinal uses of Euphorbia tirucalli	Milky juice and stembark Barki-thohar (Euphorbia tirucalli) contain euphorbin, gum, resin, fresh latex, isoeuphorol, ketone, euphorone which are used as purgative,acrid, counter irritant, vesicant, emetic, rubefacient, fish-poison, itch, scorpion-sting, rheumatism, toothache, earache, whooping cough, asthma, neuralgia, application to warts.	Parabia et al. (2000)
238	Medicinal uses of Melia azedarach	Root, stembark, flower, leaf, root, bark, fruit, seed, gum and sap of the plant contain resinous principle, tannin, oil margosine and are used as astrigent, antiperiodic, vermifuge, purgative, emollient, anthelmintic, discutient, rheumatism, anthelmintic, stimulant, insecticide, antiseptic, tonic, stomachic.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
239	Medicinal uses of Eclipta alba	Plant, bark, leaf of bhangra (<i>Eclipta alba</i>) which contain alkaloid, ecliptine, nicotine, polyacetylenic thiophenes, glucosides are used as tonic emetic and purgative.	Parabia et al. (2000)
240	Medicinal properties of Vajradanti	Plant, leaf and root of khataseriya (<i>Barleria prionitis</i>) are the useful parts containing scutellarein, g-rhamnosylglucoside, irioidsm Barterin, Acetyl barterin. Plant and leaf act as expectorant in cattarrh. Leaf when chewed, cures toothache. Root paste heals boils and swelling.	Parabia et al. (2000)
241	Medicinal uses of Cyperus alternifolius	Tuber of galanchai (<i>Cyperus alternifolius</i>) contains odorous principle and is used as tonic, stimulant, astrigent.	Parabia et al. (2000)
242	Medicinal uses of Psidium gauva	The root bark, fruit, leaf of <i>Psidium gauva</i> is useful for medicinal purpose. The leaf contains essential oil, eugenol, resin, cellulose and volatile oil, The fruit is useful to cure laxative diseases. The bark of the plant used to cure diarrhoea, the leaf for curing wounds and ulcers and also arresting vomiting in animals.	Parabia et al. (2000)
243	Medicinal uses of Heterocarpus marsupium (asna)	Gum, leaf and stem bark of <i>Heterocarpus</i> constitutes gum keno, kenotannic acid Stem bark and gum is used to cure diarrhoea, pyrosis, toothache, external application of leaf is useful to cure boils, sores and skin diseases, the leaf can be fed to the cattle.	Parabia et al. (2000)
244	Medicinal uses of Punica granatum (anar)	The root bark, stem bark, root, seed, pulp and fresh juice of <i>Punica granatum</i> are used for curing various diseases in cattle. The root bark and stem bark is used as astrigent, antihelmentic, the seed is used for stomachache, pulp as cardiac tonic. The fruit juice is used for cooling. The bark is used to control tape worm and fruit is useful to control dysentery in animals.	Parabia et al. (2000)
245	Medicinal uses of Randia dumatarium (arar/karhar)	The fruit of <i>Randia dumatarium</i> plant contains saponin essential oil and acid resin, the fruit is used for irritating emetic, bark is used as astrigent, pulp as antihelminic, abortifient, fruit pulp is used to control dysentery and bark is applied externally as anodyne, rheumatism. The root bark of the plant is used as insecticide and for boneache.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
246	Medicinal uses of <i>Cordia dichotoma</i> , <i>C.latifolia</i> , <i>C.myxa</i>	Leaf, bark, flower, kernel, mucilage of fruit of lasora (<i>Codia dichotoma</i>) contain tannin, catharin, sugar, gum and ash are used as astrigent, demulcent, anthelmintic, diuretic, expectorant, dyspepsia, fever, ringworms, ulcers, prolapse of uterus/vagina and headache, affliction of urinary passage. Diseases of lungs, spleen and snake bite.	Parabia et al. (2000)
247	Medicinal uses of <i>Costus speciosus</i>	Root, tuber of kemuka (<i>Costus speciosus</i>) contain beta-sitosterol, saponin and are used as astrigent, purgative, depurative, stimulant, tonic, anthelmintic, digestive, antiinflammatory, antiarthritic, catarrhal fevers, cough, dyspepsia, skin disease, snake bites, tuber cooked and make into syrup as tonic.	Parabia et al. (2000)
248	Medicinal uses of <i>Crataeva nurvala</i> , <i>C.religiosa</i>	Bark, rootbark, leaves, fruits, flowers of tapia <i>Crataeva nurvala</i>) which contain lepeol-triterpenoids, beta-sitosterols, crategin, tartaric and cratagegus acids, pectin and fattyacids, glucose and fructose, amygdalin and emulsin, trimethylamine and are used as laxative, alterative, cholagogue, dyspepsia, heart disease such as hypo trophy, heart depression, urinary complaints, fevers, vomiting, gastric irritation, removal of stones from ureter and urinary bladder, obstructive uropathy.	Parabia et al. (2000)
249	Medicinal uses of <i>Crescentia cujete</i>	Bark, leaves and fruit vilayatibel (<i>Crescentia cujete</i>) contain crescentic, tartaric, citric, tannic acids and chlorogenic acid which help as aperient, coolant, febrifuge, diuretic, headache, poisonous to birds.	Parabia et al. (2000)
250	Medicinal uses of <i>Croton tiglium</i>	Bark, leaf, fruit and root of jamalgota (<i>Croton tiglium</i>) which contain alkaloids, globulin, albumin, sucrose and crotonoside and are used as purgative, vermifuge, alterative, irritant, cattarrh, ribifacient, stimulant and also used in snake bite, liver diseases, dropsy and purgative in animals.	Parabia et al. (2000)
251	Medicinal uses of <i>Cuminum cimum</i>	Seed, fruit, oil and flower of shahjio (<i>Cuminum aminum</i>) which contain thymene, thymol, oil, resin, gum are used as carminative, aromatic, stomachic, stimulant, Trigent, galactagogue, cooling agent, used in hoarseness of voice, dyspepsia, chronic, diaarrhoea, gonorrhoea.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
252	Ethnomedical uses of black mustard	Leaf, seed and oil of kalorai (<i>Brassica nigra</i>) are the important parts containing glucoside mirocine sinigrin, volatile oil, fixed oil and brassic acid. Seed acts as antispasmodic, anti rheumatic, emetic, rubifacient and counter irritant, seed paste when applied on chest cures lung infection. Oil is used as digestive condiment, induce animals in to heat, rubifacient to massage rheumatic joints, massage on chest in pneumonia.	Parabia et al. (2000)
253	Medicinal uses of <i>Cuscuta reflexa</i>	Plant, seed, fruit and stem of akasbel (<i>Cuscuta reflexa</i>) which contain cuscutin, flavanoid, beta-sitosterol, C.glucoside, bergenin and coumarin which are used as purgative, anthelmintic, anodyne.	Parabia et al. (2000)
254	Medicinal properties of lubani salai	Gum of lubani salai (<i>Boswellia serrata</i>) is only medicinally important. Resin/gum acts as refrigerant, diuretic, aromatic, emulcent, aperient, alterative, emmenagogue, ecboic. Resins cures rheumatism, nervous and skin diseases.	Parabia et al. (2000)
255	Medicinal uses of <i>Digera muricata</i> , <i>D. arvensis</i>	Plant, flower and seed of latamahuria (<i>Digera muricata</i>) contain a and b spinasterols which are used as laxative and for urinary discharge	Parabia et al. (2000)
256	Medicinal uses of <i>Digitalis purpurea</i> , <i>D. arvensis</i>	The Plant of <i>Digitalis purpurea</i> contains glycosides, digitoxin, gitoxin, gitalin used for its effect on cardiovascular system, to increase force of systolic contraction and efficiency of decompensated heart and also in dropsy and renal obstruction.	Parabia et al. (2000)
257	Medicinal uses of <i>Diospyros peregrina</i> , <i>D. embnryopteris</i>	Fruit, stembark, dried seed of taindu (<i>Diospyros peregrina</i>) that contains tannins, pectin, glucose, ether extract of fruit, b-sitosterol, betulin are used as astringent, styptic, oleoginous used for snake bite, leprosy, dysentery, diarrhoea, diseases of blood, gonorrhoea, sore throat, wounds and ulcers, chronic dysentery, diarrhoea, haemorrhages and intermittent fevers.	Parabia et al. (2000)
258	Medicinal uses of <i>Diospyros melanoxylon</i>	Stembark, dried flowers of tendu (<i>Diospyros melanoxylon</i>) contain tannin, hentricontone, hentriacontanol, a -Amyrin, Binaphthoquinone and are used for dysentery, dyspepsia, diarrhoea, lotion for eyes, urinary and blood diseases.	Parabia et al. (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
259	Medicinal uses of Dolichos lablab Syn Lablab purpureus	Root, fruit, seed of sem (Dolichos lablab) contain albuminoids, carbohydrates, woody fibre, ash and are used as aphrodisiac, flatulant, bilious, febrifuge, stomachic, antispasmodic, root is poisonous, fruit is used in phlegmatic disorders.	Parabia et al. (2000)
260	Medicinal uses of Dregea volubilis, Syn.Wattakaka volubilis, Marsdenia volubilis	Plant, root and leaf of nakchhikni (Dregea volubilis) contain glucoside, dregein, glycoside, dregnoside which are used as emetic, expectorant, for boils and abscesses, eye diseases, cold and snake bites.	Parabia et al. (2000)
261	Medicinal uses of Echinocloa frumentacea, E.colonum, syn.Panicum frumentacea	Plant and fruits of sanua (Echinochloa frumentacea) contain starch and are used in biliousness and constipation	Parabia et al. (2000)
262	Medicinal use of Echinops echinatus	Plant, root, root bark, fruit of untakatara (Echinops echinatus) is used as alterative, diuretic, nervine tonic, aromatic, aphrodisiac, wound in cattle to destroy maggots, mixed with acacia gum and applied to hair to destroy lice, hoarse cough, hysteria, dyspepsia, scrofula and ophthalmia.	Parabia et al. (2000)
263	Medicinal uses of Evolvulus alsinoides	Whole plant and leaves of shankhapushpi (Evolvulus alsinoides) contain evolvul, betaine, sterols, proteins, carbohydrates, phenolic compounds, tannin that are used in brain tonic, bitter tonic, alterative, febrifuge, vermifuge, anti-phlogistic, chronic bronchitis and asthma, Loss of memory, syphilis.	Parabia et al. (2000)
264	Medicinal properties of Feronia elephantum, F.limonia, Syn. Anisophalins rumphii	Stembark, leaf, fruit, gum, pulp of kavitha (Feronia elephantum) contain citric acid and are used as astrigent, stomachic, stimulant, acrid, aromatic, carminative, astrigent, used for venomous insect bites, reptiles, salivation, sorethroat, biliousness.	Parabia et al. (2000)
265	Medical uses of Prunus domestica, P.communis, P.inisitia	Furit that contains seed-oil, malic acid, pectin, albuminoids is used as cooling agent, laxative, astrigent, bilious state, body heat, enlarged liver, gonorrhoea, piles, leucorrhoea, irregular menstruation.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
266	Medicinal uses of <i>Curcuma longa</i> : <i>C. domestica</i>	Tuber, rhizome of haldi (<i>Curcuma longa</i>) which contain curcumin, aromatic turmeric oil, terpenoids, Juvabaine are used as carminative, cooling agent, stomachic, astringent, antiinflammatory, antihistamine, antibacterial and also used in bronchitic, respiratory disorders, cough, cold, in gastric disorders.	Parabia et al. (2000)
267	Medicinal uses of <i>Commelina benghalensis</i>	Kanchara (<i>Commelina benghalensis</i>) contain n-octacosanol, n-tricontanol, stigma-sterol, compesterol which are used as demulcent, refrigerant, laxative, bitter, emollient and in leprosy.	Parabia et al. (2000)
268	Medical use of guggul	Gum, resin and essential oil of guggul (<i>Balsamodendron mukul</i>) contain myrcene act as astringent antiseptic, antispasmodic, diaphoretic, echbolic, antisyphilitic, aphrodisiac, emmenagogue, anti rheumatic and antihyperlipidemic.	Parabia et al. (2000)
269	Medicinal use of <i>Jatropha</i>	Leaf, seed and root of danti (<i>Baliospermum axillare</i>) are the medicinally important parts. Oil is extracted from seed which is used as drastic purgative, stimulant, rubifacient, hydragogue, cathartic. Seed acts against snake bites, leaf cures asthma and oil cures rheumatism.	Parabia et al. (2000)
270	Medicinal use of hingol	Stem bark, leaf, fruit and seed of hingol (<i>Balanites roxburghii</i>) are the useful parts containing saponin, organic acid, mucilage and sugar. Stem bark, unripe fruit and leaf are used as purgative, anthelmintic. Seed is used in curing cough, burns, excoriations, freckles and colic. Fruit cures snake bite.	Parabia et al. (2000)
271	Neem and its medicinal importance for cattle	Entire plant of neem (<i>A. indica</i>) is useful containing margosine and seed contains bitter oil. Leaf, seed and fruit are used as antibacterial, antiviral, insecticide, bitter tonic, antiseptic. Fruit used as astringent purgative. Gum is used as demulcent. Leaf used as emmenagogue, anthelmintic. Dry flower used as stomachic, oil used as antiseptic irritant. Leaf used in skin disease, abortion, foot and mouth diseases and its bark for dengue fever. Plant used as alternate feed and fodder during drought. Flower used to cure blindness in sheep/goats. Fruits are used in leprosy, bronchitis, intestinal worms. Oil in rheumatism.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
272	Medicinal uses of <i>Corchorus fascicularis</i>	Plant, leaf of bankusta (<i>Corchorus fascicularis</i>) and seed have glucosides, corchorin, bitter principle, corchortin which are used as anthelmintic, restorative, laxative, stimulant, tonic, aphrodisiac, stomach troubles, skin diseases, scabies, tumours.	Parabia et al. (2000)
273	<i>Corchorus capsularis</i> - medicinal uses	Fruit, seed, and leaf of singhin (<i>Cochorus capsularis</i>) contain oil, oleic and lonoleic acid, glucoside, corchorin, corchoritin are used for purgatives, laxatives, carminatives, refrigerant, diuretic, chronic cystitis, gonorrhoea, dysuria, hepatic and intestinal colic, gastric catarrh, dysentery, to increase appetite.	Parabia et al. (2000)
274	<i>Cissus quandrangularis</i> syn. <i>Vitis quandragularis</i> medicinal uses	Leaf of hadojodi (<i>Cissus quandrangularis</i>) is used as alterative and also used for fractures of bones, muscular pain, ulcers and wounds.	Parabia et al. (2000)
275	Medical uses of <i>Coptis teeta</i>	Mamiran (<i>Coptis teeta</i>) contains berberine which is used to increase appetite, restores digestive powers and removes flatulence and visceral obstructions, jaundice, debility, convalescence after fevers, debilitating diseases, atonic dyspepsia, mild forms of intermittent fevers, catarrhal and rheumatic conjunctivitis.	Parabia et al. (2000)
276	Medicinal properties of silk cotton tree	Almost all primary parts of simul (<i>Bombax mamabaricum</i>) are medicinally important. Seed contains non- drying oil and used as astringent, styptic. Tap root acts as demulcent, slightly diuretic, aphrodisiac, emetic and cures prolapse of uterus/vagina, aprodisiac is given in impotency. Flower cures menorrhoea, prickle and pimples.	Parabia et al. (2000)
277	Medicinal uses of coffee indica and <i>C. arabica</i>	Seeds of coffee (<i>Coffee arabica</i>) contain alkaloid caffeine, trogonelline, leaf and fruit contain adenine, xanthine, hypoxanthine, guanine, volatile oil, wax and are used in poisoning, chronic diarrhoea, medicine for controlling fever, depression.	Parabia et al. (2000)
278	Medicinal uses of <i>Cocculus hirsutus</i>	Root, leaf juice of jantikibel (<i>Cocculus hirsutus</i>) contain trilobine, isotrilobine, coclaurine, magnoflorine and used as refrigerant, laxative, sudorific, alterative, chronic rheumatism, venereal diseases, gonorrhoea, eczema, impetigo.	Parabia et al. (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
95	Double seeddriller for garlic: 'Dabaliyu'	Garlic is sown at a very narrow distance of about 4.5' in Junagadh district of Saurashtra. By using ordinary 'Santi' it is not possible to sow at such close distance because of its broad sowing coulters. 'Santi' can sow at a minimum of 9' distance between the two rows. Usually farmers sow garlic in rows first by keeping 9' distance between the 2 row and then again sowing between the previously sown rows of garlic to get the crop at 4.5' distance. Shri Babubhai Premajibhai of Bagadu Village has made an implement locally called as 'Dabaliyu' to overcome this difficulty. Infact, it is a type of 'Santi' but has an innovative shape and structure. Another main frame of 'Santi' is by keeping 3 to 5 feet distance. Coulters are inserted in both the frame in such a way that each can make separate furrows. Coulters of the first frame open the furrows at 9' distance and coulters in another frame to make the furrows a same distance but between the already opened 2 furrows. At a result of the new furrow at the same distance between two furrows remains 4.5'. It does not cause any damage or disturbance to the previously sown row and requires less than half of sowing time as well as draft power compared to the conventional 'Santi' (Bagadu, Gujarat).	Luhar (1992)
96	Korgi (four tyne seed drill)	It is made of jack or rose or Kooli wood for bowel, Babool wood for head piece, bamboo or iron for seed tubes and tynes. It weighs about 25-30 lbs. Operated by 2 bullocks and 2 persons for line sowing of crops which covers 3 to 4 acres/day. The depth of the sowing varies from 2 to 2.5 inches and average draught is about 84 lbs. The seed drill is hitched to the yoke with a beam. One drives the bullock and the other fills the seed bowels by rotating movement of hand (Shimoga and Tumkur, Karnataka).	ICAR (1960)
97	Korrige (six tynd seed drill)	It is used for line sowing of fingermillet and covers 3.5 acres/day. The average draught in red sandy soils is about 125 lbs. The depth of sowing with this implement is about 1 inch. The beam of the drill is hitched to the yoke by means of a rope. It is operated by a pair of bullocks and 2 persons. 1 person drives the bullocks and the other fills the seed bowl. About 90% of the farmers use the seed drill (Bangalore, Tumkur and Kolar, Karnataka).	ICAR (E) (1960)

S. No.	Title of ITK	Details of ITK and rationale	Reference
98	Argada (seed drill)	It is made with Babool, sagwan and bamboo, weigh about 60 lbs, operated by 2 bullocks and 4 persons for sowing of cotton. It is hitched to the yoke by means of a rope and covers 3 acres/day. The depth of cotton seed can be sown is 3 to 3.25 inches with the row spacing of rows of 24 inches (Nagpur, Maharashtra).	ICAR (1960)
99	Wheat sowing plate	Generally, wheat is sown by using narrow coulters of 2' ' 3.5' width in multipurpose 'Santi'. Due to this the plant grows close to each other within the narrow row, and the space between the 2 rows within a furrow remains more or less vacant. This leads to ineffective use of the moisture. To use this moisture in the vacant space between 2 rows, wide coulter was developed. Gradually a unique plate or box (8' × 4' × 2') was developed for sowing of wheat. One side of the box which opens the furrow in the soil is kept open and a small round hole is made for inserting of seed tube on the upper surface. Small hills are made by a welding machine on the inner side of the bottom. Grains drop from the seed tube through the hole in the upper surface on the hill mounted surface. The grains are interrupted by small hills during their movement towards the open end. This well arranged interruption causes uniform spreading of seeds at the outlet of the plate. A seed driller with this type of plate makes broad furrows but the distance between the center of the 2 furrows remains the same as in the case of the usual seed driller. The vacant space between 2 furrows can be utilized in this implement. It can cut the plant easily. This can be sharpened very easily after removing the guard plates because of its lightness and thinness (Pikhor, Maharashtra.)	Agraavat (1992c)
100	Two pore hal	This implement is made of Shisham and salwood for beam and handle and iron sheet for seed tube, HC steel for tynes. The weight of the tool is 46 lbs. Operated by 2 bullocks and 1 man for line sowing of maize, wheat and cotton with a depth of 4 inches. The implement is hitched with a beam with a yoke. The plough man controls the implement and bullocks. The work rate of this drill is 2 acres/day. The distance between two rows can be kept 8 inches (Ludhiana, Ferozpur, Punjab).	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
101	Single row seed drill (Nayi-nadi)	It is made with Babool wood, hallow bamboo and iron and weighs 60 lbs. It is operated by 2 pairs of bullocks and 2 persons. One man drives the bullocks and 1 woman drops the seeds through the seed bowel. It covers 1 to 2 acres/day (Jabalpur, Sehore, Gwalior and Guna, Madhya Pradesh, and Mirzapur, Aligarh, Meerut and Bareilly, Uttar Pradesh).	ICAR (1960)
102	Multi purpose tool (Santi)	This multi-purpose farming tool (Santi) is considered to be best. It is 11 tools in one and thus very economical. The tool is made of iron. The main shaft is a hollow pipe with a number of holes with a blade, coulter and V-shaped iron plate. The tool is used mainly for sowing (Saurashtra Zone of Gujarat).	Guchteneire et al. (1999a)
103	Dophan (two tyned drill)	It is made with Babool, bamboo and mild steel and weighs 60-100 lbs. Operated by 2 bullocks and 2 men for line sowing of various crops. The implement is hitched to the yoke by means of yoke and beam. One man drives the bullocks and generally a woman drops the seed in the seed bowel. It covers 2 to 2.5 acres/day. All farmers in these regions use the implement for line sowing of crops (Sihore, Mansore and Malwa, Madhya Pradesh and Warangal, Andhra Pradesh).	ICAR (1960)
104	ypphen (three tyne seed drill) for sowing of rainfed crops	The seed drill is made with Babool wood for beam, handle and tynes with Sagwan and teakwood for seed bowel. This is attached to the yoke by means of beam and operated by two bullocks and two persons; one person drives the bullocks and the other drops the seeds in the centre of the bowel. It is used for line sowing of rainfed crops like sorghum, groundnut, pearl millet and cotton. All farmers in this regions use this implement for sowing of rainfed crops (Adilabad, Medak, Karimnagar and Warangal, Andhra Pradesh; Raichur, Belgaum and Bijapur, Karnataka; and Kolhapur, Wardha, Nagpur, Akola, Jalgaon and Hamadnager, Maharashtra).	ICAR (1960)
105	Pore hal (seed drill)	It is manufactured by the local artisans with hallow bamboo or sheet metal. The attachment is tied with a country plough with a rope and the seed is dropped through the pore. It covers 0.6 acre/day and weighs about 1.5 lbs for seed attachment only (Sirmur, Himachal Pradesh).	ICAR (1960)

S. No.	Title of ITK	Details of ITK and rationale	Reference
106	Natkal kurgi (seed drill)	It is manufactured by local artisans with Shisham, Babool, Sal and teak and weighs about 50-80 lbs. The beam of the implement is tied to the yoke of bullocks by means of rope. The seed rate of various crops is adjusted by the skill of the operator. It is used for line sowing of mixed crops of cereals, oilseeds and legumes. This drill is also used for sowing of cotton by blocking the middle coulter. It covers 3-5 acres per day and has the service life of 5-10 years. Almost all the farmers in this region use this drill for line sowing of mixed crops (Puna, Kolhapur and Dhulia, Maharashtra; Ahmedabad, Baroda, Gujarat).	ICAR (1960)
107	Seed drill for sowing of sugarcane	This implement is made up of Babool, teak, bamboo wood and mild steel bars, fabricated by local artisans. The drill is hitched to the yoke operated by two bullocks by means of ropes. A boy sitting on the seat feeds sugarcane sets through a specially prepared seed bowl. It is single row drill and sow sugarcane sets at 3 inches depth (Surat, Gujarat).	ICAR (1960)
108	Two tyne drill for sowing rainfed crops	It is made up of Babool/teak/bamboo and mild steel and fabricated by local artisans. The beam is tied to the yoke with the ropes and the depth of sowing can be adjusted by adjusting the hitching distance. The work rate of the implement is 2 to 4 acres/day. It can sow to a depth of 2 to 5 inches. This drill is specially used for sowing of cotton. The weight of the implement is 40 to 70 lbs. Almost all the farming community are using this implement for sowing of rainfed crops. (Dharwad, Karnataka; Ahmedabad, Est Khandesh, Sabarkantha (Gujarat) and Parbhani, Maharashtra).	ICAR (1960)
109	Bida (harrow-cum-weeder) for land preparation	This implement is made up of Babool, salwood and mild steel, flat by the local artisans and has the weight of 45 to 50 lbs. It is used for thinning and broadcasting the seedlings of jute and paddy and covers 6 acres per day. It is fixed to the yoke by a means of beam and ropes. It is operated by a pair of bullocks and a man. Its work in taking out the weeds is very effective while work as a harrow, it functions as a rake to a certain extent in collecting the uprooted seedlings and weeds. In clay loam soils to a depth of 1-3 inches. The average draught is 110-130 lbs and is used by 60% of the farming community in this region. (Nadia	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
110	Bullet motorcycle with Saanti for weeding	Howrah, Hoogly, Burdwan, Midnapore, Murshidabad, Malda, West Dinajpur and Cooch Bihar (West Bengal)). Farmers in these villages remove the hind wheel and fit two-wheels making it a three-wheeler motorcycle. Saanti is fixed to this and used to remove weeds. A custom-made Saanti exclusively for the motorcycle with the help of a carpenter in Mota Devaliya village. The saanti can be dismantled easily and refitted if necessary. Using motorcycle-saanti, the cost of weeding a bigha of land in two rupees and about forty bighas can be covered within a day. The total cost of making the motorcycle-saanti including the cost of an old bullet is about Rs. 15,000. It can also be used for other operations like sowing sesamum or sorghum. It, however, suffers with one limitation. When it reaches one end of the field, to shift to the next row. Otherwise it can damage the entire plant-row in the process of the changing the direction.	Chheladiya (1998)
111	Khilna for weeding	Handle is made of a branch of sturdy wood and tool is made of iron, shaped like an arrow head. Used for uprooting weeds (Himachal Pradesh).	Verma (1998)
112	Discarded glucose infusion sets for drip irrigation	Everyday, several used intravenous (TV) infusion sets are dumped in the garbage. Badribhai Patel, an organic farmers of Dharampur village, Savali taluka in Middle Gujarat got the idea of using these discarded (TV) infusion sets for applying liquid organic fertilizer and water as drip irrigation. He collected used infusion sets from veterinary dispensaries of surrounding villages. He hung the bottle from a stick planted near one to two year old saplings in a sapota orchard and inserted the discharging needle in the root-zone. The bottles were covered with dried grass or old gunny bags to protect them from scorching heat of the sun. A hole was made in the bottle through which 500ml water is poured in everyday, using a funnel. He also used this set up to apply specially-prepared organic fertilizer. In a big barrel filled with 200 litre water approximately 30-40 kg of cattle dung is hung in gunny/cloth bag and sealed. The water is stirred on every alternate day. After 15 days, the filtrate becomes yellow and is used as organic liquid manure after mixing with clean water in the	Patel (1995b)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		proportion of 1:2. It is filled in the TV bottles. The organic fertilizer is given at one week interval. It is believed to provide all the essential nutrients and to improve the growth. The use of TV bottle was successful last year in 1-2 year old fruit orchards of sapota, pomegranate, amla, guava etc. Baddribhai is 40 year old and has studied up to SSC. He has stopped using chemicals on his farm since last six years. He attends various training programmes, agricultural fairs, workshops and enjoys reading literature on agriculture. He always tries to modify modern technologies of organic agriculture and reproduce them on his farm. He has set up a small lab for producing biopesticide like NPV (Nuclear Polyhedrosis Virus). He has plans for designing a bullock-drawn sprayer for organic/herbal pesticide. Sristi has arranged to provide him the services of an innovative artisan, Shri Amrutbhai Agrawal, to make this sprayer (Vadodara, Gujarat).	
113	Dranti (sickle)	It is made up of wood and mild steel, fabricated by village artisans, the weight is 0.5 to 1 lb and operated by one person. The tool is held in right hand and crop in the left hand. The crop is harvested by the movement of the blade and covers the area of 0.125 acre/day (Meerut and Gorakhpur, Uttar Pradesh; Bhagalpur and Ranchi, Jharkhand).	ICAR (1960)
114	Pata-kata daw (sickle)	The tool is made with wood for handle and mild steel for blade. The weight of the tool is 1.5 lbs, operated by one person. It is held in the right hand and handful of crop is held in the left hand. The crop is harvested by striking the blade at the roots of the stems. The work rate of the tool is 0.23 acres per day. The blade requires frequent sharpening during harvesting seasons as mild steel is used for its construction (West Bengal).	ICAR (1960)
115	Hasua (sickle)	It is made with scrape steel for blade and wood for handle. One person manually operates this implement for harvesting of paddy, wheat and small grain crops and covers 0.125 acres/day. The tool is held in right hand and crop in the left hand. The crop is cut by the movement of the blade. The tool has serrated blade (Gaya, Bihar).	ICAR (1960)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
116	Drantil (sickle)	It is made with wood for handle and mild steel for blade by village artisans. The implement weighs about 1 lb and is used for harvesting of different crops. The tool is held in the right hand and a handful of crop in the left hand. The crop is cut by the movement of the blade. The work rate of this tool is 480 to 880 lbs of standing crop or about 0.125 acre per day. Similar types of sickle is reported from Gorakhpur, Azamgarh, Aligarh (Uttar Pradesh) West Bengal, Sambhalpur (Orissa) and Andhra Pradesh (Dungarpur, Banswara, Kota, Tonk, Udaipur, Jaipur Alwar, Gundi, Chitorgarh (Rajasthan).	ICAR (1960)
117	Aruval (sugarcane knife)	This implement is made up of carbon steel for blade by village artisans. It weighs 2 to 3 lbs in weight and operated by 1 person. The knife is used to cut the stem and its work rate is 0.05 to 0.66 acre/day (South and North Arcot, Coimbatore, Tiruchy, Tamil Nadu)	ICAR (1960)
118	Palat (sickle)	This tool is fabricated by village artisans with wood and mild steel. It weighs 1.25 lbs and operated by 1 person. It is used for harvesting of sugarcane. A man holds the tool in the right hand and strikes at the root of the stem thus cutting it in one stroke. The man works either in sitting or standing position, covering 0.104 acre/day. The blade of the sickle is unserrated and above 50% of farmers in this region use this tool to harvest sugarcane (Dehradun, Uttaranchal).	ICAR (1960)
119	Aruval (sickle)	The tool is fabricated by village artisans with wood and steel. Operated by 1 person to cover 0.125 acres/day, it weighs about 0.5 lbs. It is held in the right hand and crop in left hand. The crop is harvested by the movement of the blade (Coimbatore and Ramanand, Tamil Nadu).	ICAR (1960)
120	Oil engine for running tractor	A small four-wheeled tractor using an oil engine has been envolved. A wooden stand, fixed the oil-engine on it and then attached four tyres has been made. Next, the pulley the belt, a steering wheel, brakes, a handle has been fitted to start the tractor and other necessary parts required for running it. The tractor, costing Rs. 45000, is used for ploughing and carrying loads. The tractor has five gears: four high gears and one reverse gear. A hydraulic trolley forged by Mulubhai can be connected to the tractor. All types of agricultural	Senjaliya (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		implements can be connected to it. It can draw about 80 pounds of load. The tractor has certain limitations, for instance, to start the engine one has to use a handle (Junagadh, Gujarat).	
121	Mini Kaliyu - multipurpose tool	Santi is an implement which is used for different agricultural operations. Farmers cut groundnut at certain depth underground and uproot it with pods with the help of 'santi' by inserting a long blade in two coulter at both ends. This operation requires high draft power due to heavy weight of the frame, long continuous blade and dry soil. Uprooted pods are disturbed due to the main frame touching the ground behind the blade in 'Santi'. A different type of frame of 'Santi' is designed by Shri Amritbhai Agravat of village Pikhori to overcome these difficulties. Two small wheels are fixed on the small pegs on the front axis of the rectangular frame in such a way that wheels can mount on the surface. Behind the axis of the frame, a number of holes are made to fit the coulters at various distances according to different operations. A blade of hoe is inserted in the hollows of the coulters. The main frame of the implement remains away from the ground because it runs only on coulters and front wheels. A mechanism for changing the angle of frame and coulter is also provided. This new frame is successfully used for uprooting of groundnut pods and reaking of hard soil. He is still trying to make such a frame that can be used for all operations which are done by using conventional 'santi' now-a-days. Some of the farmers had emulated this type of implement after watching at Shri Agravat's field. Even scientists of Gujarat Agricultural University, agreed that it required comparatively less draft power because of heels and light weight of the main frame. Especially in groundnut harvesting, the pods remain undisturbed on ground because only the blades and coulters come in contact with land (Pikhori, Gujarat).	Agravat (1992b)
122	Blade for groundnut harvesting	Farmers use a long iron blade in the 'Santi' for uprooting of upper portion of rhizomes with pods. Sometimes, the whole plant is uprooted and gets stuck to the blade for a short distance instead of getting cut at a certain depth. This happens generally due to the bluntness of the blade. Twin blade used by	Agravat (1992a)

FARM IMPLEMENTS

S. No.	Title of ITK	Details of ITK and rationale	Reference
		the barber triggered in Shri Agravat's mind the idea of using thin and sharp blades of iron pressed by two strong and comparatively thicker plates of iron. The blade is pressed in between two guard plates with the help of nut bolts on both the ends in such a way that its sharp working edge remains slightly ahead than the edges of the guard plates. It can cut the plant easily. This blade can be sharpened very easily after removing the guard plates because of its lightness and thinness (Junagadh, Gujarat).	
123	Collection of leftover groundnut pods after harvesting	In Saurashtra, groundnut is harvested by cutting roots below the soil by harrowing. As the soil is usually dry and hard at the time of harvesting, the rootlets holding the pods often tend to break. This problem is aggravated further if the last spell of rain before harvesting fails. Many local artisans have tried to solve this problem, but a satisfactory solution is yet to be found. An iron strip with rings on one edge and fixed it on the dorsal side of the blade of harrow is used for the groundnut harvesting. Barbed iron wires are tied to the rings. The width of the iron strip matches the width of the root zone. The strip is fixed to the blade in such a way that iron wires penetrate the soil in root region during the harrowing operation. The harrowing is carried out in the fallow field after harvesting the groundnut. These iron wires pull out the isolated pods left behind in the soil to the surface. These pods are then collected manually. This external attachment has been gaining popularity in Kunkavav Taluka over the last two years. The modified harrow costs a mere Rs 60 - 70 more than the common harrow (Amreli, Gujarat).	Davada (1995)
124	Stone roller for threshing of sorghum	It is used with one pair of bullocks and one person by hitching the roller to the yoke by means of beam and then drawn over a heap of earheads of sorghum spread in the threshing yard. It is eight-times more effective in threshing the sorghum earheads compared to the indigenous method of threshing under feet of bullocks. The weight of the implement is about 22-40 lbs (Dharwad, Belgaum and Bijapur, Karnataka; Rayalaseema region, Andhra Pradesh).	ICAR (1960)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
125	Use of Suhaga for threshing	Suhaga is used to thresh both wheat and paddy through rubbing action of the Suhaga with the tillers of the crops (Himachal Pradesh).	Verma (1998)
126	Tekuri (maize sheller)	This tool is made with mild steel for blade and wood or bamboo for handle. It is used to remove the grains from the maize cobs, 40 lbs/day. The maize cob is held in the left hand and knife is pushed upward by right hand to separate the grains (Santhal Paragana, Bihar).	ICAR (1960)
127	Ponugallu (Threshing roller)	It is made up of hard stone for roller, wood for other parts and mild steel for axle, it weighs about 800 lbs and is used for threshing of crops with a pair of bullocks and one person. The implement is hitched to yoke by the beam and is driven round and round over the crops on threshing floor. About 3,600 - 4,000 lbs of crop can be threshed in a day of 8 hours by one pair of bullocks. About 100% of the farming community in this region use this threshing implement for different crops (Coorg, Karnataka).	ICAR (1960)
128	Use of wooden pin for seperating maize	Used to remove the outer covering of maize cobs and is fashioned out of a bamboo stick cobs (Himachal Pradesh).	Verma (1998)
129	Local equipment for oil extraction from niger	Niger oil is extracted by equipment made up of locally available material like wood (for Dandia and Pidhi), leaves (for Puda) and barks (for Khala) and by following a specific process (Orissa).	Parasar (1994)
130	Daw (chopper)	The tool is made with mild steel for blade and wood for handle. It is held in the right hand and by chopping action of the tool the crop, which is held by the left hand, is harvested, it is operated while standing by a person and covers 0.16 acre/day (West Bengal).	ICAR (1960)
131	Balkati (chopper)	It is made with wood for handle and mild steel for blade by village artisans. The person holds the implement in right hand and strikes at the root of the stem of the sugarcane thus cutting it in one stroke. The work rate of the tool is 0.4 acre per day of 8 hrs (Meerut, Uttar Pradesh).	ICAR (1960)

Post-harvest Technology

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Method of drying cucumber and pumpkin seed	Seeds are mixed with wood ash and placed on a plate (Thali) in the open sun. This facilitates faster drying since wood ash probably absorbs excess water from the seed and prevents the seeds from sticking together (Mandi, Himachal Pradesh).	Verma (1998)
2	Drying of millets pulses and oilseeds on new moon days	Sun-drying is done to dry the grains. This is usually done on a 'new moon' day, since this is thought to reduce the risk of damage by pests (Tamil Nadu).	Parvathi et al.(2000)
3	Drying wheat and maize cobs from the indirect heat	For drying wheat and maize indirect heat of hearth (Chullah) is used. Residential houses consist of 3 storeys. Ground floor is meant for sheltering domestic animals. First floor is the residential portion. Directly above the kitchen there is a store house, where freshly harvested maize cobs and wheat are kept for drying. Sun heat also facilitates drying (Kangra, Himachal Pradesh).	Verma (1998)
4	Drying of food grains	Open sun-drying of cereals, pulses, oilseed crops and fruits/vegetables is an age old practice for storage of food grains for longer periods (Himachal Pradesh).	Verma (1998)
5	Curing of millets	Millet grains called 'mandal' or 'sonk' are allowed to ripen partially by stacking them in a heap and covering the heap with tarpolin. This procedure is locally termed 'garrdena' (Himachal Pradesh).	Verma (1998)
6	Curing of maize	Maize plant along with the stock is harvested and tied into small bundles called Pahra. All bundles from different fields are collected at one place and stacked in an upright position called 'thua' or 'zhumb' for 30-45 days that facilitates easy separation of cobs from the husk (Himachal Pradesh).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
7	Crop threshing by animals	Animals particularly 'dzo' are used for threshing crops by trampling in the west Himalayan cold deserts. A large circle of packed earth (about 10 m dia) forms the threshing floor. A number of animals are tied in a line to a central pole. Dzos once stirred continuously circle the central pole for hours without any fatigue. Often there is a combination of animals as many as twelve with dzos forming the inner circle while horses and donkeys circle along the outer edge. Threshing is accompanied by singing. To prevent the soiling of grains by animal dung a container is used for collecting the dung before it falls on the ground (West Himalayan cold deserts, Himachal Pradesh).	Verma (1998)
8	Threshing by using wooden sticks	Farm women use wooden sticks approximately 0.5m in length to thresh the grains (small quantities). They hold the wooden sticks in their hands and beat the harvested crops to separate the grains from the earheads. This is usually done on an earthen floor (Tamil Nadu).	Parvathi et al. (2000)
9	Post-harvest management of paddy	Harvested paddy is tied into small bundles called Pooli or Poola dried under open conditions for 3-4 days. All bundles are stacked at one place and allowed to remain there for a few days. Each stack is called a 'Kundli'. This practice enables easy handling in quick drying. Stacking aids in heat and moisture regulation thereby resulting in uniform ripening and also eases the process of threshing (Himachal Pradesh).	Verma (1998)
10	Spreading the earheads on roads for threshing	The earheads are spread on the road, where vehicles run over them and the grains become separated (Tamil Nadu).	Parvathi et al. (2000)
11	Beating crops on wooden platforms for threshing	The harvested crops are beaten against the wooden platform, benches and stools to separate the grains (Tamil Nadu)	Parvathi et al. (2000)
12	Blackgram and pearl millet threshing by using tractors	The harvested crops are spread on the threshing yard and the tractor is allowed to run over them, thus separating the grains. A tool known as a Kavathukkavai (V-shaped wooden utensil with a long handle) is used to lift the earheads from the bottom to the top for uniform threshing. A Pallukkavvai is a tool made of iron, which is used to remove the plants of blackgram and earheads of cumbu (Tamil Nadu).	Parvathi et al. (2000)

POST-HARVEST TECHNOLOGY

S. No.	Title of ITK	Details of ITK and rationale	Reference
13	Using bullocks and rollers for threshing	Harvested crops are spread out in the threshing yard. Bullocks pulling a heavy stone roller are allowed to trample the harvested produce. The stone roller runs over the earheads and the grains become separated. This practice is used for large quantities of produce, especially if the road is too far away (Tamil Nadu).	Parvathi et al. (2000)
14	Cleaning blackgram and green gram by using sieves (Salladai)	Salladai (sieves) are used to remove dust, immature seeds, stones, etc. from the threshed grains. In case of small quantities, a smaller sieve made of steel is used to remove stones and leaves. For larger quantities, a big sieve made of wire mesh with a wooden frame is used (Tamil Nadu)	Parvathi et al. (2000)
15	Dehusking of blackgram and greengram by mixing vegetable oils	To dehusk the black gram and greengram, any vegetable oil (usually groundnut oil) is mixed in and the husk removed, using a stone mortar and huller (Tamil Nadu).	Parvathi et al. (2000)
16	Dehusking of rice	Rice dehusking is done by using a wooden pestle and mortar. Usually two ladies perform this function by using the pestle alternatively (Himachal Pradesh).	Verma (1998)
17	Crop threshing in 'Khaliyan'	Crop threshing is done by employing oxen and mule on a threshing floor of about 5m diameter made of stone. This is further facilitated by threshing with a 3-4 m long flexible green oak sticks (Shimla, Himachal Pradesh).	Verma (1998)
18	Separation of finger millet grains from earheads	Finger millet grains are separated from the earhead by the process of walking over the earheads (Nilgiri, Tamil Nadu) earheads. (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
19	Winnowing by using winnower(Solavu)	The grains are winnowed in a device called a Solavu and the grains are dropped from a height. This separates the dust from the grains. To increase the height, the farmers stand on a cart or use a step-like structure called a Kokkali. Three different types of Solavu are used. One is made out of sheaths of the Morinda tintoria, a member of the mulberry family known locally as Manjanathi; the two other types are made of bamboo and palmyrah leaves (Tamil Nadu).	Parvathi et al. (2000)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
20	Cleaning of dry grains	It is performed using a container made of tin called 'Shoop' or 'Chhaj'. The grains are placed in the Chhaj and slow winnowing leads to separation of dirt and husk from the grain (Himachal Pradesh).	Verma (1998)
21	Winnowing of dry grains	Cleaning of grains is done using a container made of bamboo sticks called 'Panaudi'. The dry grains placed in it is allowed to fall from a height of about 4-5 feet in a thin vertical flow in the path of a cross wind. The lighter dirt particles and the husk are blown away and the heavier grain is separated as it falls straight to the ground. The use of a fan (mechanical or electrical) greatly accelerates this process (Himachal Pradesh).	Verma (1998)
22	Winnowing of millets and pulses by using broomsticks (Vallippumar)	Piles of grains are winnowed with the aid of a Vallippumar, a kind of broomstick made up of coconut leaves. Other types, made of plants like cotton stalk, redgram stems and Manjanathi, are also used to heap the threshed produce (Tamil Nadu).	Parvathi et al. (2000)
23	Packaging of food commodities	Containers made of bamboo sticks called 'Ddalh' are used for packing grain, maize cobs, potato, ginger, turmeric etc. For packing and carrying flour, Ddalh is lined internally with cowdung. Tokroo is a similar container but small in size. These containers are carried on head and they can be easily washed and dried. The wide usage of these containers was probably due to easy availability of bamboo wood (Lower areas of Himachal Pradesh).	Verma (1998)
24	Sack for storing grains	Sack made of goat skin is used to store farm produce (Himachal Pradesh).	Verma (1998)
25	Post-harvest techniques of rice among the tribes of Surguja district of Chhattisgarh	Use of storage bin made from paddy straw (Para) is the major structure for storage of paddy seed in Surguja district of Chhattisgarh. Earthen pots and bins made by mud + cowdung + rice husk are the other storage structures for storing the seeds. Home-made seed bins are major storage structure for storing rice grain for consumption purpose (Surguja, Chhattisgarh).	Sharma and Sharma (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
26	Post-harvest management of food grains	Foodgrain loss during storage accounts for 2.5-6% inspite of attempts to reduce the loss by different storing methods. Some indigenous practices are being followed by the farmers which seems to be most effective in this regard. Storing of rice in earthen pits for six months improved the quality of rice and also saved from damage by store grain pests. Storing of grains in "Puduka" is safe for seeds which keeps it viable and free from store grain pests. Pigeonpea grains coated with red earth kept away the pulse beetle from damage. Greegram and blackgram grains mixed with potter's ash, dry neem leaf, Basangh (Adhatoda Vasica) leaf and dry chilli keep the grain free from pulse beetle. Tubers like yam stored in earthen pit with sand retards its drying. Storing of onion with leave in bunches and hanged on a rope keeps it in good condition for 4 months. The problem of storing jaggery during hot summer months is solved by keeping it in a sand bedded house sprinkled with moisture periodically. Sugarcane planting materials, after harvesting, are kept for 2-3 months till the land is ready for planting by heaping the seed materials along with cane tops and covered with trash. Keeping vegetable seeds like gourds and okra as whole fruit after drying by hanging in the kitchen keep the seeds viable which might be due to low humidity in the kitchen (Orissa).	Nayak et al. (2002)
27	Relative efficacy of straw bin and gunny bag to control aging process in paddy seeds	Storage of crop seeds in straw bin (Olia) is an indigenous method, which has been adopted by the farmers of Orissa for long years. The farmers usually store cereals, pulses and millet seeds in especially designed straw bins. Freshly harvested seeds of paddy (var. Lalat) were stored in gunny bag and straw bin under ambient condition for 10 months. The initial values for seed moisture content germination, vigour index, field emergence, conductivity of seed leachate, insect infestation and dehydrogenase activity were 8.98%, 93 %, 1350, 91%, 0.36% mmhos/cm, 0% and 0.038 OD/g dry weight of seed, respectively. The recorded initial average temperature of stored seeds in both the containers was 27.20 degree centigrade. After 4 months of storage, seed moisture content tended to increase in gunny bag due to rise in atmospheric RH caused by onset of monsoon but less so in straw bin. Seed moisture content approached	Sahoo et al. (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		maximum values after 6 months and 8 months of storage in gunny bag (11.44%) and straw bin (10.32%), respectively. Fluctuation in temperature was more in gunny bag than in straw bin. Seeds stored in straw bin maintained germinability above MSCS (80%) for 8 months, while in gunny bag the germination value fell below MSCS after 5 months of storage. The seed ageing process was slower in straw bin as compared to gunny bag. During the course of storage there was faster decline in seed germination, vigour and dehydration activity in gunny bag than in straw bin (Orissa).	
28	Sieving device	Farmers in Tamil Nadu use traditional sieves to remove dust, immature seeds, stones etc. from threshed pulses. A small-sized sieve made up of steel is used to remove the stones, leaves etc. when the quantity handled is less. A big size sieve made of wire mesh with wooden frame is used to clean, when the quantity handled is more (Tamil Nadu).	Lakshmana (2000)
29	Cleaning Sunflower by using sieves (Salladai)	Salladai (sieves) are used to remove dust, immature seeds, stones, etc. from the threshed grains. In case of small quantities, a smaller sieve made of steel is used to remove stones and leaves. For larger quantities, a big sieve made of wire mesh with a wooden frame is used. After threshing, sunflower seeds are separated by means of a sieve-like utensil made of Palmyrah leaf sheaths (Tamil Nadu).	Parvathi et al. (2000)
30	Increasing shelf-life of potato	Forming a trench around the heap of freshly harvested potato and filling with water enhances shelf-life due to better suberization because of cold storage (Karnataka).	Anonymous (1999c)
31	Preservation of processed products, like sunflower or gingelly oil by mixing jaggery	Storing with pieces of jaggery in oil, and placing them in mud pots or tins (Tamil Nadu).	Parvathi et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
32	Packaging of perishables	Packaging of perishables like tomato is done in boxes made of bamboo called 'Tokra' which are covered with thin gunny bags on the top. The shape of container provides easy carriage of material on human head or back. The structure is easy to clean and dries soon after washing it (Himachal Pradesh).	Verma (1998)
33	Quality improvement of Avare grains	The practice of slight warming and crushing dry pods of Avare enhances quality, storability and facilitates milling as slight warming destroys insect eggs and husk acts as insect trap (Karnataka).	Anonymous (1999c)
34	Extraction of tomato seed by lemon juice	Generally, tomato seed extraction is done by two methods, viz. acid method and fermentation method. In acid method, hydrochloric acid is used which is costly and beyond the reach of the poor farmers. The fermentation method takes 16-24 hours and the colour of the seed extracted is not so good, for which the acid method is recommended to get seeds with enhanced colour for fetching good market price. However, in Ganjam district of Orissa, farmers use an indigenous technology for tomato seed extraction. In this practice, lemon juice which contain citric acid is taken as substitute for hydrochloric acid and seeds are treated with the juice for 2-3 hours @ 20 lemons/kg of wet seeds. This process is very easy to handle as compared to corrosive nature of hydrochloric acid and seed extracted also fetch good market price due to the shining colour of the seeds (Orissa).	Beura and Beura (2002)

Grain/Seed Storage

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Plastering storage area with lime and sand	The storage area Hagevu are plasterd with lime and sand. These storage areas had the capacity of 20-30 bags of grain storage. (Heggere and Chitradurga, Karnataka).	Nagarathna (2000)
2	Indoor bamboo or reed structure for grain storage	The indoor structures are made of bamboo. In certain areas where bamboo is not freely available farmers use locally available reeds for indoor storage structures. The cost of such bamboo structures are compared to be low since it is made from the locally available material and know - how but these structures do not give protection to grains against rodents and insects. The life of these structures is short and susceptible to fire and require frequent maintenance (Andhra Pradesh and Orissa).	Navanitha Raju (1999)
3	Storage of onion bulbs on bamboo platform	Onion bulbs can be stored for up to a year. The good bulbs are stored on a platform that is raised 2–3 feet above the ground. The platform is made of bamboo strips that are loosely woven so as to allow free air movement. Bulbs are piled 2-3 feet high on to the platform and protected from sun and rain by a cover (Junagadh, Gujarat).	Babulbhai (1993)
4	Method of storage of foodgrains in Khanti	The structure called 'Khanti' is made at places where the level of underground water is low (30 feet below) so that 15 feet deep khanti can be made. The shape of Khanti is made slopy with 10–15 metres wide base and 1 feet wide at the top. One foot thick layer of husk is spread both at bottom as well as on sides and neem is also mixed with that for protection from pests. Different grains can be stored in one 'Khanti' simultaneously by making thick layers of husk and large leaves in between different grains. 10-15 tonnes of foodgrains can be stored in one Khanti where the underground water level is low. Husk is spread inside the Khanti before storing the food grains to absrob moisture. Thus the grains can be stored in this structure from May to November (Maharashtra).	Singh (1999)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	Storage of potato tubers	Farmers of Hoskote village in Karnataka store potato tubers in the field. They select a highly elevated area of 25×4 sq. feet in the field and harden the soil. In every four feet they fix two stone pillars. Thus, about 12 stone pillars are required for the selected area. Over these stone pillars, a roof is thatched to give shade using eucalyptus pole, coconut and pongamia leaves. On the hardened floor different types of local grass and sugarcane leaves are spread in a layer. Harvested potato tubers are stored in a layer over this leaf bed. On top of this layer again another layer of leaves of about four inches thickness will be spread. Once in two to three weeks the storage will be checked for infestation by any of the pests. By this method farmers are able to store potatoes at least for a period of 2-3 months. Further, to prevent the attack of any rats and rodents, farmers found <i>Calotropis gigantea</i> to be effective. Around the heap of potato storage, leaves and branches of <i>Calotropis</i> are spread to prevent the attack of rats. This method is found to be so effective that farmers say even during the hot mid afternoon times, the stores potatoes will be cool in between leaf layers (Bangalore, Karnataka).	Hannganahalli (1999)
6	Dodi leaves for grain storage	Storing grains for a long period of time has always proved tedious for the farmers. Dried leaves of 'meethi dodi' (<i>Leptadenia reticulata</i>) are used for this purpose. The grains are filled into container layered with these sun-dried leaves. The leaves make the container air-tight. The grains can be stored thus for over a year (Sabarkantha, Gujarat).	Bhagora (1999)
7	Storage of sorghum, sunflower and cumbu for seed purpose by hanging	Sorghum, sunflower and cumbu are preserved by hanging the earheads in the kitchen (Tamil Nadu).	Parvathi et al. (2000)
8	Storage of grains by using medicinal plants	Plant species that are used in Jabalpur for storage of grains are <i>Azadirachta indica</i> , <i>Allium cepa</i> , <i>Calamus</i> spp., <i>Anona squamosa</i> , <i>Syzygium aromaticum</i> , <i>Ricinus communis</i> , <i>Curcuma longa</i> , <i>Trigonella phoim</i> , <i>Ferula asafoetida</i> and <i>Arachis hypogaea</i> .	Thakur et al. (2002)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
9	Storage pest control in paddy by using red chilli	Keeping of 10-15 red chilli fruits in one quintal rice bag prevents storage pests because of pungency. Mixing crushed leaves of lakke pungency. Mixing crushed leaves of lakke fermented in cow urine for a day and its extract as disinfectant and insect repellent, thus spraying on grains controls pests and diseases (Karnataka).	Anonymous (1999c)
10	Pest control methods of pulses and millets with different materials	To protect the stored grain from pests, any one of the following materials are mixed with the stored produce: ash, soap nut powder, nochi leaves, pungam leaves, neem leaves (Tamil Nadu).	Parvathi et al. (2000)
11	Grain storage in bamboo made structure-Peru	Grains of maize, wheat and paddy are stored in special structures made of bamboo called 'peri' or 'peru'. Prior to use, these structures are plastered on inside with a mixture of cowdung and clay. These containers are placed on the ground floor and grain are loaded into them from a hole made on the roof of the first floor called 'Baurh'. To take out grains an opening is provided near the bottom of each 'peri'. These containers are kept in a separate room called 'overi' and access to which is allowed by a few persons (Himachal Pradesh).	Verma (1998)
12	Storage structure for paddy	Bamboo grain storage structure plastered with cowdung slurry covered with a layer of paddy straw and a layer of dried leaves of 'lakke' at the bottom when used to store paddy reduces storage pest attack and prolongs storage life owing to disinfectant properties of cowdung and lakke (Karnataka).	Anonymous (1999c)
13	Storage pest control by neem and Eucalyptus leaves	Mixing neem and eucalyptus leaves to foodgrains controls storage pests. Neem and eucalyptus act as insect repellents and antifecdants and as insect repellents and antifecdants and oviposition deterrants (Karnataka).	Anonymous (1999c)
14	Grain storage by neem products	The pesticides of neem leaf control many types of harmful insects. These are used for grain storage and preparing ointment for skin diseases. The four most active ingredients are azadiractin, salannin, melian-triol and nimbin. (Lowlands North of New Delhi).	Puffer (1994)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
15	Use of leaves of Clerodendron phlomides for preserving grains	Leaves of 'arni' (Clerodendrum phlomides) is used for preserving grains. The leaves of Clerodendrum phlomides are crushed to prepare its extract which is bitter in taste. Five hundred ml of the extract is mixed with 40 kg of grains to be preserved. The grains are dried and filled in big earthen pots. Clerodendrum phlomides is found in hilly areas. Satanabhai says that many farmers in his area used the extract for preserving grains (Panchmahal, Gujarat).	Charpot (1998)
16	Biogas slurry for storage pest control in paddy	Paddy seed bags are soaked in water and diluted biogas slurry to induce vigorous growth due to hormonal effect and thereby, seedling resistance to pests and disease is increased (Karnataka).	Anonymous (1999c)
17	Grain storage by using leaves of neem, 'notchi' and pongam	Leaves of 'notchi', neem and 'pongam' (Pongamia pinnata) are collected and put into the storage box or room along with the grains to protect them from pests and diseases. The leaves can be changed regularly for better results. In another method, dried leaves of notchi, neem and pongam are put in a mud pot along with some dried chillies. These are then burnt and kept inside the storage room. The process is repeated every week depending upon the intensity of pest attack (Pondicherry).	Babu (2000-2001)
18	Walnut and sweetflag leaves against pests in stored grains	In rural areas of Himachal Pradesh, a layer of leaves of walnut is spread over grain stored in gunny bags. Likewise shade dried leaves of sweetflag are powdered and put over grain stored in gunny bags to protect it from damage due to stored grains pests. Walnut leaves are astrigents and the aqueous extracts have bactericidal action while, mature leaves contain 9-11 per cent tannin which are antifeeding agents. Sweetflag rhizomes have asarones (cis and trans) its effect on insects may be attractants, antifeedants, repellent, antigonadal or insecticidal (Himachal Pradesh).	Verma (1998)
19	Use of neem/ turmeric/mustard oil for grain storage	Neem, behera, walnut and mint leaves possess certain antimicrobial or pesticidal properties which help in grain storage. The antimicrobial substance in mustard is allyl isothidcyanate. The turmeric powder also appears to perform a similar function. Grain is mixed with leaves of neem/walnut/behera/mint (pudina) and then stored in bins. For pulse storage especially	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
		‘urad’, the grains are mixed with turmeric powder or smeared lightly with mustard oil and then sealed in airtight containers. Storage of pulses after soaking in cow urine, followed by drying is also practised in some parts of Himachal Pradesh (Himachal Pradesh).	
20	Storage of paddy grain with mindhal fruits	Paddy is a major crop as well as staple food in South Gujarat. It is stored in country bins for two to three years. Four or five fruits of the 'mindhal' tree are kept in storage bins at different places. It is believed that poisons in the fruits keep away pests. Some people use 'mindhal' fruit powder to kill the fish in ponds. 'Mindhal' grows in forests in South Gujarat and bears fruit in the beginning of winter. These fruits are tied around the wrists of brides and bridegrooms during the wedding ceremony (Valsad, Gujarat).	Jadav (1995)
21	Grain storage with leaves of banyan tree	Farmers mix the dried and powdered leaves of banyan tree (<i>Ficus benghalensis</i>) with the harvested grains for keeping it safe from pests. Sometimes neem (<i>Azadirachta indica</i>) leaves are also mixed with it (Banaskantha, Gujarat).	Dhirabhai (1997)
22	Grain storage using common salt	Common salt is put under the vessel containing the grains. Insects cannot move on the salt, thus their entry into the vessel is prevented. This method has been followed traditionally and the cost comes to around three to four rupees only (Pondicherry).	Govinda Raju (2000-2001)
23	Traditional storage technique of wheat	Tribal (farmers) of Nimar area of Madhya Pradesh use gunny bags and wheat straw for storage of wheat seeds (Nimar, Madhya Pradesh).	Tomer et al. (2002)
24	Grain storage in ‘Darauntha’	‘Darauntha’ is made of deodar wood and this wood checks the entry of insects/larvae. Wooden houses are built away from living quarters for checking the entry of rodents etc. Windows with adequate ventilation are provided. The size of the store house is proportional to the land holdings (Sirmour, Solan, Shimla and Kinnaur, Himachal Pradesh).	Verma (1998)
25	Grain storage in gunny bag, drum, pot, pattarai and kulumai	The cleaned produce is stored in gunny bags, drums and pots, pattarai and kulumai or kudhir (made of cowdung and clay) (Tamil Nadu).	Parvati et al. (2000)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
26	Use of neem leaves or ash for control of storage grain pests	The practice of storing the grains for seed purpose for next season with mixing of neem leaves or ash is generally followed to minimize the attack of stored grain pests on the seed. This practice is easy as no additional cost is involved. The scientific reason for this practice is that neem leaves have insecticidal, antifeedant and repellent activity. The crystalline property of the ash, helps to create mechanical wound to the body wall of the insect as a result the dehydration takes place and the insect dies (Solapur, Maharashtra).	Anonymous (2000d)
27	Use of table salt for grain storage	Table salt is mixed with the grains when storing (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
28	Use of ash of dried cow dung for grain storage	Ash of dried cow dung is mixed with the grains when storing (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
29	Bamboo storage chamber for grains	Poor farmers in some parts of temperate Himalayas have grain storage made of Bamboo. They are built in the safe vicinity of the farmhouse at some distance to protect from fire which was a common feature in the early days as the entire structure is fabricated from wood (Temperate Himalayas of Himachal Pradesh).	Verma (1998)
30	Use of walnut leaves or bark for grain storage	Leaves or dried bark of walnut tree are mixed with the grains when storing (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
31	Grain storage in earthen rooms	In Lahaul and Spiti, special earthen rooms are constructed for storing cereal crops immediately after harvesting. Storage in such rooms also provides a cool temperature so essential for storage of grain (Lahaul and Spiti, Himachal Pradesh).	Verma (1998)
32	Use of neem leaves to prevent damage to grains by storage pests	About 200 g of neem leaves are mixed with every 50 kg of grains with a few or more tender branches of neem. The grains stored with neem leaves are not affected by pests of any kind for 2–3 months (West Bengal, Bihar, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Haryana, Punjab, Maharastra and Tamil Nadu).	Samant and Prasad (1995)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
33	Storage of pigeonpea and sorghum seeds with sand and cement	Fine sand is added to the seeds of pigeonpea (<i>Cajanus cajan</i>) and cement to seeds of sorghum as protection against storage pests (Sillamarut-hupatti, Bodinaick-anoor).	Veeramallammal (1994)
34	Storage of pulses in baskets	"Saag" (<i>Tectona grandis</i>) leaves are spread in a basket made of paddy straw rope. Dried pulses are kept in the basket along with neem leaves, ash, piece of iron and leather, 'Bhoy ringni' (<i>Solanum surattense</i>) and chaff of black/horsegram. The basket is then daubed with a mixture of clay and cowdung (Valsad, Gujarat).	Gavint (2000-2001)
35	Cow's urine treatment for storage of pulses	Large grain pulses such as pigeonpea, and field bean are washed with cow urine and dried in the shade before storage. Kodomillet grains are mixed with pulse seeds to reduce the attack of storage pests. Similarly mixing castor seeds with pulse seeds would also reduce the attack of storage pests (Bangalore, Karnataka).	Prasad (1999)
36	Storage of cereals using chickpea leaves	Gram leaves can be used for safe storage of cereals like wheat and maize over a long duration of time. The gram leaves are gound and mixed with the cereal (Bhiloda, Gujarat).	Makanaji (1998a)
37	Pest control methods (Mixing non-toxic materials with produce) of black gram, gingelly and millets(for seed purposes only)	Spreading BHC 10% on the gunny sacs or placing a cloth bag of BHC 10% inside the sacs (Tamil Nadu).	Parvathi et al. (2000)
38	Storage of pulses with neem leaves	Neem leaves are put in pulse bags for storage because neem leaves affect hatching of storage pests eggs (Karnataka).	Anonymous (1999c)
39	Insect damage control in pigeonpea	Coating of overnight soaked pigeonpea grains with drying in shade reduces insect damage and facilitates milling because wetting and drying process loosens husk from kernel and red earth acts as physical barrier to the storage insect (Karnataka).	Anonymous (1999c)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
40	Storing the greengram and blackgram by mixing with dry chillies	The farmers of Khurda and Nayagarh districts of Orissa usually store completely sun dried greengram and blackgram seeds either in metalbin, tin container or earthen pots mixing with dry chilli @ 1 kg/q of seeds. They put 3 - 4 layers of sand at the bottom portion of the container, then keep sun-dried seeds mixed with dry chillies. Again 3 - 4 inch sand layer is done at the top and lids are tightened properly. In this process greengram and blackgram can effectively and economically be stored for over one year, without any damage by stored grain pests and fungal infection. (viz. <i>Fusarium</i> and <i>Aspergillus</i> spp.) (Khurda and Nayagarh, Orissa).	Biswal et al. (2002)
41	Storage of pulse grains by mixing with neem and wood ash	In selecting paddy seeds for the next sowing, farmers first identify a few rows where plant growth is better than in the surrounding area. These plants are harvested separately and the seeds carefully threshed. Farmers also select seeds during harvesting. Since paddy is usually stacked in bundles, they can easily identify bearing panicles with bold, heavy, undamaged and fully ripe grains to keep as seed. Pulse grains are usually stored in glass jars: These are preferable to the plastic, tin or other metallic containers which are occasionally used. Most seeds are mixed with neem or samalu leaves before storing; Sometimes the leaves are combined with wood ash. Farmers select the seeds of vegetables like bitter gourd, bottle gourd, pumpkin, cucumber, tamato, chilies etc. The mature fruits are picked and further dried by repeated exposure to sunlight. Then the seeds are extracted from the fruits, washed, cleaned and dried in the sun (Andaman and Nicobar).	Anonymous (1999c)
42	Post-harvest storage of horsegram in empty salt bags	Insect damage is reduced when horsegram is stored in empty common salt bags as salt prevents hatching of storage pests eggs and also acts as preservative (Karnataka).	Prasad (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
43	Storing of pulse seeds in new earthen pots	New earthen pots meant for storing seeds are brushed with cow urine. These are dried in the shade for a day and in the sun for another day. Grains like cowpea, dolichos and pulses can be stored in such pots where they will be safe for one or two years. Dolichos seeds are coated with castor oil, dried and then stored in earthen vessels. The vessels are covered with lids and sealed with cow dung. This method of seed storage is prevalent in areas adjoining the Karnataka-Tamil Nadu border and is said to keep seeds safe for one or two years (Thalli).	Patel (1993)
44	Storage of pulses in earthen containers	When farmers store pulse grains in earthen containers, the grains are covered with layers of fine sand and wood ash for protection from the grain pests (Gujarat).	Makanaji (1998b)
45	Use of premature fruit drop of mango to protect chickpea grain	Pulses are more difficult to store than cereals. Premature fruit drop of mango can be used to store pulses like chickpea. About 200 g of the dried mango fruit is mixed with 20 kg of gram (Bhiloda, Gujarat).	Anonymous (1999c)
46	Storage pest control in pigeonpea by pongamia oil	Smearing pongamia/neem oil to pigeonpea and avare at 300 ml/quintal is done to prevent storage pest damage due to insect repellent and antifungal properties (Karnataka).	Khan and Singh (1999)
47	Storage of pulse seeds mixed with ash and mustard oil	Farmers store blackgram and other legumes like chickpea and peas by mixing ash with seeds. The chickpea and pea seeds are smeared with mustard oil. Thus the seeds are stored for a long time (Kanpur, Uttar Pradesh).	
48	Dew soaked seed storage system of pigeonpea	Seeds of pigeonpea are dried in the sun and left in the open backyard throughout the night. This hardens the seeds, further a layer of sand (wet with morning dew) is spread at the base of an earthen vessel and pigeonpea seeds are layered over that. Again sand is layered over these seeds and then it is packed. This method of storage is also known to reduce the pest attack of pigeonpea to a considerable extent (Bangalore, Karnataka).	Singh (1999)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
49	Storage of pulse grains with castor seed	Mix castor seeds with pulses to reduce attacks by pests on the pulse grains. Fried and powdered castor seeds also check the menace of pests when mixed with pigeonpea seeds (Thalli).	Prasad (1998a)
50	Storage pest control in pigeonpea with castor oil	For storing, the grains are heated with castor oil and stored in earthen vessel (vaade) to remove not only glued eggs but also for physical barrier to pest (Karnataka).	Anonymous (1999c)
51	Use of wood ash for control of storage pests	Mixing woodash to pulses impart better control of storage pests as the fine powder of ash acts as physical barrier and also blocks respiration system in storage pests (Karnataka).	Anonymous (1999c)
52	Storage pest control by rock salt	A layer of rock salt is spread at the base of a storage structure for pulses and other grains to control pests and diseases (Karnataka).	Anonymous (1999c)
53	Storage pest control in pulses by cow urine	Pulse seeds are dipped in cattle urine and shade dried to protect from storage pest incidence owing to toxic odour of urine (Karnataka).	Anonymous (1999c)
54	Use of camphor to store groundnut	Camphor is used to store groundnut for seed purpose in hot humid weather. By acting as insect repellent, inducing seed dormancy due to less oxygen availability camphor helps in overcoming loss of seed viability (Karnataka).	Anonymous (1999c)
55	Storage of tuber crops in underground pit	At the onset of winter, root crops like potato, ginger, turmeric, colocasia (arbi) etc. are stored in underground pits and the top is covered with thatch and soil. These products are consumed upto to the next summer. Storage of cabbage heads, meant for seed crop is done in underground pits dug in the fields. This is a common practice in Kinnaur. Apart from other storage benefits, the crop is also protected from snow. Storage of ginger in pits for seed crops is still prevalent in some parts of Solan and Bilaspur districts. The pits of these areas are known as Khatti (Tribal belt of Himachal Pradesh).	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
56	Methods of potato storage in Orissa	The different traditional storage methods followed by the potato growers in Puri and Cuttack districts of Orissa are: spreading of the harvested potato tubers directly on the floor, on the gunny bags spreaded over the floor and on the sand beds of 1 inch height on the floor of a well ventilated room. Spreading of potato tubers on sand beds in well ventilated room is the common traditional method. In this method the storage period varies from 30 to 150 days. The weight loss to the tubers varies from 15 to 20 % and rottage varies from 12 to 15 %. By the end of storage period, sprouting occurs in 40% of the tubers. The average sprout number per tuber varies from 2-3 and the sprouts are of 1 to 2 cm length. The price fetched after storage was Rs 150.00 to 250.00/quintal, more than the price at harvest (Puri and Cuttack, Orissa).	Sahu et al. (2002)
57	Storage of potato, raddish, lime, ginger, turmeric and other such crops	Potato, raddish, lime, ginger, turmeric and other such produce are burried deep into the pit and covered with heep of hay. This is preserved or covered with heep of hay. This is preserved for long time for future use (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
58	Carrying of fresh fruits and vegetables with 'Kiltas'	Kiltas are traditional structures which have greater storage capacity and are carried usually on back with two large ropes. They are internally lined with gunny bags to provide a cushion so as to prevent injury to the fresh fruits (Higher region of Himachal Pradesh).	Verma (1998)
59	Storage of seed materials of ginger and turmeric	Ginger and turmeric seed materials are stored safely in the pits dug out in rectangular sizes for the purpose and burry the seed materials inside. The micro-climate inside the pit is scientifically assessed to be at par with that of standard storage conditions (Orissa).	Parasar (1994)
60	Storage for turmeric, onion and ginger	Turmeric and ginger are dried after harvesting in the shade of trees for 4-5 days in sand covering an area of 10×30×2.5 ft. Later hut is made with the help of wooden logs or iron rods which is covered by 1foot thick of paddy straw or large size leaves. In between sand and roof of the hut 1feet wide space is left so that air could pass through it. Onion, ginger and turmeric are kept over there. The evaporation of moisture caused by sand and the air passing through the space provides a temperature good enough during the summer and protects the material for 4-6 months (North India).	Singh (1999)

GRAIN/SEED STORAGE

S. No.	Title of ITK	Details of ITK and rationale	Reference
61	Storage of pumpkin with cowdung paste	For prolonged storage of pumpkin stalk of each pumpkin is pasted with cowdung. It prevents decay and enhances shelf life (Himachal Pradesh).	Singh (1999)
62	Storage of citrus fruits in underground pits	In Mandi district of Himachal Pradesh, ripe galgal fruit (<i>Citrus pseudolimon</i>) is stored in pits dug in the fields. At the base, a layer of ash is spread and then the fruits are placed in alternate layers of ash and fruit. The top of the pit is covered with ash and soil. Ash seems to possess antifungal properties, which helps in checking spoilage. Storing in cool pits enhances the shelf life of this citrus fruit (Mandi, Himachal Pradesh).	Verma (1998)
63	Storage of citrus fruits in pitcher	The citrus fruits are placed in wide-mouthed pitchers and then the pitcher is placed in an underground pit. The top is covered with about 6" thick layer of soil. Using this technique, citrus fruits, can be stored for 25-30 days without any spoilage (Himachal Pradesh).	Verma (1998)
64	Storage of gur/shakkar	Gur/shakkar/jaggery is stored in large earthen pots called 'rushans'. These rushans are supported by jute cords to ease during its handling. The top cover is made of wood, though occasionally earthen covers are also used. For packing shakkar a container is prepared from the leaves of 'Torr' tree. Each leaf is held in place by using small bamboo sticks. Each container has a capacity to store about 30-40 kg gur/shakkar. Such containers are called Purih or Purah. These containers are biodegradable (Sirmour district of Himachal Pradesh).	Verma (1998)
65	Storing of mahua leaves with banyan leaves	When it is humid, sotred mahua (<i>Madhuca indica</i>) leaves are prone to attack by pests, and once that happens, the entire quantity is wasted. The leaves of the banyan tree are used for storing mahua leaves so that they do not get spoiled. For every 20 kg of mahua leaves, around one kg of dry leaves of banyan tree is needed. Other farmers use the chaff of wheat for storing mahua leaves (Sabarkantha, Gujarat).	Katara (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
66	Rat control	A live rat is caught, and a bell is tied to the foreleg of the rat with the help of a wire before releasing it. The sound frightens away other rats when it tries to follow them. This saves stored grains from rat menace (Karnataka).	Basavraju (1998)
67	Rats in the Granary	Rats pose an ever present threat to stored crops. The cumin seeds and leaves that remain after the grain is separated are mixed with the crop slacks in the threshing yard. The aroma probably helps repel rats. This technique can also be used when dry fodder is stored in the field. In this cases, a layer of cumin chaff is place at the bottom of fodder pile (Kumbhali, Mahuva).	Dayalji (1993)

Horticultural Crops

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Multiple transplanting for increasing papaya yield	The papaya (<i>Carica papaya</i>) seedling is uprooted and transplanted at a different spot. Fifteen days after that it is uprooted once more and planted again at the same spot. This actually causes a decrease in the height of plant and finally result in the growth of productive phase (Banaskantha, Gujarat).	Kodarbhai (1999)
2	Reducing dropping of flowers in mango by applying butter milk and <i>sal</i>	Dropping of mango flowers due to wind and some diseases is a common problem in mango. Farmers believe that the ratio between harvested mango at the end of the season and flowers set at the onset of the bloom is more than 1:1000. To check this problem, farmers in North Gujarat, dig a circular trench at a distance of one foot from the tree trunk at the time of flowering. They mix approximately 60-80 litres buttermilk and two kg of salt and pour it in the trench surrounding the tree. After an hour or so when the buttermilk gets absorbed, fresh water is added to the trench. The practice is repeated (Banaskantha, Gujarat).	Dudhaji (1997)
3	Enhancement of fruit set in papaya by inserting nail in stem	To induce trees that flower but fail to fruit, farmers insert nails into the stem at a height of about one foot. Nails of various materials, such as iron or wooden (1-2 cm diameter) are used (Amreli, Gujarat).	Sheldiya (1992)
4	Increasing yield of vegetables and fruits by using hairs	Waste hairs can be collected and applied to vegetable, fruit and ornamental crops to increase the yield. A round pit is dug around the plant or tree and the hairs are dumped in. For ornamental plants, 1/2 kg of hairs are to be used and one kg for fruit trees. In the case of fruit trees, application is to be done one month after planting and also 45 days before fruiting. The hairs are dispersed during the last plough for vegetables like tomato and brinjal (Tamil Nadu).	Subbiah (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	Lemon juice for lemons for higher productivity	Farmers employ unique methods to increase productivity of crops. One such innovative method is being used. They dissolve 100 ml of lemon juice in two litres of water and spray their lemon trees with this solution in such a way that all leaves become wet. This has resulted in greater productivity of lemons (Rajkot, Gujarat).	Pethan (1997a)
6	Improvement of quality of vegetables like okra by applying castor oil	Farmers apply castor oil in the furrow prior to planting okra (<i>Abelmoschus esculentus</i>) (Mahesana, Gujarat).	Patel (1993b)
7	Inducing fruiting in walnut by oozing out water from the tree trunk	A hole is bored into the trunk of the walnut trees up to the hollow pith region. This results in oozing out of extra water present in this region and the tree starts bearing fruits because the water present in the pith retards the movement of nutrients from the roots to the upper region. Additionally, the branches of the non-bearing trees are pruned for bringing it to bear fruits (Himachal Pradesh).	Verma (1998)
8	Practices for increasing yield of vegetables and fruits	Some of the practices are:(a) Inserting peg at the base of cucurbit plant to increase yield, (b) putting opium at basal node to reduce fruit drop in cucurbits, (c) transplanting of cucurbits after sowing seeds on polythene seeds,(d) cutting of growing portion of cucurbitaceous stem after retaining first fruit to increase yield, (e) collection of seeds from middle portion of ripe papaya along with sowing of seeds rather than transplanting to enhance female ratio,(f) application of butter milk to reduce fruit drop in <i>kagji</i> lime, and (g) tying iron wire at the base of plant to increase yield in <i>kagji</i> lime (Sambalpur, Orissa).	Dash <i>et al.</i> (2002)
9	Root spreading for surface feeding in vegetable plantation	In Lakadh, a small wooden structure called the <i>tokhre</i> is used for digging the soil facilitating the horizontal spread of roots in cabbage and other vegetables crops, thereby increasing production. This practice facilitates enhanced moisture/nutrient uptake along with removal of weeds. The wooden structure protects roots from mechanical damage which could result from an iron implement (Ladakh, Jammu and Kashmir).	Verma (1998)

HORTICULTURAL CROPS

S. No.	Title of ITK	Details of ITK and rationale	Reference
10	Management of frost damage in mango by smoking	In the lower areas of Himachal Pradesh, mango plants are mostly damaged by frost injury during winter months in December and January. Smoke layer protects the mango plants from frost injury (Lower areas of Himachal Pradesh).	Verma (1998)
11	Preventing mango losses by covering the tree trunk with grass	Mango farmers often suffer heavy losses when crop yields decline due to inflorescence and premature fruit dropping. If the trunks of the mango trees are covered with 'kodara' (a light cereal) straw before the monsoon, there will be good fruit setting in the next season (Bhiloda, Gujarat).	Thakraji (1998)
12	Metal sheet in coconut to check climbing pests	To avoid the climbing of squirrels and other herbivorous animals, metal sheets having a width of about two feet are fixed with the help of nails all around the trunk. These sheets are fixed at about 10 feet from ground level. This method is effective and is also economically feasible (Pondicherry).	Pillai (2000-2001)
13	Prevention of fruit drop in mango	The practice of filling mustard oil to a shallow depression on the upper surface of the thickest mango branch prevents abscission layer formation and thereby fruit drop (Karnataka).	Anonymous (1999c)
14	Large cardamom-based agroforestry system	Large cardamom is grown in association with <i>Utis</i> , a shade tree adjoining to small perennial streams (<i>thoras</i>) in order to spread water seepage through the soil during most part of the year. Also <i>utis</i> is fast growing tree, produces fuel wood, timber, fixes atmospheric N, enriches the soil by adding litter, serves as catch crop, attracts leaf feeding insect pests and hence successfully used in Sikkim over a century. The area reported under this system is about 14,000 ha and is expected to increase with the aid and assistance of Cardamom Board at Sikkim. Apart from <i>utis</i> , <i>Cetis australis</i> , <i>Ficus</i> spp are also used (Joginder Nagar of Mandi, Himachal Pradesh and Sikkim).	Verma (1998)
15	Enhancing germination of coconut by keeping in water	To advance germination of coconuts, farmers place them in the standing water of an open irrigation well. After only one month or so the sprouted nuts are transplanted to the field (Una, Himachal Pradesh).	Narsinhbhai (1993)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
16	Enhancing germination of bottle gourd by keeping it in Fyol	Seeds are soaked in water and wrapped in moist cotton cloth. This moist bag is put in a vessel and buried in farmyard manure for a day. The logic behind this practice is that the moisture of wet cotton and the heat produced inside the manure heap softens the seed coat thereby enhancing germination. Sometimes farmers merely keep the seeds in water for 24 hours, but they report that the first mentioned method, though more laborious, gives better result (Kutch, Gujarat).	Jadeja (1993)
17	Improving quality of dates by pruning	To improve the quality and quantity of dates, 50% pruning is done as soon as they set in. The remaining flowers bear bigger fruits. These fruits last long and fetch higher prize in the market (Bhuj, Gujarat).	Patel (2001d)
18	Pasting cowdung ball to cut ends for better sprouting and rooting	The practice of pasting cowdung ball to cut ends of plants help in better sprouting and rooting by reducing dessication and acts as a promotor (Karnataka).	Anonymous (1999c)
19	Pruning apical buds in bottle gourds for higher production in off season	Some farmers grow bottle gourd and other vegetables in summer when the prices of these are high. They allow the apical shoot to grow till it bears five or six flowers. After that only the lateral branches are allowed to grow till they bear five or six flowers. The apical bud of the lateral branch is then snipped and only the sub-lateral branches are allowed to grow. Farmers say that this practice improves the quality of vegetable (Kheda, Gujarat).	Parmar (1993c)
20	Prevention of dropping off gourd flowers	In crops like ridge gourd, bottle gourd and pine gourd, flower dropping is a severe problem. To prevent it, 25 g 'hing' (asafoetida) is powdered and dissolved in one litre of water and sprayed on the crop (Bhavnagar, Gujarat).	Baraiya (1994a)
21	Propagating date palm through suckers	When approximately 5 or 6 years old date palm trees produce suckers from the stem near the ground. The suckers strike roots as they come in contact with soil and can be used to raise new plants. But when suckers sprout from higher up on the stem, that is, at about one metre or more above the ground level they do not reach the soil and hence do not produce roots. A method has been evolved to make the high up suckers strike roots so that they can be used for propagating	Turq (1996)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		the plant. Soil is mixed with organic manure in polyethylene bags and ties them around the suckers sprouting from the higher points of the stem. The bags are secured in such a way that soil and a portion of stem remain in contact; after a few days these suckers also strike roots. Suckers which develop roots are separated from the parent and transplanted along with the bags in the field. Trees raised by vegetative method of propagation have characteristics identical to that of the mother plants and produce fruits of similar size and taste. The only care that needs to be taken is that after detaching the suckers from the mother plants, the cut portion from where suckers have been removed must be plastered; otherwise, the exposed portion make the tree susceptible to attack by a grub locally known as ' <i>dhal kitak</i> ' (Kutch, Gujarat).	
22	Ratoon crop of banana	Generally, farmers take only one harvest of banana and do not allow the plants to grow suckers and remove the main plants after harvesting. A few farmers take a ratoon crop once. It is believed that after one season or two, the yield of fruits is reduced and so the plant is removed. Farmers of Kutch district, have been taking the crop continuously by retaining the plants for last 20 years. They allow all the healthy suckers to grow and remove mother plant, after two or three harvesting. They have been weeding crop only two or three times a year and applies organic manure twice in a year crop which has been standing in the same field for last 20 years. Over the years, it has been found that the tree produces highest yield in its second year of harvesting, but the yield stabilizes from third year onwards up to the tenth year when the average yield is around 15 - 20 kg. But sometimes the fruits may be small (Katch, Gujarat).	Khodiyar (1996)
23	Checking the sprouting of suckers in banana by use of kerosene oil	In banana crop, three to four months after sowing, the sucker, (lateral shoot which emerges from primary roots of the plant) start sprouting near the plants. Since it absorbs nutrients and water from the same root, it hampers the growth and development of plant and its fruits. Farmers remove the sucker by cutting it as and when it appears. But it regenerates again and again from the same place. Hence, it requires lots of labour and continuous care to check its growth.	Patel (1995d)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		About 8-10 desuckering operations are required during the whole crop life. Farmers have devised very interesting method to curtail the re-occurrence of suckers. They cut each sucker from the ground level and make 1-2 inch deep hole by inserting a pointed iron stake on the open cut surface from where sucker was removed. Then kerosene is poured into it drop by drop. This delays resprouting of the sucker. It takes three months to reappear instead of the normal one month it takes without this treatment. The same practice is followed every time, while removing the suckers. Overall this treatment reduces the number of the desuckering operations to two or three instead of 8-10 and save labour cost and time (Kheda, Gujarat).	
24	'Kalika' technique of onion cultivation	Onion is one of the major crops of Nimar Valley. Onion covers more than 3,000 ha. area only in East Nimar (Khandwa). Onion is grown twice in a year, and the technique of onion cultivation of Nimar is called as <i>kalilka pyaz</i>, i.e. budded onion. There are six major steps involved in this cultivation technique: (1) Nursery phase which starts from December, (2) Nursery seedlings maintained till April, when small buds are formed, (3) Uprooted the seedlings having buds and dry them under the shade of tree, and after drying collected the healthy seedlings with buds (<i>Kalika</i>), (4) Keeping those seedlings in well-ventilated store and shuffling done time to time, then (5) In August where the intensity of rains is reduced then these seedlings again re-transplanted in the fields, and finally (6) In October, these small buds become full grown onion bulbs and however, farmers get the maximum price for that (Nimar, Madhya Pradesh).	Tomar <i>et al.</i> (2002)
25	Grafting in apricot	In the Nubra valley of Ladakh, scions of apricot (sweet types) are grafted over bitter forms of wild apricot. This job is carried out by three to four experts (free of charge) in a village. Local technique is known as <i>Kalam</i> and <i>Dambu</i>. In '<i>kalam</i>' half lamina along with the petiole is inserted into the peeled part of the stock and the removed bark is then used to secure the union. A two to three year old seedlings. In this case a cut is made in the bark at the point of bud with a deliberate slow rotatory movement and the entire	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		piece of cylindrical bark is removed much like the cap of a pen. It is then rewrapped and secured so that the petiole region of the scion is properly united with the stock. Protection of two to three vital veins in the petiole region is regarded as essential for the success of this graft. The use of peeled off bark as a piece in <i>Kalam</i> and <i>Dambu</i> displays local wisdom for providing moisture to the grafted union. The use of the half leaf lamina is checked against possible damage to the union due to strong blowing wind, a common phenomenon in the region (Nubra Valley, Himachal Pradesh).	
26	Cow dung as crop protective chemical	Arecanut seedlings in the nursery stage are faced with pest menace. It may be spots, or small insects. Mixing of cowdung and spraying this slurry over the seedlings once or twice a week is found to be an effective control measure. Pumpkin or ashgourd grown in the backyard are found to attract monkeys and thus saving the vegetables from them till harvesting, is a problem. Cow dung is found to be the answer for that problem too. Coating of pumpkin or ashgourd, with the cowdung slurry is found to be effective in keeping away monkeys (Shimoga, Karnataka).	Basavanagadde (1999)
27	Control of sucking pests in vegetable crops by spraying with palm juice	The vegetable crop is more likely to be attacked by sucking pest like white fly, aphids etc. These pest usually attack the plant at its flowering stage. These pests suck the sap from the tender leaves thereby causing stunted growth of the plant. Moreover these pests are responsible for the spread of the leaf curl disease caused by the virus. To control these sucking pests the juice obtained from the "date palm" (<i>Phoenix sylvestris</i>) is used. Approximately 1-1.5 litre is mixed with 15 litres water. It is then sprayed on the vegetable crop. If needed, another round of spraying can be done after 10 days. This practice has no side effect (Dahod, Gujarat).	Katara (1999)

S. No.	Title of ITK	Details of ITK and rationale	Reference
28	Controlling <i>Nilgai</i> menance in ' <i>chiku</i> ' plantation	Small plants of ' <i>chiku</i> ' (<i>Achrus zapota</i>) are often damaged by nilgais. They eat away the tender twigs and leaves of the ' <i>chiku</i> ' plant. The <i>nilgai</i> particularly damage the plants that emit milky substance. To prevent this damage, a mixture of cowdung and water was sprinkled on the top branches of <i>chiku</i> plants with the help of a broom. It was observed that although <i>nilgais</i> enter the orchard, they do not eat the tender twigs and leaves of ' <i>chiku</i> ' because of the foul odour. The mixture was regularly sprinkled on the ' <i>Chiku</i> ' plants every 15-20 days (Mehsana, Gujarat).	Patel (1998a)
29	Increasing brinjal yields through use of <i>neem</i> kernel extract	To increase brinjal yields, seedlings are soaked overnight in <i>neem</i> kernel extract prior to planting. Farmers also apply <i>neem</i> kernel powder in paddy as a basal dose, and again 35 days after planting. The powder is also used as top dressing for brinjal and tomato (@ 40 kg/acre). These preparations are better than equivalent applications of <i>neem</i> cake (Kuppanam-patti, Tamil Nadu).	Thevar (1994)
30	Protecting coffee plant from stem-borer by <i>Nerium oleander</i>	About 400 g of the root of <i>Nerium oleander</i> are cut into small pieces and soaked in 1,500 ml of water. To this 20 g turmeric powder is added and paste is made. The paste is applied to the infected portion of the stem in such a way that the insects come out of it and die (Hassan, Karnataka).	Basavaraju (2000)
31	Control of bacterial diseases, white fly and aphid in vegetables by palm juice	In order to prevent infestation, juice from <i>tadi</i> (<i>Phoenix sylvestris</i>) tree is diluted in 15 lit of water and sprayed in the infected plants to control pest and diseases (Dahod, Gujarat).	Katara (2000)
32	Control of mite in coconut	A mixture of <i>Aloe vera</i> , <i>Vitex negundu</i> and <i>neem</i> cake is applied around the trunk of coconut tree followed by covering with cowdung slurry controls eriophyid mite in coconut (Kunninathur, Tamil Nadu).	Samyapam (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
33	Effect of indigenous methods in controlling soft rot of ginger	On-farm trials were conducted in the farmers' fields of Kandhamal district during 1990-2000 and 2000-2001 to control the soft rot of ginger (<i>Zingiber officinale</i>) by the indigenous methods vis-à-vis recommended practices. The local variety of the farmers was sown in April each year in a plot size of 100 sq metre with 5 replications. The treatments, namely T/1: Farmers practice (imbalanced use of cow urine and asafoetida extract), T/2: Spraying of Bavistin (1g/litre), T/3: Drenching of Bavistin (1g/litre) and Plantomycin (1g/litre), T/4: Coating of Bavistin and Plantomycin paste and T/5: Drenching of asafoetida and cow urine (10 g of asafoetida in litre of urine) were imposed to study the efficacy against the soft rot of ginger. The assessment made in the investigation revealed that drenching of Bavistin (1g/litre) and plantomycin (1g/litre) in the root zone of ginger (T/3) reduced the wilting of ginger drastically (8.9%) caused by the soft rot and gave the highest yield of 139.8 q/ha with 76.6 q/ha (121.2%) increase in yield over farmers practice. However, drenching of asafoetida and cow urine recorded only 10.3 q/ha (16.3%) increase in yield resulting in 35.9% wilting. The farmers practice showed the maximum wilting (47.2%) and minimum yield (63.2) q/ha of ginger at Kandhamal district of Orissa (Kandhamal, Orissa).	Sahoo and Kanungo (2002)
34	Indigenous practices for vegetable crops	It was found in Uttaranchal that wood-ash is used by the farmers on exposed surface of cut potato tubers at the time of planting of tubers. Wood-ash was also applied to check the spread of powdery mildew in cucurbits. An obnoxious weed of the hilly region, <i>Kuri</i> (<i>Lantana camara</i>) was found to be used as support for climbing vines of cucurbitaceous crops. This weed is highly resistant to pest attack. This quality of weed also protects cucurbits from pest attack (Uttaranchal).	Joshi <i>et al.</i> (2002)
35	Control of damping off disease of tomato by using leaf extract of <i>Kahithapu</i>	<i>Kahithapu</i> (<i>Bougainvillea glabra</i>) leaf extract is used for control of damping off disease in tomato nursery. About 20 ml leaf extract is mixed in 1lt water and seeds are soaked in it for 6 hours (Vattalakundu, Tamil Nadu).	Kupusamy (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
36	Disease control in bottle gourd by <i>hing</i>	The lower portion of the vine of the bottle gourd has a tendency to rot. A spoonful of ' <i>hing</i> ' (asafoetida) powder is put on the rotten portion and a fine cloth bandage is tied around it. This treatment has been in existence for a long time and is mostly used in homestead gardens and with favourable effects within a week (Jamnagar, Gujarat).	Patel (1993i)
37	Control of <i>Kukkad</i> disease in chilli by tobacco extract	<i>Kukad</i> is a viral disease of the chilli plant characterized by curling of leaves and dropping of flowers and is very common in winter. Farmers prepare an extract of tobacco leaves and mix it with equal quantities of pearl millet flower and butter milk. This admixture is sprinkled on the crop. Approximately 30 - 40 kg of the mixture is required for one acre. A week after this treatment, the plants bear new growth. The treatment is repeated twice or thrice at weekly intervals. Some growers have been using this practice for the last six to eight years. In South Gujarat, farmers dissolve alum in water which has been used for washing intact fish (fish from which the scales have not been removed). This mixture is sprinkled over the diseased chilli crop. This practice has been in use for the last 10 - 11 years in this region (Jamnagar, Gujarat).	Maganbhai (1993)
38	Control of grapes from insect attack	A mixture of 1 litre stale butter milk, 50 g of <i>neem</i> juice and 1 litre of cow urine is made. This mixture is sprayed on the plant once in every 10 days to prevent development of pests and worms. The branches grow well and immunity in plants also increases (Sabarkantha, Gujarat).	Patel (2001a)
39	Control of insect pest in ginger by planting <i>Calotropis</i>	To save ginger (<i>Zingiber officinalis</i>) from insect pest ' <i>akado</i> ' (<i>Calotropis</i> sp) is planted randomly in the field. The smell from this plant acts as repellent for the insect pest (Sabarkantha, Gujarat).	Pandoor (2001)
40	Control of pests in coconut and rice by use of neem kernel extract	<i>Neem</i> fruits are soaked in water for two months and the pulp is separated from the kernels, mixed with water and sprayed on coconut palm and paddy fields to control pests (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
41	Mixed cropping prevents pest attack	Mixed cropping of a few lines of onion with carrot prevents pest attack on both the crops. Similarly, sowing a few lines of maize with beans reduces pod borer attack on beans (Bangalore, Karnataka).	Reddy (1998)
42	Plant protection by Embelia ribes	Boil 200 g of Embelia ribes in two litres of water and filter it the next day. Dilute this solution with 100 litres of water. The diluted solution acts as a good spray against insects and viral disease.	Anonymous (2000e)
43	Control of <i>Heliothis</i> in okra by spraying of extract of <i>methi</i>	To control <i>Heliothis</i> one kg flour of <i>methi</i> (<i>Trigonella foenum</i>) is mixed with 2 litres of water and the mixture is kept aside for 24 hours. Having diluted with 40 litres of water the mixture is sprayed in 1 ha of land. Within 7 days 50% of <i>Heliothis</i> gets controlled. It is advisable to plough the field as early as possible after harvesting to destroy <i>Heliothis pupae</i> (Panchmahal, Gujarat).	Vankar (2000)
44	Control of root disease in fruit trees by applying ash or lime	Farmers remove the mud around fruit trees or vegetable plants and put fuelwood ash or lime (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
45	Control of white grub in coconut by applying jaggery	The white grub bores into coconut trunks and reduces the quality of the nuts. Severely infected trees die. A concentrated solution of jaggery is prepared and poured in and around the grub holes to attract ants. Ants are the natural predators and so reduce populations of white grub. From a long history of use, the practice is very effective and free of harmful side effects (Banaskantha, Gujarat).	Patel (1993d)
46	Control of beetle in fruit trees by applying sugar and ghee	To control beetle larvae that harms tree by boring into the trunk. a mixture of sugar and ghee is poured in the holes to attract ants. Other techniques are (i) the larvae can be cemented so that the insect suffocates inside and (ii) the larvae can be pulled out using a wire loop (Banaskantha, Gujarat).	Patel (1993d)
47	Control of fruit fly in mango by planting <i>Ocimum sanctum</i>	Mango is vulnerable to fruitfly, locally known as ' <i>Fal makhi</i> ' that injures the fruit and causes premature drop. The infested fruits are disposed of by burial. To deter the appearance of the pest, basil (<i>Ocimum sanctum</i>) is planted throughout the orchard (Junagadh, Gujarat).	

S. No.	Title of ITK	Details of ITK and rationale	Reference
48	Fumigation for viral control in chilli	<i>Kukad'</i> a viral disease is spread by the white fly which stunts chilli (<i>Capsicum</i> sp.) growth. Farmers fumigate the crop by smoldering husks and broken grains of ' <i>Kodra</i> ' (<i>Paspalum scrobiculatum</i>), a type of millet during the evening when air is comparatively still (Pati Khaida, Viliya).	Choudhary (1993b)
49	Prevention of black spots in mango by covering the fruits with bowls made of leaves of <i>Butea monosperma</i>	The fruits of mango tree ripen in hot summer. When the rays fall directly on the ripening fruit with the intense heat of the sun, the skin of the fruit gets burnt and black marks begin to develop. The whole fruit gets spoiled. The leaves of ' <i>khakhra</i> ' (<i>Butea monosperma</i>) is used as a remedy against this damage. The fruits ripening on the tree are covered with bowls made from ' <i>khakhra</i> ' leaves. This prevents the rays from falling directly on the fruits. It is a labour intensive process and some extra expenditure has to be incurred. Hence, only a few people adopt this method though it can protect 60 per cent fruit from spoilage (Bhiloda, Gujarat).	Gohil (1998)
50	Protecting gladioli from insect attack by spraying extract of <i>Clerodendron inermis</i>	Gladioli flowers are protected from being eaten by insects using the leaves of ' <i>ishamadhari</i> ' (<i>Clerodendron inermis</i>). Three kg leaves are ground and soaked overnight in 10 litres of cow urine. The next morning it is filtered and diluted to 200 litres. This is enough for one acre. It is sprayed on the flowers during the evening (Karnataka).	Reddy (1998)
51	Protecting grapes from stem girdler by cowdung	To control stem girdler damage in grapes, fresh cow dung can be applied over infested parts. This prevents further damage (Tamil Nadu).	Selvamani (1998)
52	Control of Eriophyid mite in coconut by herbal insecticide	Eriophyid mite is prevalent in most coconut-growing regions of south India. A herbal formulation is prepared with equal amounts (1kg) of leaves of custard apple (<i>Annona squamosa</i>), turmeric rhizome, ' <i>Peenari Changu</i> ' (<i>Clerodendrum inermis</i>), ' <i>Chothukatralai</i> ' (<i>Aloe vera</i>), ' <i>nochi</i> ' (<i>Vitex negundo</i>) and ' <i>neem</i> ' (<i>Azadirachta indica</i>) kernel. All the ingredients are ground in to a paste by adding sufficient water. This way about 5 litres of juice is extracted. This is diluted with another 15 litres of water. This herbal extract is administered in to the crown region at the rate of 2 litres per palm after harvesting of nuts. This can be repeated once in two months i.e. each harvesting time (Erode, Tamil Nadu).	Chellamuthu (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
53	Control of rhinoceros beetle in coconut by providing alternate host	Keeping cowdung slurry and groundnut cake in water in earthen pots @ 20-25 pots/ha minimizes damage by rhinoceros beetle in coconut gardens because of the fermenting mixture attracts this pest (Karnataka).	Anonymous (1999c)
54	Pruning of fruit trees for better growth	Pruning and training of fruit trees is an important indigenous practice performed during the dormant season to create a proper frame and to provide symmetry to the tree and ensure proper balanced growth. Some inconspicuous pests such as aphids which hibernate as egg nymphs are automatically removed along with pruned branches/twigs thereby mitigating the severity of their attack in the next season. Further pruning of old, damaged and weak portion of the tree encourages new growth which is healthier and stronger. Pruned plants have less pest infestation rate (Himachal Pradesh).	Verma (1998)
55	Cow dung and clay fruit trees mixture for control of pests and diseases in fruit trees	The practice of applying a thin paste made of cowdung, clay and cow urine as a disinfectant on the floor of mud (<i>kutchra</i>) houses in rural areas is an age old practice. Similarly the application of paste to treat wounds and injured limbs of fruit trees has been in vogue in villages. A fine slurry is prepared by thorough mixing of clay, cowdung and cow urine in a container. This mixture possess antibacterial properties (Himachal Pradesh).	Verma (1998)
56	Control of blight in onion	Farmers move empty gunny bag over the onion crop in the field early in the morning when ' <i>Jal Dhui</i> ' is done. They also irrigate the crop immediately after the ' <i>Jal dhui</i> ' is observed. It is believed by the farmers that due to this operation attack of <i>Karpa</i> (Blight) on onion crop is minimized. The scientific reason behind is that due to moving of empty gunny bag over onion crop the moist portion on the tips on onion leaves is minimized. Moist portion on the leaves is congenial for sporulation of fungus/bacteria which results in <i>Alternaria</i> (<i>Karpa</i>) disease of onion. Low temperature is also congenial to sporulation of <i>Alternaria</i> . Due to irrigating the crop early in the morning the sporulation is minimized (Solapur, Maharashtra).	Anonymous (2000d)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
57	Control of deformity in brinjal by using mustard cake	Ringworm infestation causes deformities in brinjal fruit. To prevent this the roots are treated with oil cake of mustard applied with water. This treatment results in big shiny brinjals (Uttar Pradesh).	Ram Pratap and Rajput (1999)
58	Control of mosaic virus in tomato by using cakes of <i>neem</i> or mustard	Tomato is prone to mosaic virus. In order to control the virus farmers use oil cakes of <i>neem</i> or mustard which are powdered and applied near the root region mixed with water. This is very effective in controlling the virus (Uttar Pradesh).	Ram Pratap and Rajput (1999)
59	Application of common salt to control pests in coconut	Application of common salt to coconut reduces button shedding and rhinoceros insect incidence as common salt acts as insect repellent and is cost effective substitute for potash (Karnataka).	Anonymous (1999c)
60	Biological control of mango hopper	Planting cashew in mango orchards reduce magno hopper incidence because cashew acts as an alternate host of the hopper (Karnataka).	Anonymous (1999c)
61	Cost effective control of sooty mould in mango and sapota	Cowdung being disinfestant, on spraying its slurry control sooty mould effectively in mango and sapota (Karnataka).	Anonymous (1999c)
62	Control of <i>Koleroga</i> in areca by intercropping	<i>Amorphophallus</i> is grown as an intercrop with Areca because the its root exudates inhibit root grubs (Karnataka).	Anonymous (1999c)
63	Control of grubs in cardamon and lemon	Leaves of <i>Kasarka</i> (<i>Struchnos nuxvomica</i>) mixed with cowdung is applied to cardamom and lemon plants to control grubs owing its fumigation effect. Discharded cattle horn filled with kerosene and burnt to dispel wild boars because of the odor of burning horn acts as repellent (Karnataka).	Anonymous (1999c)
64	Control of root rot disease in fruit trees and vegetables by ash	The farmers remove the mud around fruit trees or vegetable plants and put fuel-wood ash or lime to check root rot disease (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
65	Control of virus in chillies through fumigation	A virus infection in chilli plants, causes the leaves to shrivel. This leads to loss of nutrition in the plants and the crop yield falls. Farmers have developed a method of fumigating away the virus. They burn ' <i>guggul</i> ' (<i>Balsamodendron mukul</i>) and fumigates the plants with its smoke. The ' <i>guggul</i> ' is placed on burning cow-dung cakes and is carried around the fields (Mahesana, Gujarat).	Desai (1997)
66	Control of stem borer in fruit trees by kerosene soaked	The kerosene soaked swap is put at the place where the stem borer are damaging the fruit trees (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
67	Control of <i>Gundariya</i> (Gummy diseases) in lemon	Lemon trees are often affected by Gundariya disease. This results in drying of leaves and formation of ulcers on the bark of the tree alongwith discharge of a sticky fluid from the tree trunk. He also sprays one kg of tobacco powder on the plant. Within two to three days the plant starts recovering from the disease also (Mahesana, Gujarat).	Patel (1997b)
68	Plant extract to cure leaf curl in chilli	Leaf curl is a viral disease and characterized by curling of leaves. The crop remains stunted. Some farmers prepare extract of ' <i>kheemp</i> ' (<i>Leptadenia pyrotechnica</i>) and tobacco and spray it over the chilli crop for effective control of the disease (Ajmer, Rajasthan).	Kumhar (1996b)
69	Control of sooty mould in mango and sapota by spraying soap water	Spraying of soap water to mango and sapota physically removes the sooty mould pathogen by washing off (Karnataka).	Anonymous (1999c)
70	Chrysanthemum for control of brinjal fruit borer	Farmers grow <i>Chrysanthemum coronarium</i> as border crop in the main field of brinjal to reduce the incidence of fruit borer.	Anonymous (2000-2001j)
71	Maize as a border crop against leaf curl in chilli	Farmers of Kota district believe that this disease is spread by tiny insects. They grow maize around the chilli field to prevent entry of insects. Maize leaves can cause injury to the soft bodies of insects. Sometimes maize is grown inside the chilli field or the boundary of plots for the same purpose (Kota, Rajasthan).	Nagar (1996)

S. No.	Title of ITK	Details of ITK and rationale	Reference
72	Control of caterpillars in cabbage	Small green caterpillars with white fur (<i>Heliothis armigera</i>) are a menace to the cabbage crop. They damage the crop by consuming the leaves and fruits. <i>Ketaki</i> (<i>Agave americana</i>) and chilli are used to control caterpillars in cabbage crop. <i>Ketaki</i> leaves are beaten on a rock a couple of times, then packed in a plastic packet. The packet is squeezed to get the juice from the leaves. About 200 g of juice is mixed with a fistful of dry red chilli powder. A glass of water is added to this mixture. The mixture is stirred and further diluted in 14 litres of water. This is filled in a spray pump and then sprayed on the cabbage crop. One spray pump full of this liquid is prescribed for half a vigha of land. The skin of the caterpillar being more delicate, and there being the added punch of chilli powder, the liquid is quick to take effect (Bhavnagar, Gujarat).	Ghori (1999)
73	Control of leaf spot in banana by tobacco leaf extract	Tobacco leaves are soaked in cold water for two to three days. The supernatant solution is taken and diluted with water and then sprayed on the leaves with the help of hand sprayer for effective prevention of leaf spots the solution is sprayed early in the morning or late in the evening (Pondicherry).	Ravi, Subbiah (2000-2001)
74	Control of pests in chilli and brinjal by use of alum and castor shells	Chilli and brinjal pests are white coloured and shaped like ants. With a life span of about 15 days, they are seen in abundance. Maliyabhai of Baroda has been using a traditional method of control for the last 19 years. He uses alum and empty castor (<i>Ricinus communis</i>) shells to control these pests. Around 60 kg empty castor shells and two kg alum are mixed together and spread on the land while ploughing before the sowing of the seeds (Baroda, Gujarat).	Rathwa (1999)
75	Goats milk to cure leaf curl in vegetable and spice crops	Certain vegetables like chilli (<i>Capsicum annum</i>), brinjal (<i>Solanum melongena</i>) and spices like black pepper (<i>Piper nigrum</i>) experience fruit and flower abscission and leaf curling. This disease occurs due to extreme cold and particularly so in the months of November and December. To control this phenomenon, fresh milk of goat is sprinkled on the plant using a pump sprayer. The results are visible in a week's time (Dahod, Gujarat).	Babudiben (1999)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
76	Control of larvae in tuber crop	Some farmers in Valsad district grow tuber crops such as elephant foot, pumpkin, turmeric etc. A larva attacks the crop at later stage of the crop when tuber develops. It enters into tuber and eats away the tuber resulting in reduction of yield. Farmers call the larva as ' <i>laskari iyal</i> ' (<i>Prodenia</i>). It is one inch long with stripes of brownish green and black colour. The larva remains in the soil in day time and damages the crop during night hours. The larvae attack can damage the whole crop within few days. To control the larvae, some farmers use the residual liquid waste obtained in the preparation of country wine. Approximately one litre of this liquid is applied to the soil near the base of the plant. It can be applied either before or after sowing of the crop. No side effect of the waste is observed. Its application also helps in increasing the yield. The waste is also applied in seed beds of crops like brinjal, chilli, tomato, fenugreek, coriander and leafy vegetables before sowing. It makes the soil soft and is claimed to help the seedlings grow faster and become resistant to diseases (Valsad, Gujarat).	Patel (1996b)
77	Tank silk for tomato	Application of tank silk @ 25 tonnes/ha to irrigated tomato not only supplies micronutrients that build resistance to pests but also saves cost on plant protection (Karnataka).	Anonymous (1999c)
78	Burrying the dead animals around the roots of fruit trees to increase growth	Dead animals, like cats, dogs, etc. are buried around the roots of fruit trees. Fish bones are also buried. It is said that this promotes the growth of fruit trees (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
79	Management of banana crack by use of castor oil	Occasionally, fruits of banana crack and fail to fill out. As a prevention, farmers in Saurashtra add castor oil to the irrigation water. A tin is suspended over the water channel so that the oil drops into the running water drop by drop. Some farmers also believe that this helps to control of soil pests such as white ant, locally called ' <i>Talkidi</i> ' (Bhavnagar, Gujarat).	Kheda (1992)

S. No.	Title of ITK	Details of ITK and rationale	Reference
80	Use of wood ash to vegetable crops to supply nutrient and protect the crops	It is common practice to sprinkle wood ash on vegetable crops especially growing in kitchen garden and to spread it around plants to ward off pests and to enhance nutrients status of the soil. To achieve this, a thick layer of ash is spread on the soil around plants and it is also sprinkled on foliage to protect it against a variety of pests. This is because it is source of phosphorous for plants and it also acts as a physical poison usually causing abrasion of epicuticular waxes and thus exposing pests through dessication (Himachal Pradesh).	Verma (1998)
81	Improvement in the yield of garlic, ginger, turmeric and other bulb crops by application of ash	Fuelwood ash contains potassium (K) which improves the yield of crops like garlic, ginger, turmeric and other bulbous crops. Therefore, turmeric and other bulbous crops. Therefore, fuelwood ash has got widespread application in hill areas particularly in kitchen gardens (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
82	Enhancing vegetable production by using mixture of kitchen ash and poultry manure	The mixture of kitchen ash and poultry manure is applied to increase the production levels of vegetable crops such as tomato, brinjal, capsicum and cauliflower through optimal supply of nutrients and improving the soil physical properties (Nubra Valley, Himachal Pradesh).	Verma (1998)
83	Application of tank silt to coconut gardens	Coconut gardens are applied with 6 - 8 tonnes of tank silt/red earth/ha to improve nut size and yield. This improves soil properties and supply nutrients (Karnataka).	Anonymous (1999c)
84	Quality improvement in potato through application of kitchen ash and goat manure	Application of kitchen ash and goat manure mixture improves the potato size and quality on account of optimal supply of nutrients. This organic manure mixture improves the soil structure, porosity and waterholding capacity of the soil. In this way there is an overall improvement in physical, chemical and biological properties in terms of microbial population etc. that might contribute to the increased size of potatoes (Nubra Valley, Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
85	Inducing fruit bearing in coconut	At times coconut trees grow taller by the year but bear no fruits. Driving an iron nail into the trunk results in inducing fruits. An iron rod of about 0.5 cm diameter and 45 to 60 cm length is driven into the trunk at a height of about 1.5 m from the ground. A reduction in the vegetative growth of the tree, bearing fruit the following season are resulted. This practice probably helps in two ways: (a) as the heavy black soil of this region is deficient in iron, it may help in rectifying the deficiency, (b) because the soil nitrogen content is very high, the land is highly fertile and any tree grows vigorously if optimum moisture is provided (Valsad, Gujarat).	Dudha (1995)
86	Promotion of growth of fruit trees	Dead animals like cats, dogs are buried around the roots of fruit trees as it is said to promote the growth of fruit trees (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
87	Control of flower dropping of vegetable crops	Two kg of <i>neem</i> seed are ground well and diluted with water and then filtered. To this filtrate 10 kg of fresh cowdung is mixed thoroughly. This is sufficient for spraying on one acre of land by adding required quantity of water to stop flower dropping (Dharmapuri, Tamil Nadu).	Gounder (2000)
88	Improvement of quality of fruits of ber	Residue of clusterbean (<i>Cyamopsis tetragonoloba</i>) is incorporated into soil around the 'ber' (<i>Zizyphus</i> spp) tree to improve the quality of fruit (Mahesana, Gujarat).	Patel (1993b)
89	Spraying of ash dust in cucurbits and other vegetable crops for supply of potassium and pest control	Dusting of ash in the fields enhances the early maturity of cucurbits and vegetable crops due to sufficient quantity of P in ash is available to the plants. Ash dust also repels the insect pests of the cucurbits and improves soil structure and fertility (Cold deserts of the western Himalayas).	Verma (1998)
90	Induction of flowering in jack fruit and papaya by nailing	Nailing sterile jack/papaya trees induces flowering and fruiting as iron induces flowering (Karnataka).	Anonymous (1999c)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
91	Control of dropping of immature nuts of coconut	To overcome this problem, a trench of 1-1.5 feet deep is dug at a distance of about 4 feet from the tree. The trench is filled with 5 kg. <i>Neem</i> leaves and 25 kg green leaf manure and is covered with soil. This is watered regularly for 3 months. As a result, dropping of tender and immature fruits stops and size of the nuts increases. Application of lime on the trunk up to 6 feet from the base oozing (Hasan, Karnataka).	Santheshivara (2000)
92	Use of fuelwood ash as manure in bulb crops	Fuelwood ash is used as manure in bulb crops like garlic, ginger, turmeric, onion, etc. The fuelwood ash contains Potassium (K) which improves the yield of bulb crops, which require more potassium (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
93	Aloe prevents fruit rotting in brinjal	Vegetable crops like brinjal are affected by disease which leads to rotting of the fruit. Ultimately the plant dries up. In order to prevent the infestation, ' <i>kunwarpatha</i> ' (<i>Aloe vera</i>) is used. A solution is made of one litre water and eight crushed leaves of <i>Aloe</i> . It is then sprayed on the crop which is infested. This is believed to be effective remedy for preventing rotting of fruits and does not have any side effects (Junagadh, Gujarat).	Chudasama (1999)
94	Fig triggers growth	Fig fruits are used as growth accelerators. The extract of fig fruits is taken in water and is left over a week. The solution is then sprayed on plants. Basavaraju found that spraying of this solution increases the growth of plant (Karnataka).	Basavaraju and Santheshivara (1998b)
95	Enhancing growth of <i>neem</i>	One palmful of <i>khakhro</i> (<i>Butea monosperma</i>) flowers is soaked in a bucketful of water for 3-4 hours. The flowers are then removed from the bucket and juice is squeezed. The solution is applied in the plants every week. This treatment enhances the growth of the tree. When the <i>neem</i> tree was treated this way, it gained a height of 10 feet in a year (Banaskantha, Gujarat).	Sumara (2001)
96	Traditional apple plucking	It is done by climbing an apple tree with putting a small basket around the neck of gunny bag cloth. This prevents damage to fruits. Plucked apples are transferred to big basket (<i>kilta</i>) which is also provided with a rough cloth cushion. In this way apples are carried to the store room for grading (Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
97	Plant protection by Grind 7 kg of <i>Vitex negundo</i> , <i>Ipomea fistulosa</i> and extract of common vegetation	<i>Pongamia pinnata</i> each with 4 kg of <i>Calatropis procera</i> and boil in 20 litres of water for half an hour. Next day, filter the solution then dilute this solution with 100 litres of water and spray to control pest.	Anonymous (2000e)
98	Indigenous harvesting of onions	Rolling an empty drum of about 10 in onion field 10-15 days before harvesting facilitates stalk removal by physical breaking of leaves from the bulbs (Karnataka).	Anonymous (1999c)
99	Apricot drying on the trees	Apricots are harvested and allowed to dry on tree itself. Due to very low relative humidity they dry well on the tree. The dried product is of excellent quality not obtained even after modern techniques of drying. These tree dried fruits cost more (Nalling, Nako, Pooh of Himachal Pradesh).	Verma (1998)
100	Storage of apples in underground pits	The apples are stored in underground pits, prior to the onset of winter. Apples are packed into wooden boxes which are then placed in underground pits and the mouth of pits is covered with thatch and soil. This way apples can be stored up to summer time without any appreciable loss in quality. A pitcher or wooden box placed in a pit creates a cool store (Lahaul and Spiti, Himachal Pradesh).	Verma (1998)
101	Storage of fruits and vegetables by sundrying	Apricot, wild apricot, apple and local grapes are sundried on roof tops. After 10-15 days of drying the fruits are collected and packed into gunny bags for subsequent use. Except for uneven slicing of apples with iron sickles ' <i>Drati</i> or <i>Drat</i> ', no pretreatment is administered to any crop. Open sundrying of tomato, cabbage, turnip, mustard leaves is practised in Kinnaur and other adjoining areas. After making four incisions on tomato, slicing of turnip, cabbage and sarson leaves are placed in open sun for drying. After 15-20 days of continuous drying, dried products are collected and used in lean seasons. (Shimla, Sirmour, Kullu and Chamba of Himachal Pradesh).	Verma,(1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
102	Enhancement of shelf-life of onions	Bunching of local small onion and hanging to the roof enhances shelf-life as hanging prevents rodent damage and the higher temperature and air circulation near the roof has a curing effect (Karnataka).	Anonymous (1999c)
103	Ripening of banana	Bananas are kept in a big earthen vessel, along with paddy straw. The mouth of the vessel is covered with another small earthen pot. Burning coal is placed on the earthen pot. The heat is believed to help uniform and early ripening of bananas (Raichur, Karnataka).	Gowder (1998)
104	Ascertaining taste of ridge gourd	If there are an even number of raised ridges on the skin of the ridge gourd, it is likely to be sweet and if there are an odd number of raised ridges, the ridge gourd is likely to be bitter. This method is used for ascertaining the taste of gourd for the last 50 years (Amreli, Gujarat).	Bhadabhi (1998)
105	Drying of unripe mango slices	The mature unripe mango slices are placed in bamboo baskets and kept for open sundrying. The dried product called ' <i>Bukarian</i> ' is stored in earthen pots and is used as an acidulant (Lower areas of Himachal Pradesh).	Verma (1998)
106	Ripen of mangoes uniformly with onion	Farmers collect ripe mangoes and keep in ordinary store room for ripening as well as for preservation. They purchase used empty tea crates and put approximately 200 kg mangoes in one box along with 8-10 bulbs of onion. The onion bulbs are spread randomly inside the box, while <i>neem</i> leaves are layered on the top of the box. According to those who use this method, the onion helps in uniform ripening of the mangoes while the bitter smell of neem leaves protects them from storage insect pests (Bhavnagar, Gujarat).	Gohel (1994)
107	Prevention of sprouting in garlic	10 kg of wet garlic is mixed with 2 kg of finger millet in a clean empty vessel to prevent sprouting of garlic. Finger millet is used because it has the capacity to absorb moisture (Pondicherry).	Ganeshan (2000-2001b)
108	Soil burning (sudu mannu) to raise vegetable nursery	Soil burning is done to reduce damping off of seedlings and the weed population that sterilizes the soil and has a priming effect. (Hilly and the soil and has a priming effect (Hilly and coastal zone of Karnataka).	Anonymous (1999c)

HORTICULTURAL CROPS

S. No.	Title of ITK	Details of ITK and rationale	Reference
109	Horticultural production practices of tribals of eastern ghat region of Orissa	Some of the ITKs documented include: preservation of horticultural biodiversity by replenishing the harvested produce as in case of tuber crops, preservation and conservation of fruit crops and forest areas due to religious reasons; mulching in turmeric, long-term fruit and vegetable preservation by drying; use of mango kernel as a starch rich food in times of scarcity and the use of cowdung as an effective defence against cattle, control of cuscute in niger (Orissa).	Rath <i>et al.</i> (2002)
110	Maintenance of microclimate in silkworm rearing	For creating microclimate in silk worm rearing, farmers hang wet gunny cloths around the rearing room to cool the air that come inside the rearing room. Earthen pots filled with water also serve the same purpose. To combat the intense sun, roof of the rearing house is covered with either sugarcane trash or eucalyptus branches or coconut fronds. An innovative farmer of Maillur village Mr. Munilakkappa, fixed thermocoal sheets to inner walls and ceiling of rearing room which served as a good insulator. Spreading waste fresh leaves (ripe, soiled and other mulberry wastes) on the floor helps in regulating temperature in the rearing room. Raising finger millet/ minor millet nursery on wet sand beds below the rearing stand also reduce the temperature in the rearing room especially in summer season. Farmers take enough care, while building the rearing houses to manage the optimum rearing conditions. A series of small holes are provided at the base of the walls of the rearing house to push out hot air and other bad gases. Construction of more number of small windows than having less number of big windows in the rearing room helps to regulate the temperature and relative humidity according to the stage of silkworm growth and season. In addition, if rearing house is small, regulation of temperature and relative humidity is easy. If walls are constructed with cement hollow bricks, the air pocket inside the hollow bricks acts as an insulator (Kolar, Karnataka).	Chinnaswamy <i>et al.</i> (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
111	Indigenous and improved methods for the controlling of wilt in brinjal (<i>Solanum melongena</i>)	An experiment was carried out during 1995, 1996 and 1997 to evaluate the efficacy and validate the ITK, ie. application of turmeric powder in combination with hing (<i>Asafoetida</i>) in controlling wilt in brinjal cv. <i>Pusa Kranti</i> . Soil drenching and spraying of turmeric in combination with hing @ 1g and 0.1g respectively/litre of water considerably reduced the infestation of wilt and significantly increased fruit yield over control in all the years. Three years mean data showed an optimum fruit yield of 182.0 q/ha with only 23.6% wilt in comparison to 81.6% wilt and 62.9 q/ha yield in control. As such an increased yield of 189.3% was obtained over control due to application of this ITK. Seedling root dip in turmeric and hing solution was also found very effective where a yield of 169.5 q/ha was recorded with a moderate 35.6% wilted plants during 1997. However, the recommended practice of soil drenching and spraying of 100ppm streptomycin with 3 g of copper oxychloride/litre of water was found to be most effective. But it was a costly proposition to the rural resource poor farmers (Orissa).	Mohnaty <i>et al.</i> (2002)
112	Efficacy of <i>Ranbeli</i> (<i>Feronia hyperthusa</i>) bark extract in control of shoot and fruit-borer in brinjal	A two-year study conducted in the farmers' fields of the adopted village of KVK Koraput during 1999 and 2000 showed that spraying of <i>Ranbeli</i> (<i>Feronia hyperthusa</i>) bark extract at growth and fruiting stage @ 12.5 kg bark soaked in 50 litres of water for 24 hours and diluted to 500 litres/ha (farmers practice) reduced the borer incidence up to 15% and produced 160 q/ha yield as against 195 q/ha obtained from the recommended practice of chemical method of control of fruit and shoot borer in brinjal. Spraying of Endosulphan @ 0.2 % concentration during growth stage followed by spraying of <i>Ranbeli</i> bark extract at fruiting stage produced as much as 180 q/ha yield with 30% increase over the farmers practice with the highest return per rupee spent (Rs 8.6). Although chemical method of pest control produced the highest yield of 195 q/ha but return per rupee spent was less (Rs 4.03). <i>Ranbeli</i> plant is easily available to the tribal farmers as they are abundantly found in the local region (Koraput, Orissa).	Dixit <i>et al.</i> (2002)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Control of diarrhoea by leaves of <i>Strychnos potatorum</i>	Approximately 100 g leaves of kantas (<i>Strychnos potatorum</i>) are crushed and soaked in water. This mixture is fed for 3 days to the ailing animals (Dahod, Gujarat).	Sitaram (1997)
2	Control of diarrhoea	A mixture of asul (<i>Ventilago denticulata</i>) roots and jamun (<i>Syzygium cumini</i>) bark is crushed and given with water to the suffering animal. Cure can be expected within 2-3 days. Asul is a creeper found in hedge rows throughout the year and jamun is a common tree (Bori, Shahera).	Dalsukhbhai (1993)
3	Decoction of <i>Soymida febrifuga</i> for diarrhoea remedy	Fresh leaves of royan (<i>Soymida febrifuga</i>) are crushed and soaked in water for 1 hr and this concoction 100-150 ml is given to the animal. The animal gets relieved in 24 hr. This remedy has a long history in this region (Shahera, Gujarat).	Dalsukhbhai (1993)
4	Treatment of diarrhoea with <i>Ficus hispida</i>	Roots of Dedhumari (<i>Ficus hispida</i>) are crushed after washing, soaked in water for 1 hr and filtered through cloth. Between 100 and 200 g of the filtrate is administered to the animal. The treatment takes effect in a day and completely cured in about 2-3 days. Many farmers use this method at times, they do consult veterinary experts (Panchmahal, Gujarat).	Baria (1993)
5	Control of diarrhoea by mixture of bark of umra and banana plant	To treat diarrhoea during the monsoon, bark of umra and sap of banana (<i>Musa Paradisiaca</i>) plant are used. Approximately 500 g bark of umra is pounded. Approximately 500 ml juice from stem of banana is added in the pounded bark of umra. The mixture is then filtered and the filtrate given to affected animal. One hour after the treatment the animal is fed with 250 ml of groundnut oil. The animal is cured within a day or two (Valsad, Gujarat).	Patel (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
6	Treatment of diarrhoea in cattle	The flowers and fruits of Vazhai (<i>Musa ×Paradisiaca</i>), an erect tree-like herb are crushed and made into a paste with dry ginger, pepper, black myrobalan, nut meg and karanda. This is given orally to cattles in forms of severe diarrhoea (Tamil Nadu).	Ranjan and Sethuraman (1997)
7	Treatment for rathakalichal (blood tinged diarrhoea)	Blood tinged loose motion can be noticed in the affected animal. For this leaf of Kombampalai (<i>Holarrhena antidysentrica</i>) 200 g are ground well and diluted with 500 ml of water, one lime fruit Juice is added and the whole mixture is administered to the animal three times a day. <i>Holarrhena antidysentrica</i> acts as a stomachic, purgative, liver stimulant, anti-dysentric and wormicidal.	Anonymous (2000-2001f)
8	Medicinal uses of eletteria cardamom	Roots and seeds of elaichi (<i>Elettaria cardamom</i>) contain essential oil, terpeniol, terpinine, lemonine, linalnool acetate and are used in cambodian medicine, root and fruit as laxative, tonic and given in diseases of liver and uterus (Gujarat).	Parabia et al. (2000)
9	Use of Nagod to control diarrhoea	To control diarrhoea, approximately 200-250 g of leaves of nagod (<i>Vitex negundo</i>) are fed to the animal with normal feeds for two or three days. Though the plant of nagod grows as wild shrub in hedges in this region, only a few people from the village know about this use. The nagod plant bears small white flowers throughout the year (Valsad, Gujarat).	Bhimsen (1995)
10	Control of diarrhoea in cattle by kodra	About 10 kg, of boiled kodra (<i>Paspalum scrobiculatum</i>) grain (one type of coarse millet) to the suffering animal. Kodra grain contains mainly carbohydrates which is easily digestible and act as a balanced diet. It maintains the vitality of animal (Sutaria).	Rathod (1992)
11	Treatment of diarrhoea by barley	Boiled barley (<i>Hordeum vulgare</i>) or kondo (<i>Paspalum scrobiculatum</i>) is given to suffering animal (Eastern Uttar Pradesh).	Gupta (1993)
12	Treatment of diarrhoea with sihor	Leaves of sihor (<i>Strebilus asper</i>) are fed to suffering animal (Eastern Uttar Pradesh).	Gupta (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
13	Control of diarrhoea with seeds of tamarind	Powder of the seed of tamarind (<i>Tamarindus indica</i>) is used cattle of diarrhoea in cattle. A fine powder of 500 g of tamarind seeds is mixed with half the quantity of water and fed to the cattle. The mixture is administered for five or six days. This practice has been followed for generations with very good results (Kheda, Gujarat).	Vankar (1998)
14	Control of diarrhoea with black soyabean	Black soybean is grinded and mixed with water. It is given to the animals suffering from diarrhoea for two to three days. The mixture of black soyabean flour and ragi flour in water is also fed to the animal (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
15	Cure for diarrhoea with salt	Administering handful salt in 4 litres of water or handful of salt mixed in cattle feed restores electrolyte imbalance and stops diarrhoea (Karnataka).	Anonymous (1999c)
16	Cutting of edge of tail to control diarrhoea	A very strange practice has been noticed to control diarrhoea. The lower edge of the animal's tail is cut by a sharp knife and the out portion is immersed in previously boiled edible oil (This method is not an effective treatment for Diarrhoea moreover, cruelty towards animals: TCL). The role of branding and acupuncture is being investigated recently. All aspects of this practice including cruelty vis-a-vis the death hazard through diarrhoea will be investigated carefully (Canhela, Gujarat).	Bavabhai (1992a)
17	Control of diarrhoea with methi	Fifty grams of fenugreek seed (<i>Trigonella foenum-graecum</i>) are soaked overnight and pounded with one coconut flower bunch (Thennampalai) and ten unripened coconut are fed to the cattle. After a little while regular feed may be given. This treatment generally cures diarrhoea with one dose. If it does not, then the dosage may be repeated on the second day (Nagapattinam, Tamil Nadu).	Somu (1998)
18	Herbal treatment of dysentery and diarrhoea	Feeding of <i>Leucas lanata</i> (Safeda) and bamboo leaves cures diarrhoea. Also feeding 200 g of <i>Cissampelos pareira</i> (Batauva) in maize husk cures diarrhoea and dysentery (Mid hills region of Himachal Pradesh).	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
19	Cure for dysentery in cattle	For treating dysentery a red hot iron is brought near the nose of the animals because it probably stimulates the defense mechanism that is involuntary contraction of gastrointestinal musculature which in turn may relieve constipation which is known to be the major cause of dysentery (Ladakh, Jammu and Kashmir).	Verma (1998)
20	Treatment for dysentery in cattle	Burning Jawanlari grass along with black cloth and mixing the ash with oil is fed to cows afflicted by dysentery. This grass is dried and stored for winter months (Lahaul valley, Himachal Pradesh).	Verma (1998)
21	Treatment of dysentery with common salt	A handful of common salt is given to the cattle along with the normal food. It can also be dissolved in four litres of water and fed to the ailing animal (Shimoga, Karnataka).	Sankaranar ayana (1998)
22	Control of foot and mouth disease in cattle	It is common bovine disease prevalent mostly during the monsoon. If infection is limited to feet only, animal becomes lame. However, it is more common for the animal to get infected in both mouth and hooves. Such animal also stops eating. Milch animal reduces its milk output by 60 to 70 %. And if it continues for about 10 to 12 days, it is difficult to regain its milk production. Small farmers and landless labour who keep only two or three milking animals as source of income gets affected severely. The leaves juice of kidamari (<i>Aristolochia braeteolata</i>) is used to cure this disease. It is applied on the infected hooves. This treatment is followed twice a day till animal gets relief. Kidamari is a small shrub which grows wild in common lands. Its name is in itself indicative of its toxic nature (kida means worm or insect and mari means killer). Farmers use the plant for controlling various field and storage insect pests. It is found commonly in the dry regions of Surendranagar and Bhavnagar districts of Saurashtra. The farmers believe that the bitter taste of leaf juice is responsible for killing the pathogens. Most of the people know about this property of the plant. However, its use varies from region to region (Bhavnagar, Gujarat).	Sambad (1995)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
23	Control of FMD by alum	Fifty gram alum is dissolved in 500 ml water and boiled. This solution is used for washing affected parts till the animals start rumination and feeding. Sometimes, after washing powder of alum is filled in the wound also (Eastern Uttar Pradesh).	Gupta (1993)
24	Prophylactic measure against foot and mouth disease by applying Geru	Geru is applied on the hornes of all the animals the herd. It protects the animals from the spread of the disease (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
25	Treatment of FMD by smoke of hooves	Scrappings of hooves of horses are burnt to smoke close to the nostrils of the animals. The disease is cured in short time (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
26	Control of FMD by banlila leaves	A paste is made from 100 g chopped and well pounded leaves of banlila and applied on the ulcers and blisters regularly about for a week (Eastern Uttar Pradesh).	Gupta (1993)
27	Control of FMD by kusum seeds	Powder of kusum seed (<i>Schleichera oliosa</i>) is placed on the ulcers of hooves till it get cured (Eastern Uttar Pradesh).	Gupta (1993)
28	Prophylactic measure against FMD by feeding of eggs of spider to the animals	The farmers feed the eggs of spider with the flower of ragi to the animals. This protects them from the spread of FMD disease (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
29	Control of FMD by terminalia ballirica	The powder of 50g harre (<i>Terminalia chebule</i>) and equal amount af bahera (<i>Terminalia ballirica</i>) is mixed with 250 ml. water. After boiling, this solution is used for washing the affected parts of mouth and hooves twice a day till it heels (Eastern Uttar Pradesh).	Gupta (1993)
30	Control of FMD by ziziphus mauritiana	100 g of well grinded fruits of Vanberi (<i>Ziziphus mauritiana</i>) along with 250 ml water is given twice a day till it cures (Eastern Uttar Pradesh).	Gupta (1993)
31	Control of FMD by mixture of jaggery	Affected parts of hooves are washed with warm water and filled with a mixture made of Jaggery and lime (50g) and lime (50g), once aday for 7 days (Eastern Uttar Pradesh).	Gupta (1993)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
32	Treatment of mouth infection by roots of vacha	A 50 ml paste prepared with fresh roots of vacha cures the infectious conditions of mouth in animals.	Kumar (2000-2001)
33	Treatment for FMD by mixture of Clerodendrum phlomides	About 50 to 100 g leaves of arni (Clerodendrum phlomides) and 10 g leaves of tobacco are ground and the paste is applied on the hooves of affected animals twice a day for three days. This prevents the secondary bacterial infection (Sabarkantha, Gujarat).	Bhanbhai (2001)
34	Treatment for FMD by pulp of Aegle marmelos fruits and crushed leaves of Annona squamosa	Fruit pulp of three to four bili (Aegle marmelos) fruits is applied on the hooves of the animal twice a day for two days. Sitafali (Annona squamosa) leaves can also be used as an alternative. Juice from 200 g crushed leaves of Sitafali is applied on hooves of the animals twice a day for three days (Bharuch, Gujarat).	Vasava (2000-2001b)
35	Control of FMD by smoke of burning fishes	Fish is collected from the near by water stream or pond and placed on the burning coal near the cattle shed to control of FMD. The smoke which comes out from the fish is blown towards cattle head. It is believed that this practice protects the animal against the FMD disease (Choryana Muvada).	Prajapati (1992)
36	Control of FMD by phenyl and kerosene oil	Affected parts are washed with phenyl and kerosene oil cures ulcers easily (Eastern Uttar Pradesh).	Gupta (1993)
37	Control of FMD by washing with water boiled with neem leaves	.Wound is washed with water boiled with neem leaves regularly for 7-8 days, healing takes place very soon (Eastern Uttar Pradesh).	Gupta (1993)
38	Control of FMD by pounded leaves	Healing of wound is faster if well pounded leaves of chakawar (Cassia tora), khaira (Acacia catechu), karonda (Corise corondas) and kusum (Chechera olosa)is applied on the affected part (Eastern Uttar Pradesh).	Gupta (1993)
39	Foot and mouth disease	Collect spines of dead hedgehog (Hemichinus auritus), a small insectivorous animal having a spiny body cover.Expose animals suffering from FMD to the smoke of these spines. (Bhavnagar, Gujarat)	Khatana (1997d)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
40	Control of FMD by using outer cover of the hooves of horses	Farmers fumigate the outer cover of the horses' hoof and keep it near the mouth of the animal Gandhinagar, Gujarat).	Thakor (1993)
41	Control of FMD	Farmers of Bharuch district of South Gujarat have devised a unique method to fight this disease: They pierce hole in the bottom of an empty water pot (mud pot) and it is filled with bark of the sesam (<i>Dalbergia sissoo</i>) tree. A small pit is then dug on the farm where the mud pot can fit in. A small hole (just big enough for a mug to fit in) is made at the center of this pit. The water pot is then filled with water and placed in the pit in such a way that half of it remains outside the pit. Before this, a mug is placed in the hole at the centre of the pit. Then dried cowdung cakes are arranged around the pot and burnt. This results in formation of a black fluid which drains out into the mug from the hole at the bottom of the pot. This fluid is used to wash the wounds of the animal and helps to heal them in six to seven days (Bharuch, Gujarat).	Vasava (1997b)
42	Control of FMD	Firstly, the hooves of animal is washed with warm salt solution. The ash which is prepared by burning old leather (shoes) is sieved through cotton cloth, mixed with approximately equal amount of groundnut or sesame oil and is applied on the affected hooves everyday till it heals (Sanjnasara).	Boliya (1992)
43	Control of FMD	Farmers pick up the new growing branches or primordial of karanj (<i>Pongamia pinnata</i>) to cure FMD disease. It is a common perennial tree which prefers medium black to sandy loam soil. Approximately, 50 ml juice is extracted from the collected primordial leaves and spread over the infected hooves of the animal. This practice is followed twice in a day for 4-5 days. People advise not to use the older primordial because there are chances of increase in the severity of disease by using them (Kanjari).	Makwana (1992)

S. No.	Title of ITK	Details of ITK and rationale	Reference
44	Fruits of kosam for treatment of foot and mouth disease	Fruit of kosam (<i>Schleichera oleos</i>) a tree during rainy season from the forest. Kosam is a local tree found in abundance in natural forests of this area. It bears fruit in Monsoon season. However, it has a problem of alternative bearing. Leaves are greenish and broad, and are used in making the roof of the hut. Collected fruit are heated in the open fire till bubbles of oil come out of it. Only a little quantity of oil can be collected from each fruit. Oil of kosam is used to cure the FMD in animals. Approximately 50-100 ml kosam oil is applied on the hooves and inside the infected mouth, food and water is to be stopped strictly for 1 to 2 hrs. Due to this treatment about 70% recovery can be achieved within 2-3 days. However, it takes about one week for getting complete relief (Ghodimal).	Sonubhai (1992)
45	Cure for FMD	To cure an animal of foot and mouth disease, a paste of the leaves of sadad (<i>Terminalia crenulata</i>) is made and applied on the affected area. This cures the animal (Banaskantha, Gujarat).	Damor (1999)
46	Leaf extract of <i>Aristolochia bracteolata</i> and <i>Annona squamosa</i> for treatment of foot and mouth disease	Fresh leaves of kidamari (<i>Aristolochia bracteolata</i>) and sitaphal (<i>Annona squamosa</i>) are taken in equal proportion and crushed together to make semi-liquid paste. This paste is applied to the infected hooves, and reportedly cures the disease within three days. There are no-ill side-effects. This practice has been used for years (The custard apple leaves contains hydrocyanide (HCN) which might be toxic for the virus) (Krishnapuri, Talaja).	Somabhai (1993)
47	Hot sand and <i>Azadirachta indica</i> for treatment of foot mouth disease	The infected animal is taken to a riverbed and forced to walk on hot sand. Then a decoction of and neem (<i>Azadirachta indica</i>) leaves is poured on to the hooves. A piece of cotton cloth is sometimes placed over the treated part to reduce evaporation of the neem extract (Dugsar, Muli).	Bhaguanbhai (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
48	Fruits of Diospyros cordifolia for control of foot and mouth disease	People collect 2-3 fruits of dheka (<i>Diospyros cordifolia</i>) tree and keep it in warm ash of Chulah to heat it. Hot fruits are crushed and allowed to cool slightly. Thereafter, it is pasted on the infected hooves of the animal. This practice is followed for 3-4 days, i.e. till the animal recovered. <i>Diospyros cordifolia</i> is a perennial bushy shrub which bears spine. Unripe fruit has green colour which turns into yellow at ripening stage and slowly becomes black at post- ripening stage. It bears flowers in summer season and fruits in early monsoon (June-July) season.	Keshabhai (1992)
49	Intestinal parasites	It is believed that because of excessive feeding, very young calves get infected with an internal parasite called karamiya. The infected calf stops eating and if not treated promptly, it may die within 10-15 days. The following two treatments are given to the infected calf. (a) Buttermilk and salt: Approximately 50 g of salt is dissolved in 500 ml of buttermilk and given to the calf to get it rid of intestinal parasites. A regular dose of the treatment for a week cures the calf. This practice has been in use for ages without any modification. It is very widely used in this region. (b) 'Rati Bhindi' or 'sesame': To expel intestinal worms, calves are fed with leaves of 'rati bhindi' or sesame. To cure the same in bullock, 250 g white onion is fed for a week, along with 'rati bhindi' or sesame (Sabarkantha, Gujarat).	Chauhan (1994a and 1994b)
50	Castor oil for control of intestinal parasites	Castor oil, 50-70 g is fed to the animal successively for three to four days. After this treatment the faeces become loose and parasites are expelled (Baroda, Gujarat).	Deepsingh (1992)
51	Prevention of indigestion	This problem is commonly found in young calves. About half litre of castor oil is fed to calves so that the calves are made to pass the motion to clear their stomach. One hundred grams of rock salt, dry ginger powder, powder of <i>Andrographis paniculata</i> are mixed together and stored in bottle. This mixture is fed to the animal at regular intervals. Powdered ginger and pepper mixed with water is fed to the animal (Bangalore, Karnataka).	Bhagya (1999)

S. No.	Title of ITK	Details of ITK and rationale	Reference
52	Millipede for mastitis	Most of the time, cows suffer from mastitis due to lack of hygiene. The infection also spreads, while milking with dirty hands. The farmers have a very unique solution to cure mastitis. During monsoon, the millipedes are found in plenty. These millipedes are dried and pounded. They are then made into a paste and applied on affected udders. The farmers believe that this decreases the swelling in the udders (Himachal Pradesh).	Chowdhary and Dass (1999)
53	Vitex negundo to treat mastitis	To treat mastitis roots of nagod (<i>V. negundo</i>) are used. About 100 ml of juice is extracted by grinding root or bark of nagod. The extracted juice is diluted with water and applied twice a day for four days on the sore of the udder (Bharuch, Gujarat).	Vasava (2000-2001a)
54	Treatment of scratches on udder by ash of coconut	After washing the udder with alum water, a paste of crushed leaves of tont (<i>Pysalis minia</i>) is placed on udder and paste is replaced once in day. This practice is done for 2 days (Eastern Uttar Pradesh).	Patel (1994e)
55	Treatment of tunka (a type of mastitis) by <i>Pysalis minia</i>	Sterile flowers of mango (<i>Mangifera indica</i>) are grinded and pasted around the udder with a little addition of common salt (Eastern Uttar Pradesh).	Gupta (1993)
56	Treatment of tunka (a type of mastitis) by sterile mango flowers	Sterile flowers of mango (<i>Mangifera indica</i>) are grinded and pasted around the udder with a little addition of common salt (Eastern Uttar Pradesh).	Gupta (1993)
57	Treatment for swelling of the udder smearing juice of Nakti	Any cattle particularly cows or buffaloes when affected with mastitis show a remarkable (Mastitis) by decrease in milk production. The production of milk decreases by about 30%. This bacterial disease is usually caused due to any injury on the teats. The teats and udder are hardened, swollen and feel hot to touch especially while milking. On milking, a sticky watery fluid or pus comes out. Effective treatment for such a disease is using the root or bark of nakti. Approximately 100 ml of juice is extracted out. This is smeared on the affected area twice a day for four days. This treatment gives relief to the cattle (Bharuch, Gujarat).	Vasava (1999)

S. No.	Title of ITK	Details of ITK and rationale	Reference
58	Treatment of mastitis and bites by soil of termite burrows	Mastitis, bites of poisonous creatures, mechanical injury and improper milking may cause swelling udder. Farmers collect about 200 g soil from the termite burrows and boil it in water. The boiled suspension is given to the animal. This treatment gives relief within 24 hrs. Farmers say that soil collected in rainy season is not so effective, hence they do not use this practice in monsoon, (may be the substance that effects the cure gets washed off in rain water) (Sabarkantha, Gujarat).	Dhulabhai (1993)
59	Sesame oil for hairy tail	Animals sometimes lose hair on their tail due to excessive cold or some skin problems. Some farmers use sesame oil to prevent this. The oil is boiled till it becomes red in colour. It is allowed to cool and the animal's tail is dipped into it. If it is applied for two to three times a day for a month, the animal regains its hair (Jhalore, Gujarat).	Vasnoi (1997)
60	Curing mastitis by mulberry	Mastitis is believed to cause about 30% decrease in milk production of milch cows. This disease is usually caused by some injury in the udders. The area around the udders and teats remain swollen and becomes hard. This causes a lot of pain to the cow. Juice extracted out of 100-120 g of mulberry (<i>Morus alba</i>) leaves is applied on the affected region. This is continued for three days. By doing so the swelling recedes in a week time (Sabarkantha, Gujarat).	Patel (1999a)
61	Treatment of tunka (a type of mastitis) by meur	Boiled decoction of meur is applied to wash the affected udder for 2-3 days (Eastern Uttar Pradesh).	Gupta (1993)
62	Control of mastitis by feeding the animals banana stuffed with camphor	Blood comes out along with milk while milking the animal. The disease is locally called saralvu. One of the reasons of the disease is injury to the udder. If primary treatment is not provided, the animal's ability to give milk may be impaired forever resulting in a tumour or mastitis. To treat this, one pellet of camphor is inserted in a fruit of banana and fed to the infected animal. This treatment is repeated twice a day, in the morning and evening for 3-4 days. Some farmers use to feed alum for the same purpose. Arjun (<i>Terminalia arjuna</i>) tree leaves can also be helpful (Mahesana, Gujarat).	Rabari (1996)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
63	Treatment of thanali (mastitis) by paste of eurginea indica leaves	A paste made of tirturating the leaves of van piyaji (<i>Eurginea indica</i>) and is pasted on udder regularly for 3 successive days (Eastern Uttar Pradesh).	Gupta (1993)
64	Treating eye injuries with Capparis sepiaria and <i>Salvadora persica</i>	Three to four small salt cubes along with three to four leaves of kanther (<i>Capparis sepiaria</i>) and piludi (<i>Salvadora persica</i>), are chewed and spit on the eyes of the animal. Repeating the treatment two to three times reduces watering in the eyes and relieves the pain to a large extent (Ahmedabad).	Bharwad (1998)
65	Curing eye ailment with <i>Balantes aegyptica</i>	Whenever cattles are injured in the eye, there are chances of getting a scare in the eye. This injury causes the watery eyes and reddish dot like scar appears in the sclera region of the eye. If not treated at the earliest the cattles may even go blind. The bark of angoria (<i>Balantes aegyptica</i>). Tree bark is rubbed on stone with little water. The paste obtained is applied in the injured eye of the animal with the finger. This treatment is repeated twice a day on two days interval for ten days. The scar formed in sclera region disappears. This type of treatment is being followed for over 30 years (Banaskantha, Gujarat).	Rabari (1999)
66	Treatment of cataracts (eye infection) in cattle by spitting of chewed betel leaves	In the treatment of cataracts, the person tending the cattle will often chew a mouthful of betel leaves and then spit directly into the animal's eye. This treatment is given in the morning, and repeated on three consecutive days (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
67	Treatment of eye cojunctivitis by leaf extract of cephalotes	Leaf extract of goom (<i>Leucas cephalotes</i>) is mixed with lac powder, 3-4 drops of this solution is poured in eyes of animal, until animal gets cured (Eastern Uttar Pradesh)	Gupta (1993)
68	A natural analgesic to cure pain in eyes, head and stomach	Preparations from the leaves of vanan or nirgandhi (<i>V. negundo</i>) are used as an analgesic to relieve pain in the eyes, head and stomach and to lessen swelling. The leaves can be mixed with jaggery and eaten to relieve stomachache, both in humans and animals. The smell of the crushed leaves is inhaled to cure headaches. The extract obtained by crushing the leaves is applied externally on the eyes to provide relief from pain and eye irritation. Moreover, the brew obtained by boiling the leaves in water and salt can	Sharma (1998)

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		be used as hot massage to give relief from pain and swelling due to mechanical injury (Una, Himachal Pradesh).	
69	Curing eye infection by leaves of <i>Coccinia indica</i>	The eyes of cattle suffering from eye diseases are treated with <i>Coccinia</i> leaf. Ten drops of koi (<i>Coccinia indica</i>) leaf extract applied to the eyes of the ailing animal gives relief within two days (Erode, Tamil Nadu).	Ramasamy (1998)
70	Treatment for eye sores in cattle by human saliva	Human saliva is used in the suffering eyes of the cattles for curing eye sores. This is the best treatment for eye sores. Human saliva is antiseptic in nature and has epidermal growth factor which initiates healing process (Lahaul valley, Himachal Pradesh).	Verma (1998)
71	Treatment of flatulence by seeds of <i>Cucumis sativus</i>	The seeds of kakdi (<i>Cucumis sativus</i>)—a creeper in the Cucurbitaceae, bears long fruits that are eaten as a table vegetable are pounded and then soaked in water for 2 hr. This preparation is given orally twice a day until the animal is cured. At least 50% relief can be expected within 4 to 5 hr following the first dose (Panchmahal, Gujarat).	Patel (1992c)
72	Treatment of flatulence	It is a common problem in cattles during monsoon and winter because their feed consists of excess green fodder. The common belief of farmers is that flatulence is caused by the small insects found on the grass which gets eaten along with the grass. The animal seems uneasy, restless and its bloated abdomen looks like a drum. To alleviate this condition, turmeric powder and salt are mixed together in equal quantities. A little water is added to the mixture to make a paste which is then rubbed on the affected animals back for about five to 10 minutes. Simultaneously, about 100 g ajmo (<i>Trachyspermum ammi</i>), four or five medium sized onions and one green or dry kothamadu (<i>Cucumis callosus</i>) are grounded thoroughly, mixed with two litres of buttermilk and administered to the animal through a nal (a tube like structure), This treatment gives relief to the animal within one hour. For calf, the proportion of ingredients will be half. This treatment is given only once. The farmers believe that the animal starts sweating under the influence of this treatment. The treatment has no side effect. Kothamadu (<i>Cucumis</i>	Panchal (1994)

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		callosus) is a creeper, which grows in the monsoon. It bears yellow flowers. Fruits form at the end of the monsoon. Some farmers broadcast seeds of kothamadu in the standing crop of bajra (pearl millet) so that its fruits can be harvested and stocked for future use. About 25% people of this village adopted this practice for many years (Kheda, Gujarat).	
73	Treatment for cholera and flatulence	When animals overfeed or drink contaminated water, they fall sick and suffer with cholera or other stomach disorders. They also lose their appetite and stop eating. Farmers try several ways to solve the problem. A few of them are mentioned here: (1)when animals stop passing stool and urine, they suffer from severe stomachache. In such case, they are fed boiled ginger. The animals get immediate relief. (2)sometimes animals experience uneasiness after feeding on green fodder contaminated with pesticides. Cattle owners administer tamarind water to animals for getting instant relief. (3)Animals suffer intense pain when they develop stones in their stomach. To treat this, the bark of jamun (<i>Eugenia jambolana</i>) is ground and fed to the sick animal. The stones are expelled along with the animals stool (Himachal Pradesh).	Lal (1998)
74	Treatment of fever in animals	Bark of Rayan (<i>Soymida febrifuga</i>) tree collected and powdered separately is given to animals along with water for 4-5 days continuously to cure the fever. (The action of <i>Somida febrifuga</i> tree's bark as antipyretic requires verification (Bhatkodu).	Bhagore (1992)
75	Tea, pepper and ginger for pyrexia	During the monsoon, cattles are often affected by fever. In such a condition, the cattles feels cold and starts shivering. The food intake of the cattles decreases considerably and passes yellow urine frequently. As a remedy to this fever, the following ingredients are used : tea leaves (<i>Camellia sinensis</i>), black pepper (<i>Piper nigrum</i>) and dry ginger (<i>Zingiber officinale</i>). Approximately 100 g dry tea leaves, 25 g powdered black pepper and 25 g dry ginger powder are dissolved in two glasses of water and boiled. After cooling, the solution is given to the cattle. This is given once a day for two days and the cattle is relieved of its fever. This has been used traditionally for many years and is used as a remedy for fever by over 80% percent of the farmers in this region (Surendranagar, Gujarat).	Gadhvi (1999)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
76	Indigenous treatment for fever and cold in animals	A hot soup made of zira and garlic is analgesic and antipyretic in nature which is fed to animals suffering from cold and fever. It improves digestion and thus protects body from common cold and fever (Lahaul valley, Himachal Pradesh).	Verma, (1998)
77	Treatment of fever/loosened teeth and pneumonia	The farmers give smoke of rice husk, cotton sack, black til or barley for the treatment of fever/loosened teeth and pneumonia (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
78	Treatment for fever	(i) To relieve body pains and fever 100 g dried root powder of vacha (<i>Acorus calamus</i>) mixed with 200 g of wheat flour is given orally twice a day to animals. This is a widely used practice in Changar area of Kangra District (Himachal Pradesh).	Kumar (2000-2001)
79	Curing fever, cough, anorexia and bloat	Three fistfuls of perumarundhu (<i>Aristolochia indica</i>) leaves along with roots, 15 g of dried ginger, 15 g of arisithippili (<i>Piper longum</i>), 15 g of omam (<i>Ptychotia jowan</i>) and 15 g of turmeric are pounded together and made into three boli. One boli may be given in the morning, another in the evening and the third the next morning. This treatment is believed to cure fever, cough, anorexia and bloat. Perumarundhu leaf has the property of detoxifying action (Krishnapuram Seruvaviduthi Post Pattukkottai, Tamil Nadu).	Balasundaram (1998)
80	Treatment of jaharbad (black quarter)	250 g bark of chilbil (<i>Holoptalea integrifolia</i>) is grinded and mixed in to water. This solution is given twice a day with the help of drench bottle made of bamboo (Eastern Uttar Pradesh).	Gupta (1993)
81	Treatment of simple fever	Bark of guruchehh (<i>Tinospora cardifolia</i>), neem, pipal (<i>Ficus religiosa</i>) and leaves of meur (<i>Vitex negundo</i>) including clove, harre and ajwain are taken and boiled in 3 litres of water for 1-2 hours and then cooled. The decoction is given thrice a day for 2-3 days (Eastern Uttar Pradesh).	Gupta (1993)
82	Black salt and jaggery cures tympany	When the cattle graze excessively on the tender green grass during the monsoon, the chances of its suffering from tympany increases. Due to gas formation, the stomach region appears swollen and the cattle has trouble in breathing. Because of this it also stops chewing the cud. A solution of 5 g hing (<i>Ferula asafoetida</i>), 25 g dry ginger, 100 g black salt, 50 g soova dana (<i>Anethum sowa</i>), 25 g ajma	Masani (1999)

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		(<i>Trachyspermum ammi</i>) and 500 g of jaggery is boiled along with one litre of water. The solution is boiled till the amount of water is reduced to half. After cooling the solution the animal is made to drink. This cures the animals within three hrs and the remedy is believed to be 100% effective (Amreli, Gujarat).	
83	Treatment of tympany/rumen bloat	Sometimes due to intake of leguminous fodders with high moisture content, lot of gases are produced in the rumen and abdomen. This condition is known as tympany. Feeding of gandhala (<i>Murraya koenigii</i>) and feeding of black pepper + kali jiri + gur + onion helps in the release of gases accumulated in the rumen (Mid hills of Himachal Pradesh).	Verma (1998)
84	Cure for aafara	Aafara (flatulence/tympany) causes distension of the left side of the abdomen. There is salivation from the mouth and motions are not discharged in a regular way. It is an acute problem and the animal needs to be relieved in a few hrs or there could be serious consequences. Pods of garmalo (<i>Cassia fistula</i>) and steam coal are used to cure animals of aafara. Around 200 g pods of garmalo and 100 g steam coal are mixed and pound to a fine powder. This is thoroughly mixed in water and filtered. The filtrate liquid is given to the animals once a day for two days. It will have loose motions then becomes stable (Sabarkantha, Gujarat).	Khaant (1999)
85	Control of anthrax	A viscous suspension is made in 100 ml lime water containng 50 g tilai bark/leaves, 50 g turmeric (<i>Curcuma longa</i>), 50 g grinded flowers of goom (<i>Leucus cephalotes</i>) and 25 g sarson grains (<i>Brassica compestris</i>). This suspension is given to the affected animals once a day till it cures. This takes about 3-4 days (Eastern Uttar Pradesh).	Gupta (1993)
86	Control of anthrax	A suspension consisting of 20 g turmeric (fresh or dry), 50 g onion (<i>Allium cepa</i>) and 100 ml lime water given orally with the help of dharati once a day for 3-4 days (Eastern Uttar Pradesh)	Gupta (1993)
87	Treatment of anaemic and weak animals	Fermented wheat flour or fermented banana is fed to the animals which are weak and anaemic (Kumaun hills, Uttar Pradesh)	Chander and Mukherjee (1994)

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88	Control of eczema disease in cattle by coal and ash	Fuelwood coal and ash which is generally used for washing the utensils is applied on the affected parts of the animal (Kumaun hills, Uttar Pradesh)	Chander and Mukherjee (1994)
89	Control of colic in horses	Tobacco smoke is given by closing one nostril so that horse could inhale maximum smoke quickly. This treats colic (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
90	Treatment of valo	The affected animals become docile and immobile as a result of this disease. Some farmers cure it by forcing the animal to stand or float in deep water. Another method is to startle the animal with a black cloth or with some noise so that it gets up and becomes active. In either case 200 g tea powder boiled in one liter water is given to the animal (Surendranagar, Gujarat).	Patel (1992e)
91	Curing valo disease by smoking	Valo is a common disease in cows and buffaloes in the monsoon. It is characterized by continuous salivation and the animal stops eating. To treat the affected animal, about 500 g to 700 g of salt is rubbed on the animal's back for about half an hour. Sawdust of sisam (<i>Dalbergia sisso</i>) wood and a gunny bag are put on burning coal in a container to produce a continuous stream of smoke. The animal is forced to inhale the smoke by keeping the container near its muzzle. This treatment shows effect within two days and the animal gets cured (Junagadh, Gujarat).	Ralu (1995)
92	To prevent prolapse of uterus	To prevent premature delivery in cattle, farmers give approximately one kg of castor oil to the animal in the morning, in three to four split doses, along with other feed. They prefer to give castor oil with jaggery after 3-4 months of pregnancy. Sometimes Kamachi locally available coloured clay used for painting is also mixed in water and given to the animal. Some farmers use it to paint the upper surface of the animals body to maintain optimum body heat. Most farmers follow all these practices at serious times according to the availability of resources and severity of the problem (Gandhinagar, Gujarat).	Chamar (1993)

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93	Treatment of rabies	Approximately 10 leaves of <i>Alotropis</i> spp and jaggery are fed to the animal . The animal calms down within an hour or so after this treatment. This treatment is believed to give good results if it is followed immediately after appearance of symptoms of the disease at an early stage. In advanced stages, chances of success are very rare. This is a fairly wellknown method of treatment (Kutch, Gujarat).	Jajeda (1993)
94	Herbal treatment for uterine disorder in animals	In cattle and buffaloes, uterus and vagina come out at the time of parturition. This problem can be cured by administering 250 g each of <i>Micromeria biflora</i> , <i>Helmis lanceolatus</i> and <i>Trichoderma indica</i> . Mixture of these herbs have antiseptic properties and cooling effect (Mid hill region of Himachal Pradesh).	Verma (1998)
95	Cure for snake bite	Leaves and roots of <i>Alternanthera sessilis</i> are mainly used which are rich in vitamin C, riboflavin, niacin, stigmasterol, B-sitosterol, iron, phosphorus and calcium, acts against snake bite, indigestion, galactagogue, choleagogue (Gujarat).	Parabia et al. (2000)
96	Treatment of aafara	Approximately 1 kg of bark of the Jamun (<i>Syzgium cumini</i>) tree is soaked in water until it becomes soft. Then it is crushed and soaked again. A filtrate of this is fed to the suffering animal. If bark of jamun is not available, 50g of drumstick seed (<i>Moringa pterygosperma</i>) with one litre water is used (Surendranagar, Gujarat).	Chanabhai (1992)
97	Filtrate of <i>Hordeum vulgare</i> dislocates stones in urinary tract	A filtrate of barley grain (<i>Hordeum vulgare</i>) boiled in water reportedly dislocates stones in the urinary channel (Vadodara, Gujarat).	Pratapsinh (1992)
98	Use of root extract of <i>Triumfetta rotundifolia</i> for treatment of yoke gall in bullocks	Root extract of jipta (<i>Triumfetta rotundifolia</i>) is applied on the neck twice in a day for three to four days successively. Jipta can be found growing in hedge rows all year long (Amreli, Gujarat).	Vaghjibhai (1992)

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99	Removal of tumour	Painful tumor of the size of beetle nuts or larger often appears on the neck. Leaves and fruits of dhatara (<i>Datura spp</i>) are pounded and mixed with jaggery (cooked and crystallized sugar can extract) and pasted over the tumour. After two or three applications the tumor usually bursts. Healing of the treated area, occurs slowly. Thus, precise localization of treatment is required (Indran, Bayad).	Mohanji (1993)
100	Cure of liver diseases	Leaves of bamboo (<i>Bambusa arundinacea</i>), ber (<i>Zizyphus mauritiana</i>), kudrum (<i>Hibiscus sabderiffa</i>) and futkal (<i>Ficus inpectoria</i>) are of high medicinal value for liver ailments (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
101	Treatment of eye infection	Juice of aparazita (<i>Elaitoria spp</i>) leaves was found to have effective against eye infection in cattle (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
102	Treatment of wounds	Karanj (<i>Pongamia olabra</i>) and neem (<i>Azadirachta indica</i>) oil are found useful for treatment of wound (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
103	Healing of bone fracture	Paste of harjor plant was found highly useful for fractured bones (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
104	Pain killer for animals	Kujri (<i>Celestrus paniculata</i>) oil is used as painkiller for both human beings and animals (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
105	Control of external parasites of animals	Leaves of sinduwar (<i>Vitex negundo</i>) leaves have been proved to contain insecticidal property that kills and eliminate the external parasites of the animals. Sinduwar leaves are boiled, after cooling is applied throughout the animal body (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
106	Control of lice and ticks in cattle and buffalo	For control of ectoparasites like lice and tick in cattle and buffalo, sarifa (<i>Anona squamosa</i>) fruits were soaked overnight in 1 litre of water, which is boiled in the morning and after cooling applied throughout the body. Paste of sarifa leaves is also applied on the infected body of the animal to eliminate lice and tick. (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
107	Healing of FMD lesions	Paste of vantulsi (<i>Ocimum</i> spp) leaves is applied in khurha (FMD) disease (Saraikela and Dumka, Jharkhand).	Bara et al. (2002)
108	Fresh jaggery from the processing unit for treatment of ulcerated hooves	Livestock often suffer from ulcerated hooves after walking on hilly, rocky terrain or on tarmac. Farmers collect jaggery from the sugarcane processing, while it is still hot and paste it on the affected hooves approximately 25 g per hoof. The application is repeated three times per day for 2-3 days (Kantala, Ghogha).	Kanjibhai (1993)
109	To draw out the pus from boils and sores in cattle by avarai (Lablab purpureus), a climbing herb	The leaf paste of avarai (<i>Lablab purpureus</i>) is applied to boils and sores to draw out the pus (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
110	Treatment of urinary blockage by pollen of pearl millet	The seed setting stage of pearl millet is known locally as Dudhiyo, which means milk stage. The pollen of this plant is collected by gently running the fingers on the flowerheads. This is mixed with water and given to the bullocks for releasing the urinary blockage (Surendranagar, Gujarat).	Kanubhai (1992)
111	Cure for kidney stones by leaves of Bryophyllum	Urination becomes difficult for animals which have stones in the urinary bladder and the bladder swells. Farmers believe that if pregnant animal suffers from this problem, there are chances that its uterus may prolapse. If the animal is not treated promptly, urine accumulates in the bladder and the ensuing toxicity can kill the animal. To treat this condition, leaves of a plant locally called pathar paan which translates as stone leaf (<i>Bryophyllum</i> spp.) are used. Approximately 500 g leaves are crushed and squeezed to mix well with 500 ml water. About 250 ml of the filtrate is given twice a day, once in the morning and other in the evening for 8-10 days to effect a complete cure (Sabarkantha, Gujarat).	Patel (1996a)

S. No.	Title of ITK	Details of ITK and rationale	Reference
112	Fruit of bijoru to cure urinary blockage	Urinary blockage is also treated by feeding the bullock 10-15 bijor fruits with horizontal cuts made on them, per day. Relief can be seen on the following day but the animal should continue this course for 8-10 days to complete the cure. The Bijoru tree can be found throughout India. It bears fruit, which resemble citrus on the inside, only towards the end of June. The treatment has been practiced in this region but only by a few farmers for the past 15-18 years (Bhavnagar, Gujarat).	Bhikhabhai (1992)
113	Treatment for urine blockage by flowers of Butea monosperma	A decoction of flowers of palash (<i>Butea monosperma</i>) of 60 ml is given to animals twice a day for two days to cure the urinary blockage problems.	Paisa (2000-2001)
114	Treatment of animals by ash of <i>Canabis sativus</i>	Ash of bhang (<i>Canabis sativus</i>) is applied on haematoma of animals for its treatment (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
115	Treatment of fractured bone	For fractured bones, paste of vitex quadrangularis application and tying of flattened bamboo sticks are followed (Sambalpur, Orissa).	Nanda et al. (2002)
116	Treatment of swelling in neck	Application of mustard oil and pressing of hot pods of sunari (<i>Cassia fistula</i>) for treatment of swelling in neck or throat (Sambalpur, Orissa).	Nanda et al. (2002)
117	Treatment of fever and indigestion	Cattle are fed with the herbal mixture of juani, black salt, ginger and molasses for fever and indigestion. (Sambalpur, Orissa)	Nanda et al. (2002)
118	Treatment of FMD	For foot and mouth disease (FMD), farmers follow practices like application of bamboo node oil, coconut oil, neem oil, mustard oil or kerosene. Walking over sands is also practised for control of the disease (Sambalpur, Orissa).	Nanda et al. (2002)
119	To check the growth of papillae in cattle by rubbing salt with lime	Lime (citrus) and salt is rubbed on the papillae in the mouth of animal to check its growth (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
120	Control of Hematuria in animals by feeding lime water with black soyabean	Farmers feed the mixture of lime water and grinded black soyabean for 2-3 days (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
121	Healing/repair of bone fracture	For fractured bones or ligaments, boiled juice extracted from hadabhanga stem (<i>Vitex quadrangularis</i>), leaves of tamarind (<i>Tamarindus indica</i>), bark of pipal (<i>Ficus religiosa</i>) and jamun (<i>S. cumini</i>), along with common salt is successfully applied for healing/repair. Similarly, crushed plant parts of malanga (<i>Vanda roxburghii</i>) is also used for quick recovery of fractured bones of cattle (Ganjam, Orissa).	Sandha et al. (2002)
122	Treatment of delayed expulsion of placenta	Cattle are fed with castor leaves and molasses followed by boiled horsegram water in case of delayed expulsion of placenta (Ganjam, Orissa).	Sandha et al. (2002)
123	Cure of FMD lesions on hooves	For foot and mouth disease, walking over mud is commonly used to overcome it (Ganjam, Orissa).	Sandha et al. (2002)
124	Cure of indigestion	For indigestion, molasses with ginger are fed (Ganjam, Orissa).	Sandha et al. (2002)
125	Treatment of swollen neck	External application of warm common salt is followed in case of swollen neck (Ganjam, Orissa).	Sandha et al. (2002)
126	Remedy for urinary problem and mastitis	Common salt and ice are the traditional remedy for urinary problem and mastitis (Ganjam, Orissa).	Sandha et al. (2002)
127	Treatment of external injuries	Farmers still use camphor , cocunut oil and turmeric pest in case external injuries (Ganjam, Orissa).	Sandha et al. (2002)
128	Treatment for kudirai valippu (paralysis) by leaves of <i>Aristolochia indica</i> in butter milk	The symptoms of this type of paralysis are that the animals will always be in a lying position; shiver its legs and froth will be coming out of mouth. About 100 g leaves of <i>Aristolochia indica</i> are ground well and mixed with 200 ml of butter milk and administered three times a day.	Anonymous (200-2001g)

S. No.	Title of ITK	Details of ITK and rationale	Reference
129	Treatment for paralysis in cattle by treating with hot white stone	Locally available white stone called chaggar is heated and directly brought in contact with the head of the affected animal which effectively cures paralysis because of its ability to induce nervous stimulation. Any nervous malfunction or any clotting in the brain is sensitized by the hot stone resulting in recovery from paralysis (Ladakh, Jammu and Kashmir).	Verma (1998)
130	Inducing cooling effect in animals by feeding of leaves of Bauhinia	Fresh leaves of Bauhinia species (Kachnar) are fed to buffaloes, because of their cooling effect (Himachal Pradesh).	Verma (1998)
131	Treatment for paralysis by decoction of flowers of Butea monosperma	A decoction of flowers of palash (Butea monosperma) in a dose of 60 ml twice for about 15 days is believed to cure paralytic attacks in animals.	Jwalamukhi (2000-2001)
132	Treatment of eczema	Paste of turmeric, neem leaf and mustard oil is most effective for eczema (Ganjam, Orissa).	Mishra et al. (2002)
133	Cure of arthhritis and epilepsy	Indigenous medicine prepared out of dharanja (Pongamia sp), talamuli (Curculigo orchoides), koilekha (Astercantha longifolia), bhuinimba (Andrographis paniculatus) and mahanimba (Melia composita) cures arthritis and epilepsy in animals (Ganjam, Orissa).	Mishra et al. (2002)
134	Healing of fractured bone	The extracts of hadabhanga (Cissus pallida) mixed with milk rejoins the broken or fractured bones (Ganjam, Orissa).	Mishra et al. (2002)
135	To induce heat in cows	The late heat of cows can overcome when they are fed with the fenugreek (Trigonella foenum) powder (Ganjam, Orissa).	Mishra et al. (2002)
136	To increase milk production in cattle	Satabar (Asparagus recemosus) is effective in increasing the milk production in cattle (Ganjam, Orissa).	Mishra et al. (2002)
137	Treatment of broken horn	Paste of blackgram and mustard cures the broken horns of cattle (Ganjam, Orissa).	Mishra et al. (2002)

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138	Treatment of worm infestation	Paladhua (<i>Erythrina indica</i>) is best effective for worms (Ganjam, Orissa).	Mishra et al. (2002)
139	Cure of gangarin tail in bullocks	Slaked lime paste cures the gangarian tail in bullocks (Ganjam, Orissa).	Mishra et al. (2002)
140	Cure of intestinal disorders	The roots of koilekha also improves the animal cdigestion systems and gastro intestinal disorders (Ganjam, Orissa)	Mishra et al. (2002)
141	Treatment of diarrhoea	Severe diarrhoea is cured when the cattle is fed with tender leaves of kaitha (<i>Feronia limonia</i>) (Ganjam, Orissa).	Mishra et al. (2002)
142	Treatment for prolapse of vagina in late preganancy	In cattle, the vagina sometimes prolapses in late preganancy before calving. As treatment, juice is extract from fresh onions by chopping and pounding. The prolapsed part of vagina, is washed with this juice as a disinfectant and then carefully pushed back in to place. A leather shoe or chapal (also disinfected.) is used when pushing against the surface of the vagina. The animal is then forced to stand and fed the tuber of elephant foot plant locally known as suran (<i>Amorphophallus campanulatus</i>). About 2-3 kg of this, is cut in small pices and given along with other food. It is believed that this plant extract helps in fixation of the uterus. Sometimes a thin rope is tied around the body in the form of a net so as to prevent recurrence of prolapse. Besides this, the slope of ground surface in the cattle shed is kept such that the rear of the anima remains higher than the front. (Vanod, Patdi).	Karshandas (1993)
143	Treatment of stomatitis and glossitis	Use of fig leaf for stomatitis and glossitis and feeding of nyctanthus (local name - gangasiuli) leaf as hepato protective in bovines (Orissa).	Barik and Swain (2002)
144	Prevention of hepato disease	Use of fig leaf for stomatitis and glossitis (Orissa).	Barik and Swain (2002)
145	Cure of coccidiosis in poultry	Feeding of onion and turmeric for coccidiosis (Orissa).	Barik and Swain (2002)
146	Reducing broodiness in poultry	Frequent water bath for reducing broodiness in poultry (Orissa)	Barik and Swain (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
147	Treatment of FMD	Use of neem leaf and bark decoction for treatment of FMD (Orissa).	Barik and Swain (2002)
148	Treating sheep against wool shedding with sulphur and mustard oil	A mixture of sulphur and mustard oil helps in prevention and control of skin diseases and provides nutrition to wool fibre and thus overcomes the problem of wool shedding in sheep (Lahaul valley, Himachal Pradesh).	Verma (1998)
149	Humoral therapy of disease	The exudation of blood from the infected portion is done by making an incision that helps in the removal of infection because the poison and pathogens are exuded out along with the blood (High hills and cold deserts of Himachal Pradesh).	Verma (1998)
150	Treatment of foot-and-mouth disease, mastitis, fever, bloat, diarrhoea and helminthiasis in cattle turmeric, garlic and preparation made of neem and tamarind	Many of disease treated with traditional remedies are husbandry-related ailments such as mastitis, bloat and diarrhoea. Farmers reported that these conditions could be adequately treated with local knowledge and that no outside expertise was needed. However, they acknowledged that the and buffalo by effectiveness of the treatment depends on the pepper, ginger, stage and severity of the disease. Neem was reported to be most popular plant, but tamarind also has many uses. Both neem and tamarind trees are found in every village in Kerala and all the various parts of the tree-bark, leaves, fruits etc are used. The traditional healers had a good working knowledge of all herbs with Ayurvedic properties. There are specific combination for treatment of each disease and all the healers combined two or more plants in the preparation of each drug (Kerala).	Padmakumar (1998)
151	Treatment of urinary blockage in bullocks	Bullocks are prone to this problem because their urinary tract is not straight as in case of cows. This facilitates deposition of the stones. Roots of lajamani a local plant are crushed and the juice is extracted. Sometimes the entire plant is used for the purpose. The juice is boiled and cooled and approximately 500 ml of this is administered to the animal. This practice helps in urination by removing obstructing stones from the urinary canals. This herb grows wild in monsoon. It also grows at other times provided water is available. It is a sensitive plant and curls up when touched. Hence it is called lajamani meaning the shy (Bhavnagar, Gujarat).	Solanki (1995)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
152	Intestinal worms-Kachaka	About 100 g leaves of kachaka (<i>Caesalpinia crista</i>) are crushed thoroughly and its juice is extracted and mixed with 100 ml water and fed to the calf every morning for three or four days. This is a fairly common practice and nearly 70% of the people in this area use this method as a tradition. It is simple, easy, inexpensive and has no side effect (Bharuch, Gujarat).	Patel (1994a)
153	Treatment for urinary trouble by sodium bicarbonate	Approximately 500 g of sodium bicarbonate is dissolved in one litre water and resulted solution is given to the animal having urinary trouble (Bhandaria).	Virambhai (1992)
154	Treatment for rinderpest by fruit of <i>Shorea robusta</i>	250 g of sakhu fruit (<i>Shorea robusta</i>) powder is dissolved in water and given twice a day till its cure (Eastern Uttar Pradesh).	Gupta (1993)
155	Treatment for rinderpest by extract of tobacco	A filtered solution of tobacco dissolved in lime water is given thrice a day or more depending upon the condition (Eastern Uttar Pradesh).	Gupta (1993)
156	Treatment for rinderpest by turmeric	A mixture of tirtulated turmeric and sooran (<i>Amorphophalus campanulatus</i>) mixed with curd is drenched to affected animals. It cures animals within 8-10 hrs as reported by local people (Eastern Uttar Pradesh).	Gupta (1993)
157	Control of arthritis in camels by sesamum	Sesamum oil and sugar are mixed together in equal proportions and rubbed on the skin over the oil and sugar affected part of the camels body twice a day for three or four days. Most camel keepers in this region are aware of this practice (Mahesana, Gujarat).	Joytabhai (1993)
158	When animal stops ruminating	Sometimes animal stops ruminating and suffers from following symptoms : (a) it stops drinking water and eating food, (b) the left side of its body gets swollen and (c) after ten to twelve days the skin on its body dries and starts peeling. The following treatment are given : 200 to 300 g leaves of drumstick (<i>Moringa spp.</i>) are crushed by hand and mixed with 500 g jaggery. This mixture is then dissolved in water and given to the animal. After this the bark of hingori (<i>Balanites spp.</i>) is crushed in 200 ml water and then ground in to a paste. This paste is given just once to the animal to bring relief. If the animals skin becomes dry or cracks then some jaggery water solution is applied to the skin (Sabarkantha, Gujarat).	Taral (1997)

S. No.	Title of ITK	Details of ITK and rationale	Reference
159	Rejuvenating milk veins	To prevent occlusion of milk vein (or any problems) in the udders of cattle, the extract of certain creeper is fed to the animal in the village Mahuvaria of Surat district. About 500 g of creepers of manson are soaked in water till the water becomes milky-white owing to the latex in the plant. Sometimes the creepers are squeezed lightly to extract more latex to last for two days. The mixture is filtered and the filtrate is given to animal for two days. The treatment takes effect within a week. It is a widely used practice in the surrounding villages too. The manson, a creeper, grows mainly in hilly areas during monsoon. It has small stick like leaves and white flowers (Surat, Gujarat).	Patel (1994d)
160	Treatment for respiratory trouble by leaves of Corchorus spp	Ruptured leaves of the vahufali (Corchorus spp) is fed to the bullock which breathes too much during work. This procedure is followed for 3-4 days continuously (Tajpur).	Bharvad (1992)
161	Treatment against urinary blockage	When animals suffer from kidney stones, it causes acute pain and inflammation of the urinary tract. This leads to blockage of the urinary passage. This ailment is treated by feeding fruits of bijoru (bitter apple: Citrullus colocynthis). 500 g fruit of bijoru are fed to the animal along with its daily feed for three days. The dose is given once in the morning and the other in the evening (Bhavnagar, Gujarat).	Bhil (1997)
162	Treatment against urine blockage	Cattle especially bullocks, often suffer from urinary blockage due to stones. Shri Mansukhbhai Samjibhai Savaliya suggests use of jamun (S. cumini) juice for this problem. One or two measures of the juice made of the tender skin of jamun fruit is administered twice a day for two to three days. This treatment brings relief to the animals (Junagadh, Gujarat).	Savaliya (1997a)
163	Controlling chakri in animals	Chakri disease, mostly affects cows, buffaloes and bullocks. The animal suffers from dizziness and gets tired and then finally collapses due to exhaustion. This sensation may occur at any moment and there is a likely danger that the animal may fall in a pit or a well accidentally which can be fatal for the animal. Approximately 250 g of black pepper pounded into fine powder is mixed with one litre of water. To the filtrate, 400 g of ghee is mixed. The mixture is fed to	Parmar (1998a)

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		the diseased animal in the morning and in the evening daily for three days. It is believed that the animal will recover within a week (Mehsana, Gujarat).	
164	Calotropis gigantena cures eczema in animals	Camels, donkeys and horses often suffer from eczema. Once infected, the animal starts scratching its skin by rubbing against a tree, wall or some rough surface. A decoction of milkweed (Calotropis gigantena) is used for this disease. Leaves of milkweed are boiled in water and this water is applied to the skin of the animal. This is done once or even twice a day. The treatment gives relief to the animal within a week. The juice of milkweed leaves can also be used to treat the animal. (Mahesana, Gujarat)	Raval (1997)
165	Treatment of ahawa	A mixture of clove, gurhal flower (Hibiscus rosacinensis) and neem leaves are prepared and given to suffering animals after dissolving it in water. This is given twice a day for quick recovery from the disease (Eastern Uttar Pradesh).	Gupta (1993)
166	Treatment for horn rotting	Horn rotting is common in bullocks. A slight bending of the horn is the initial symptom of the rotting. In advanced stages pus forms. The rotting horn is cut away with a hack-saw leaving four cm stub. Approximately 100 g of castor oil is applied on exposed cut surface of the horn. A mixture of 50g of kalijiri (Vernonia anthelmintica) and 50 g of urea fertilizer is applied over it and bandaged. Healing occurs after a week (Mahesana, Gujarat).	Desai (1994b)
167	Treatment against blocking of urinary tract	Cows and buffaloes, especially bullocks, suffer from stones in urinary bladder. Crush the green bark of jamun tree (S. cumini) and give the extract to the animal other in the morning and once in the evening for three days. This gives relief to the animal (Junagadh, Gujarat).	Savaliya (1997b)
168	Treatment of diarrhoea by Kangasi caesalpinia bonducella	About four seeds of kangasi (Caesalpinia bonducella) are powdered and mixed with one cup water. This decoction is given to affected animal three to four times a day. For a young animal, the dose is reduced to half. This treatment is continued for four to six days. About 20% of people in villages use this method. The kangasi plant grows to a height of three or four metres. It bears tiny thorns on stem and twigs.	Ad (1995)

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		Its leaves are arranged in bunches of eight or 10. The seeds are also covered by a shell like structure with tiny thorns. It grows abundantly on hedges in middle Gujarat (Panchmahal, Gujarat).	
169	Treatment of arthritis	Cattle suffering from arthritis experience great difficulty in walking. Their joints become stiff and they cannot be used for ploughing or drawing loads. Internal bark of Moringa pterygosperma and sangheda trees are used to relieve the affected cattle of pain. One kg of the internal bark of this tree is mixed with four litres of water and the mixture is boiled till it is reduced to half its original volume. Then it is removed from the fire, cooled and rubbed on the joints of the cattle. The massage should be continued at intervals till the pain disappears (Junagadh, Gujarat).	Radadia (1998)
170	Treatment of mino by mixture of ash and jaggery	The ash from burning 500 g newsprint is mixed with 1 kg of jaggery and is rubbed for 20 min on the entire inner side of the animal's jaw. This is repeated after 2 hr and relief can be expected within 4-5 applications (Bhavnagar, Gujarat).	Chauhan (1992)
171	Treatment of anorexia in camels	If a camel has undergone hard labour, its intestines and liver are liable to swell and it will not consume its regular grass feed. After hard labour the camel drinks more water, breathes heavily, sits down constantly and slowly stops taking its regular meals. About 100 g each of alum and kali jeeri (Vernonia anthelmintica) and one kg of jaggery are added to two litres of water and boiled. The boiled brew is allowed to cool down and given in the morning for three days. The camel soon starts taking its regular food. The camel breeders used this method twice in the last five years. They learnt about it while travelling from one place to another along with animals. Other farmers say this remedy is also useful bullocks (Kheda, Gujarat).	Marwadi (1999)
172	Curing rheumatism in cattle	Rheumatism is a disease which affects the joints of the cattle. The knee is most affected and the intense pain causes the cattle to limp. Hadsankala ajmo and sava are used for treating rheumatism. Approximately 300 ml juice is extracted of hadsankala (Cissus quadrangularis). To this 25g of ajmo (Trachys-	Pancholi (1999)

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		permum ammi) and 10 gm of sava (<i>Anethum sawa</i>) powder is added. This is given to the cattle once a day for a week. This cures the cattle of the rheumatic pain (Bhavnagar, Gujarat).	
173	Cure from snake/scorpion bite	Leaf, stem bark, root bark and seed of <i>Siris</i> scorpion bite (<i>Albizia lebbek</i>) contains saponin used as immunogenic, astringent, anthelmintic. Bark is used for curing bronchitis, leprosy, paralysis; gum is used in curing inflammation, diarrhoea, while plant and leaf is against scorpion/snake bite and night blindness (Gujarat).	Parabia et al. (2000)
174	Treatment of mino	If an animal feeds too extensively on immature sorghum or the first cutting of lucerne it often results in an ailment called Mino. Symptoms are restlessness and discharge. Soil from termite mounds is rubbed thoroughly for 5-10 min onto the inner and outer of the mandible (jaw) and this is repeated frequently for three days. Since this remedy has yielded success for ages, farmers use it with confidence (Bhavnagar, Gujarat).	Mer (1992)
175	Control of anthrax	Tillai a wild plant and its bark and leaves are used to treat this disease. 250 g well grinded bark is taken and solution is made in half litre of water or 50 g well pounded leaves along with 4 grains of black pepper is given to the suffering animals once a day for 2-3 days with the help of drench bottle made of bamboo locally called as dharati. Animal is cured within 2-3 days (Eastern Uttar Pradesh).	Gupta (1993)
176	Use of leaves of <i>aegle marmelos</i> <i>cenchrus</i> spp for control of pus in udder	Leaves of <i>bili</i> (<i>Aegle marmelos</i>) and <i>dhamno</i> (<i>Cenchrus</i> spp) are collected in equal quantity and crushed together. This mixture is suspended in water and sprinkled over the udder frequently in a day, if pus comes from the inflamed udder, it is cured in few days (Bharuch, Gujarat).	Nareshbhai (1992)

S. No.	Title of ITK	Details of ITK and rationale	Reference
177	Treatment of urinary problems	One kg of chhatodi (<i>Boerhavia diffusa</i>) roots are boiled vigorously in two and a half litres of water till the quantity of water reduces to one litre. The decoction is stored in a vessel and administered to the animal having urinary trouble for two to three days at a dose of 100 ml per day. Chhatodi is a creeper with small round leaves, bears white and yellowish-pink flowers. The roots of chhatodi bearing white flowers are useful for curing this disease (Bhavnagar, Gujarat).	Dodia (1998)
178	Treatment for haemorrhage in bullocks	This remedy is particularly meant for bullocks. Bleeding occurs in these animals when they are wounded or in pain. This happens particularly to bullocks because they are used as beasts of burden. The shoulder region bears the brunt of the load. The cure is as follows. Mix equal quantities of leaves of amla (<i>Cassia auriculata</i>) and goat droppings thoroughly. Add a small amount of water to get a paste-like consistency by grinding with a stone. This paste is used as a dressing and the clot is bandaged. One has to be careful that the dressing does not move away from the point of the clot or injury. The only disadvantage of this remedy is that it cannot be used for injuries on the stomach or hooves/feet of the animal (Baroda, Gujarat).	Singh (1999)
179	Treatment for prolapse of uterus	Many a time, cows and buffaloes are in danger of prolapsed uterus. The danger increases with the approach of delivery time. Manabhai has come up with a method using onions to avert this problem. When an animal has suffered from prolapse of the uterus in the past, it is given ten kg onion to eat when it is not carrying. This prevents prolapse at delivery time (Sabarkantha, Gujarat).	Rathod (1999)
180	Cure for naval infection in calves	Most of the naval infections in calves occur due to lack of hygiene. Leaves of tanderja (<i>Amaranthus spinosus</i>) are used for curing such infection. The infection causes pus formation in the naval region. Approximately 50 ml of juice is taken out of the leaves of tanderja. This is then mixed with 50 g of jaggery and gently warmed. The paste is then applied on the naval region and bandaged. It is continued for three days with two dressings a day (Junagadh, Gujarat).	Solanki (1999)

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181	Medicinal uses of Pennisetum graveolens, syn. P.typhoides, P.typhoideum	Plant, seeds have albuminoids, minerals, used as principle food. Cooked grains are fed after parturition in animals for increasing milk (Gujarat).	Parabia et al. (2000)
182	Medicinal uses of Phoenix sylvestris	Root, flowers, fruit, fresh juice of Phoenix sylvestris contain alcohol and carbohydrate and are used for tonic, restorative, astringent, toddy preparation, euphoratic, stimulant, depressant, narcotic, toothache and nervous disability.	Parabia et al. (2000)
183	Medicinal uses of Peucedanum graveolens, syn. Anethum graveolens, A.sowa	Seed and oil of Peucedanum graveolens contain volatile oil, anethine, phellandrine, apiol and D-lemonine and are used as carminative, stomachic, aromatic, stimulant, diuretic, resolvent, emmenagogue, galactagogue, abortifacient.	Parabia et al. (2000)
184	Medicinal uses of Phyllanthus emblica, syn. Emblica officinalis	Plant, stem bark, leaf, root, flower and seeds of Phyllanthus emblica contain vitamin C and are used as refrigerant, diuretic, laxative, acrid, cooling agent, carminative, stomachic, aperient, vermifuge, anaemia, jaundice, dropsy, cough, inflammation of the eye, asthma, bronchitis, biliousness.	Parabia et al. (2000)
185	Medicinal uses of Plantago ovata, P.isabgol	Seed and husk of Plantago ovata contains mucilage, fatty oil, albuminous matter, glucoside, aucubin and are used as demulcent, cooling agent, diuretic, laxative agent, mild astringent, emollient, catarrh, chronic constipation, dysentery, diarrhoea, bladder affections, urethra and kidney disorders.	Parabia et al. (2000)
186	Medicinal use of Picrorhiza kurroa	Rhizome of Picrorhiza kurroa contains glycoside, picrorrhizine, non bitter kirrin, kucicol and used for cathartic, stomachic, cholagogue, antiperiodic.	Parabia et al. (2000)
187	Medicinal uses of Piper longum	Immature berries, stem, roots of Piper longum contain resin, volatile oil, starch, gum, fats, piperine and are used for infusion, stimulant, carminative, alterative, tonic, aphrodisiac, vermifuge, emmenagogue, stimulant, externally rubefacient, catarrh, asthma, respiratory disorder, gastric disorders, colic, flatulence.	Parabia et al. (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
188	Medicinal uses of <i>Prosopis cineraria</i> , <i>P.stephaniana</i>	Stembark, pods, ashes of <i>Prosopis cineraria</i> contain spicigerine, laknoic acid, prosogerin-A which is used as astrigent, rheumatism, scorpion sting.	Parabia et al. (2000)
189	Medicinal uses of <i>Polygonum aviculare</i> (nutgrass)	The seed, stem, leaf, root and root oil of <i>Polygonum aviculare</i> are used for externally application of skin diseases (seed) cutaneous affections. Scabies, rhematism (seed oil) containing karangene and stem bark which contains bitter alkaloids is useful to cure internally bleeding piles. The leaf of the plant as poultice applied on ulcers with worms. The root juice is useful to for cleaing foul ulcers.	Parabia et al. (2000)
190	Medicinal uses of <i>Polyalthia longifolia</i>	Stem bark of <i>Polyalthia longifolia</i> contains proanthocyanidin, b-Sitosterol, leuccocyanidine trimer for use as febrifuge.	Parabia et al. (2000)
191	Medicinal uses of <i>Plumbago zeylanica</i>	Root and milky juice of <i>Plumbago zeylanica</i> contain plumbagin and are used as alterative, gastric, stimulant, appetizer, indigestion, scabies, ulcers.	Parabia et al. (2000)
192	Medicinal uses of <i>Physalis minima</i>	Plant and berries of <i>Physalis minima</i> contain b-Withaphysalin, Physalin-b, Dihydroxyphysalin-b and are used as tonic, diuretic, purgative, alterative, diseases of spleen, dropsy, gout, urinary diseases.	Parabia et al. (2000)
193	Medicinal uses of <i>Myristica fragrance</i>	Seed and oil of kernel contain saponin, volatile oil, alphapinene, myristicine, resin, fat, sugar, dextrin, muculage, which are used as carminative, stomachic, stimulant, aromatic, narcotic, aperient, carminative, nausea, vomiting.	Parabia et al. (2000)
194	Medicinal uses of <i>Mentha viridis</i> , <i>M.crispa</i> , <i>M.spicata</i>	Leaf, flower, plant contain menthol, menthane, essential oil which are used as stomachic, diuretic, stimulant, jaundice, vomiting, antispasmodic, carminative, aromatic, emmenagogue, fevers and hiccups.	Parabia et al. (2000)
195	Medicinal uses of <i>Mimosa pudica</i>	Leaf, root and stem of <i>Mimosa pudica</i> contain alkaloids, mimosine, tannin and are used as resolvant, alterative, carminative, aphrodisiac, antiseptic, blood purifier, piles, hydrocele, scorpion sting.	Parabia et al. (2000)
196	Medicinal uses of <i>Mimusops hexandra</i>	Seed, fruit and stembark of the plant contain pectin, tannin, coloring matter and are used as astrigent, tonic, demulcent, emollient, alterative.	Parabia et al. (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
197	Medicinal uses of <i>Mirabilis jalapa</i>	Plant, root, flower, tube of the plant contain resin, gum, ash, trogonelline which act as purgative, aphrodisiac, maturant, poultice on carbuncles, boils, buboes, inflammation, phlegmons and wheteglow.	Parabia et al. (2000)
198	Medicinal uses of <i>Mollugo cerviana</i>	Plant, root, flower that contain resin, gum, bitter, alkaline nitrates used as stomachic, aperient, uterine, stimulant, antiseptic, febrifuge, rheumatic complaints.	Parabia et al. (2000)
199	Medicinal uses of <i>Momordica charantia</i>	Furit, seed, leaf, root contain glucoside, resin, albuminoids, momordine, saponin, essential oil and are used as purgative, emetic, galactagogue, anthelmintic, vermifuge, astrigent, stomachic, stimulant, antibilious, laxative, alterative, piles, leprosy, rubbed in burning of sole and feet, jaundice, haemorrhoids, snake bite, diabets.	Parabia et al. (2000)
200	Medicinal uses of <i>Momordica dioica</i>	Furit, tuberous root contain alkaloid, fragrant matter, ash and are used as astrigent, antiseptic, expectorant, piles, urinary complaints, high fever, delirium, snake bite, scorpion-sting.	Parabia et al. (2000)
201	Medicinal uses of <i>Mangifera oleifera</i>	Root, rootbark, stembark, flower, fruit, seed, seed oil, gum of the plant contain morigine, moringine, amorphousbase, essential oil and are used as stimulant, carminative, stomachic, abortifacient, aphrodisiac, paralytic affection, intermittent fever, epilepsy, chronic rheumatism, nervous debility, spasmodic affections of bowels, hysteria, flatulence, spasm, liver diseases, spleen disorders, articular pains, tetanus, paralysis, dental caries, venereal affections.	Parabia et al. (2000)
202	Medicinal uses of <i>Morus alba</i>	Fruit and bark of <i>Morus alba</i> contain essential oil, pectin, citrates, malates that are used as refrigerant, purgative, anthelmintic, sore throat, dyspepsia, melancholia	Parabia et al. (2000)
203	Medicinal uses of <i>Nigella sativa</i> , <i>N.indica</i>	Dried fruits and seeds of <i>Nifella sativa</i> contain a yellow volatile oil, essential oil, albumen, mucilege, organic acid, toxic glucoside, melathin which are used for animals as condiment in curries, obstinate hiccups, loss of appetite, fever, diarrhoea, dropsy, puerperal diseases, stimulation of uterine contraction.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
204	Medicinal uses of <i>Musa paradisiaca</i>	Fruit, leaf and stem of <i>Musa paradisiaca</i> contain tannic and gallic acids, albuminods, fat, which are used to animals as tonic, antisorbutic, antihelmintic, antibilious, alterative, veneral disease, emollient, demulcent, mild astrigent, nutreint, laxative, dysentery, menorrhagea, blisters and burns, hyseria, epilepsy, dysentery, diarrhoea.	Parabia et al. (2000)
205	Medicinal uses of <i>Pedalium murex</i>	Fresh leaves, stem, dried fruits, powdered leaves of <i>Pedalium murex</i> are used for gonorrhoea, diuretic, demulcent, urinary disorder, micturition in gonorrhoea, ulcers.	Parabia et al. (2000)
206	Medicinal uses of <i>Nelumbium speciosum</i> syn <i>Nelumbo nucifera</i>	Plant, seed, leaf, root, flower, filament, anther stalks contain resins, metarbin, tannin, alkaloid, nelumbine, nupharine which is used as diuretic, expectorant, refrigerant, demulcent, cholera, fever, disease of liver, leprosy, antidote to poisons, bleeding of piles, menorrhagea, dysentery, ringworm.	Parabia et al. (2000)
207	Medicinal uses of <i>Nerium odorum</i> , <i>N.indicum</i>	Root, rootbark, leaf, tuber of <i>Nerium odorum</i> that contain neriodorin, nerioderin, karabin, rosaginine, essential oil, tannic acid, wax, glucoside, pseudo-curanine, neriene, neriantine are used for animals as diuretic, cardiac tonic, alternant, applied to cancer, ulcers on the penis, decoction to reduce swelling, leprosy.	Parabia et al. (2000)
208	Medicinal uses of <i>Couroupita guianensis</i>	Stembark, leaves and seed of <i>Couroupita guianensis</i> contain alpha amyrin, beta amyrin, beta-sitosterol which are used in reproductive disorders, skin diseases and tumors.	Parabia et al. (2000)
209	Medicinal properties of <i>Nicotiana tabacum</i>	Leaf of <i>Nicotiana tabacum</i> has alkaloid nicotine, nicotine, nicomine, anabasine, nor-nicotine, camphoraceous principles, resins, fats, ash, albumen, tabacinin, iso-quercitin which are used for animals as sedative, narcotic, emetic, antispasmodic and antiparasitic. Rheumatic swelling, skin disease, scorpion sting, fish poison.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
210	Medicinal properties of <i>Ocimum basilicum</i>	Leaf, root, flower and seeds of <i>Ocimum basilicum</i> contains terpinene, linalool which act as carminative, diuretic, stimulant, demulcent, aphrodisiac, diuretic, fragrant, aromatic, anthelmintic, febrifuge, gonorrhoea, chronic diarrhoea, dysentery, catarrh, nephritis, cystitis, internal piles, bowel complaints, cough in animals.	Parabia et al. (2000)
211	Medicinal uses of <i>Ocimum sanctum</i>	Plant and leaf of <i>Ocimum sanctum</i> contain camphor, citronelic acid, eugenol, borneol, dipentene, terpenol, crithmene, limonene, mucilage, terpene which are used as antibacterial, expectorant, carminative, stimulant, cough, cold, joint pains, wound healing, systolic and diastolic high blood pressure of animals.	Parabia et al. (2000)
212	Medicinal uses of <i>Opuntia dillenii</i>	Fruit, sap and leaf of <i>Opuntia dillenii</i> contain malate of Mn, fatty acid, citric acid, wax, resinous matter, albuminoids and are used for animals as refrigerant, expectorant, cholagogue, demulcent, asthma, whooping cough, hepatic congestion, snake-bite, gonorrhoea, purgative, poultice in ulcers, ophthalmia.	Parabia et al. (2000)
213	Medicinal properties of <i>Oryza sativa</i>	Grain, spirit, vinegar, rice gruel, rice water contain oridine, oryzynine, nukain and are used for inflammatory state of intestine, disorganized digestion, bowel complaints, diarrhoea, dysentery.	Parabia et al. (2000)
214	Medicinal uses of <i>Papaver somniferum</i> , var. <i>P.glabrum</i> , <i>P.sentigerum</i>	Plant, leaf, fruit, seed, milky juice of immature capsules, ripe and dried capsules, petals of <i>Papaver somniferum</i> contain morphine, narcotine, codiene, codamine, paramorphine, trotipine, narceine, cryptopine, pseudomorphine, paudanine, laudanocine, grosopine which help to use as demulcent, astrigent, soporific, sedative, narcotic, anodyne, emollient, stimulant, anodyne, antispasmodic, aphrodisiac, astrigent, mycotic of cattle.	Parabia et al. (2000)
215	Medicinal uses of <i>Mucuna pruriens</i> , Syn. <i>Carpopogon pruriens</i> , <i>Dolichos pruriens</i>	Root, seed, and pods of <i>Mucuna pruriens</i> contain mucunine, mucunadine, viscous coui, resin, tannin, L-dopa, are used as anthelmintic, aphrodisiac, nervine tonic, purgative, nerve tonic, diuretic, vermifuge, stimulant, mild vescicant, scorpion sting, delirium in fever, dropsy, cholera, increase libido in men, oligospermia in men, spermatogenesis.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
216	Medicinal use of bamboo in cattle	Important parts of bans (<i>Bambusa arundinacea</i>) used are leaf and stem containing choline, betain, nuclease, urease, cyanogeenticand glucoside. Leaf acts as emmenagogue, stimulant, astringent, febrifuge, echbolic and diuretic and acts against leprosy, tympany/bloat, diarrhoea, retained placenta, thread worm,cough, cold in horses. Flowering occurs once in ten-twelve years. The plant dries after flowering.	Parabia et al. (2000)
217	Medicinal importance of zakhmehaiyat	Leaf juice of zakhme is medicinally valuable containing malic, isocitric and citric acids act as styptic, astringent and antiseptic. Pulp is applied on bruised wounds insect bites. When given internally cures diarrhoea, dysentery and lithiasis.	Parabia et al. (2000)
218	Medicinal use of Bastard teak	Seed, flower, stem bark leaf and gum are the medicinally valuable parts. Contains glucosides, kenotannic gallic acid and essential oils which act as astringent antihelmenthentic aphrodisiac and diuretic. Stem bark heals pthisis and haemorrhage, controls ringworm, conjusted and septic wounds, diarrohea, dysentery.	Parabia et al. (2000)
219	Medicinal uses of <i>Derris trifoliata</i> , <i>D.uliginosa</i>	Root, bark of banda (<i>Derris trifidiata</i>) contain lipeol, taraxerol, beta-sitosterol, scandenin, coumarin, resins, alkaloids, rotenone, saponin which are used as alterative, insecticide, cathartic, dysmenorrhoea, astrigent, narcotic,for wounds, rheumatism, menstrual troubles, remedy for consumption, asthma, mania and as a substitute for betelnut.	Parabia et al. (2000)
220	Medicinal uses of <i>Dendrocalamus strictus</i>	The leaf and other parts of kaban (<i>Dendrocalamus strictus</i>) which contain silicious matter are used as astrigent, ecbolics to animals.	Parabia et al. (2000)
221	Medicinal uses of <i>Datura metel</i> , <i>D.alba</i> , <i>D.fastuosa</i>	Leaf, root, fruit and ripe seed of sadah datura (<i>Datura metel</i>) contain alkaloids, hyoscamine, hyocine, atropine, scopalamine, allantoin, vitamin-C, are used for insanity, fever with catarrh and cerebral complication and fruit to get animal in to heat, prolapse of uterus/vagina.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
222	Medicinal uses of <i>Dalbergia sissoo</i>	Stem bark, root, leaf, mucilage of sisam (<i>Dalbergia sissoo</i>) which contain tannin, dalberginone, dalbergin, allylphenol of latitontype, 5,7,4-trihydroxy-s-methoxyisoflorone and are used for leprosy, boils, eruptions to allay vomiting, oil is used for cutaneous afflictions. Mucilage of leaves mixed with sweet oil is applied in excoriations.	Parabia et al. (2000)
223	Medicinal uses of <i>Cyperus rotundus</i>	Tubers of motha mutha (<i>Cyperus rotundus</i>) have essential oils, myristic and stearic acid, unstable alkaloid, b-seilinne, cyperenone and are used as diuretic, emmenagogue, anthelmintic, stimulant, tranquilizer, antipyretic.	Parabia et al. (2000)
224	Medicinal uses of <i>bergia</i>	Plant and leaf of <i>bergia odorata</i> are the medicinally valuable parts containing tannin used in cleaning teeth and are applied to broken bones. Poultice prepared from leaf heals sores and plant paste heals urticaria and allergic sores.	Parabia et al. (2000)
225	Medicinal use of opthalmic barberry	Root, stem bark, wood, stem of darhald/rasaut (<i>Berberis aristata</i>) are the useful parts containing tree alkaloid named berberine used as alterative, tonic and antiperiodic. Stem bark and root cures skin diseases, jaundice, dysentery, colic, nervous diseases, sores, copious discharge from womb, trachoma virus and amoebiasis.	Parabia et al. (2000)
226	Kachnar - an antidote to snake poison	Stembark, root, leaf, flower, seed and gum of kachnar (<i>Bauhinia variegata</i>) are the useful parts containing mainly tannins and glucose. Stem bark acts as alterative, tonic, astringent and cures cough, bleeding piles, hematuria and manorrhagia, malaria and primarily act as antidote to snake poison. Root is used as carminative and flower laxative and cures sore throat.	Parabia et al. (2000)
227	Medicinal uses of <i>Coriandrum sativum</i>	Leaf, fruit, seed and plant kottmir (<i>Coriandrum sativum</i>) contain coriantrol, oxalic acid, calcium, vitamin C, carotene, essential oil, tannin, malic acid and ash which are used as aromatic, stimulant, carminative, stomachic, antibilious, refrigerant, diuretic, aphrodisiac, correction of bad breathe, dyspepsia, flatulence, vomiting, indigestion, sore throat, bilious complaints.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
228	Medicinal use of Barleria cristata	Plant, leaf and root of barleria cristata are the important parts contains apigenin and naringenin. Leaf and root are used to reduce swellings, cures cough. Root decoction cures rheumatism. Plant acts against snake bite.	Parabia et al. (2000)
229	Cultivation of Seabuckthorn (Hippophae)	Seabuckthorn is widely distributed in an altitudinal range of 700 m to 5500 m and above, owing to enormous uses of its fruits in curing several ailments including skin tumor, digestive disorders and respiratory ailments, foot and mouth disease in cattle, besides it is used in agro forestry practices. Also it is major source of fuelwood, fodder for goats and cattle, fencing to protect fruit trees/nurseries/orchards, maintenance of irrigation channels apart from soil conservation, improving fertility, quality timber, useful for newly opened areas and subsidiary food items, medicinal products and alcoholic preparations. Hence, the development of seabuckthorn will help in vegetation rehabilitation, ecological sustenance and economic gains to local farmers (High hills, river beds, valleys, dry and cold mountain areas of Himachal Pradesh).	Verma (1998)
230	Medicinal importance of deku sindoor	Only root is essential part, heals swelling of legs, cholera, diarrhoea and leaf paste heals yoke gall.	Parabia et al. (2000)
231	Ethno medical use of physic nut or fever nut	The useful parts of katkarnja (Caesalpinia bonduie) are seed, root, stem bark and leaf that contain bonducine, non alkaloid bitter principles and fatty oils. Seed, root and bark are used as antiperiodic antispasmodic antihelmenthic and febrifuge and cures intermittent fevers, asthma and colic.	Parabia et al. (2000)
232	Medicinal uses of Embelia ribes	Leaf, rootbark and fruit of Baberang (Embelia ribes) contain emblic acid, quercitol, christembine, resinoid, volatile oil are used in sore throat, infusion of root, cough and diarrhoea.	Parabia et al. (2000)
233	Medicinal uses of Enicostemma hyssopifolium, E. littorale, E. axillare	Plant of chota kirayat (Enicostemma hyssopifolium) has bitter glycoside and ophelic acid which is used as stomachic, tonic, laxative, carminative, blood purifier, dropsy, rheumatism, abdominal ulcers, hernia, swellings, itches and insect poisoning. Emperical use in diabetes.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
234	Medicinal properties of Eucalyptus globulus	Leaf, gum, exudation from stem, oil from leaf of Eucalyptus globulus possess sesquiterpene, tannin, resin, kino-tannic acid, catechin and pyro catechin and used as febrifuge, carminative, stimulant, expectorant, diaphoric, antiseptic oil antimalarial, powerful antiseptic, disinfectant, used to increase the flow of saliva, gastric intestinal juices, appetite and digestion, heart beat. Lowers arterial tension and quickens respiration. Useful in respiratory afflictions, diphtheria, fever, chronic cystitis.	Parabia et al. (2000)
235	Medicinal uses of Eugenia jambolana, E.jambos, Syn Syzigium cumini, S.jambos	Fruit, leaf, dried seed, stembark of mamon (Eugenia jambolana) contain jamboline, ellagic acid (phenolic acid), tannin, kino-like gum which are used as astringent, diuretic, stomachic, antidiabetic, diarrhoea, dysentery, sorethroat, spongygums.	Parabia et al. (2000)
236	Medicinal properties of Euphorbia hirta	Dudhi (Euphorbia hirta) contains gum, resin, alkaloid, wax, caoutchouc, tannin, sugar, calcium oxalate, mucilage, carbohydrates, albuminoids, essential oil, gallic acid, quercetin, new phenolic substances that are used as demulcent, antispasmodic, local parasiticide, cough, coryza, hay asthma, bronchial afflictions, bowel complaints, respiratory diseases, worms, kidney stones.	Parabia et al. (2000)
237	Medicinal uses of Euphorbia tirucalli	Milky juice and stembark Barki-thohar (Euphorbia tirucalli) contain euphorbin, gum, resin, fresh latex, isoeuphorol, ketone, euphorone which are used as purgative,acrid, counter irritant, vesicant, emetic, rubefacient, fish-poison, itch, scorpion-sting, rheumatism, toothache, earache, whooping cough, asthma, neuralgia, application to warts.	Parabia et al. (2000)
238	Medicinal uses of Melia azedarach	Root, stembark, flower, leaf, root, bark, fruit, seed, gum and sap of the plant contain resinous principle, tannin, oil margosine and are used as astrigent, antiperiodic, vermifuge, purgative, emollient, anthelmintic, discutient, rheumatism, anthelmintic, stimulant, insecticide, antiseptic, tonic, stomachic.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
239	Medicinal uses of <i>Eclipta alba</i>	Plant, bark, leaf of bhangra (<i>Eclipta alba</i>) which contain alkaloid, ecliptine, nicotine, polyacetylenic thiophenes, glucosides are used as tonic emetic and purgative.	Parabia et al. (2000)
240	Medicinal properties of <i>Vajradanti</i>	Plant, leaf and root of khataseriya (<i>Barleria prionitis</i>) are the useful parts containing scutellarein, g-rhamnosylglucoside, irioidsm Barterin, Acetyl barterin. Plant and leaf act as expectorant in cattarrh. Leaf when chewed, cures toothache. Root paste heals boils and swelling.	Parabia et al. (2000)
241	Medicinal uses of <i>Cyperus alternifolius</i>	Tuber of galanchai (<i>Cyperus alternifolius</i>) contains odorous principle and is used as tonic, stimulant, astrigent.	Parabia et al. (2000)
242	Medicinal uses of <i>Psidium gauva</i>	The root bark, fruit, leaf of <i>Psidium gauva</i> is useful for medicinal purpose. The leaf contains essential oil, eugenol, resin, cellulose and volatile oil, The fruit is useful to cure laxative diseases. The bark of the plant used to cure diarrhoea, the leaf for curing wounds and ulcers and also arresting vomiting in animals.	Parabia et al. (2000)
243	Medicinal uses of <i>Heterocarpus marsupium (asna)</i>	Gum, leaf and stem bark of <i>Heterocarpus</i> constitutes gum keno, kenotannic acid Stem bark and gum is used to cure diarrhoea, pyrosis, toothache, external application of leaf is useful to cure boils, sores and skin diseases, the leaf can be fed to the cattle.	Parabia et al. (2000)
244	Medicinal uses of <i>Punica granatum (anar)</i>	The root bark, stem bark, root, seed, pulp and fresh juice of <i>Punica granatum</i> are used for curing various diseases in cattle. The root bark and stem bark is used as astringent, antihelmentic, the seed is used for stomachache, pulp as cardiac tonic. The fruit juice is used for cooling. The bark is used to control tape worm and fruit is useful to control dysentery in animals.	Parabia et al. (2000)
245	Medicinal uses of <i>Randia dumatarium (arar/karhar)</i>	The fruit of <i>Randia dumatarium</i> plant contains saponin essential oil and acid resin, the fruit is used for irritating emetic, bark is used as astrigent, pulp as antihelminic, abortifient, fruit pulp is used to control dysentery and bark is applied externally as anodyne, rheumatism. The root bark of the plant is used as insecticide and for boneache.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
246	Medicinal uses of <i>Cordia dichotoma</i> , <i>C.latifolia</i> , <i>C.myxa</i>	Leaf, bark, flower, kernel, mucilage of fruit of lasora (<i>Codia dichotoma</i>) contain tannin, catharin, sugar, gum and ash are used as astrigent, demulcent, anthelmintic, diuretic, expectorant, dyspepsia, fever, ringworms, ulcers, prolapse of uterus/vagina and headache, affliction of urinary passage. Diseases of lungs, spleen and snake bite.	Parabia et al. (2000)
247	Medicinal uses of <i>Costus speciosus</i>	Root, tuber of kemuka (<i>Costus speciosus</i>) contain beta-sitosterol, saponin and are used as astrigent, purgative, depurative, stimulant, tonic, anthelmintic, digestive, antiinflammatory, antiarthritic, catarrhal fevers, cough, dyspepsia, skin disease, snake bites, tuber cooked and make into syrup as tonic.	Parabia et al. (2000)
248	Medicinal uses of <i>Crataeva nurvala</i> , <i>C.religiosa</i>	Bark, rootbark, leaves, fruits, flowers of tapia <i>Crataeva nurvala</i>) which contain lepeol-triterpenoids, beta-sitosterols, crategin, tartaric and cratagegus acids, pectin and fattyacids, glucose and fructose, amygdalin and emulsin, trimethylamine and are used as laxative, alterative, cholagogue, dyspepsia, heart disease such as hypo trophy, heart depression, urinary complaints, fevers, vomiting, gastric irritation, removal of stones from ureter and urinary bladder, obstructive uropathy.	Parabia et al. (2000)
249	Medicinal uses of <i>Crescentia cujete</i>	Bark, leaves and fruit vilayatibel (<i>Crescentia cujete</i>) contain crescentic, tartaric, citric, tannic acids and chlorogenic acid which help as aperient, coolant, febrifuge, diuretic, headache, poisonous to birds.	Parabia et al. (2000)
250	Medicinal uses of <i>Croton tiglium</i>	Bark, leaf, fruit and root of jamalgota (<i>Croton tiglium</i>) which contain alkaloids, globulin, albumin, sucrose and crotonoside and are used as purgative, vermifuge, alterative, irritant, cattarrh, ribifacient, stimulant and also used in snake bite, liver diseases, dropsy and purgative in animals.	Parabia et al. (2000)
251	Medicinal uses of <i>Cuminum cimum</i>	Seed, fruit, oil and flower of shahjio (<i>Cuminum aminum</i>) which contain thymene, thymol, oil, resin, gum are used as carminative, aromatic, stomachic, stimulant, Trigent, galactagogue, cooling agent, used in hoarseness of voice, dyspepsia, chronic, diaarrhoea, gonorrhoea.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
252	Ethnomedical uses of black mustard	Leaf, seed and oil of kalorai (<i>Brassica nigra</i>) are the important parts containing glucoside mirocine sinigrin, volatile oil, fixed oil and brassic acid. Seed acts as antispasmodic, anti rheumatic, emetic, rubifacient and counter irritant, seed paste when applied on chest cures lung infection. Oil is used as digestive condiment, induce animals in to heat, rubifacient to massage rheumatic joints, massage on chest in pneumonia.	Parabia et al. (2000)
253	Medicinal uses of <i>Cuscuta reflexa</i>	Plant, seed, fruit and stem of akasbel (<i>Cuscuta reflexa</i>) which contain cuscutin, flavanoid, beta-sitosterol, C.glucoside, bergenin and coumarin which are used as purgative, anthelmintic, anodyne.	Parabia et al. (2000)
254	Medicinal properties of lubani salai	Gum of lubani salai (<i>Boswellia serrata</i>) is only medicinally important. Resin/gum acts as refrigerant, diuretic, aromatic, emulcent, aperient, alterative, emmenagogue, ecboic. Resins cures rheumatism, nervous and skin diseases.	Parabia et al. (2000)
255	Medicinal uses of <i>Digera muricata</i> , <i>D. arvensis</i>	Plant, flower and seed of latamahuria (<i>Digera muricata</i>) contain a and b spinasterols which are used as laxative and for urinary discharge	Parabia et al. (2000)
256	Medicinal uses of <i>Digitalis purpurea</i> , <i>D. arvensis</i>	The Plant of <i>Digitalis purpurea</i> contains glycosides, digitoxin, gitoxin, gitalin used for its effect on cardiovascular system, to increase force of systolic contraction and efficiency of decompensated heart and also in dropsy and renal obstruction.	Parabia et al. (2000)
257	Medicinal uses of <i>Diospyros peregrina</i> , <i>D. embnryopteris</i>	Fruit, stembark, dried seed of taindu (<i>Diospyros peregrina</i>) that contains tannins, pectin, glucose, ether extract of fruit, b-sitosterol, betulin are used as astringent, styptic, oleoginous used for snake bite, leprosy, dysentery, diarrhoea, diseases of blood, gonorrhoea, sore throat, wounds and ulcers, chronic dysentery, diarrhoea, haemorrhages and intermittent fevers.	Parabia et al. (2000)
258	Medicinal uses of <i>Diospyros melanoxylon</i>	Stembark, dried flowers of tendu (<i>Diospyros melanoxylon</i>) contain tannin, hentricontone, hentriacntanol, a -Amyrin, Binaphthoquinone and are used for dysentery, dyspepsia, diarrhoea, lotion for eyes, urinary and blood diseases.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
259	Medicinal uses of Dolichos lablab Syn Lablab purpureus	Root, fruit, seed of sem (Dolichos lablab) contain albuminoids, carbohydrates, woody fibre, ash and are used as aphrodisiac, flatulant, bilious, febrifuge, stomachic, antispasmodic, root is poisonous, fruit is used in phlegmatic disorders.	Parabia et al. (2000)
260	Medicinal uses of Dregea volubilis, Syn.Wattakaka volubilis, Marsdenia volubiis	Plant, root and leaf of nakchhikni (Dregea volubilis) contain glucoside, dregein, glycoside, dregnoside which are used as emetic, expectorant, for boils and abscesses, eye diseases, cold and snake bites.	Parabia et al. (2000)
261	Medicinal uses of Echinocloa frumentacea, E.colonum, syn.Panicum frumentacea	Plant and fruits of sanua (Echinochloa frumentacea) contain starch and are used in biliousness and constipation	Parabia et al. (2000)
262	Medicinal use of Echinops echinatus	Plant, root, root bark, fruit of untakatara (Echinops echinatus) is used as alterative, diuretic, nervine tonic, aromatic, aphrodisiac, wound in cattle to destroy maggots, mixed with acacia gum and applied to hair to destroy lice, hoarse cough, hysteria, dyspepsia, scrofula and ophthalmia.	Parabia et al. (2000)
263	Medicinal uses of Evolvulus alsinoides	Whole plant and leaves of shankhapushpi (Evolvulus alsinoides) contain evolvulin, betaine, sterols, proteins, carbohydrates, phenolic compounds, tannin that are used in brain tonic, bitter tonic, alterative, febrifuge, vermifuge, anti-phlogistic, chronic bronchitis and asthma, Loss of memory, syphilis.	Parabia et al. (2000)
264	Medicinal properties of Feronia elephantum, F.limonia, Syn. Anisophalins rumphii	Stembark, leaf, fruit, gum, pulp of kavitha (Feronia elephantum) contain citric acid and are used as astrigent, stomachic, stimulant, acrid, aromatic, carminative, astrigent, used for venomous insect bites, reptiles, salivation, sorethroat, biliousness.	Parabia et al. (2000)
265	Medical uses of Prunus domestica, P.communis, P.inisitia	Furit that contains seed-oil, malic acid, pectin, albuminoids is used as cooling agent, laxative, astrigent, bilious state, body heat, enlarged liver, gonorrhoea, piles, leucorrhoea, irregular menstruation.	Parabia et al. (2000)

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266	Medicinal uses of <i>Curcuma longa</i> : <i>C.domestica</i>	Tuber, rhizome of haldi (<i>Curcuma longa</i>) which contain curcumin, aromatic turmeric oil, terpenoids, Juvabaine are used as carminative, cooling agent, stomachic, astringent, antiinflammatory, antihistamine, antibacterial and also used in bronchitic, respiratory disorders, cough, cold, in gasteric disorders.	Parabia et al. (2000)
267	Medicinal uses of <i>Commelina benghalensis</i>	Kanchara (<i>Commelina benghalensis</i>) contain n-octacosanol, n-tricontanol, stigma-sterol, compesterol which are used as demulcent, refrigerant, laxative, bitter, emollient and in leprosy.	Parabia et al. (2000)
268	Medical use of guggul	Gum, resin and essential oil of guggul (<i>Balsamodendron mukul</i>) contain myrcene act as astringent antiseptic, antispasmodic, diaphoretic, echbolic, antisyphilitic, aphrodisiac, emmenagogue, anti rheumatic and antihyperlipidemic.	Parabia et al. (2000)
269	Medicinal use of <i>Jatropha</i>	Leaf, seed and root of danti (<i>Baliospermum axillare</i>) are the medicinally important parts. Oil is extracted from seed which is used as drastic purgative, stimulant, rubifacient, hydragogue, cathartic. Seed acts against snake bites, leaf cures asthma and oil cures rheumatism.	Parabia et al. (2000)
270	Medicinal use of hingol	Stem bark, leaf, fruit and seed of hingol (<i>Balanites roxburghii</i>) are the useful parts containing saponin, organic acid, mucilage and sugar. Stem bark, unripe fruit and leaf are used as purgative, anthelmintic. Seed is used in curing cough, burns, excoriations, freckles and colic. Fruit cures snake bite.	Parabia et al. (2000)
271	Neem and its medicinal importance for cattle	Entire plant of neem (<i>A. indica</i>) is useful containing margosine and seed contains bitter oil. Leaf, seed and fruit are used as antibacterial, antiviral, insecticide, bitter tonic, antiseptic. Fruit used as astringent purgative. Gum is used as demulcent. Leaf used as emmenagogue, anthelmintic. Dry flower used as stomachic, oil used as antiseptic irritant. Leaf used in skin disease, abortion, foot and mouth diseases and its bark for dengue fever. Plant used as alternate feed and fodder during drought. Flower used to cure blindness in sheep/goats. Fruits are used in leprosy, bronchitis, intestinal worms. Oil in rheumatism.	Parabia et al. (2000)

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272	Medicinal uses of <i>Corchorus fascicularis</i>	Plant, leaf of bankusta (<i>Corchorus fascicularis</i>) and seed have glucosides, corchorin, bitter principle, corchortin which are used as anthelmintic, restorative, laxative, stimulant, tonic, aphrodisiac, stomach troubles, skin diseases, scabies, tumours.	Parabia et al. (2000)
273	<i>Corchorus capsularis</i> - medicinal uses	Fruit, seed, and leaf of singhin (<i>Cochorus capsularis</i>) contain oil, oleic and lonoleic acid, glucoside, corchorin, corchoritin are used for purgatives, laxatives, carminatives, refrigerant, diuretic, chronic cystitis, gonorrhoea, dysuria, hepatic and intestinal colic, gastric catarrh, dysentery, to increase appetite.	Parabia et al. (2000)
274	<i>Cissus quandrangularis</i> syn. <i>Vitis quandragularis</i> medicinal uses	Leaf of hadojodi (<i>Cissus quandrangularis</i>) is used as alterative and also used for fractures of bones, muscular pain, ulcers and wounds.	Parabia et al. (2000)
275	Medical uses of <i>Coptis teeta</i>	Mamiran (<i>Coptis teeta</i>) contains berberine which is used to increase appetite, restores digestive powers and removes flatulence and visceral obstructions, jaundice, debility, convalescence after fevers, debilitating diseases, atonic dyspepsia, mild forms of intermittent fevers, catarrhal and rheumatic conjunctivitis.	Parabia et al. (2000)
276	Medicinal properties of silk cotton tree	Almost all primary parts of simul (<i>Bombax mamabaricum</i>) are medicinally important. Seed contains non- drying oil and used as astringent, styptic. Tap root acts as demulcent, slightly diuretic, aphrodisiac, emetic and cures prolapse of uterus/vagina, aprodisiac is given in impotency. Flower cures menorrhoea, prickle and pimples.	Parabia et al. (2000)
277	Medicinal uses of coffee indica and <i>C. arabica</i>	Seeds of coffee (<i>Coffee arabica</i>) contain alkaloid caffeine, trogonelline, leaf and fruit contain adenine, xanthine, hypoxanthine, guanine, volatile oil, wax and are used in poisoning, chronic diarrhoea, medicine for controlling fever, depression.	Parabia et al. (2000)
278	Medicinal uses of <i>Cocculus hirsutus</i>	Root, leaf juice of jantikibel (<i>Cocculus hirsutus</i>) contain trilobine, isotrilobine, coclaurine, magnoflorine and used as refrigerant, laxative, sudorific, alterative, chronic rheumatism, venereal diseases, gonorrhoea, eczema, impetigo.	Parabia et al. (2000)

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279	Ethnoveterinary recipes of Bhindi	The essential oil, pectins and starch of bhindi (<i>Abelmoschus esculentus</i>) plant and its fruits are used as emollient, demulcent, diuretic. The root is crushed and its juice is fed to animals with bone fractures and also used in decreased milk flow.	Parabia et al. (2000)
280	<i>Coccinia indica</i> ; Syn. <i>Cephalandra indica</i> medicinal uses	Root, leaf, stembark of katduriki-bel (<i>Coccinia indica</i>) contain alkaloids, amylase, resin, starch, alkaloid, sugar, gum, glucokenin and are used as antispasmodic, expectorant for diabetes, eruption of skin, gonorrhoea, ringworm, psoriasis and itch.	Parabia et al. (2000)
281	<i>Clerodendron phlomides</i> , <i>C.multiflorum</i> -medicinal uses	Plant, root, leafjuice of urni (<i>Clerodendron phlomides</i>) contain scutellarcin, pectolinargenin are used as demulcent, convalescent of measles, neglected syphilitic complaints, obesity, diarrhoea, worms.	Parabia et al. (2000)
282	<i>Citrus medica</i> var. <i>acida</i> medicinal uses	Fruit of maphal (<i>Citrus medica</i>) is aromatic, stomachic, tonic, antiscorbutic, distilled water of fruit is sedative, juice refrigerant, astringent, digestive used in jaundice, biliousness and remittant fevers, rind, dysentery.	Parabia et al. (2000)
283	Medicinal importance of <i>Ficus carica</i>	Milky juice from fresh fruit of anjir (<i>Ficus carica</i>) has protease, aminoacid, tyrosine, enzymes, cravin, lipase, caotin, leaf, bitter substance ficusin, bergaptene, latex, ficin, globulin; used as demulcent, aperient, emollient, nutrient, acrid, worms.	Parabia et al. (2000)
284	Ethnomedicinal importance of spanish pepper (<i>Capsicum annum</i>)	Useful parts are fruits and resin which contain capsaicin, capsaisin, selanine, volatile oil and fatty acids. Fruit acts as stomachic, rubifacient, desiccant, carminative, stimulant and local irritant; cures sore throat. Resin is used for massaging rheumatic joints and inflammation.	Parabia et al. (2000)
285	Medicinal uses of <i>Ficus bengalensis</i>	Stembark, milky juice, young bunds, aerial roots of vad (<i>Ficus bengalensis</i>) contain tannin, wax, caouhouc, oil, albuminioids, fibre are used in pains, rheumatism, lumbago, sores, ulcers, toothache, dysentery, diarrhoea, diabetes, abscess, gonorrhoea.	Parabia et al. (2000)

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286	Medicinal uses of <i>Ferula narthex</i> : <i>F.alliaceae</i> , <i>F.asafoetida</i> , <i>F.foetida</i> , <i>F.scorodosona</i>	Aromatic gum resin of hingra (<i>Ferula narthex</i>) obtained by incision from root has volatile oil, allyl persulphide and two terpenes, malic acid, acetic acid, formic acid, valerianic acid and is used as stimulant, antispasmodic, expectorant and slightly laxative and carminative used in bloats for expelling gas from rumen, also used as flavouring agent, valuable in nervous disorder, flatulent colic and spasmodic afflictions of the bowl.	Parabia et al. (2000)
287	Medicinal importance of <i>Cassia</i>	Seed, leaf, root contain glucoside, emodins they are used as antifungal, laxative, skin diseases maturant and anodyne action, mucilaginous, leprosy, psoriasis, gout, sciatica in joints and snake bites.	Parabia et al. (2000)
288	Medicinal properties of negro coffee (<i>Cassia occidentalis</i>) (<i>Cassia fistula</i>)	Leaf, seed and root and medicinally valuable parts and act as purgative, ferbrifuge, antiperiodic, cures cough and skin diseases. It also cures neuralgia and dropsy.	Parabia et al. (2000)
289	Medicinal uses of <i>Cassia fistula</i>	Root bark, root, leaf and fruit are medicinally important. Root bark, leaf and seed are used as purgative, laxative and cures, pustules, rheumatism, fever, heart diseases, retained excretions, bronchitis, belousness, ringworm.	Parabia et al. (2000)
290	Ethnomedical properties of tanners <i>Cassia</i>	Roots, stembark, leaf, flower and seed are principally used. Stem bark is used as astrigent, tonic and cures fever and urinary diseases. Leaf is used as antihelmenthic, laxative, prolapse of uterus or vagina. Seed acts as refrigerant, attenuant and cures conjunctivitis and rheumatism.	Parabia et al. (2000)
291	Medicinal properties of ajowan	Fruit and seed are medicinally valuable which contain searoptin, thymine, thymol. Seed acts as antihelmenthic antiseptic stimulat, carminative, stomachic aromatic, antispasmodic. Used against flatulence, indigestion, colic, atonic dispepsia, diarrrohea, choleara, hysteria and profuse expectoration in bronchitis.	Parabia et al. (2000)
292	Medicinal properties of lajala	Leaf and seed of lajala (<i>Biophytum sensitivum</i>) are useful parts used as stomachic and act against gomorrhoea, lithiasis, diabetes and asthama.	Parabia et al. (2000)

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293	Medicinal properties of papaya (<i>Carica papaya</i>)	Fruit, seed and milky juice are medicinally valuable which contain papain and alkaloid, namely carpaine, glucoside-carposide, plant contain saponin and seed-carpicimine. Juice, seed and pulp of green fruit has antifertility effect. Acts as laxative and diuretic. Ripe fruit heals habitual constipation, piles dispepsia.	Parabia et al. (2000)
294	Ethnomedical use of spreading hog weed	Plant and root of gudhparna (<i>Boerhavia diffusa</i>) are the useful parts containing large quantities of potassium nitrate, and alkaloid, namely punarnavine acts as diuretic, purgative, laxative, anthelmintic, expectorant, febrifuge and cures asthma, kidney ailments, dropsy, jaundice and enlargement of liver.	Parabia et al. (2000)
295	Medicinal use of khattari	Plant contains alkaloids, carbohydrates, sterols, anthocyanins, terpene and flavanoids used as expectorant, emmenagogue, febrifuge and alterative. Cures rheumatism and skin diseases especially. Poultice of leaves effectively cures gout.	Parabia et al. (2000)
296	Medicinal importance of kachra (<i>Capparis aphylla</i> , <i>Capparis decidua</i>)	Plant root, bark and fruits of kachra (<i>Capparis aphylla</i> , <i>Capparis decidua</i>) are the useful parts which contain beta sitosterol, capric acid, glucocapparin, alkaloid, namely L-stachydrine. Root bark acts as astringent and alterative and cures rheumatism, gout, cough, dropsy and palsy. Plant acts as stimulant laxative, counter irritant and heals boils, cures eruptions, joint diseases and used as antidote to poison.	Parabia et al. (2000)
297	Medicinal value of lemon grass	Essential oil contained in the plant is the important parts used for curing diarrhoea, colic, flatulence, fever, catarrh, gastric irritability.	Parabia et al. (2000)
298	Medicinal uses of <i>Canna indica</i>	Rhizome and fruit, essential parts contain alkaloids, fats, gum and starch. Fruit acts as diuretic diaphoretic and demiluent. Seed juice relieves earache cures fever dropsy, dyspepsia. Its stock is cut into pieces boiled with rice water and given as antidote to poisonous effects produced by eating poisonous grasses.	Parabia et al. (2000)

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299	Medicinal properties of pigeonpea	Seed and leaf are essentially used owing to the presence of globulins cajanin, canejanin, nitrogenous matter and carbohydrates. Seed is used against snake bite, Its poultice reduce swelling. Leaf juice with salt cures jaundice and leaf and seed paste applied over mammae to check milk secretion.	Parabia et al. (2000)
300	Meicinal importance of Krishna chura	Leaf, bark and flower are the medicinally important parts. Fresh leaves in post-seeding stage contain hydrocyannic acid that acts as stimulant, emmenagogue and purgative. Bark acts as emmenagogue, abortifacient. Flowers aids in healing bronchitis, ashthma and malaria.	Parabia et al. (2000)
301	Cinnamomum cassia, C.aromaticum, C.sinense-medicinal user	Stembark of dalchini (Cinnamomum cassia) used as antispasmodic, aromatic, stimulant, haemostatic, astrigent, antiseptic, stomachic, germicide oil is used as astringent, vascular nervine stimulant, aromatic and also used for dyspepsia, flatulence, diarrhoea, vomiting, toothache, paralysis of tongue.	Parabia et al. (2000)
302	Medicinal use of caronda (Carissa carandas)	Fruit, stembark, leaf and root are important parts fruit acts as antiscorbutic, stomachic, refrigerant and digestive. Root is used as antihelmenthic and commonly used in curing fever.	Parabia et al. (2000)
303	Medicinal uses of Aloe vera	Useful parts of Aloe vera are pulp, root, dried juice of leaf and the entire plant.Acts as emmenagogue, anthelmentic, purgative, stomachic, acts against constipation, cough, nervous diseases, colics, burns, scalds,dyspepsia, menorhoea. It improves fertility.	Parabia et al. (2000)
304	Medicinal use of centenary plant	Roots, seed, gum of barakhawar (Agave americana) principal parts used for medicine. Roots act as diuretic, anti-syphilitic, while sap acts as laxative, diuretic, emmenagogue, antiscorbutic and totally used as tonic and poultice. The active ingredients are sugar yielding alcohol, agavose, saponins, steroids.	Parabia et al. (2000)
305	Medicinal importance of groundnut	Seed and nut oil of mungphali (Arachis hypogea) are the useful components of the crop. Mainly palmitic acid, oleic acid are present and are nutritious, aperient, emollient and cures tympany and relieves constipation in cattle.	Parabia et al. (2000)

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306	Medicinal properties of maharuk/tree of heaven	Leaf and stem bark of accva , maharukh (<i>Ailanthus excelsa</i>) are used owing to the presence of ailantic acid which is bitter used as tonic, carminative, febrifuge and stem bark is expectorant, anthelmintic, antispasmodic and hence used in dyspepsia and bronchitis.	Parabia et al. (2000)
307	Medicinal uses of onion	Useful parts of onion (<i>Allium cepa</i>) are bulb and seed which contain volatile oil and mucilage. Bulb acts as stimulant, diuretic, expectorant, aphrodisiac, carminative, emmenagogue are used in prolapse of uterus/vagina to control blood cholestrol and also used in inducing animal to heat.	Parabia et al. (2000)
308	Medicinal importance of <i>Apium graveolens</i>	Root and seed of <i>Apium graveolens</i> are the useful parts. It contains sulphur, poisonous principle, glucocide, apiin, volatile oil, albumen, mucilage and salts. Seed act as stimulant, cordial, tonic, carminative while root acts as alterative, diuretic, emmenagogue, lithotriptic and used against colic, bronchitis, asthma, liver and spleen diseases, flatulence and tympany.	Parabia et al. (2000)
309	Ethnomedical use of bakla	Gum and bark of the bakla, <i>Anogeissus latifolia</i> is useful. Important constituents of the plant are gum and tannin. Poultice of the plant is used against scorpion sting/snake bite. Bark is used as astringent and used to cure chronic diarrhoea and liver complaints.	Parabia et al. (2000)
310	Medicinal uses of <i>Citrullus colocynthis</i>	Bitter principle of indrayani (<i>Citrullus colocynthis</i>), colocynthin, glucoside, hydrocarbon saponin, root has alpha eleaterin, saponin, tannin and is used as astringent, diuretic, purgative, bitter tonic, anthelmintic, jaundice, ascites, urinary diseases, rheumatism, snake bites, scorpion stings, dysentery, diarrhoea, epilepsy, inducing conception.	Parabia et al. (2000)
311	Medicinal use of garlic	Useful parts of garlic (<i>Allium Sativum</i>) are bulb, tuber, oil that contains mucilage, volatile oil. Bulb is carminative, diuretic, aphrodisiac, expectorant, stimulant and used in curing cough, fever, rheumatism, to control blood cholestrol and to control ring worm.	Parabia et al. (2000)

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312	Ehnomedical cure for veterinary diseases with Aegle marmelos	Fruit of baclaripal (Aegle marmelos) is aromatic,used in habitual constipation, chronic dysentery, dysppsia. Unripe fruits are used as stomachic demulcent. Pulp is antipyretic, antiscorbutic while root and stem bark only act as antipyretic. Aegelin is used in the treatment of bronchial spasms.	Parabia et al. (2000)
313	Ehnoveterinary disease management	Useful part of alpinia galanga is rhizome which contains compheridine, galangin, alpin, essential oil, methyl cinnamate, camphor. Used as expectorant, stimulant, carminative, stomachic and hence used against rheumatism, fever, cattarh, sorethroat.	Parabia et al. (2000)
314	Medicinal use of dita bark	Stembark, leaf and milky juice of dita bark are used against diarrhoea, dysentry and snake bites. Milky juice is applied on ulcers for cure.The active ingradient present are ditamine, echitamine, alstonine, echitamidine.	Parabia et al. (2000)
315	Medicinal importance of lovelies bleeding	Seeds and plant of contain fatty oil which is used as astringent, demulcent, diuretic and hence acts against diarrhoea, dysentry, externally emollient on ulcers in throat and mouth.	Parabia et al. (2000)
316	Ehnomedical importance of Amaranthus	Plant, stem, root and leaf of Amaranthus are used and contain protein and iron. Leaf and root acts as laxative, emollient, while root alone acts as galactagogue. Used against gonorrhoea, eczema, colic. Poultice prepared from plant controls boils and burns.	Parabia et al. (2000)
317	Medicinal use of: Elephant foot yam	Useful parts are root, tuber/corm and seed that contain mainly acrid juice. Tuber is used astonic, stomachic, restorative, carminative and acts against piles, dysentry, swellings, rheumatism, while root is used as emmenagogue and acts against opthalmia.	Parabia et al. (2000)
318	Ethnoveterinary importance of Cashew nut	Stembark, fruit, seed, spirit and oil of cashew nut generally acts as vermicide, insecticide, purgative while nutoil is used as irritant, rubifacient and generally used against diarrhoea, cough, and leprosy. Principal constituents are cardol (acrid oil), anacardic acid.	Parabia et al. (2000)

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319	Medicinal properties of <i>Fagonia cretica</i> , <i>F.schweinfurthii</i>	Plant, leaf of damahan (<i>Fagonia cretica</i>) have harmine, Triterpenoids that are used as astrigent, tonic, febrifuge, antiseptic, dropsy, delirium, and prophylactic against against smallpox.	Parabia et al. (2000)
320	Ethnoveterinary importance of sitaphal	Every part is medically important. Leaf and fruit contains amorphous alkaloid which is anti bacterial, pediculocidal, astrigent, vermicide and insecticide; seed contains acrid principle that act as pediculocidal and detergent. Crushed leaf cures tympany, bloat, foot and mouth disease, dewormer, dressing on wound with maggots while leaf juice is fed on broken horns.	Parabia et al. (2000)
321	Medicinal use of khair	Bark of the plant, khair (<i>Acacia catechu</i>), is used as astrigent;ripe pods are used in curing constipation while unripe pods are used in curing diarrhoea, wounds and ulcers.	Parabia et al. (2000)
322	Medicinal uses of <i>Cicca acida</i> syn <i>Phyllanthus acidus</i>	Root bark of <i>Cicca acida</i> contains tannins, saponins, gallic acid, crystalline substance, vitamin-c. Fruit is used as astrigent, root as cathartic leaf and root are used as antidote to viper venom. ()	Parabia et al. (2000)
323	Medicinal uses of <i>Chenopodium ambrosioides</i>	The <i>Chenopodium ambrosioides</i> contain essential oil, saponins, albuminoids that are used as anthelmintic, carminative, stimulant, antispasmodic, aromatic and laxative.	Parabia et al. (2000)
324	Medicinal uses of <i>Chenopodium album</i>	Plant and leaf of <i>Chenopodium album</i> contains essential oil, minerals, carotene, vitamin-C. Used as anthelmintic, laxative and also for round worms.	Parabia et al. (2000)
325	Medicinal uses of <i>Centella asiatica</i>	Plant and leaf of brahmamanduki (<i>Centella asiatica</i>) contain bitter substance-hydrocytin, resin, asorbic acid, glucoside, asiaticoside, essential oil, fattyoil sitosterol, tannin. Used for skin diseases, leprosy, leaf for improving memory, syphilis both internally and externally.	Parabia et al. (2000)
356	Medicinal uses of <i>Celastrus paniculatus</i>	Stembark, seed, leaf and oil of malakanguni (<i>Celastrus paniculatus</i>) that contain alkaloid, glucoside, coloring material, seed oil, alkaloid panicualtine and celastrine. Used as rheumatism, leprosy, gout, various fever, paralysis and beriberi.	Parabia et al. (2000)

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327	Medicinal uses of <i>Cedrus deodara</i>	Wood, bark and leaves of deodar (<i>Cedrus deodra</i>) contain alow-resin, turpentine, atalntone, sequiterpenes like himachalol. Wood carminative bark astringent, febrifuge. Alkaloid extract of stem anticancer activity in human epidermal carcinoma of throat. Used in remittent and intermittent fever, diarrohoea and dysentery. Turpentine applied to ulcers and skin diseases.	Parabia et al. (2000)
328	Medicinal use of rati/gunja	The principal ingredients of rati/gunja (<i>Abrus precatorius</i>) like abrin,abrine, glucoside,abrain in leaf, seed,root stembark are used in curing cough, sore throat, tympany, bloat, in dropping placenta, and specifically it is root is used as substitute to licorice.	Parabia et al. (2000)
329	Medicinal importance of Mexican poppy	Root, seed and flower of brahmadundi (<i>Argemone mexicana</i>) are the useful parts which contain alkaloids like barberine, protopine and argemone oil. Seed is used as laxative, emetic, expectorant and demulcent. Oil is used as purgative while root is used as alterative. The yellow juice prepared from it cures dropsy, jaundice and cutaneous infections.	Parabia et al. (2000)
330	Medicinal use of kikar	The stem bark, gum, leaf, seed, fruit pods of kikar (<i>Acacia arabica</i>) are used in curing most of the general ailments like cough, chronic diarrhoea, dysentery, passive haemorrhages of cattle, sheep,goats, etc. Plant is usually used as alternate feed and fodder during drought. Also bark is crushed and fed in blindness in sheep/goats.	Parabia et al. (2000)
331	Medicinal use of <i>Aerua lanata</i>	The principal constituents of gorakhganja (<i>Aerua lanata</i>) and root like b-sito sterol, palmitate, a-amyrin act as diuretic, antihelmentic, demulcent and hence used in curing headache, lithiasis and cough.	Parabia et al. (2000)
332	Ethnomedicinal use of bokat	Only seed is important part containing lupeol which is used as diuretic. Seed paste cures ulcers and inflammed parts.	Parabia et al. (2000)
333	Ethnomedical use of khakali kuppi	Leaves, root, stem and flowers of the plant khakali kuppi (<i>Acalypha indica</i>) are generally used as cathartic, anthelmintic, expectorant, emetic, anodyne, hypnotic and laxative.	Parabia et al. (2000)

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334	Medicinal importance of shatavari	Root and leaf are important parts of Satavari, Shahakul (<i>Asparagus racemosus</i>) containing asperagin, mucilage and saccharine matter, used as refrigerent, demulcent, aphrodisiac, galactagogue, anti diarrhoeal, anti spasmodic and also used as dewormer and cures maggot wounds.	Parabia et al. (2000)
335	Medicinal use of latjira	The plant, latjira, chirchita (<i>Achyranthus aspera</i>), has insecticidal properties and used as local anaesthetic, purgative, anodyne, astringent, alterative antiperiodic. It is used for leprosy, cough and obesity.	Parabia et al. (2000)
336	Ehnomedical use of mitha zahar	Alkaloid, aconitine, pseudo-aconitine napelline present in root and leaves of mitha zahar (<i>Aconitum chasmanthum</i>) act as antidiabetic, antiphlogistic, antiperiodic, diaphoretic, diuretic, also used as narcotic and sedative. As antipyretic, when used in large dose act as powerful poison.	Parabia et al. (2000)
337	Curing common veterinary diseases by Adhatoda vasica	The active substances like alkaloids, vascine, adhatodic acid present in leaves, root, stem bark and flowers of the plant - adosa, basak (<i>Adhatoda vasica</i>), are expectorant, diuretic, antispasmodic and hence used in curing cough, asthma, bronchitis.	Parabia et al. (2000)
338	Medicinal uses of bhang, charas, and ganja	Plant and leaves contain cannabinol, cannabideol, canbigerol, cannabidioilic acid and resins. They act as intoxicants, stomachic, antispasmodic, analgesic, narcotic, stimulant, aphrodisiac and sedatives. When used in large doses causes mental exaltation, hallucination and loss of memory.	Parabia et al. (2000)
339	Ehnomedical use of Abutilon indicum	The leaves of kikar (<i>Abutilon indicum</i>) plant are used as demulcent, aphrodisiac, laxative, diuretic, pulmonary sedative and seed is used as laxative, expectorant, demulcent. Generally the seeds of this plant are used in curing chest infections, gonorrhoea and urethritis.	Parabia et al. (2000)
340	Medicinal uses of Lawsonia inermis, L.alba, L.spinosa	Bark, leaf, stem bark, flower and seed of Lawsonia inermis contains lawsone, hannotannic acid, resin, glucoside that are used as alterative, sedative, astringent, refrigerant, soporific, deodorant, diuretic, jaundice, enlargement of spleen, bruises, sprain inflammations, burns, menorrhagoea.	Parabia et al. (2000)

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341	Medicinal uses of <i>Helecteres isora</i>	Stembark, root juice, fruit, seed of morphali (<i>Helecteres isora</i>) contain tannin, is used as astringent, demulcent, anodyne, antigalactagogue, diarrhoea, root juice for diabetes, empyema, snake-bite, stomach trouble, scabies.	Parabia et al. (2000)
342	Medicinal uses of <i>Heliotropium indicum</i>	Plant, leaf of hastisunda (<i>Heliotropium indicum</i>) contain alkaloids, tannins, indicine, echinatin, supinene, leleurine, heliotrine and are used as anodyne, abortifacient, diuretic, boils, sores, gum boils, pimples, sore throat, ring worm, rheumatism, bronchitis, cough.	Parabia et al. (2000)
343	Medicinal uses of <i>Hemidesmus indicus</i>	Root, rootbark and root juice of magrabu (<i>Hemidesmus indicus</i>) that contain volatile oil, hemidesmine, coumarin, stearoptin, saponin, resin acid, glucoside, sterols, tannins are used as alterative, diaphoretic, demulcent, diuretic, sudorific, inflammation of urinary passage, blood tumours, cough, dyspepsia, loss of appetite, fever, skin disease, ulceration, syphilis, rheumatism, leucorrhoea, scorpion and snake bites.	Parabia et al. (2000)
344	Medicinal uses of <i>Hibiscus rosasinensis</i>	Root, flower, seed of the plant that contain quercetin, cyanidin, kaempferol are used as emollient, demulcent, emmenagogue, antiinflammatory, refrigerant, aprodisiac, anodyne and laxative, menorrhoea, fever and cough.	Parabia et al. (2000)
345	Medicinal uses of <i>Holarrhena antidysenterica</i> , Syn. <i>Wrightia antidysenterica</i>	Stembark, leaf and seed of <i>Holarrhena</i> contain alkaloids, conessine, kurchine, kurchine, holarramine, conarrhimine, conamine, conessimine, isocondessimine, conessidine, condkurchine, kurchincine and are used as astringent, febrifuge, anthelmintic, bitter tonic, antibacterial, dysentery, intestinal worms, amoebiasis, mucus colitis.	Parabia et al. (2000)
346	Medicinal uses of <i>Ficus glomerata</i> , <i>F. racemosa</i>	Stembark, leaf, rootbark, fruit, milky juice of gular (<i>Ficus glomerata</i>) contain tannin, wax, caouhouc, ash, silica, phosphoric acid. They are used in controlling rinder pest, dysentery, diabetes, bilious affections, menorrhoea, haemoptysis, piles and diarrhoea.	Parabia et al. (2000)

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347	Medicinal uses of <i>Hyoscyamus niger</i>	Leaf, flowering tops and seed of khurasani ajvayan (<i>Hyoscyamus niger</i>) contain alkaloid, hyoscamine, scopalamine, hyosrypikrin and are used as sedative, narcotic, anodyne, antiseptic, digestive, astringent, anthelmintic, antispasmodic, mydriatic, cough, haemoptysis, urinary disorders, asthma, whooping cough, dry cough.	Parabia et al. (2000)
348	Ethnomedical uses of Swallow wart	Root, plant, rootbark, flower juice are essentially used due to the presence of active principle-mudarine, glucosides-calotropine,usenarine and calotoxin. Plant is used as caustic and astringent, cardiac tonic, cardiac tonic, antispasmodic, expectorant and rubifacient and cures leprosy constitutional syphilis, chronic rheumatism, skin diseases, tympany-bloat, foot and mouth disease; heated leaf cures dengue fever.	Parabia et al. (2000)
349	Medicinal uses of <i>Indigofera tinctoria</i> , <i>I.indica</i> , <i>I.anil</i> , <i>I.sumatrama</i>	Plant of nil (<i>Indigofera tinctoria</i>) that contains luc-indigo, indigotin. It is used as stimulant, alterative, deobsruent, purgative, antiseptic, astringent, whoopingcough, asthma, palpitation of heart, lung disease, dropsy, calculus, maintenance of pregnancy, hepatitis, scorpion sting.	Parabia et al. (2000)
350	Medicinal uses of <i>Jatropha curcas</i>	Leaf, rootbark, seed and juice of <i>jatropha</i> contain oil, albumin, caseine, jatrophiacid, curcin, phytosterol and are used as purgative, depurative, antiseptic, lactagogue, haemostatic, styptic, stomachic, astringent, dyspepsia, diarrhoea, bleeding, spongy gum, as poultice on boils.	Parabia et al. (2000)
351	Medicinal uses of <i>Guazuma ulmifolia</i> , <i>G.tomentosa</i>	Bark of rudraksh (<i>Guazuma ulmifolia</i>) that contains b-sitosterol, betulin, fiedelnon-3-acetate is used as sudorific, tonic, demulcent, dry beads are used for high blood pressure.	Parabia et al. (2000)
352	Medicinal uses of <i>Lantana camara</i> , <i>L.aculeata</i>	Plant juice contains essential oil and is used as antiseptic, checks bleeding, diaphoretic, carminative, antispasmodic, tetanus, rheumatism, malaria.	Parabia et al. (2000)
353	Medicinal properties of <i>Holoptelea integrifolia</i>	Stem bark of <i>holoptelea</i> that has mucilage is used for rheumatic swellings.	Parabia et al. (2000)

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354	Medicinal uses of <i>Lepidium sativum</i>	Leaf, root, flower of seed <i>Lepidium sativum</i> that contain aromatic, volatile oil, glucoside, glucotropocol iodine, iron, phosphate and sulphate are used as aperient, diuretic, tonic, demulcent, aphrodisiac, carminative, galactagogue, emmenagogue, stimulant, diuretic, postparturient, uterine tonic, irritation of intestine.	Parabia et al. (2000)
355	Medicinal uses of <i>Leptadenia reticulata</i>	Plant and leaf of <i>Leptadenia reticulata</i> contain tocopherols, phytosterols, stigmosterols, beta sitosterol, gamma sitosterol that are used as stimulant, galactagogue, oestrogenic, eye tonic, astringent, agalactia, prolapse of uterus, vagina, abortion, induce heat, soothen hard milkers, induce milk letting.	Parabia et al. (2000)
356	Medicinal uses of <i>Leucas aspera</i> , <i>L.cephalotes</i> , <i>L.linifolia</i>	Plant, leaf, flower contain essential oils, alkaloids that are used as stimulant, diaphoretic, antipyretic, insecticide, chronic rheumatism, cough, cold, psoriasis, scabies.	Parabia et al. (2000)
357	Medicinal uses of <i>Limonia acidissima</i> , <i>L.crenulata</i> , Syn. <i>Naringi crenulata</i>	Root, leaf and dried fruit of <i>Limonia acidissima</i> contain marmesin, suberosin, suberenol, coumarin, quinolone, sitosterol and are used as purgative, sudorific, antifermentive, colic, epilepsy.	Parabia et al. (2000)
358	Medicinal uses of <i>Linum usitatissimum</i>	Stembark, flower and seed of the plant contain proteins, resin, wax, HCN, glucoside, linamarin and are used as demulcent, expectorant, emollient, diuretic, aphrodisiac, astringent, cordial, cardiac tonic, poultice in gout and rheumatism swellings, irritation of urinary system, gonorrhea, burns.	Parabia et al. (2000)
359	Medicinal uses of <i>Litsea sebifera</i> , <i>L.chinensis</i>	Stembark and leaf of <i>Litsea sebifera</i> contain laurotetanine and are used as demulcent, astrigent, antidiarrhoeal, antidyenteric, aphrodisiac.	Parabia et al. (2000)
360	Medicinal properties of <i>Madhuca indica</i> : <i>M.latifolia</i> , Syn. <i>Bassia latifolia</i>	Plant, leaf, flower and bark of the plant contain alkaloid, gucoside, sapogenin, abscisic acid are used as cooling agent, aphrodisiac, anthelmintic, galactagogue, expectorant, carminative, cough, fomentation in orchitis, piles.	Parabia et al. (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
361	Medical uses of <i>Mangifera indica</i> , <i>M. montana</i> , <i>M. domestica</i>	Fruit, leaf, flower, stem bark, gum of the plants contain vitamins A, B and C, tannin, gallic acid, fat, sugar, gum and are used as laxative, diuretic, diaphoretic, astringent, refrigerant, nourishing, stomachic, antiscorbutic, astringent, antihelminthic, stops bleeding, prolapse of uterus.	Parabia et al. (2000)
362	Medicinal uses of <i>Manilkara kouki</i> , Syn. <i>Mimusops kauki</i>	Bark, seed and root contain tannin of <i>Manilkara kouki</i> are used as tonic, febrifuge, anthelmintic, astringent, ophthalmic, leprosy, delirium, child diarrhoea.	Parabia et al. (2000)
363	Medicinal uses of <i>Melaleuca leucadendron</i>	Bark and leaf of the plant contain essential oil, betulin, friedelin, sitosterol, uvaol and are used as stimulant, analgesic, antispasmodic, psoriasis, eczema, rheumatism, mosquito repellent, choloretic diarrhoea.	Parabia et al. (2000)
364	Medicinal uses of <i>Kirganelia reticulata</i> , Syn. <i>Phyllanthus reticulatus</i>	Leaf, bark and fruit of <i>Kirganelia reticulata</i> contain tannic acid and are used as diuretic, cooling agent, alterative, attenuant, bleeding gums, infant diarrhoea.	Parabia et al. (2000)
365	Medicinal uses of <i>Fumaria officinalis</i>	Stem and leaves of <i>khsetra parpati</i> (<i>Fumaria officinalis</i>) are used as diaphoretic, tonics, emetics, anthelmintic, aperient (laxative), leprosy, syphilis and constipation.	Parabia et al. (2000)
366	Medicinal uses of <i>Gloriosa superba</i>	Tuber and seeds of <i>kalihari</i> (<i>Gloriosa superba</i>) contain gloriosine, superbine, resin, colchicine and are used as anodyne for insect bites, snake bites, scorpion sting, leprosy, skin infection, piles and colic.	Parabia et al. (2000)
367	Medicinal uses of <i>Glycyrrhiza glabra</i>	Peeled root of <i>Jethimadh</i> (<i>Glycyrrhiza glabra</i>) that contains glycyrrhizin, asparagin, sugar, starch, glycyrrhizic acid, resin, gum, mucilage, tannin is used as expectorant, demulcent, laxative, tonic, emollient, cooling agent, diuretic, emmenagogue, scorpion sting, cough, sorethroat, asthma, dysuria.	Parabia et al. (2000)
368	Medicinal uses of <i>Gossypium herbaceum</i>	Seed, stem bark, root bark, leaf, flower of <i>kapas</i> (<i>Gossypium herbaceum</i>) that contain resin, phenols, glucosides, gossypetin are used in lactogenic, nerve tonics, emmenagogue, galactogue, dropping of placenta, increasing fat in milk.	Parabia et al. (2000)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
369	Medicinal uses of <i>Grewia sclerophylla</i> , <i>G.scabrophylla</i>	Root of Pharsia (<i>Grewia sclerophylla</i>) that contains vegetable dye and tannin is used as emollient, for eczema, irritable intestine and bladder.	Parabia et al. (2000)
370	Medicinal properties of <i>Gentiana kurroa</i> , <i>G.Chirayita</i>	Plant, root, rhizome of karu (<i>Gentiana kurroa</i>) contain gentianic acid, pectin, chitin, ophelic acid and are used as tonic, antibilious, stomachic, astringent, antiperiodic, anthelmintic, febrifuge.	Parabia et al. (2000)
371	Medicinal uses of <i>Gardenia gummifera</i> : <i>G.florida</i>	Resinous exudation from the fruit of dikamali (<i>Gardenia gummifera</i>) is used as antiperiodic, cathartic, and antispasmodic, fevers, flatulent, dyspepsia, toothache, expulsion of round worms antihelminthic.	Parabia et al. (2000)
372	Medicinal uses of <i>Foeniculum vulgare</i>	Root, leaf and seed of bari-saunf (<i>Foeniculum vulgare</i>) are used as stimulant, aromatic, stomachic, carminative, emmenagogue, diuretic, purgative, vermicide, fever, burning sensation in passing urine.	Parabia et al. (2000)
373	Medicinal uses of <i>Ficus religiosa</i>	Stembark, stem, root, fruit, seed of pipal (<i>Ficus religiosa</i>) have wax, latex and act as astringent, laxative, cool and refrigerant and alterative, stembark is used for gonorrhoea, ulcers, skin disease, scabies.	Parabia et al. (2000)
374	Medicinal uses of <i>Grewia tiliaefolia</i>	Bark and wood of pharsadhamani (<i>Grewia tiliaefolia</i>) contain mucilage and are used as antidote to poisonous stings and drugs, in opium, poisoning, to remove irritation.	Parabia et al. (2000)
375	Use of Vacha (<i>Acorus calamus</i>) for treating ailments of animals	(i) A powdered mixture of 500 g roots of Vacha 500 g zhonkhra (<i>Artemisia scopuliria</i>), 200 g methi (<i>Trigonella foenum</i>), 200 g ajwain, 100 g saunth (dry ginger) and 100 g black salt has antipyretic/ analgesic effect in cattle. This mixture is administered at the rate of 10 to 20 g twice a day as a nasal spray and topical massage. (ii) A powder mixture of 100 g 'Vacha' roots, 50 g 'ajwain' and 25 g Acacia catechu is applied inside oral/buccal cavity to heal lesions in mouth of cattle. The mixture is given in a dose of 5-10 g twice a day for three days.	Anonymous (2000-2001e)

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376	Nutritive feed for healthy calves	For obtaining healthy calves, the cows are fed with a special tonic prepared with following ingredients. Leaves of palakodi (<i>Leptadenia reticulata</i>) kernel of mango (<i>Mangifera indica</i>), roots of ashwagandha (<i>Withania somnifera</i>) and leaves of malaivembu (<i>Melia azedarach</i>). Each of the ingredients (30 g) are pounded well and administered for 10 days after the animals are inseminated (Pondicherry).	Kunde (2000)
377	Flower of <i>Madhuca indica</i> and cotton bolls feed in distress condition	During summer when green fodder is scarce the fried flowers of <i>Madhuca indica</i> , about 2 kg are fed. Only a few farmers in this region are using this practice. Feeding animals with cottonseed cake is a much more common practice. Farmers believe that feeding cottonboll soaked in water makes separation of butterfat from the animals milk easier. Cottonseed cake has high protein but is unsuitable for young calves because it contains a toxic element. Gossypol. As <i>Madhuca</i> flowers are rich in sugar, they are used even in making country-wine. It is interesting to note that Indian Veterinary Research Institute, Izatnagar, recommends feeding buffalo with <i>madhuca</i> seed (dhodi) cake. This is prepared by soaking the cake in water for 2 hr and then mixing it with an equal weight of wheat straw or wheat bran, salt and jaggery (Vejpura, Savli).	Parmar (1993)
378	Appetite stimulation in animals	Approximately 100 g of white alum is dissolved in water and given to animals which are off feed. Excessive doses produce ulcers in the mouth. This practice is continued for eight to ten days, especially after calving or while recuperating from illness. It is a widely known practice (Gandhinagar, Gujarat).	Bihola (1993)
379	Stress feeds and fodder	Stress feeds and fodders are mostly consumed during the scarcity period. Farmers believe that certain feeds and fodder of this category may cause harm to the animal health hence, they do not prefer to use during normal condition (Vaghada, Patdi Khapat, Una).	Ganeshbhai (1993)
380	Subabul seeds as a food additive	Subabul (<i>Acacia</i> spp) seeds added to livestock's feed, increases milk yields and fat content (Gujarat).	Patel (1993g)

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381	Cactus and other xerophytic plants as livestock feed	There was a severe drought for three successive years during 1986 that forced people to try many kinds of local resources as livestock feed for their animals. Cactus and other xerophytic plants after collecting were cleaned of thorns, chopped into small pieces pounded slightly, and soaked in water and fed to animals (Vaghada, Patdi Khapat, Una).	Ganeshbhai (1993)
382	Grazing of cultivated pea for higher fat content	People (mostly Yadav) facilitate the milch animal for grazing in pea crop cultivated for the purpose when plants acquire a height of 7-8 inches. They believe that this practice increases the fat per cent in milk (Eastern Uttar Pradesh).	Gupta (1993)
383	Feeding of cattle and buffalo with locally available feeds and fodder	Cattle and buffalo are fed paddy straw and mixture of rice and wheatbran and mahua, soaked in water. 200-250 g dry mahua and 100-150g bran per animal is fed (Eastern Uttar Pradesh).	Gupta (1993)
384	Feeding of horsegram (Dolichus biflorus) for reduction of calving interval in cows	A survey conducted in Dhenkanal district of Orissa (involving 212 farmers of villages adjacent to Dhenkanal and Livestock Inspectors of the district) revealed that in dairy cows feeding of horsegram (Dolichus biflorus) is practised by the farmers since long for improvement of fertility status in general and reduction of calving interval in particular. Horsegram tied in a cloth is soaked in water for germination. The germinated horsegram at the rate of 200 g/day/cow is mixed with 100 g of treacle. This mixture is fed to cows which do not come to heat after 4 months of calving. The feeding continues for three weeks. If the cow does not come to heat after that then this mixture is supplemented with 50 g of mineral mixture. The success rate of treatment was found to be 72% as reported by the farmers. (Dhenkanal, Orissa).	Mishra and Dehuri (2002)
385	To initiate feeding of calf during first calving	After the first calving, some cows will desist feeding the calf. They are not able to recognize the calf. Such cases are efficiently handled by villagers. About 25-30 leaves of Premna obtusifolia are collected and soaked in about 10-15 litres of buttermilk. Onion, garlic, jeera, turmeric, chilli and salt are added in equal amount after grinding. Next day the calf is separated from the mother for the entire day. Then the whole process of calving is repeated by pushing and pulling the Premna obtusifolia leaves. During	Prasannayya (1999)

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		he entire process, the cows' eyes will be covered and it is as if the cow was giving birth to the calf again (Though in reality it is the leaves and not the calf). Meanwhile the prepared buttermilk is poured over the calf and it is made to stand next to the mother. After the process of artificial calving, the cloth covering the eyes of cow is removed and calf is pushed near its mother. Because of salty and sour buttermilk, the cow starts licking the body of calf and process of feeding begins automatically. However, it is important that only experts are allowed to perform this pseudo delivery process (Bangalore, Karnataka).	
386	Datepalm as energetic food for bullocks	To increase performance of bullocks that are working intensive, farmers feed them a small amount of dried datepalm (Vejpura, Savli).	Adabhai (1993)
387	Cotton stalk as cattle feed	Rainfed cotton is grown in some parts of Saurashtra. Normally cotton stalks are used as fuel. But it is also used as cattle feed. An inexpensive and high quality feed can be prepared by mixing molasses and salt with pieces of cotton stalk. It has good scope of being utilized as stress feed during drought years in Saurashtra region (Amreli, Gujarat).	Masani (1996)
388	Feeding of cotton bolls to increase fat content of milk	Feeding fresh primordial and immature cotton bolls to dairy cattle reportedly increases butterfat content (Dudhrej, Vadhvan).	Gandabhai (1993)
389	Treatment of constipation in animals	10 g of hing (Asafoetida) is warmed in 250 g ghee and given to the affected animals till cure (Eastern Uttar Pradesh).	Gupta (1993)
390	Treatment for stomach pain in cattle	Bark of pungam (Pongamia pinnata) is dried and a decoction is made . About 350 ml of this decoction is given to the ailing animal per day for 2 days (Dharampuri, Tamil Nadu).	Pandurangan (2000)
391	Treatment of Afara(indigestion)	50 g of leaves and 50 g of fruits of Sonafool are taken and boiled. Then it is mixed into 500 ml of water. This is filtered by cloth and decoction is given twice a day for a week (Eastern Uttar Pradesh).	Gupta (1993)

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392	Treatment for stomach problems	Amaltas seeds are traditionally used as purgative in animals. As it is laxative in nature, it induces purgation in animals by drawing out fluid from intestines. In cases of severe constipation, a mixture of half kg of amaltas (<i>Casia fistula</i>) seeds, 250 g ajwain, 250 g harad, 250 g jaggery and half kg wheat bran are given to the animals.	Anonymous (2000-2001d)
393	Treatment against indigestion of calves	About half litre castor oil is fed to calves suffering from indigestion so that it can pass motion to clear their stomach. Hundred gram of rock salt, dry ginger powder, powder of <i>Andrographis paniculata</i> are mixed together and stored in bottle. This mixture is fed to the animal at intervals (Bangalore, Karnataka).	Venkatramaiah (2000)
394	To ease stomach pains of animals	Rice, cooked and mixed with pumpkin is fed to the animals, along with 10 g of chilli and 10 g of cloves. Besides, back of the animals massaged with castor oil and a heat treatment is given to the animals using copper vessels filled with hot water (Bangalore, Karnataka).	Laxmi (2000)
395	Treatment of indigestion and tympany in animals	Ground coriander seeds mixed with water is fed to animals to treat indigestion and tympany (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
396	Treatment of Afara (indigestion)	Mustard oil is given with feed at the rate of 100 ml/day (Eastern Uttar Pradesh).	Gupta (1993)
397	Treatment of Afara (indigestion)	Turmeric, hemp seeds and ajwain is crushed properly and mixed into 500 g curd. This mixture is given 3-4 times in a day to suffering animal for 1-2 days (Eastern Uttar Pradesh).	Gupta (1993)
398	Treatment of constipation in animals	Well triturated 500 g onion, 250 g garlic, 250 g ajwain, 4-5 lemons, 2 g common salt and 250 g of jaggery are taken and properly mixed and boiled in 1.5 litres of water and cooled. About 400 ml quantity is given per day for 4 day. (Eastern Uttar Pradesh)	Gupta (1993)
399	A cure for gastric problems in cattle by 'Ingi' (<i>Zingiber officinale</i> [Zingiberaceae])	A paste is made up which consists of 10 g each of Ingi (dry ginger), pepper, asafoetida (<i>Ferula asafoetida</i>), and sweet flag (<i>Acorus calamus</i>) in hot water. This extract is administered orally to cattle as a cure for gastric problems (Dindigul, Tamil Nadu).	Ranjan and Sethuraman (1997)

S. No.	Title of ITK	Details of ITK and rationale	Reference
400	Cure for digestive disorders and flatulence in cattle by Vethalai (Piper betle) (betel pepper)	Ten Vethalai (betel) leaves and 20 g of dry black pepper are made into a paste and given orally to cattle as a cure for digestive disorders and flatulence. This is repeated two to three times (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
401	Treatment for adaippan (indigestion)	Tymapany or gastric trouble; difficult to pass the dung; not taking feed are some of the symptoms of indigestion. A handful of leaves of 'periangai' (Andrographis alata) are ground well and diluted with 500 ml of water and administered orally.	Anonymous (2000-2001h)
402	Treatment for constipation	Constipation is quite a common condition in bullocks. This condition is called kabatjiyat. People collect the yellow coloured fruits of the 'harde' (Terminalia chebula) plant and keep them in the sun for two to three days. 250 g of the powder of the dried fruits and one litre of water is administered to the animal. The effects are felt within a day. Too high dose can cause diarrhoea. Harde is a medium size tree and bears fruit in winter. Sometimes people store these fruits for the lean period (Ahmedabad, Gujarat).	Kanabhai (1993)
403	Treatment of gastric problem in cattle	A paste is made up, which consists of 10 g each of dry ginger, pepper, asafoetida and sweet flag (Acorus clamus) in hot water. This extract is administered orally to cattle as a cure of gastric problem (Tamil Nadu).	Rajan and Sethuraman (1997)
404	Treatment for stomach problems	(i) Cusucuta reflexa (whole plant) fumes are given in the troubles of digestive tract infections and any external swellings in animals.(ii) Juice made out of bark of Vihul (Grewia optiva) in a dose of 30 ml twice a day controls worm infestations in newborn animals. Similarly, 100 g ash of pine needle (Pinus roxburghii) mixed with a litre of fresh water kills the worm in animals (Una, Himachal Pradesh).	Lata (2000-2001)
405	Treatment for stomach ailment in cattle with garlic	Garlands of fresh garlic which are put on the neck of the animal,cure stomach ache due to their peculiar odour that stimulates the eructation reflux and is effective in treating stomach ailments (Lahaul valley, Himachal Pradesh).	Verma (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
406	Treatment of Afara with gas problem	200 g well-crushed bhatua and 10 g common salt is fed together to the suffering animal twice a day. People reported that the animal starts rumination after 3-4 doses. Sometimes raddish (<i>Raphanus sativus</i>) is added with this mixture which gives rapid relief to the animal (Eastern Uttar Pradesh).	Gupta (1993)
407	Treatment of constipation in animals	100 g Ajwain (<i>Corum capticum</i>), 250 g jaggery is boiled in 1 litre of water till it becomes half. 250 ml mustard oil is poured in to the solution and mixed thoroughly. The whole suspension is given in 3-4 doses at interval of 3 hrs. It cures the disease. Ajbain is carminative and mustard oil is laxative in nature (Eastern Uttar Pradesh).	Gupta (1993)
408	Treatment of constipation in animals	A solution of 100 g seed powder of amaltas (<i>Casia fistula</i>) dissolved in 500 ml of water is prepared and given orally twice a day for 2-3 days. Amaltas is highly purgative in nature (Eastern Uttar Pradesh).	Gupta (1993)
409	Treatment of afara with gas problem	A mixture of dry ginger, ajwain and mustard oil is prepared and given to the suffering animal (Uttar Pradesh).	Gupta (1993)
410	Mango flowers for cure of stomach problems of horse	If horse suffers from stomachache, gastric trouble, or refuses feed then it is given a solution of 100 g powdered inflorescence (flowers) of mango (<i>mangifera indica</i>) and water. This treatment gives relief to the animal. Alternatively 50 g seeds of teak (<i>Tectona grandis</i>) are powdered, mixed with water and then given to the horse. This is a traditional practice followed by horse keepers of North Gujarat (Sabarkantha, Gujarat).	Havabhai (1997)
411	Treatment for stomach ailments in animals	Long grasses found in fields are boiled and are fed to animals suffering from stomach ailments and also sarson oil is known to cure stomach ailments as it is a rich source of energy and has high fat soluble vitamins enabling to control constipation and thereby curing stomach ailments. (Lahaul Valley, Himachal Pradesh).	Verma (1998)
412	Treatment of afara (indigestion)	100 g pounded leaves of gold mohar (<i>Delonix regia</i>) are given with small quantity of water 2-3 times a day. Gold mohar leaves are highly purgative (Eastern Uttar Pradesh).	Gupta (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
413	Treatment of afara(indigestion)	50 ml oil of kahu (<i>Terminalia arjuna</i>), 50 g fruits of goom, 100 g peel of batua (<i>Beneincara hispida</i>) and 100 ml lime water are mixed thoroughly. Later 500 ml of water is added to this solution. The resulted suspension is given to suffering animals twice a day till the animals get relief (Eastern Uttar Pradesh).	Gupta (1993)
414	Indigenous treatment for swollen abdomen in cattle	200 ml of mustard or wild apricot oil is fed to cattle suffering from swollen abdomen because the germicidal properties of the oil cures the ailments effectively (Kinnaur, Himachal Pradesh).	Verma (1998)
415	Apple alleviates acidity	Apple can cure acidity and headache. Pieces of apple coated with salt are consumed on an empty stomach for fifteen days cures persistent headache. To cure acidity, keep ten g cloves and one chopped apple together for ten days, after which the cloves are removed. These cloves can be taken with tea to alleviate symptoms of acidity (Una, Himachal Pradesh).	Kaur (1998a)
416	Treatment of afara (indigestion)	Powder of kali mirch (about 50 g) is mixed with 100 ml mustard oil and given once a day till the animal is completely cured (Eastern Uttar Pradesh).	Gupta (1993)
417	Treatment of bone fracture	Bhavanbhai has been treating animal fractures for the last 22 years. He aligns the broken bone manually and then massages the affected part with sesame oil or iodex. The area is massaged gently with sesame oil daily for the next five days (Surat, Gujarat).	Patel (1994b)
418	Treatment for swollen and painful joints	Bullocks suffer from inflammation and pain of joints due to excessive pressure of load and exertion. This may cause limping or even prevent the animal from walking. Zalabhai prepares a balm from drumstick (<i>Moringa</i> spp.) tree and ghodakhundi. He pounds 100g bark of drumstick and mixes it with 100g of pounded ghodakhundi plant. This mixture is then applied to the affected joints twice or thrice a day for three days to bring relief to the animal (Junagadh, Gujarat).	Zala (1997)

S. No.	Title of ITK	Details of ITK and rationale	Reference
419	Treatment of dislocated joints	Because of sudden jerks, the leg bones of animals often get dislocated. This is characterized by inflammation in the joints and the animal begins to limp. To treat dislocated joint, farmers in some parts of Sabarkantha district massage the affected part with camphor mixed in sesamum oil. Four pellets of camphor are added to about 500 g oil in a vessel and heated. It is then allowed to cool and filled in a bottle. Oil is massaged on dislocated part of body for about 5-10 minutes. The said treatment is given twice a day for about one week (Sabarkantha, Gujarat).	Patel (1995c)
420	Treatment of fractured bone	Charcoal is prepared by burning a dry stem of kerada (<i>Caparis decidua</i>). The charcoal is powdered and mixed with pure ghee and the paste is applied over the fractured bone of the animal. This sets the fractured bone (Bhavnagar, Gujarat).	Khatana (1997a)
421	Treatment of broken horn	Fresh branches of shimala (<i>Bombax ceiba</i>) tree are stripped of their bark, crushed, and mixed with flour of nagli (<i>Eleusine coracana</i>) grain. One part of shimala and two parts of nagli are made into a semi-liquid paste. Long strands of human hair are tied around the broken edge of the horn. Then the preparation is pasted over the hairs and a bandage tied over this. It is left undisturbed for 20 to 30 days (Kavachiya, Valiya).	Chaudhari (1993)
422	Treatment to mend fractures	The animal suffers from immense pain due to fractured bones. Area around the broken bones becomes swollen and as the bones rub against each other, the pain is aggravated. Gamabhai uses bark of khakhra (<i>Butea monosperma</i>), seeds of guwar (<i>Cyamopsis tetraonoloba</i>) for making a liniment for bone fracture. The injured animal is given two eggs to eat. Then it made to lie down and the fractured bone is first set in the right position. Thereafter, a paste made out of 200 g of green bark of khakhra and 200 g seeds of guwar is smeared on the affected area, then bandaged and supported with thin bamboo strips around the fractured bone. The bandage is kept on for twenty one days. Meanwhile the bone heals completely (Kheda, Gujarat).	Baraiya (1999)

S. No.	Title of ITK	Details of ITK and rationale	Reference
423	Curing joint pains	A mixture of 250 g varoiyali (<i>Foeniculum vulgare</i>), 50 g turmeric powder, and 500 g dalda ghee is prepared. This, when given to the animal to drink, loosens the stiffness in the body of the animal and relieves joint pains. Half this dosage is prescribed for very young animals (Sabarkantha, Gujarat).	Rawal (1998)
424	Cure of sprains or swelling in the knee joint	A handful of leaves of peenarisangu (<i>Clerodendrum inerme</i>) are ground with water and administered orally. The same plant residues should be used for smearing over the knee joint. ()	Anonymous (2000-2001c)
425	Treatment for bone fracture	A paste of fenugreek, locally known as methi (<i>Trigonella foenum graecum</i>) seeds, pounded into flour, and water is applied to the area of the fracture and bandaged. Bamboo strips are fastened on for support and the preparation is left undisturbed for 15-20 days. Fenugreek is usually grown with lucerne during the winter. The seed is treasured for its medicinal qualities (Panchmahal, Gujarat).	Patel (1992g)
426	Turmeric powder and egg for treatment of fractures	A mixture of two spoonful of turmeric powder and a hens egg (without the shell) is applied on the site of the fracture and covered with five to seven leaves of gundi (<i>Cordia gharaf</i>). A bandage is then tied around the affected area. The treatment shows positive effects within five to seven days; it is also used for fractures in human beings (Valsad, Gujarat).	Kalubhai (1993)
427	Healing of bone fracture	A paste is prepared by mixing 200 g turmeric powder, 500 g human hair and 250 to 500 g til (<i>Sesamum indicum</i>) oil. This paste is applied to the affected area. Then strips of bamboo are placed on the fractured bones and a bandage is tied. After three days, the bandage is changed. The second bandage may be removed after one month. With the application of the paste and bandage, the gap in the cracks or bone fracture gets filled up, and the bones get joined (Banaskantha, Gujarat).	Nandasaniya (1998)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
428	Treatment of fracture by use of khakhara	For treating fractured animals, a paste made from 500 g bark of Khakhara (<i>Butea monosperma</i>) and 500 g seed of guvar (<i>Delonix elata</i>) is prepared and applied to the affected area. Strips of bamboo are prepared and placed on fractured bones for 10-12 days. Over and above, 2 eggs are fed to the ailing animals (Kheda, Gujarat).	Barayia (1999)
429	Treatment of bone fracture in animals	A lotion is prepared from harjozan herb and sakar mud (clay). This lotion is applied on the fractured bones and it is tied/plastered to make the part immovable. This method has amazing efficiency (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
430	To stimulate the virility and reproductive performance of bulls by onion (<i>Allium cepa</i>)	A mixture of 250 g onion bulbs and 250g solidified jaggery (unrefined brown sugar made of palmwine derived from fruit of the toddy palm (<i>Borassus flabelifer</i> L.) is pounded into a dry paste. This is administered orally each morning for ten consecutive days to stimulate the virility and reproductive performance of bulls (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
431	To relieve pain and swelling of knee cap area in cattle by karu-oomathai, or 'Oomathai'. (<i>Datura metal</i> L.).	A seed paste of karu-oomathai mixed with water is applied to the patella (knee cap) area in cattle, to relieve pain and swelling. The paste is also used to treat eczema and other skin problems (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
432	Reduction of pain and swelling in the joints of cattle by Puli (<i>Tamarindus indica</i>)	The leaf paste is applied as a poultice to reduce pain and swelling in the joints of cattle (Dindugul, Tamil Nadu) 'Puli' (<i>Tamarindus indica</i>).	Ranjan and Sethuraman (1997)
433	Treatment of harna (Trypanosomiasis)	10-20 g of turmeric is grated and soaked in water. This paste is fastened over around the horns and later on bending with red hot iron rod is done (Eastern Uttar Pradesh).	Gupta (1993)
434	Treatment to cure swelling in udder	To treat swelling in udders of dairy cows and buffaloes pulverised quartz stones are passed through a muslin cloth. After that, it is mixed with butter and smeared over the udder. It is applied twice a day and continued till the animals get-relief (Dharamapuri, Tamil Nadu).	Muniapa (2000)

S. No.	Title of ITK	Details of ITK and rationale	Reference
435	Treatment of hadda (Antinomycosis)	At primary stage of formation, a milky substance of Sehur is applied on the swelling, it checks the broadening of hadda. Failing which a semi warm decoction made of Madars' root (<i>Calotropis gigantia</i>), tobacco leaves and common salt is sprinkled upon the hadda for 2-3 days. It softens the stone and later it is opened by moving a hot iron rod crossward. After pressing it is washed by using alum water. Crushed leaves of ganiyar (<i>Premna integrifolia</i>) are filled in it. Besides, preventing bacterial growth in wound, it facilitates healing very fast (Eastern Uttar Pradesh).	Gupta (1993)
436	Remedy for swollen udders	Sometimes, due to wrong methods of milking or dirt on milker's hands, the udders and teats are injured, resulting in reduction of milk, pus in the milk and swelling of the udder. Some farmers use the juice of piloodi (<i>Salvadora prsica</i>) leaves to cure this condition. The juice is applied on the swollen udders twice a day. The swelling disappears within two days (Junagadh, Gujarat).	Dhanani (1997)
437	Treatment of sick calves by kuvech	Only two or three mature and dried fruits of kuvech (<i>Mucuna</i> spp) are soaked in buttermilk (200-300 ml) and shaken well so that fine hair of the fruits drop into buttermilk. Fruits are removed and butter milk stirred well so hairs get mixed. It is given to the animal either in morning or evening with feeds. The calf is cured within 24 hrs of the treatment. It is an inexpensive method, its use has been widespread for long. About half of the villagers use this method of treatment. The kuvech (<i>Mucuna</i> spp) plant is a creeper. It bears bunches of brown fruits which have tiny hair on them. Till the fruit is green, it is painless to touch. When dry, it causes severe itching on contact with the skin (Valsad, Gujarat).	Garasia (1994)
438	Treatment of Jaharbad (black quarter)	Bending of red hot iron rods on the skin surrounding the swelling portion is done. This practice is supposed to be very effective against many swelling and pain causing diseases (Eastern Uttar Pradesh).	Gupta (1993)
439	Treatment of swollen and painful joints in cattle	The fruit of vilvam or vilva (<i>Bel</i> or <i>aegle marmelos</i>) is roasted and the contents carefully removed. A paste is prepared with water and used as a poultice to treat the swollen and painful joint in cattle (Tamil Nadu).	Rajan and Sethuraman (1997)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
440	Treatment of boils and sores	The leaf paste of avarai, a climbing herb (<i>Lablab purpureus</i>) is applied to boils and sores to extract pus (Tamil Nadu).	Rajan and Sethuraman (1997)
441	Use of erukku to make the cattle more alert and active	A handful of leaves of erukku (<i>Calotropis gigantea</i>), an erect, branched herb or subshrub with milky latex are crushed and given orally to cattle to make them more alert and active (Tamil Nadu).	Rajan and Sethuraman (1997)
442	<i>Calotropis</i> reduces swelling	Swelling on any part of the cattle's body occurs due to injury, microbial infection, or intake of any poisonous compound. This swelling can also cause problems in other system of animal. Like, the digestive power of the animal decreases and blood circulation also decreases. The swelling is prominent in the areas below the knee joint of the animal and also in the neck region. Swelling on the leg causes the animal to limp slowly. Two kg of bark or leaves or leaves of akada (<i>Calotropis gigantea</i>) is boiled and made into paste. This paste is smeared on the swollen region after cooling. This remedy is so effective that if the paste is smeared just once, the swelling recedes within two to three days (Banaskantha, Gujarat).	Nandasaniya (1999)
443	Treatment of snake bite and infectious wounds by metha plant (<i>Aconitum bulfourii</i>)	Metha is very poisonous and is used to cure snake bite. A paste is made from the tuber and this is applied to the affected area. It is equally effective in curing wounds in domestic animals (Central Himalayas of India).	Maikhuri et al. (2000)
444	Use of karela for healing wounds	Karela (<i>Momordica charantia</i>) is used to cure wounds infested by external parasites. Karela is cut into small pieces without peeling the skin and the pieces are crushed till the paste becomes soft like an ointment. The paste is stored in a separate container. The affected parts are cleaned and buffalo milk is poured on them. The milk lures the worms to come out on the surface. These are picked and removed. The wound is cleaned with cloth or cotton and the karela paste is applied on it. The treatment is repeated twice a day in the morning and evening (Mehsana, Gujarat).	Parmar (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
445	Attracting worms out of wound	Sometimes worms are found in wounds of the animals. Blood and pus comes out of the wound. Irritation may also occur. It is quite painful to the animal. Application of sugar crystals helps, makes worms come out. Worms are then removed and the wound is cleaned. Bark of baval (<i>Acacia nilotica</i>) is cut into pieces and boiled in water. The decoction is allowed to cool and then poured on the wound. A spun of cotton lint dipped in castor (<i>Ricinus communis</i>) seed oil is put on the wound. The treatment is repeated for 5-7 days for complete healing of the wound. Tannin present in the bark of baval probably helps in healing the wounds. Castor oil has emolient, antiseptic and soothing properties and helps in effective healing (Banaskantha, Gujarat).	Chauhan (1996)
446	Wound healing by cashew oil	Application of cashew shell oil to cattle wounds helps in fast healing of wounds by acting as antiseptic and softening the wound site. Cowdung application also has disinfectant properties and helps in wound healing in cattle (Karnataka).	Anonymous (1999c)
447	Goat droppings for healing of wounds	About three to four droppings of goat and one or two leaves of avariyo or aval (<i>Cassia auriculata</i>) are pound together and the mixture applied daily over the animal's wound. The wound is healed within a week. Aval grows through out the year in this region (Panchmahal, Gujarat).	Pagi (1997)
448	Method to cure khurda disease in sheep	Karnu tree leaves are crushed and wrapped around the infected feet of sheep after washing them with luke warm water effectively cures khurda disease due to antiseptic and fly repellent properties of Karnu leaves (Lahaul valley, Himachal Pradesh).	Verma (1998)
449	Herbal treatment for injuries in animals	Bark of beli tree is wrapped around the injured portion of animals for speedy recovery because of its antiseptic properties and fly repellent properties (Lahaul valley, Himachal Pradesh).	Verma (1998)
450	To promote healing of wounds in cattle by Thumbai (<i>Leucas aspera</i>)	The leaf paste of Thumbai is applied to wounds to promote healing (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)

S. No.	Title of ITK	Details of ITK and rationale	Reference
451	Treatment of septic wounds	The leaf of 'sundarsol' placed on an injury with its upper side in contact with a wound, promotes healing. If the lower (dorsal) side is placed in contact with a boil, it forms pus. In the treatment the lower side is first applied to ripen the boils and then the upper side for quick healing. People treat clean wounds directly with the upper side of the leaf. The same treatment is also used in human beings and is widely adopted in Gujarat (Amreli, Gujarat).	Valjibhai (1993)
452	Treatment and healing of wounds	The leaf paste of Thumbai, an erect herb (<i>Leucas aspera</i>) is applied to wounds to promote healing (Tamil Nadu).	Rajan and Sethuraman (1997)
453	Treatment for small cuts and wounds in cattle	Cow urine is used as medicine for small cuts and wounds owing to its antiseptic properties and also exuvae (skin) of snakes is crushed with common salt and fed to the affected animals to cure cuts and wounds (Lahaul and Kinnaur, Himachal Pradesh).	Verma (1998)
454	Control of septic wounds in livestock by sindur and sesamum oil	If a semi-liquid paste of sindur (mercuric oxide) in sesame oil is applied on a septic wound, healing is evident in three or four days. Care should be taken to see that the animal does not lick the paste; hence a bandage is tied over the wound. This practice originated about ten years ago and is followed by about 25 to 30 per cent of the villagers. Sometimes people use crushed leaves of kidamari (<i>Aristolochia bracteata</i>) for the same purpose (Ahmedabad, Gujarat).	Kalabhai (1993)
455	Treatment for Mandaikarappan (Horn Itching)	Itching is noticed in the horn region and due to this the animal dashes its horn against any solid surface, like a tree or wall. It is caused by a organism which affects the inner portion of horn. Horns will grow sideways in tilting or slanting position. Hundred and fifty g of roots of siru kachakampatti (<i>Citrullus colocynthis</i>) are ground well and diluted with 250 ml of water and administered.	Anonymous (2000-2001b)

S. No.	Title of ITK	Details of ITK and rationale	Reference
456	Treatment of septic wounds by ghee and latex of darudio	Latex of a noxious weed called darudio (<i>Argemone mexicana</i>), collected by detaching branches from the shoot is mixed with clarified butter (ghee) and applied on wounds to kill the pathogens. Some farmers use only the latex. It is applied twice a day for 2-3 days. Darudio (Mexican poppy) grows in winter and bears seeds in capsule during early summer. It grows with wheat crop on cultivated land. However, it grows profusely in uncultivated common land. It grows up to 1 to 2 feet height and bears tiny thorns on the leaves and the stem (Banaskantha, Gujarat).	Thakor (1993)
457	Specially prepared ash for treatment of septic wounds	Leather of discarded shoes (cut into small pieces), one-half of a coconut (the white inside part), and a small quantity of tar are burned together. A paste of the ash is prepared by adding water and applied to the septic wound. This treatment helps in healing and in keeping away flies and other insects. (Mandra, Shihor)	Patel (1993j)
458	Healings of wound	A mixture of curd (100-150 g) with natural indigo (25g) is applied once in a day to the open wounds, such as yoke galls in bullocks. The practice is widely used in this region and has no ill side-effects Unfortunately, natural indigo (<i>Indigofera</i> spp) is now difficult to find (Vejpura, Savli).	Somabhai (1993)
459	Treatment of common cold in cattle	Cattle often suffer from common cold during the winter. As soon as the symptoms appear in an animal, farmers of Rajkot district feed 250g of groundnut oil once a day to the cattle. They also include onions in the cattle feed and allow the animal to eat as much as it can. In the evening the infected cattle are given a decoction of tulsi leaves (<i>Ocimum sanctum</i>), mint leaves (<i>Mentha viridis</i>), tea leaves or powder and anni seeds or 'ajwain' (<i>Trachyspermum ammi</i>). All these ingredients are boiled in water till the water reduces to half of the original volume. The decoction is then cooled and filtered and given to the ailing animal everyday. According to the farmers, this treatment cures the cold in three to four days (Rajkot, Gujarat).	Kapadia (1997a)

S. No.	Title of ITK	Details of ITK and rationale	Reference
460	Moringa wards off cough	The cattle are affected with bronchopneumonia during winter. This causes inflammation of the lungs and trachea which also leads to swelling in severe cases. This causes a lot of irritation to the cattle. The onset of the disease causes a sticky fluid to flow through the nostrils and the cattle stands with its head in a bowed position. Combination of 'drumstick' (<i>Moringa oleifera</i>), sonkheda, bark and roots of 'ratanjod' (<i>Jatropha curcas</i>) is used for the treatment. Approximately 100 g bark of drumstick and sonkheda each and 50 g of ratanjod are pounded to form a fine powder. About 400 ml of water is added and the solution is boiled for fifteen minutes. The cooled solution is given to the animal to drink (Navsari).	Mahla (1999)
461	Treatment of cold	Leaves of sehur (<i>Euphorbia nerifolia</i>) are fed to the animal (Eastern Uttar Pradesh).	Gupta (1993)
462	When animals catch cold	1. Animals are prone to cold, especially when their enclosures are not designed properly. Extreme cold makes their eyes and nose watery and eventually it leads to fever and indigestion. Cattle owners deal with this problem in many ways:(1)Black pepper and joughal (<i>Myristica fragrans</i>) are ground well and the powder is roasted and mixed with ghee. This mixture is fed to the ailing animal.(2) Punarnava (<i>Boerhavia diffusa</i>), ajwain (<i>Trachyspermum ammi</i>) and methi (<i>Trigonella foenum-graecum</i>) are taken in equal quantities and boiled in water and the filtrate is fed to the sick animal.(3)Boil the seeds of tara-mira (<i>Eruka vesicaria</i>) and methi (<i>Trigonella foenum-graecum</i>) in equal quantities and feed this decoction to the diseased animal in luke-warm condition.(4)Dry ginger (<i>Zingiber officinale</i>) is pounded to powder and fried in ghee and made into little balls. Three balls are fed to the diseased animal once a day. It reduces the cold and gives relief to the animal within a short while (Himachal Pradesh).	Singh (1998)
463	Leaves of <i>Calotropis gigantea</i> to heat the animal body	Leaves of <i>Calotropis gigantea</i> are heated moderately. These leaves are placed on the animal's body. The body of animal gets heat due to these leaves. As soon as leaves get cooled, they are heated again and replaced. This practice is repeated for one and half hour (Guujela).	Balvalbhai (1992)

S. No.	Title of ITK	Details of ITK and rationale	Reference
464	Treatment of cold in sheep and goat by bhoyrigni	Juice of bhoyrigni (<i>Solanum surattense</i>) fruit is dropped in the nose of sheep and goats suffering from cold. It enhances respiration through nose. Bhoy rigni is a wild plant having violet-blue flowers. This is a thorny plant and grows around the river banks. (Any special effect of juice of <i>Solanum surattense</i> requires investigation, otherwise any simple or irritant fluid pouring in nasal cavity induce irritation and sneezing cause exhaustion of air from nose) (Sanjnasar).	Rambhai (1992)
465	Cure of chronic cough in cattle by 'kandakathin' (<i>Solanum surattense</i>)	The leaves of kandakathin plant are made into a paste with thuthuvalai (<i>Solanum trilobatum</i>) and hot water. The extract is mixed in neem oil (<i>Azadirachta indica</i>) and given orally to cattle as a remedy for all types of chronic cough (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
466	Treatment for asthma/cough	When animals have difficulty in breathing, about a quarter measure of kallathikai (<i>Ficus tinctoria</i>), 50 g cumin and two onions are pounded well, and administered to the animal.	Anonymous (2000-2001i)
467	Treatment of coughing and bronchitis	The leaf paste of Mullu murungai tree (<i>Erythrina suberosa</i>) is mixed with water and given orally to cattle as a cure for severe coughing and bronchitis (Tamil Nadu).	Rajan and Sethuraman (1997)
468	Treatment of gathiya (painful swelling on the knee)	A paste of gathiya vat root is made and placed on the swellings. After 1-2 days animal gets relief (Eastern Uttar Pradesh).	Gupta (1993)
469	Neck pain remedy	Neck pain of animals used in agricultural labour can be alleviated with kuwaar or <i>Aloe barbadensis</i> . Kuwaar leaves are heated in hot ash and then pounded to a fine powder. This powder is applied to the neck of the animal to provide relief (Una, Himachal Pradesh).	Devi (1998a)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
470	Treatment of gathiya (painful swelling on the knee)	A mixture of 500 g bark of bahauri (<i>Cordia mixa</i>), 200 g akshbel (<i>Cuscuta reflexa</i>), 500 g semal leaves (<i>Bombax malabaricum</i>), 250 g bamboo leaves (<i>Bamboosa arandinaceae</i>), 400 g leaves of arus (<i>Adhatoda vesica</i>) is taken and pounded. This mixture is added in 5-7 litres water and boiled until the half volume. This solution is now ready for washing the swelling. After washing the swelling a dense smoke is given around the affected parts. Animals gets cured in 4-5 days (Eastern Uttar Pradesh).	Gupta (1993)
471	Treatment of pain, swelling and eczema in cattle	A seed paste of karu-comathai or Oomathai (<i>Datura metal</i>), mixed with water is applied to the patella (knee cap) area in cattle to relieve pain and swelling. The paste is also used to treat eczema and other skin problems (Tamil Nadu).	Rajan and Sethuraman (1997)
472	Control of ringworm infections	Leaf, seed, fruit, stembark of <i>Annona reticulata</i> are the useful parts. Important constituents are amorphorous alkaloid, resin, tannic acid that act as vermicide, insecticide, pediculocide, antibacterial, tonic, astringent and fruit is antihelmentic and controls ringworm infections (Gujarat).	Parabia et al. (2000)
473	Ethnoveterinary worm killer	Plant seed and leaf of kiramar (<i>Aristolochia bracteata</i>) are the valuable parts containing volatile alkaloids which are used as purgative, emmenagogue, alterative, anti periodic and anthelmintic. Mainly cures syphilis, gonorrhoea and skin diseases. Leaf juice mixed with castor oil is applied on ulcers and on eczema (Gujarat).	Parabia et al. (2000)
474	Use of <i>Delonix elata</i> for worm	Leaf and stembark of <i>Delonix elata</i> contain hentriacontaine, b-sitosterol, glucoside, hentriacontanol, protocatechuic acid, quercetine and are used as antiperiodic, febrifuge, rheumatism, flatulence, worms (Gujarat)	Parabia et al. (2000)
475	Treatment of intestinal worms in calves	Mamejvo (<i>Enicostema hyssoplifolium</i>) is pounded and given to the calf twice or thrice a day. The plant grows to a height of hardly one foot and has very small leaves. The practice is very old (Jamnagar, Gujarat).	Mavjibhai (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
476	Treatment of intestinal worms in calves	Roots of sasani ghoghdi are pounded thoroughly and mixed with water. Approximately two glasses of the suspension are administered to the calf early in the morning. There is a belief that excessive feeding of milk increases the worm in young calves. This practice is quite old and has not changed over the years (Jamnagar, Gujarat).	Bhoya (1993)
477	Treatment of intestinal worms in animals	Juice extracted from the mamejvo plant is to be administered in mornings and evenings for three consecutive days to animals .It is believed that this treatment is a broad spectrum method and helps to eliminate all types of intestinal worms. The mamejvo plant which grows in the monsoon reaches a height of two to three feet (about 30 to 60 cm) and bears white flowers (Surendranagar, Gujarat).	Dabhi (1994)
478	Control of intestinal worms	Two to three branches of ‘fafada thor’ (Euphorbia spp) are burnt to ashes. Then 50 g of ash is mixed with water and given to the animals to drink once for 2 days. Another treatment for intestinal worms is to make a powder after the drying the following: bark of Holarrhena antidysentrica(10%), Tinospora cardifolia(40%), leaves of Mentha piperita (10%), Butea monspersma seeds (20%) and Phyllanthus emblica (20%). Dose of 3 g each of this mixture twice a day helps eliminating the intestinal worms (Banswada, Rajasthan).	Thakor (1992)
479	Earthworms control intestinal worms	During monsoons earthworms become conspicuous in wet soils. These are caught and dried in the sun. Subsequently they are powdered and the powder is stored in a clean bottle. When calves suffer from intestinal worms they are given about one teaspoon of this powder dissolved in 200 ml of milk. This helps to get rid the animal of intestinal worms (Bharuch, Gujarat).	Vasava (1997a)

S. No.	Title of ITK	Details of ITK and rationale	Reference
480	Deworming in animals by garlic	Twenty gram garlic (<i>Allium sativum</i>) is pounded well and mixed with 200 ml vinegar and administered orally on a full moon day or one day before it. For another 4 hrs no feed or water is given. The practice of giving during waxing phase of moon is advised because of multiplication of worms in the gut of the animal is very fast during that time, therefore the treatment would give best control and kill maximum worms on the full moon day (Susindram, Kanyakumari, Tamil Nadu).	Jerom (2000)
481	Deworming of calves	A solution is prepared from 100g of fresh papaya seeds which are crushed, mixed in 1 litre water act as anti-helmentic and is known to be cost effective deworming medium for calves (Karnataka).	Anonymous (1999c)
482	Treatment of inflammation near hoof joints	Cattle suffering from inflammation are usually not able to move around because of the pain. Wood apple (<i>Feronia elephantum</i>) is burnt in coal fire and the inner portion of the fruit is tied over the inflamed area with a piece of cloth. After a few days, the inflammation subsides (Bangalore, Karnataka).	Gowda (1999)
483	Treatment of fire burns	A suspension made of linseed and lime water is pasted upon the burnt wound. Animals gets cured in 8-10 days if applied continuously (Eastern Uttar Pradesh).	Gupta (1993)
484	Control of gala ghotu (HS)	Ten-twelve leaves of davana (<i>Artimisia vulgaris</i>) are tinturated after adding 10 cloves and this mixture is pasted around the swelled parts of neck. This paste is changed after 2-3 hrs by fresh one (Eastern Uttar Pradesh).	Gupta (1993)
485	Control of gala ghotu (HS)	Ten cloves are boiled in 250 ml of ghee(preferably cows ghee) and left for sometime. The warm ghee is given to affected animal twice or thrice a day with the help of dharaki (Eastern Uttar Pradesh).	Gupta (1993)
486	Control of gala ghotu (HS)	A mixture of well grinded 100 g of black pepper and 250 ml mustard oil is given once a day for 2 successive days. HS is cured if applied at the initial stage (Eastern Uttar Pradesh).	Gupta (1993)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
487	Treatment of yoke gall in bullocks	A mixture of black powder from dry-cell battery and oil is applied to galls on the neck that are used by the yoke. In other cases, Buharo (<i>Byttneria herbacea</i>) leaves are chewed into a paste by the farmer and then applied. The treatment is repeated twice per day for two to three days or until the gall is healed (Mahesana, Gujarat).	Punjabhai (1992)
488	Treating yoke gall	Yoke gall is formed on the neck of bullocks when the wood used for making plough is not smooth. It is also formed if the height of the two bullocks is not equal or when there is more strain on one or both of the bullocks. Shri Rupabhai Dhediabhai Vasava suggests the use of tanach leaves (<i>oujeinia oojeinensis</i>) for treating yoke gall. He applies paste of 100 g tanach leaves thrice a day for 4 to 5 days on the gall (Bharuch, Gujarat).	Vasava (2000-2001c)
489	Treatment of yoke gall in bullock	If bullocks suffer from yoke gall 200 g of onion peel are burnt and applied to the yoke gall of the bullock (Jhalore, Gujarat).	Vasnoi (1997b)
490	Treatment for swelling and sores of yoke-gall in cattle	The leaf paste of pekenkai, a climber with the tendrils (<i>Luffa acutangula</i>) is applied to the neck region of cattle to treat the swelling and sores of yoke-gall (Tamil Nadu).	Rajan and Sethuraman (1997)
491	Treatment of yoke gall	A paste is prepared by grinding and boiling 100g horsegram seeds and is applied for 3-4 days to yoke gall. This preparation has antibacterial effect (Karnataka).	Anonymous (1999c)
492	Treatment for yoke gall	(a) The coconut shell is ground very fine and mixed with butter. This mixture is applied on the neck of the bullock suffering from gall. The wound is healed within 5-6 days (b) Mixture prepared by boiling camphor in groundnut oil is applied on gall, 3 times a day for 3 days. The gall heals completely by this practice (Sabarkantha, Gujarat).	Parkhanbhai (2001)
493	To prevent yoke gall	At the time of yoking a new bullock a paste of water and the ash left behind by burning leaves of gunda (<i>Cordia</i> spp) is applied on the neck to prevent yoke galls (Amreli, Gujarat).	Patel (1993f)

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494	Treatment of yoke gall	Yoke gall is a common problem in bullocks and is treated traditionally with extracts of a perennial plant locally called safed buvariyo (<i>Aerva tomentosa</i>). About 50 g of leaves are kept in a container along with a little water and ground. The crushed leaves are squeezed to extract juice which is applied on the yoke gall thrice a day for five to six days. <i>Aerva tomentosa</i> is a perennial wild plant which grows in pasture lands and hills but has become rare (Sabarkantha, Gujarat).	Desai and Desai (1996)
495	Yoke gall in animals	Young bullocks are trained by attaching various implements before inducting them into actual operations. In the initial stages, the tender shoulders may get injured and sometimes ulcers can occur on the shoulder. To cure these injuries, 100 grams of kalthi (<i>Dolichos biflorus</i>) seeds are grounded to powder and heated in water to prepare a paste. The paste is applied on the wounds daily in the evening and the effects of the treatment could be seen within three to four days. Another remedy is to crush the bark of jipta (<i>Triumfetta pentandra</i>) and apply on the injuries (Junagadh, Gujarat).	Kathiriya (1998)
496	Treatment of Jonk (leach) infestation	In this case either powder of palash fruit (<i>Butea monosperma</i>) along with water or concoction of tobacco and lime water is given to the animal with the help of drench bottle made of bamboo (Eastern Uttar Pradesh).	Gupta (1993)
497	Efficacy of vaira (<i>Heterofragma roxburgii</i>) root extract against ticks in cattle	Tick infestation constitutes a great health hazard in cattle of Koraput district, particularly in rainy season. The root extracts of vaira (<i>Heterofragma roxburgii</i>), a medium size shrub (belonging to family Bignoniaceae), abundantly available in the area is commonly used by the local people to control tick infestation in cattle. With a view to assess and refine the indigenous technology available with the farmers, a case study was conducted to find out the efficacy of vaira root extract at different concentrations against adult <i>boophilus</i> ticks and its performance was compared with butox (deltamethrin), the common drug available in the local market to control ticks. Spray of vaira root extract at a concentration of 0.3, 0.4 and 0.5 kg root/lit of water and butox at a concentration of 0.02% (recommended by the	Behura et al. (2002)

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		manufacturer), killed 75,84,91 and 90% of ticks, respectively within 48 hrs. Reinfestation of ticks occurred from 15-21 days post-application. Symptoms of toxicity was not observed in any case. Vaira root extract at a concentration of 0.5 kg roots/litre of water proved to be most effective against ticks in cattle (Koraput, Orissa).	
498	Control of leach infestation	Farmers apply tobacco tar inside the nostrils where leaches infestation is there. Leaches are killed (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
499	Luffa amara for mastitis	Mastitis is an inflammation of mammary gland of cattle mainly caused by bacteria and occasionally by fungi and algae. The most important symptoms are abnormality in milk secretion and swelling of udder and teats. About 100 g of Luffa amara leaves are ground and smeared over the udder region. In addition, about 10 g roots of Aristolochia indica are pounded and mixed in 150 ml of water and used for drenching animal. This solution is applied on the udder for three days.	Anonymous (2000-2001a)
500	Indian curry for skin infection	Kharajva is a skin disease, which is characterised by hair loss, itching and hardening of skin. Kadhi (indian curry) if applied on the affected skin can cure it within 3-4 days (Viramgam, Ahmedabad, Gujarat).	Patel (2001b)
501	Control of skin diseases in animals	Deodar oil mixed with common salt is used to massage the diseased portion of the skin of goats in Kinnaur. Both have medicinal value (Ladakh, Jammu and Kashmir).	Verma (1998)
502	Treatment of skin diseases by devdar (Cedrus deodara) in sheep and goat	Oil extracted from the wood is used to treat a skin disease of sheep and goats known as makku disease; also used to cure the demodetic scabis disease (Central Himalayas of India).	Maikhuri et al.(2000)
503	Skin care	Preparations from amarvel or Cuscuta reflexa are used to alleviate swelling and skin infection in humans and animals. Animals sustaining injuries and suffering from internal swelling can be given relief using this plant. The plant is thoroughly dried and burnt in such a way that the smoke is directed towards the face of the animal. It gives relief from swelling. According to Dipak Kumar, the entire plant should	Kaur (1998b)

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		be boiled in water and the filtered brew used to wash and massage the legs of people suffering from swelling and pain. The filtered brew also gives relief from pain caused by dislocation of bones. Taking a bath after adding juice extract of amarvel to the water alleviates skin allergy. Directing the vapour of boiling amarvel, gaandhala (<i>Murraya koenigii</i>) and nirgandhi towards the body opens the pores of the body and facilitates normal sweating (Una, Himachal Pradesh).	
504	Treatment of skin disease	Cattle often suffer from skin diseases characterized by hair loss and rough, hard skin. A paste is prepared by adding water to the scrapings of the inner portion of the bark of Baval (<i>Acacia nilotica</i>). Application of this to the affected area is continued for 7-10 days. This method has been widely used in this region for many years (Rena, Shahera).	Lilabhai (1993)
505	Treatment of voils on cattle skin	Seeds of <i>Croton tiglium</i> are crushed in curd and the paste is applied on the skin of cattle suffering from voils, five hours after the application it can be washed off (Bangalore, Karnataka).	Hemawati (2000)
506	Oil of oil engine for treatment of skin disease	Spent engine oil is boiled and sprayed over the skin for controlling skin disease of animals. This practice is followed for the last 20-25 years. This skin disease is locally known as Lihvo (The boiled engine oil has acaricidal action and cures skin diseases only if it is caused by mange (Paniyala).	Chawda (1992)
507	To prevent abortion	Farmers believe that animals abort during early pregnancy because of their internal body heat. To prevent this, the leaves of kanthi (<i>Limonia acidissima</i>) are crushed and mixed with sugar and given to the animal. One dose of 500 g of leaves, 200 g sugar and one litre of water is given daily. The treatment is started after the first signs of pregnancy are noticed and continued for 21 days continuously kanthi is a plant available throughout the year in common lands and grasslands in arid regions. It bears small leaves, similar to henna leaves, and has a hardcoated fruit which is considered to be very nutritious. This treatment has been in existence for at least 50 years in the region and is followed by most farmers. There are no side effects. However, care must	Bhuraji (1993)

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		be taken to maintain optimum proportion of sugar in the feed. The treatment should not be given to non pregnant animals (Banaskantha, Gujarat).	
508	Recovery of animal after parturition	Mixture of rice, urd dal and fenugreek seeds are cooked and given to the cattle at calving (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
509	Methods to minimize mortality rates in cattle	Offspring birth is regulated in such a way that the birth takes place during April and May to ensure a higher survival rate. This is controlled either through isolation of sexes or through the covering of male genitalia during winters (Ladakh, Lahaul and Spiti valleys, Himachal Pradesh).	Verma (1998)
510	Control of mange in camels	Camels lose hair usually in winter. One can prevent this by applying a special oil. The ingredients used for making the oil are bhilama (<i>Semecarpus anacardium</i>). Copper sulphate and karanj (<i>Pongamia pinnata</i>) oil. Five to ten kg karanj oil, 50 g bhilama and 50 g copper sulphate are mixed thoroughly and boiled. After the oil cools down, it is applied using jute bags as swabs. The only precaution that needs to be taken is to see that the camel does not lie down. If it does, dust will stick to its body, making the remedy ineffective. After application of this oil, the hair growth returns to normal within 10 to 15 days (Sabarkantha, Gujarat).	Desai (1999b)
511	Suitability of traditional bamboo mat goat sheds in Orissa	In central and western Orissa region goat rearing is a major source of income of many farmers. A survey of 100 farm families within different villages of Kalahandi district revealed that 85% of the farmers construct a traditional bamboo mat goat shed, while 30% go for kutcha floors and only 2% have concrete floor houses as goatsheds. From a comparative study between the modern practice of goat housing system and traditional bamboo mat goat shed, it was found that in case of construction of traditional goat shed the initial investment is much less and not much of the skill is required. The materials used in this shed is cheaply available in the localities. While, in case of modern housing system, the initial investment is much higher and skilled persons are required to construct it. The main problems found with the traditional system of housing is lower height of the	Mohapatra et al. (2002)

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		bamboo mat floor leading to difficulty of regular cleaning of the faces resulting in poor hygienic conditions and improper ventilation due to lack of windows on the wall. But these problems can be solved easily by elevating the bamboo mat to a minimum height of 4 ft and providing 2 to 3 small windows on the wall (Orissa).	
512	To increase milk yield of buffaloes	Sweet saunf (<i>Foeniculum vulgare</i>), masoor dal (<i>Lens culinaris</i>), moong dal (<i>Vigna radiata</i>), and 'tara-mira' (<i>Eruka vesicaria</i>) are taken in equal quantities and cooled in milk. The filtrate is mixed with jaggery and fed to the animal (Himachal Pradesh).	Devi (1998b)
513	Feeding of rice to buffalo for increased milk yield	To increase milk production, buffalo is fed with 250g of cooked rice twice a day. The production increases considerably within a week. But Shantaben cautions that prolonged feeding of rice may adversely affect the health of the animal (Rajkot, Gujarat).	Ramani (1997b)
514	Increasing milk yield of lactating animals by feeding scorpion grass (<i>Urtica diocea</i>)	Farmers feed their lactating animals with bichchu grass or sisaun or scorpion grass. It is claimed that this practice increases milk yield of animals (Kumaun hills, Uttar Pradesh).	Khoont (1997)
515	Increasing cattle milk production	Cattle owners use different techniques for increasing milk production. A mixture of cotton ball, dried beans of desi baval (<i>Acacia nilotica</i>) and kernels of pearl millet is prepared. All these ingredients are boiled in water and the animal is fed with the boiled mixture of milking. The inner kernel from mango stone may also be added to the cattle feed to increase milk production (Rajkot, Gujarat).	Khoont (1997)
516	Increasing milk and reducing intercalving	The leaves and twigs of a tree locally called jethimadh (<i>Taverniera cuneifolia</i>) are regularly fed to the animals. According to some farmers the practice also reduces the intercalving interval. People also feed the veins of uruvel (<i>Tinospora</i> spp), collected from the forests, for the same purpose. The vine grows in hedges and climbs on to large trees. This practice is reported to increase not only the milk yield but also the fat content of the milk. (Dang)	Gordhanbhai (1993)

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517	Use of khijada and baval to increase milk yield	Pods of khijada (<i>Prosopis cineraria</i>) and baval (<i>Acacia nilotica</i>) trees are fed in combination to dairy cattle to increase the milk yield (Munjpur, Vadhvan).	Dudharejia (1993)
518	Use of khijada and baval to increase milk yield	The tender shoots of shatavari (<i>Asparagus racemosus</i>) are used as a vegetable by the hill folks. This also acts as a stomach cleanser. The farmers of Uttarakhand crush the roots of this plant and mix it with grains which are to be fed to the milch cows. The farmers believe that the quantity and quality of the milk increases considerably (Uttarakhand).	Joshi (1999)
519	Method to improve milk production in cattle	Dried leaves of ber and kuljara (a type of wine) are fed to cattle to increase milk production (Bilaspur and Mandi, Himachal Pradesh).	Verma (1998)
520	Increasing milk yield	Most shepherds and herds collect vines of kharkhodi from the hedges and feed it to the cattle for increasing milk yield. Also pounded seeds of fennel are soaked in water and given to animal for the same purpose (Jamnagar, Gujarat).	Patel (1993e)
521	Easy dropping of placenta	Approximately 300-400g leaves of fand (<i>Rivea hypocrateriformis</i>), 250 g of jaggery, 50 g of suva and 25 g of ash of sesamum indica stalks are boiled in one litre of water. The boiled mixture is allowed to cool down and given to the animal which has not dropped placenta after 7-8 hrs of calving (Bhavnagar, Gujarat).	Khatana (1997b)
522	Herbal treatment to expel placenta in cows	Bamboo leaves and bark are boiled with paddy husk and fed to cows for the expulsion of placenta (after parturition) (Mid hill region of Himachal Pradesh).	Verma (1998)
523	Removal of placenta after calving	It is believed that a cause of this problem is deficiency in some essential nutrients that provide proper development of the uterus. To induce the placenta, or fragments that sometimes remain to drop, fresh flowers of mahuda (<i>Mdhuca indica</i>) are crushed and heated in a vessel over a gentle flame until it becomes sticky and greenish in colour. If fresh flowers are not available, then dried flowers are soaked in water and used. This is given (quantity unreported) after calving along with 500 g of an extract of the fruit of the plant called kokam (<i>Garcinia indica</i>) and 2-3 kg of cooked	Parmar (1993a)

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		rice. This should induce the placenta to drop within 2-3 hr. Larger quantities of Kokari may be toxic. Farmers say that animals that graze in pastures where <i>Madhuca indica</i> grows are usually free of this problem; hence the origin of this idea. It is also believed that this food causes contraction of the uterus (ChoryanaMaavada, Salvi).	
524	Easy dropping of placenta in cattle	To facilitate the dropping of the placenta about one kg of paddy smeared with groundnut oil is fed to the animal three to four hrs after calving. Alternatively, sometimes seven to eight seeds of chanothi (<i>Abrus precatorius</i>) is given if the placenta is not shed for more than seven or eight hrs (Rajkot, Gujarat).	Ramani (1997a)
525	Dropping of placenta	Approximately 10-15 growing primordial of banyan (<i>Ficus benghalensis</i>) tree are collected and fed with about 100g bajra flour to animal which has difficulty in dropping of placenta after calving. Placenta drops within an hr after the treatment according to Pujabhai Vala's experience. This is a traditional practice and is often used by many farmers in this region (Amreli, Gujarat).	Vala (1997)
526	Use of ber for easy dropping of placenta	Leaves and twigs of ber (<i>Zyzyphus mauritiana</i>) are collected and burnt and the ash is given to the animal along with water to induce the placenta to drop (Junagadh, Gujarat).	Baraiya (1994b)
527	Leaf extract of jinjara for dropping of placenta in animals	When the placenta is not dropped after delivery, the animal is treated with jinjara leaves. About 250 g leaves of jinjara are crushed and water is added in it. The filtrate is given to animal after six hrs of delivery. Farmers estimate the success rate of this treatment at about 60% (Banaskantha, Gujarat).	Rabari (1994)
528	Removal of placenta of calf by perandai a climbing shrub with tendrils (<i>Cissus quadrangularis</i> L.)	The whole plant is crushed into paste and given orally to newborn calves to facilitate removal of the placenta: after swallowing the paste, the calf will start to vomit (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)

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529	Use of tassles of aize cob for dropping of placenta	The tassles of 20-25 maize cobs are boiled in water and given to the animal after calving to help dropping of placenta (Junagadh, Gujarat).	Savalia (1998)
530	Removal of placenta	Fifty grams of turmeric, 200 g of raw rice and 200 g of Palmyrah jaggery are pounded together and fed to the animal. If this method does not work, three kg of bamboo leaves may be pounded and administered to the animal. As a last resort ruraikai (<i>Lagernaria vulgaris</i>) may be fed to the animal in small pieces. It will definitely induce the placenta to drop (Pattukkottai).	Balasundaram (1998)
531	Treatment for expulsion of placenta	The animal is fed with one or two basketfull of green leaves of <i>Bambusa bambas</i> . It is believed that the treatment helps to release placenta within two to three hrs (Junagadh, Gujarat).	Savalia (1998)
532	Dropping of placenta	Empty cotton shells and roots of the cotton plant are boiled in water. The decoction is filtered through a cotton cloth and given to the animal if it has not dropped the placenta within 7-8 hrs after calving. To prepare one litre of decoction, approximately 400 g each of empty pods shell and roots are boiled in 2-3 litres of water. Approximately half a litre of decoction is given to the animal 2 or 3 times at intervals of half an hour or so. This treatment starts having its effect within an hour. Few people use this treatment; it was quite popular 30-35 years ago. One limitation is that cotton shells and roots are available only during a limited period in the year (Banaskantha, Gujarat).	Darbar (1993)
533	Removing the placenta in buffaloes	The roots of jepti herbal plant is used to remove the placenta from buffaloes after delivery. Around 500 g roots of jepti are thoroughly pounded to extract juice which is given to the buffalo to drink. This releases the placenta. Kamod (a variety of rice), sanakhadi, khapat (<i>Abutilon indicum</i>), chanothi (<i>Abrus precatorius</i>) seeds, bajri, jaggery, oil, suvadana (<i>Anethum suva</i>) and umri (<i>Ficus glomerata</i>) fruits are also used to remove the placenta from the body of the animal. The oil is applied on the shoulders of the animal. Kamod and sanakhadi are boiled and given to the animal to drink. The leaves of khapat tree are boiled in water and the filtered brew is given to the animal to drink. One or two seeds of chanothi	Singh and Khan (1999)

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		and sweetmeat prepared from a mixture of bajra, jaggery, oil, suvadana and ajmo seeds are given to the animal to eat. The fruits of umri are pounded to a fine powder, boiled in water and given to the animal to drink. After the animal has consumed all these items, the placenta emerges a bit. An old leather shoe is tied to it to pull the rest out (Junagadh, Gujarat).	
534	Treatment of new borne calf which has eaten placenta	The seed paste of nerunji, a prostrate herb (<i>Trivulus terrestris</i>) is given orally to new borne calves to facilitate removal of the placenta. After swallowing the paste, the calf will start vomiting (Tamil Nadu).	Rajan and Sethuraman (1997)
535	Treatment for removal of placenta	Paddy husk is fed to the animal for early removal of placenta after parturition (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
536	Aiding expulsion of placenta	The expulsion of placenta after delivery does not occur in some cows. The reason for this could be lack of minerals and vitamins in their diet. Besides this, Brucella or IBR viral infection could also lead to non-expulsion of the placenta. This causes anorexia. The leaves of sugarcane is used for the expulsion of placenta. Approximately one litre of sugarcane leaf juice is extracted. It is strained and fed to the cattle. The expulsion of placenta occurs within 2-3 hrs (Dahod, Gujarat).	Ninama (1999)
537	Treatment for retention of placenta	For easy expulsion of placenta after delivery approximately two kg pearl millet (<i>Pennisetum americanum</i>) grains, 100 g of methi (<i>Trigonella foenum-graceum</i>) seeds, 50 g of asalio (<i>Lepidium sativum</i>), 25 g of suva (<i>Anethum graveolens</i>) and 500 g of jaggery are boiled in water for one hour. The cooked feed (after cooling) is fed to cow or buffalo after delivery. The placenta expels out within 2-3 hrs after this treatment (Junagadh, Gujarat).	Vaghasiya (2000-2001)
538	Post-calving care	Immediately after calving, the cow sits down to recoup herself. The chances of milk fever is high if excessive colostrum is withdrawn. To prevent it, chalk dust (lime) is fed to the animal along with other feed (Sabarkantha, Gujarat).	Damor (1994)

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S. No.	Title of ITK	Details of ITK and rationale	Reference
539	Post-calving care	Jaggery 1-2 kg is dissolved in the water and given to the animal immediately after calving. Sometimes this is continued for one week or more. This is practiced by most farmers in Gujarat to hasten post-calving recovery. Reportedly it also increases the animal's milk production (Baroda, Gujarat).	Bapusingh (1992)
540	Use of mehndi for problem of repeat breeding	A few crushed leaves of mehndi (<i>Lawsonia inermis</i>) and fine sand known as gormati dhul are soaked overnight in an open earthen vessel filled with water. Next morning this mixture is fed to the animals suffering from the problem of repeat breeding (Bhavnagar, Gujarat).	Khatana (1997c)
541	Treatment for repeat breeding	A mixture of 200g of pure ghee and 500 ml of sugar solution should be given to the affected animal till it is cured for treatment of the repeat breeding (Rajkot, Gujarat).	Ramani (1997c)
542	Feeding papaya fruits to animals to bring them into heat	Approximately two to three kg unripe papaya (<i>Carica papaya</i>) fruits are chopped and the pieces are fed to the animal once a day for 4-5 days to bring the animal into heat (Valsad, Gujarat).	Nayak (1995)
543	Bringing cattle into heat by use of common salt	Feeding common salt (50-100 g per day) for seven to eight days brings the cattle into regular heat. (Eastern Uttar Pradesh).	Gupta (1993)
544	Bringing cattle into regular heat by use	A mixture of wheat (500 g), mahuva (150-200 g) and common salt (100 g) is fed to animal to bring it to regular heat (Eastern Uttar Pradesh).	Gupta (1993)
545	Remedies for unsuccessful conception	Approximately 2 kg of gundi (<i>Cordia spp</i>) leaves are crushed and the juice is extracted. One kg sugar and 500 g majith are added to the extract along with three litres of water and given to the buffaloes to help them to conceive. For cows, the quantity of all the ingredients are halved and mixed and only two litres of water are used. This mixture is given to buffaloes during 5th and 8th month (Banaskantha, Gujarat).	Patel (1994c)
546	Treatment to bring the animal into heat	Droppings of pigeon are fed to the animal to bring it into heat (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)

S. No.	Title of ITK	Details of ITK and rationale	Reference
547	Treatment of injury	In case of injury in any part of the body, paste consisting of crushed imli leaves (<i>Tamarindus indica</i>), turmeric and onion are applied in the wound. (Eastern Uttar Pradesh).	Gupta (1993)
548	Prevention of the onset of heat in buffaloes	Methi (fenugreek) seeds are mixed with wheat flour and fed to buffaloes that helps in preventing buffaloes from coming to heat (Mid hilly region of Himachal Pradesh).	Verma (1998)
549	Treatment to bring the animal into heat	Fried salt and cucumber leaves are fed to the animal to bring it early into heat (Kumaun hills, Uttar Pradesh).	Chander and Mukherjee (1994)
550	To induce heat in animals	Due to either deficiency of nutrition or some problems in reproductive system, animal does not come into heat. To induce heat in such an animal, farmers feed the animal with the leaves of bili (<i>Aegle marmelos</i>). Approximately one kg of leaves are fed over 6-7 days to animal. The animal comes into heat within 20-25 days of the treatment. Bili is a perennial tree, grows to a height of 5-12 m. It bears leaves with 3-5 leaflets dodi (<i>Leptadenia reticulata</i>) and 'shatavari' (<i>Asparagus recemosus</i>) are fed for the same purpose. Seeds of hivlingi (<i>Couroupita guianensis</i>) can also be given to bring animal into heat (Bhavnagar, Gujarat).	Koradia (1995)
551	Bringing cattle into heat by use of bamboo leaves	Feeding of bamboo leaves brings cattle into regular heat (Eastern Uttar Pradesh).	Gupta (1993)
552	Treatment of anestrus in buffaloes	To get buffaloes into heat (anestrus) and control their cycle, feed them the shells of four to five eggs with the feed once a day. The buffalo comes into heat within a week. The reason for this is that the egg shells generate heat in the buffalo's body (Sabarkantha, Gujarat).	Desai (1999a)
553	Bringing cattle into regular heat by use of jute plant	Feeding of leaves of jute plant (about 2 to 2.5 kg) brings the animal into heat (Eastern Uttar Pradesh).	Gupta (1993)

S. No.	Title of ITK	Details of ITK and rationale	Reference
554	Remedy to prevent bortion	Sometimes foetus in cow or buffalo get aborted due to either injury or infectious reproductive diseases or feeding of some feed of 'hot' nature.(Farmers believe that some feed have hot nature and some have cold. Jaggery is hot and sugar is cold). To prevent abortion, farmers from Mangrol taluka feed pieces of stem of banana (<i>Musa paradisiaca</i>) plant. After conception, buffalo is fed 10-15 kg and cow is fed 5-10 kg pieces of stem of banana. It is fed for five times over a period of 2-3 days. It helps to reduce internal heat and improves the health. This practice has been in use for the last 30-40 years (Junagadh, Gujarat).	Multani (1996)
555	Inhibiting repeat breeder	Cows are sometimes not able to conceive inspite of being in heat. After siring them repeatedly the cow remains in heat. Such a condition is called a repeat breeder. This may be caused by certain bacteria called brucela. This causes infection in the uteral lining of the cow and that is the primary cause of the cow not being able to concieve. Roots of shankhavalli (<i>Convolvulus microphyllus</i>) are used for curing the infection. Approximately 100 g of root or bark of the shankhavalli is pounded and mixed with 300 ml of water and boiled. This concoction is filtered and then cooled. This is then given to the affected animal once a day for three days. This treatment cures the infection and soon afterward the cow is able to conceive (Anand, Gujarat).	Parmar (1999)
556	Repeat breeding in dairy animals	The study was conducted with the objective to document the indigenous technical knowledge followed by the farmers in treatement of dairy animals reproductive problems : The Karnal district of Haryana was selected. Random sampling technique was applied to select the villages and respondents. Three hundred respondents from twelve villages of six blocks, sixty from each land holding category(i.e, landless, marginal, small, medium and large), were selected for the investigation. Reduced feeding was the most common ITK used for the treatement of repeat breeding by 63% of the respondents . Mustard oil was also used to overcome the repeat breeding by 50% farmers. Mehandi (<i>Lawsonia alba</i>) powder was used by one-fourth of the respondents, whereas giving bath in pond and feeding of barley (<i>Hordium vulgare</i>) flour mixed with water was	Meena and Malik (2002)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		followed by 20% of the respondents .Only a few farmers followed the methods of manually cleaning the cervix before the natural service, feeding desi sugar and missing service on the first heat and thereafter, gave natural service to the dairy animals (Haryana).	
557	Bringing cattle into heat by use of mann leaves	Feeding leaves of mann tree in adequate amount (15-20 kg approximately). Adopting this practice the females comes to heat after 12-14 hrs (Eastern Uttar Pradesh).	Gupta (1993)
558	Bringing cattle into heat by use of black pepper and Vanghuchi seeds	A mixture of black pepper (10 grains) and Vanghuchi seeds (20-25) is given twice a day at interval of 6-8 hrs for 1-2 days (Eastern Uttar Pradesh).	Gupta (1993)
559	Identification of heat period	Following symptoms are observed as proper heat period in cows and buffaloes : (i) Udder becomes harder and swell for three successive days after commencement of heat ; (ii) Bellowing and the animal feel uneasy; (iii) White mucus and slimy material ooze out from the vagina; (iv) Frequent urination by animal; (v) Loss of appetite and; (vi) Animal starts humping on other animals (Eastern Uttar Pradesh).	Gupta (1993)
560	Inducing animal into heat by feeding grasshoppers	Sometimes hieifers, even after attaining maturity, do not come into heat. This leads to delay in first calving. Some animals fail to come into heat after two-three calvings as a result of some internal problem or nutritional deficiency. A common practice in North Gujarat is to feed animals which fail to come into heat with two or three grasshoppers along with chapati (bread) or fodder. It is believed that animal comes into heat within 15 days after this treatment. Sharadaben from Ambasan village who had tried this out on her buffalo says a single treatment cycle is enough to get the desired result. The grasshopper is locally called titighodo. It is generally found during rainy season on cactus (Euphorbia spp) and akada (Calotropis spp). It has yellow and greenish stripes on the body (Mehsana, Gujarat).	Patel and Patel (1995)

S. No.	Title of ITK	Details of ITK and rationale	Reference
561	Treatment of reproductive problem in cow by Elavam, Iiavamaram (Ceiba pentandra) white silk cotton tree	The leaves of silk cotton tree are pounded together with fermented boiled rice water and the extract is administered to cows orally as a remedy for reproductive problems. Approximately 500 ml three times a day for three consecutive days (Dindugul, Tamil Nadu).	Ranjan and Sethuraman (1997)
562	Remedy for unsuccessful conception in cattle	Sometimes due to deficiency of nutrients or other internal problems, animals fail to conceive. This leads to problem of repeat breeding or infertility. To treat this condition, about one kg leaves of a local tree are fed to the animals after they are inseminated naturally or artificially. The leaves are fed for eight to ten days after fertilization (Bhavnagar, Gujarat).	Koradia (1995)
563	Induction of conception in cows and buffaloes	To induce conception, cows and buffaloes are fed with a locally prepared tonic/medicine after siring. The tonic/medicine is prepared by mixing and powdering the herbs like Tinospora cordifolia, bark of Casia fistula, tender leaves of jackfruit tree, roots of Plumbago zeylanica and leaves of Clerodendrum inermis. This herbal mixture is mixed in cows milk along with jaggery and fed to the animals (Bangalore, Karnataka).	Honnegowda (2000)
564	To bring animals into heat	Cattle breeder Hirabhai Dharmabhai Parmar uses the pods of dudheli (Pergularia daemia) to bring animals into heat. Dudheli grows on the fences of the farmland. About four to five pods of dudheli are given to the animal to eat daily along with bajr flour cakes for four days. The animal comes into heat within 10-12 days (Banaskantha, Gujarat).	Parmar (1998b)
565	Treating infertility	If a heifer does not conceive after attaining puberty, 200 g of germinated bengal gram (Cicer arietinum) soaked overnight is fed to the animal continuously for one week. Along with this pounded leaves and unripened fruit of yaanai nerunji (Pedalium murex) may be given once a day for three days without adding water. After a week, the heifer will show heat symptoms. If inseminated at this stage, the heifer will conceive. Horsegram can also be given instead of bengalgram (Pattukkottai, Tamil Nadu).	Balasundaram (1998c)

S. No.	Title of ITK	Details of ITK and rationale	Reference
566	Advancing the onset of puberty in heifers	Pearl millet and math (<i>Vigna aconitifolia</i>), 10 kg of each are boiled in water and fed (in accordance with normal intake) to the heifer over a period of eight to 10 days. This treatment reportedly produces heat in the animal's body that is necessary for the onset of puberty (Morvad, Vijiapur).	Patel (1993a)
567	Control of unsuccessful conception	Castor oil, 200-300 ml, is given to cows that are unable to conceive. Sometimes banana leaf extract or the actual leaves are fed to the cattle as treatment. This is practised only once or twice after taking animal into heat to a male for service. In North Gujarat, castor oil is also used with camels. In this case 1-15 kg is given to the female camel (Amreli, Gujarat).	Virabhai (1992)
568	Inducing puberty in cows and buffaloes	Three-four seeds/fruits of bhilama (<i>Semecarpus anacardium</i>), available at consumer stores are fed to the animal everyday when it is not coming into heat or fails to conceive successfully. This practice is followed for cows and female buffaloes for 3-4 days continuously. About 10-12 days after feeding of this seeds/fruit, animal conceive successfully. (The effect of <i>Semecarpus anacardium</i> in anoestrus and infertility cases is innovative and requires scientific research (Paliyad).	Bechardas (1992)
569	Bringing animals into heat	Some farmers give about five to 10 g excreta of either pigeons or hen to the heifer every day for about three to four days (Mehsana, Gujarat)	Patel (1995f)
570	Control of ectoparasities	Ticks, zoaa and bagai are very common ectoparasites of cattle in South Gujarat. Farmers mix 'karanj's (<i>Pongamia spp</i>) oil, salt and powdered camphor in equal quantities and smear it on the body to kill ticks, it is also believed to prevent further infestations. This treatment offers great relief to the animal which otherwise becomes exceedingly restless because of the irritation caused by the ectoparasites. Small calves are also very susceptible to tick infestations. People administer this treatment in the night so that the animal or its herd mates do not lick away the application. Many people are familiar with this practice (Valsad, Gujarat).	Patel (1995h)

S. No.	Title of ITK	Details of ITK and rationale	Reference
571	Control of ectoparasites	Dry leaves of mahuda (<i>Madhuca indica</i>), castor oil, turmeric and avchi-bavchi (<i>Moschosma polystachyum</i>) plant are used when cattle are infected with fleas. 10 to 15 plants of avchi-bavchi are rubbed on the affected parts of the body. Cattleshed is cleaned with brooms made out of the same plant and about 100g of dry mahuda leaves are spread near the shed. The strong odour of 'mahuda' leaves deter the fleas from attacking the cattle. For preventing ticks, 50g of turmeric powder (<i>Curcuma longa</i>) is mixed with 100 g of castor oil and the mixture is rubbed on the affected parts of the body for three days. The ticks drop down from the tender parts of the animal's body like the lower portion of the ear. Similarly, turmeric heals the infected parts of the cattle (Vadodara, Gujarat).	Chauhan (1998)
572	Tobacco for control of ectoparasites in animals	Animal infected with ectoparasites becomes irritated. To control the parasite 25 g tobacco powder is dissolved in one and a half litre of water. This mixture is kept for 3-4 hrs and later diluted with 20 litres water. The animal is bathed with the diluted mixture properly by scrubbing it with cotton cloth. This is followed till the animal is completely free from ectoparasites (Banaskantha, Gujarat).	Patel (2001c)
573	Prolapse of vagina	The acical portion (new growth) of cactus (250-300 g) is crushed and mixed in 700g buttermilk and administered orally once to the animal to correct the prolapse of vagina. Farmers believe, that a 60-70% success is achieved with this treatment (Banaskantha, Gujarat).	Vankar (1994)
574	To cure cold in cattle	To cure cold in cattle, mustard oil with egg and jaggery was found effective (Uttaranchal).	Singh et al. (2002)
575	To cure gastric problems	To overcome gastric problem in animals, mixture of ajwain and jaggery is widely used (Uttaranchal).	Singh et al. (2002)
576	Easy dropping of placenta	For complete dropping of placenta after calving, bamboo leaves are fed to the animals (Uttaranchal).	Singh et al. (2002)
577	Treatment of uterus prolapse during pregnancy	To overcome the problem of uterus prolapse during pregnancy, feeding flour of singhara (water chestnut) to the animal has shown tremendous results (Uttaranchal).	Singh et al. (2002)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
578	How water bath to cure from valo	People bathe the suffering animal with hot water (In case of Valo, there is mystic and hot water bath that gives hot fomentation to muscle (Gunjela).	Zala (1992)
579	Management practices for keeping animals healthy	Animals like yak and dzos are not allowed to take water after heavy work by tying their mouth during their return from the fields. Because intake of water after heavy exercise in the fields leads to the formation of tumors in the neck region and also abdominal colic due to some physiological disturbances and sudden contraction and expansion of muscular tissue resulting in sudden changes in the body temperatures caused by the intake of cold water (Cold deserts and hilly regions of Himalayan regions).	Verma (1998)
580	Relief from heat to camel	Sometimes camels feel uneasy in summer because of internal heat. To get relief from this problem, approximately five kg each of curd and flour of barley are mixed together and given to the camel. This is practised by some camel keepers of North Gujarat near Rajasthan border (Banaskantha, Gujarat).	Gangabhai (1997)
581	Selection of good bullock	Characteristics of good bullock as considered by the local people are : a strong physical structure, broader mouth and open nostrils, straight hump, dark black hooves and long tail (Eastern Uttar Pradesh).	Gupta (1993)
582	Selection of good cow	The characteristics of good cow as considered by the local people are narrow body size on head, while broader on back side, thin neck, and soft dewlap, big eyes, developed udder and curved milk veins and dwarf horn. (Eastern Uttar Pradesh)	Gupta (1993)
583	Cleaning the uterus after abortion in sheep and goats	To clean the uterus after an abortion, the following treatment is given: Crushed tender twigs of sipda are mixed with butter-milk and boiled till the solution becomes white. It is then cooled and given to the animal to drink. It is given three to four times for complete cleansing of the uterus in sheep and goats. Sipda is a two to ten (0.5m to 3.0m) feet tall plant with leaves; it grows on hedges and bunds of fields. (Mahesana, Gujarat).	Thakor (1994)

S. No.	Title of ITK	Details of ITK and rationale	Reference
584	Treatment of weaking of teeth	Animals are not able to eat if their teeth become loose. One part bark of khatamadi (<i>Pavonia ceratocurpa</i>) and one part bark of ambala (<i>Embllica officinalis</i>) are crushed with two parts root of Saslanu heju. This pounded mixture is given to the animal along with water. Khatamadi and ambala, being trees are found throughout the year, but Saslanu heju is available only during the monsoon season (Bharuch, Gujarat).	Chaudhary (1992)
585	Tradional wool combing and spinning	In temperate Himalayas, farmers use large sized shearer/scissors for shearing wool from goats and sheep. The sheared wool is combed and made smooth either with a special comber called kangoo or with a special arrow like device called phanani. The combed wool is stored in small bamboo basket (kamoli). These small woollen packs are used for spinning a thread with a special spindle known as taklu. These woollen threads are used for making woollen fabrics like blankets (pattu) long woollen cloth (lahanga/pattee) dark-black woollen cord (dora) and shawls which are generally woven by gaddies on indigenous handlooms (Temperate Himalayas of Himachal Pradesh).	Verma (1998)
586	Reducing food poisoning	Small part of donkey's faeces is suspended in water and given to animal for minimizing the food poisoning caused due to excessive feeding of immature sorghum or leaves of castor (Makan-champa).	Parmar (1992b)
587	Treatment of in grown horn wound	As an animal ages, its horn often curls so that it penetrates the head or the lower portion of the horn. Not only is this deformed horn easily broken, but the wound is susceptible to infection. To treat the wound, a few human hairs are added to a paste of nagli (<i>Eleusine coracana</i> - a minor millet) flour and water. This paste is applied and the wound is bandaged until the wound is healed. This practice has existed for at least 15 years. Ravjibhai Vasava recently used it with success (Bharuch, Gujarat).	Vasava (1992d)
588	Black pepper and pearl millet flour for disease control in chicken	Chicken sometimes suffer from a disease characterized by frothing at the mouth, frequent cackling, restlessness, and reduced food intake. If it is a male chicken the comb (locally Kalgi) becomes dark-red and a spine-like structure appears on the tail. A Northern Gujarat remedy involves removing the	Parmar (1992a)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		spine like structure with a knife and applying turmeric powder to stop the bleeding. In addition, 10 -15 black pepper corns are grounded and mixed with pearl millet flour and water so that small pellets can be formed. When fed to the chicken, the mixture increases body heat and voiding of excrement. It subsequently rids the bird of the disease (Sabarkantha, Gujarat).	
589	Use of garlic against pulorum in poultry birds	Salmonella pulorum affects the poultry. The affected chicks are usually 1-14 days old. The chicks have white coloured droppings. The chicks lose appetite. The cloves of garlic (<i>Allium sativa</i>) is used to cure the chicks of this disease. One or two cloves of garlic (peeled) are soaked in a cup of water for 12 hrs. This water drunk by the chicks whenever they feed. This cures the chicks in two days (Dahod, Gujarat).	Khant (1999)
590	Poultry disease management	Sometimes, poultry birds fall prey to an unidentified disease, which kills them within a few days. The tribals use one of the following alternative plant recipes to treat the ailing birds: (In all the cases , plant material is pounded and suspended in the water given to the birds; all the houses have special water sites for chicken) (i) Bark of 'beda' (ii) Small pieces of onion (iii) Grains of paddy smeared with kerosene (iv) Tuber of 'dev-alad' (<i>Curcuma</i> spp). Most people use the bark of beda or the tuber of <i>Curcuma</i> spp and <i>Cuscuta reflexa</i> . However, the choice depends on the season and availability of plant. <i>Cuscuta reflexa</i> is a parasitic plant locally called as adharvel meaning that which does not touch the ground (Bharuch, Gujarat).	Gujariyabhai (1993)
591	Rabbit's faeces and <i>Cuscuta reflexa</i> mixture to cure poultry birds from zukava disease	Poultry are susceptible to a highly contagious disease, contractable any time of the year known as zukava. Rabbit faeces (locally sasla) are mixed with vines of amarvel (<i>Cuscuta reflexa</i>), which have been crushed and soaked in water for day. Relief comes within a day after feeding this concoction to the birds. This remedy is practiced by most poultry keepers in the region (Valsad, Gujarat).	Patel (1992h)

S. No.	Title of ITK	Details of ITK and rationale	Reference
592	Mixture of onion, garlic and <i>Cuscuta reflexa</i> to cure poultry birds from contagious disease	Chickens can be inflicted by a disease that causes restlessness and inactivity. It is contagious and the mortality rate is high. As treatment, onion and garlic bulbs are pounded together with the vine of <i>Amarvel</i> (<i>C. reflexa</i>) and this mixture is added to the birds' drinking water. <i>Amarvel</i> is a leafless greenish-yellow parasitic plant, commonly found on hedges and forest trees (Bharuch, Gujarat).	Vasava (1992e)
593	Tonic for chicken	Sometimes, the chickens suffer from acute diarrhoea and become weak and exhausted. In order to rejuvenate them, a tonic is made from the pods of garmalo (<i>Cassia fistula</i>), onions and garlic. Green pods of garmalo, or Indian laburnum are cut into small pieces and ground with water. About 100 g of this juice is mixed with the essence of one knot of garlic, two onions and 100 ml of water. This mixture is fed to the chickens whenever they feel very hungry. The thick liquid rejuvenates the chickens in a day or so (Panchmahal, Gujarat).	Solanki (1998)
594	Poultry lice treated with Nagod	In poultry birds, lice infestation occurs mainly during the kharif season. The irritation causes by the biting of lice, makes the birds peck itself all over its body and this causes detachment of the feathers. To control lice, leaves of the nagod (<i>Vitex negundo</i>) are heaped in the poultry farm. It is believed that the smell of the nagod leaves repels lice (Valsad, Gujarat).	Patel (1994g)
595	Control lice in chicken	Small chicks are easily infested with lice. When the lice infestation becomes severe there is every possibility of death of the chicks. To control this, a fire is made near the chicken coop and leaves of East Indian satinwood (<i>Chloroxylon swietenia</i>) are put into the fire to raise smoke. The smoke thickness and wafts on to the chicks housed in the chicken coop. The smoke kills lice. Repeating this practice for 3-4 days will effectively control lice in chicks (Bangalore, Karnataka).	Hanniganahalli (1999)

Fisheries

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Trapping fish with 'supali' leaves	Leaves of 'supali' (Mundulea suberosa) are dried in the sun and powdered. Approximately 100-200 g of the powdered leaves are wrapped in a cloth and secured by knots. About three or four such cloth bundles are immersed in different parts of a small water reservoir. Half an hour after immersion of this powder, all the fish become dazed and come up to the surface. They then can be trapped with a net. Untrapped fish become normal after an hour or so. Generally, this method is used in stagnant pools or slow streams (Valsad, Gujarat).	Ranchhodaji (1995)
2	Catching fish by feeding with fruits of ingori	Fruits of ingori (B' Nalanites roxburghii) tree is used to catch fish. The tree is 20 to 25 feet high and its branches have thorns. The fruits are shaped like the native ber (Zizyphus jujuba). The fruits are pounded and then thrown in the water to be consumed by the fish. The fish slowly become unconscious and float up on the surface, becoming easier to catch. The wax like substance in the inner part of the ingori fruit is somewhat poisonous. Both dry and green ingori fruits can be used (Sabarkantha, Gujarat).	Gadat (1998)

Ethno-botany and Agro-bodiversity

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Giloy: A multipurpose plant	The leaves of giloy or <i>Tinospora cordifolia</i> are used in preparation with other ingredients to cure disorders of the respiratory, nervous and digestive systems. According to Ankush Sud, consuming giloy leaves with sugar cures acidity, and with ghee or purified butter, it cures constipation. Taken along with honey, it cures cough, and with dry ginger, it alleviates body ache. Manoj Dhimaan says that the leaves of brahmi and giloy should be boiled together till they form a semi-solid mass, and given to help mentally challenged people recover. The extract of the leaves should be mixed with ilaychi and honey, and given to patients suffering from tuberculosis. The brew from boiling giloy leaves and black salt in water can be helpful in curing fever and removing impurities from the blood (Una, Himachal Pradesh).	Dariyal (1998)
2	Biodiversity management	There are several sacred groves dedicated to the temples spread over different villages. Communities jealously protect these groves against interference of any kind. These groves are excellent examples of biodiversity conservation. For example, it was religiously prohibited to cut any vegetation from the lands in the immediate vicinity of temples and religious places known as oran (protected forest) lands. Collection of dry wood only was allowed for fuel and serious punishment was prescribed for using axe in orans. In Barmar, Jaisalmer, Naguar, Jodhpur, Pali, Sikar, Jhunjhunu and Jalore districts of Rajasthan there are still 420 orans covering a total areas of 100 -140 ha (Rajasthan).	Malhotra (1988)
3	Preparation of traditional tea	Dried leaves of shilphori (<i>Bergenia ciliata</i>) ground into powder, which is a good substitute for tea leaves (Central Himalayas of India).	Maikhuri et al. (2000)

Methods of Weather Forecasting

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Forecasting rain and frost	(i) Ants coming out from their nest carrying their purpae, indicates that rain will come soon. Goats can sense approaching rain, and through behavioural changes signal the coming 2 to 3 days in advance. They change their usual resting places, show little interest in taking food or water, and bawl and shout the day long. (ii) If the neem (<i>Azadirachta indica</i>) tree bears plenty of fruit and the baval (<i>Acacia nilotica</i>) tree produces plenty of pods, then the total rainfall for the monsoon will be high. (iii) If there is a rain on seventh day of next fortnight of the month Shravan, there is a high chance of frost that winter and if rain comes on eighth day of next fortnight of month Shravan (the day called Janmashtami) the chance of frost that winter will be low. Using this method, farmers decide whether or not to go for late sowing (Amreli, Gujarat).	Chhaganbhai (1992)
2	Assessing rainfall through fruiting pattern of thumari	To know if there will be good rainfall, one needs to see the fruiting pattern of thumari (<i>Securinaga leucopyrus</i>). If it bears a large number of fruits, then rainfall tends to be heavier in that season. Conversely, if fruit borne is less, then rainfall will most likely be less (Banaskantha, Gujarat).	Agori (1999)
3	Prediction of season by spider	When spider webs are plentiful on grasses, sticks of tomato crop and on french bean crop then it is assumed that the rainy season is over (Himachal Pradesh).	Verma (1998)
4	Prediction of rainfall by cultural beliefs	If first 10 to 15 days of Jeth (May-June) month are very hot, good rainfall is predicted during ensuing rainy season. This may be due to low pressure zone in North-west India that is generated due to high temperature. When grey coloured clouds descend below the hilltops they definitely cause rainfall. If khejri tree bears good fruit in a particular year good rainfall during next rainy season is predicted and vice	Verma (1998)

METHODS OF WEATHRE FORECASTING

S. No.	Title of ITK	Details of ITK and rationale	Reference
		versa. If chakla belan (rolling pin and board) show moisture on them then within few days rainfall to occur. Farmers carry tambaku in bags for hooka (smoking device). When this bag shows more moisture in the tambaku then farmers predict rainfall within one or two days (Himachal Pradesh).	
5	Rain prediction by cloud colour	If the colour of the clouds is similar to the colour of wings of titar bird (Partiridge) i.e. grey or black grey and strong eastern winds are also blowing then rainfall is predicted. These clouds are rainbearing cumulonimbus clouds (Himachal Pradesh).	Verma (1998)
6	Anticipating sowing time for mustard	Mustard is sown as winter crop on a large scale in Rajasthan. The area under this crop has grown at a very fast rate in the last few years. If ants are observed going out of their burrows during noon time or soon after, it indicates the best time for sowing of mustard seeds in the field. Normally mustard is sown in the first fortnight of October just at the beginning of the winter. Farmers explain it by saying that presence of ants outside during noon time indicates a decline in the temperature because of onset of winter. Mustard is a very thermo sensitive crop (Jaipur, Rajasthan).	Srisuvalal (1996a)
7	Rain prediction by sparrow	A group of sparrows frolicking in the sand indicates rainfall that day or the next day. If they are playing in the water then it is believed that weather will be dry for some days (Himachal Pradesh).	Verma (1998)
8	Forecasting of rainfall	Farmers use certain bio-indicators like local plants, namely badli, satabari, nandal and pipal; animals like jackal and cow; insects like ant and winged termites; and also fish for predicting the time of occurrence and the distribution pattern of rainfall (Orissa).	Parasar (1994)
9	Crops and constellations	Paddy is sown when the moon was waning, coinciding with the Leo constellation. The leo constellation is known for enhancing seed and fruit development (Tamil Nadu).	Jerome (1998)
10	Rain prediction by thapiha bird	During long hot days in summer the cry of thapiha bird is heard. The people believe that God will quench her thirst and there will be rainfall after 1 or 2 days (Himachal Pradesh).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
11	Prediction of rain by leeches	If the jonks (leeches) are immobile at the water surface then dry weather is predicted. If they move rapidly in the upward and downward direction in water then rainfall is predicted (Himachal Pradesh).	Verma (1998)
12	Prediction of rain by tatihari bird	f the tatihari (lapwing) lays eggs on higher portion of the field, heavy rainfall is predicted during coming rainy season. If the eggs are laid in the lower portion of the field then drought is predicted. These birds never construct their nests but lay eggs on bare soil. If a single egg is laid there will be rainfall only for one month out of four months rainy season. Two eggs means two months of rain and so on (Himachal Pradesh).	Verma (1998)
13	Weather prediction	Weather is predicted by observing the visible spectrum around the sun or moon. If the spectrum around the sun had greater diameter than that around the moon, they predict rainfall after a day or two. Some people base on their prediction the nature of solar hallow, specifically the spectrum around the sun has larger dia then the rainfall is assured. All the photometers luminous phenomenon produced by the refraction, reflection, diffraction or interference of light from the sun or moon. The visible spectrum of light around the sun or moon is called hallow or corona. According to the distance from the sun / moon, if the distance is more it is called hallow which is caused by a layer of thin veil of cirrus clouds which are non rainbearing clouds. If the distance is less it is called corona produced by somewhat dense clouds which may cause rainfall. The accuracy of this indigenous observation can be as high as 50% (Himachal Pradesh).	Verma (1998)
14	Rain prediction by tillbohara	With the tillbohara observed to swarm in large groups over a water surface then dry weather is predicted. If they swarm over open dry land or fields then early rain is predicted (Himachal Pradesh).	Verma (1998)
15	Rain prediction by centipedes	If centipedes emerge from their holes carrying their eggs in swarms then farmers predict early rain. The centipedes do this so to avoid egg damage which can be caused by rainwater (Himachal Pradesh).	Verma (1998)

METHODS OF WEATHER FORECASTING

S. No.	Title of ITK	Details of ITK and rationale	Reference
16	Weather forecast	Rains can be predicted by observing a natural phenomenon. The natural phenomenon is known by the name of datardu or sickle. It can be seen around the moon at nine 'o' clock on the night of Vaishakh sudi 8 (eighth day of the bright half of the month of Vaishakh). The rains can be forecast by observing the location of the moon on the sickle. If the moon is on the pointed end of the sickle, scanty rains are indicated. If the moon is positioned at the middle of the sickle, medium rains are indicated. If it is located on the handle of the sickle, the forecast is good for heavy rains (Amreli, Gujarat).	Vadodariya (1998)
17	Prediction of rain by clouds and winds	If there is accumulation of clouds in layer in South-East direction accompanied by winds blowing from the Southern direction then it is claimed that there will be rainfall within a day or two (Himachal Pradesh).	Verma (1998)
18	Rainfall prediction by nialu	It is believed that on hot summer day the cry of bird called nialu for water brings rainfall (Himachal Pradesh).	Verma (1998)
19	Rainfall prediction by house swift bird	During rainy season farmers observe the matilary bird (house swift) and predict heavy rainfall if bird flies high in the sky (Himachal Pradesh).	Verma (1998)
20	Prediction of rain by maina bird	If the maina bird bathes in water it indicates that there will be rain within one or two days (Himachal Pradesh).	Verma (1998)
21	Predicting the monsoon	The aerial root of the banyan tree serves as a practical moisture indicator during the monsoons. It works like this: the tip of the aerial root is snipped off; if several drops of water flow out, it indicates likelihood of good showers in near future (within couple of days). Given the hygroscopic nature of aerial roots one can expect them to serve as a crude indicator of relative humidity (Baroda, Gujarat).	Desai (1996)
22	Rain prediction by observing camel's leg	If there is a swelling on the lower portion of the camel's leg then the rainfall is predicted. The swelling is probably due to high relative humidity (Himachal Pradesh).	Verma (1998)

Food Product Development

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Quality jaggery preparation	Using ammonium sulphate in jaggery preparation improves quality and colour of the jaggery because sulphur acts as clarifying (oxidising) agent (Karnataka).	Anonymous (1999c)
2	Distillation of liquor by dhanti system	An empty ghee tin (cannister 15 kg capacity) is made slightly rounded. A temporary stand is placed on which a pot is placed for collecting condensed vapours. The pot is attached to a rubber pipe to receive the liquor in bottles/plastic cans. This has higher efficiency and it also allows the separation of initial drops of the liquor which contains higher levels of methanol (Himachal Pradesh).	Verma (1998)
3	Curing of chilgoza	The harvested chilgoza cones are collected at one place and covered with chilgoza pine needles, leaves and soil. After 15 to 20 days, the chilgoza cones are cut open using the sharp edged axe (behla); with a gentle strike the seeds are easily separated due to the maintenance of desired temperature and humidity inside the heap (Kinnaur, Himachal Pradesh).	Verma (1991)
4	Wall hive	It is a cavity left in the wall when the house is under construction at a height of 150 cm from the floor in kitchens, store rooms, living rooms and sheds. The hive has an entrance hole of about 2cm diameter towards the outside, while inside it is covered usually with a plank of wood plastered with mud. The wall hive is opened only to harvest honey and never otherwise. A swarm of <i>Apis cerana</i> descends naturally and settles in this hive making parallel combs because of its habits of nesting in natural darkness and protected cavities. It provides relatively constant temperature due to the human and animal habitation of the farm house and also the microclimate inside the hive is not easily influenced by sudden outside changes and so the bees have to spend less energy towards temperature regulation that enhances the honey harvest (Himachal Pradesh).	Verma (1998)

FOOD PRODUCT DEVELOPMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
5	Straw hives	Straw hives are made of locally available materials like rice straw, locally made strings for tying straw, strips of waste wood and wood for making frames. The rice straw fibres are tied into 5cm thick sheets with the help of strings and wooden strips and joined to form a brood chamber in accordance with the standard for <i>Apis cerana</i> frame hive. A hollow raised of bamboo is placed to provide entrance to bees. The top cover is made in the form of a sloping roof from straw of sarcanda grass held in place with sticks to drain off water. Care has to be taken to ensure that no crevices are left, no loose straw should project into the brood chamber as it would interfere with bee activity. This hive is suitable for temperate regions as its management during peak winter is quite easy and internal temperature is not quickly influenced by changes in temperature. Therefore, the bees have to spend less energy in temperature regulation and enhance the honey harvesting (Himachal Pradesh).	Verma (1998)
6	Orchard hive	The orchard hives are made of locally available materials, viz. stones available on field, clay, chopped wheat straw, sarkanda grass and wood for making frames. A platform of stones plastered with mud is made at a south-east direction of the orchard with the brood chamber of standard size for <i>Apis cerana</i> is made on it and entrance hole of 1.5 cm diameter is provided for the easy movement of the bees. The top cover is made from the sarkanda grass tied with string and supported with strips of wood as a sloping roof to drain off water. This structure ensures better temperature regulation and so enable its suitability to temperate regions and also offers protection from wild animals. Its main limitation is that it can not be moved even within the orchard and so is useful for stationary bee keeping (Himachal Pradesh).	Verma (1998)
7	Log hive	It is prepared by the hollowing of a piece of trunk closing both of its ends with piece of tin/wooden plank/stone mixed with cowdung and clay and boring a small hole of 6 mm diameter along with its length to serve as an entrance, 4-5 strips of old combs are fixed at 3cm apart at each end before use. There are horizontal vertical log hives. The vertical one is very similar to the horizontal one except it is placed in an upright position on a piece of tin or flat stone with 5-	Verma (1998)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		6 entrances or holes above the base. This is advantageous as it is amenable for shifting to orchards for pollination and also is portable up to short distances and main constraint lies with these hives is the scientific management of colonies is not possible and only squeezed honey can be extracted (Himachal Pradesh).	
8	Banana ripening	Banana fruits wrapped in grass/cloth is ripened in soil pit and also enhances its storage period (Himachal Pradesh).	Verma (1998)
9	Packing of pickles	In lower parts of Himachal Pradesh mangoes, galgal, lime are pickled in earthen pots. The pots are sterilized using fumes generated from burning red chillies alongwith Asafoetida (heeng) and a little mustard oil. The top of the container is covered with a lid made of wood. The fumes have antimicrobial properties (Lower parts of Himachal Pradesh).	Verma (1998)
10	Drying and preservation of meat	Meat strips are dried by hanging on strings tied across the room. Due to heavy snow and low temperature, spoilage of the product is prevented. Due to low relative humidity meat dries well and preserved for longer period. In some places salt is also sprinkled which assists in preservation. In Nako and Nalling areas of Kinnaur meat is hung in kitchen. The smoke from earth chullah serves to smoke the meat and preserves it. In Mandi, Kullu meat is smeared with mixture of mustard oil and turmeric powder which act as antimicrobials (Shimla, Kinnaur, Lahaul and Spiti, Himachal Pradesh).	Verma (1998)
11	Preparation of dried ginger	Fresh ginger upon soaking in water is rubbed against gunny bags and is placed in bamboo basket to remove the peel. The coarsely peeled ginger is then dipped in lime solution, followed by rinsing and drying under open sun. The dried product is called south (Shillai and Renuka areas of Sirmour, Himachal Pradesh).	Verma (1998)

FOOD PRODUCT DEVELOPMENT

S. No.	Title of ITK	Details of ITK and rationale	Reference
12	Distillation of fermented liquid	Fermented liquid is boiled in a vessel called baltoiat the base of which a temporary stand is made under which a cantainer is placed to collect distilled liquor. Upon heating the fermented liquid boils and its vapours are cooled by striking the top of the container (holding cold water). The condased vapours drop into the container. Cold water is repeatedly replaced until the process is completed (Himachal Pradesh).	Verma (1998)
13	Traditional distillation of liquor	Fermented musk is placed in metallic pitcher covered with stone slate with a hole at its centre for the passing out vapours. The slate is used ostensibly to avoid the overflow of the material as it boils. Another metallic pan with a hole is kept on the slate and it is attached to a side pipe where condased alcoholic vapours are collected. To cool the vapours this container is housed in biggermetal pan which is cooled by continuously running tap water. Two rubber pipes, viz, inlet and outlet aid in the circulation of cold water and release of warm water. The pan is maintained in a tilted position so that the inlet of the pipe is located higher than the outlet pipe. The bottom of the utensil is cooled thus the alcoholic vapours condense on its lower surface. Around 12 to 14 bottles of alcohol is collected from 40 kg of fermented musk. All joints are secured by using barley or wheat paste (Himachal Pradesh).	Verma (1998)
14	Distillation of country liquor	In some areas country methods of seperation of liquor as previosly mentioned have been further improved by replacing the water trough by rubber pipe to collect vapours from the boiling fermeneted liquor. In lean periods, dry grapes, apple and chuli are used for preparing the fermented musk (Himachal Pradesh).	Verma (1998)
15	Method to retain colour in chilli	Chilly when treated with red earth retain red color for long because red earth acts as insulator against temperature and sunlight (Karnataka).	Anonymous (1999c)
16	Steam cooking	A big special vessel made of brass is used for preparing steam cooked maize or barley cake. The vessel is called chalta, at the bottom of which water and rice straw is placed. Above this, a round cover, made from maize or barley flour is placed and cooked with steam (Himachal Pradesh).	Verma (1998)

INDIGENOUS TECHNICAL KNOWLEDGE IN AGRICULTURE

S. No.	Title of ITK	Details of ITK and rationale	Reference
17	Improvement of aroma in curry leaf	Application of 200 ml butter milk to curry leaf plant every week ensures the availability of enzymes, vitamins and micronutrients and thereby, improves aroma (Karnataka).	Anonymous (1999c)
18	Preparation of country liquor	The liquid for fermentation is prepared from local grapes, apricot, wild apricot (chuli), pear, apple, wild almond (bemi). The fruits are handwashed or washed by feet and placed in large wooden or concrete tanks. Molasses are also added to get higher alcohol output. Drums are sealed with wooden or heavy stone lids and left for fermentation for 20 days. The completion of fermentation is indicated by alcoholic odor. In some places fermenting vat or bottle is placed in cowdung pit (mahlash) where the generated heat provides warmth for better fermentation (Tribal areas of Himachal Pradesh).	Verma (1998)
19	Katha extraction	The heart wood chips of the plant, khari (Acacia catechu) are boiled in earthen pots along with water for about 12 hrs or till the boiling mixture attains a thick syrup like consistency and this is poured into moulds dug out in fine sand which absorbs the tannic acid (liquid) and leaves behind a residue of catchin (katha) in crystallized form. On cooling ,it solidifies and then is cut into small bricks for sale in the market under the trade name katha. In India, it is consumed with betel leaves and used medicinally for intestinal disorder and is known to improve digestion (Himachal Pradesh).	Verma (1998)

Agro-animal based Yarns/Natural Dyes and Weaves

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Skinner (Kataru)	Skinner is a traditional implement used for taking off the skin of slaughtered goat/sheep (Himachal Pradesh).	Verma (1998)
2	Extraction of fibre and seeds from bhang' cannabis	Bhang cannabis is cultivated in Chhota/Bada Bhangal of Kangra and Karsog area of Mandi district of Himachal Pradesh for the extraction of fibre and seeds. Its green leaves are used for extracting narcotics which are very addictive and its cultivation is illegal. After maturation the harvested crop is set aside to dry. After drying, the seeds are collected and the fibre is separated from the stems and branches. Its fibre, being stronger than jute is used for making ropes of varying thickness (Kangra and Mandi, Himachal Pradesh).	Verma (1998)
3	Enhancing wool production in sheep	Capsion shrub (stem of 20 to 25cm diameter) is fed to sheep along with its bark to enhance the wool production. The stem is a rich source of sulphur containing aminoacids (Ladakh, Jammu and Kashmir).	Verma (1998)
4	Leather tanning	Leather tanning and trading is a traditional business for some village communities. Raw leather is treated to soften it. A special site called kund (tank) for processing leather is found many villages. It is normally isolated from the rest of the village. A glassful of latex of <i>Calotropis gigantea</i> is added in the kund filled with water (100 to 150 litres). Small pieces of the bark and trunk of <i>Acacia nilotica</i> are added to it. Raw leather is immersed in it and turned over everyday and kept soaked for about one and a half months. Once the leather is removed from the tank, it is cleaned in water. Small fibers on the inner side of the processed (ripened) leather are scraped away with a knife and it is again washed and cleaned in water. Salt is dusted on the surface and it is kept in the sun for three days for drying. This process	Rohit (1996)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		improves the texture and colour of leather. Sometimes taners smear a little oil of Pongamia seed on the leather to make it shine. Approximately 30 to 40 kg raw leather can be processed simultaneously (Bhavnagar, Gujarat).	
5	Shearer (Balwan)	Used for shearing wool (Himachal Pradesh).	Verma (1998)
6	Production of organic carpets using sheep wool, cotton and natural dyes made from plants	The local bhotia people have traditionally been a community of sheep rearers. The menfolk took care of the animals, while the women made carpets in their homes. The carpets were made of sheep's wool and natural dyes from plants and other naturally occurring pigments and colours (Northen Hills of Uttar Pradesh).	Guchteneire et al. (1999b)

Low-cost Housing Materials

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Wooden frames for mud walls	In rural areas, clayey mud is thoroughly kneaded to construct houses. Ordinarily, oval shaped tiles are prepared from mud and then placed on each other to construct walls. One after the other these tiles are prepared and the surface of the wall is made even by patting the mud. Walls constructed in this fashion are not thick and lack a smooth, even surface. The mud used may have pebbles, small glass pieces and other small metallic items that can injure the hands when one is trying to make the surface even. Further, it is time consuming to resurface the walls of the house. Valjibhai Gameti, an artisan of Sabarkhantha district, has a solution to these problems. He has prepared a wooden frame, very useful in the construction of a mud house. The frame is formed using four wooden blocks. It is placed on the ground and filled with mud that is pressed thoroughly. Then the frame is removed, leaving a rectangular block (or a huge brick) of packed mud. The process is continued until the walls are constructed. Walls constructed with the help of this wooden frame have uniform thickness and smoothness. According to Valjibhai, a wall of three feet can be constructed in one day. Less labour is required and the walls do not crack. Thus the strength of the walls also increases. People living in nearby areas are calling Valjibhai to construct the walls of their houses with his wooden frame (Sabarkantha, Gujarat).	Gomati (1998)

Unclassified

S. No.	Title of ITK	Details of ITK and rationale	Reference
1	Indigenous agriculture knowledge of farmers in North-Western agro climate zone of Orissa	In Orissa, potato tubers can be economically and effectively stored for 5-6 months on sand beds with minimum weight loss. Some of the practices are: controlling insect pest like caseworm in paddy by using navel string of a newly born baby. Debarkment of trunk of jackfruit tree for enhancement of fruit bearing capacity, and use of opium/hengu in stem of pumpkin for inducing female flower for better fruiting (Orissa).	Barik, M. K (2002)
2	Prevention of crop loss caused by animals by beating drums	Sounds that are produced by beating iron drums keep the non-insect pests like pig, monkey, elephant and sparrow away from the cropped fields (Nilgiri, Tamil Nadu).	Karthikeyan and Chandra Kandan (1996)
3	Leather tanning	Tanning leather is a very common rural enterprise in Banaskantha district, a drought-prone region of North Gujarat. In most of the villages, groups of 8 to 10 families are involved in this business. There is a very strong institutional arrangement for collecting, dissecting and processing of dead animals. Kund is an institutional arrangement where dead animals are brought and their hides are separated and processed. The kund is situated in common land, but is isolated. Grazing animals cannot go near it easily. Three or four tanks (kunds) are constructed on this site. Processing leather organically by using locally available plants and substances is an art. The freshly separated hide is cleaned and dried carefully. It is processed for softening and inducing a natural colour. First of all, the dried hide is immersed in clean water till it absorbs the water. The bark of amla (Cassia auriculata), and Calotropis branches along with the inflorescence are chopped and kept in the kund. Salt is also added. The soaked hide is put in the kund and water is poured on it till it gets immersed. Weights are kept on the hide so that it remains completely submerged in the water. It is	Parmar (1995)

S. No.	Title of ITK	Details of ITK and rationale	Reference
		made sure that the hide is completely immersed in the water because unsoaked portions become hard. The kund is covered with tin sheets to protect it from dust and impurities. It is left undisturbed for two weeks. It is believed that this method of treatment makes the leather soft and it gives it natural colour. The processed leather is known as ripened leather. It is cleaned and used either for making shoes or sold in the market. It is believed that the colour, shine and durability of kund treated leather are much better than those of chemically processed leather. The chemical processing is faster and easier. If the leather is processed by the traditional process, shoe-makers give a two-year guarantee on their product without any hesitation. People also believe that shoes made from kund processed leather gives cooling effect to the feet and reduces the chances of developing eye problems. Sometimes ropes are made from such leather. These ropes do not rot in water (Banaskantha, Gujarat).	
4	Tanka-a traditional rainwater harvesting system for drinking water	Tanka is an underground tank (cistern) constructed for collection and storage of runoff water from a natural catchment, artificially prepared catchment, or from a roof top. The stored water is used primarily for human consumption. The capacity of tankas range between 20 to 200 cubic metres depending upon the requirements. Catchments in this systems are prepared artificially to induce the runoff. The inhabitants in Rajasthan construct tankas on individual household basis near their settlement to mitigate their drinking water demands. Plantation of suitable species of trees (ber, pomegranate) around the structures in many places has helped in the environmental improvement (Rajasthan).	Khan (1997)
5	Roof water harvesting following rains	The harvesting of rainwater is done commonly by the farming community where roof water is collected in a dug out structure known as diggy in Kangra and Khatti in Hamirpur districts. These structures are excavated into hard rocks. In addition to the roof water surface, runoff is also collected into the dug out structure for multifarious uses (Lower hills of Himachal Pradesh).	Anonymous (1999d)

S. No.	Title of ITK	Details of ITK and rationale	Reference
6	Storage of grass in Toli	In temperate zones bundles of dry grass from the ghasni (grassland) is carried by both men and women on their backs and is stored in toli which is pyramid shaped (Temperate zone on Himachal Pradesh).	Verma (1998)
7	Nutgrass management with cotton petals	Cotton petals when spread to a thickness of 2 to 3 inches one month before the onset of rain controls nutgrass for 3 years because alkaloid in cotton petals aids destruction of nutgrass bulbs (Karnataka).	Anonymous (1999c)
8	Roof water harvesting	In lower areas of Himachal Pradesh during rainy season, roof water is collected in dug out structures which are known as diggi in Kangra district and khati in Hamirpur and Bilaspur districts. These structures are dug in hard rocks. Not only roof water but also surface water is collected in dug-out structures (Kangra, Hamirpur and Bilaspur, Himachal Pradesh).	Verma (1998)
9	Ground water detection	To indicate sources of water for well drilling several tree species such as vikla (<i>Maytenus emarginata</i>), kanthar (<i>Capparis sepiaria</i>), bordi (<i>Zizyphus mauritiana</i>), harmo (<i>Peganum harmala</i>), vad (<i>Ficus benghalensis</i>), khijda (<i>Prosopis cineraria</i>) and rayan (<i>Manilkara hexandra</i>) are reportedly useful. The chances of finding water are believed to be even greater if the well hole is drilled near termite burrows or nests of sahudi (a wild animal found in fields in this area (Bhad, Khamba Amrely).	Akbari (1993)
10	Nutgrass management with goat manure	Applying goat manure to nutgrass affected fields controls nutgrass because goat manure acts as growth retardant (Karnataka).	Anonymous (1999c)
11	Nutgrass management with garlic	Growing garlic in nutgrass affected fields once in three years minimizes nutgrass growth as garlic exudes weedicide (Karnataka).	Anonymous (1999c)

S. No.	Title of ITK	Details of ITK and rationale	Reference
12	Indigenous farming practices	An inventory of documentation and analysis of indigenous farm practices on major crops reports that incorporation of kitchen ash into soil for increased soil fertility, use of silt from the dried reservoir beds and broadcast in their fields during summer, mixture of lime and sugar for rodent control, providing irrigation whenever termite attack is observed, applying fresh mud to the graneries before each new crop is stored, tying of polythene sheets randomly in the paddy field on 3 to 4 feet tall sticks, uprooting gallmidge affected seedlings of paddy and burning in the nursery before transplantation, mixed cropping of mestha with seamum to compensate the yield loss, opening of 2 to 3 ft deep trenches and adding of 5 kg of common salt, 40 to 50 kg of organic matter and covering the soil before onset of monsoon to prevent flower and fruit shedding in mango, wrapping of sugarcane stem by twisting leaves around the stem to protect from wild animals are some of the traditional practices adopted by the farming community (Andhra Pradesh, Tamil Nadu and Karnataka).	Lakshmana (2000)
13	Kadera	It is used for collecting pine needles (Himachal Pradesh).	Verma (1998)

Geographical indicators and other attributes of plant materials used in ITK

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
1	<i>Abrus precatorius</i>	Indian liquorice	H-Ghunghehi B-Kunch M-Gunja G-Chanoti Tel-Guriginja T-Gundumani Kan-Guluganji Mal-Kunni	The roots and leaves contain glycyrrhizin, the active principle of liquorices. The decoction of both is widely used for cough, cold and colic. The principle poisonous constituent is abrin. Abrin has been resolved into globulin and albuminose. An infurida of the bruished seeds when applied to conjuctiva may cause fatal poisoning due to absorption of abrin. It causes acute inflammation, which in some cases improve the condition. The bruished seeds have been used criminally for poisoning cattle, and for homicidal purpose. A poultice of seeds is said to have been used as a suppository to bring about abortion.	A climbing shrub with paripinnate leaves, sensitive to light and challenges in weather. It is found throughout India even at an altitude up to 3,500 feet on the outer Himalayas. It is now naturalized in all tropical countries.
2	<i>Abutilon indicum</i>	Country mallow	H-Kanghi B-Potari Tel-Tutturabenda T-Paniyarattutti Kan-Tutti Mal-Velluram	The leaves and seeds (called <i>balbij</i>) are rich in mucilage and are used as laxative and demulcent. In India an infusion of the roots is taken internally as a cooling medicine.	A hairy under shrub with golden yellow-flowers, abundant throughout the hotter parts of India.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
3	<i>Acacia arabica</i>	Babool	<i>H-Babool</i> <i>P-Kikar</i> <i>G-Baval</i> <i>Tel-Nallatamma</i> <i>T-Karuveli</i> <i>Kan-Jali</i> <i>Mal-Karuvelam</i>	Babool bark contains tannin. The tannin content of the bark varies considerably. Sometime it is as high as 20% but average is 12%. Leather made from babool bark is firm and durable though harsh and dark colour. Pods contain 12 to 19% tannin. Good quality babool gum is used in calico-printing and dying. Inferior variety of gum is employed in the manufacture of matches, ink, and distempers	It is a moderate sized, spiny evergreen tree. The tree is indigenous to Sind, the Deccan and tropical Africa. It is naturalized in all parts of India.
4	<i>Acalypha indica</i>	Indian acalypha	<i>H-Kuppi</i> <i>M-Khokli</i> <i>B-Muktajhuri</i> <i>B-Muktajhuri</i> <i>Tel-Kuppichettu</i> <i>Tel-Kuppichettu</i> <i>Mal-Kuppaimeni</i> <i>Kan-Kuppigida</i>	The fresh or dry plant is a gastro intestinal irritant. It contains alkaloid acalophin. It also contains cyano-genetic glucoside and triacetanamine. The leaf of the plant ground with common salt, quick lime or of the plant ground with common salt, quick lime or externally. The paste of the leaves with lime juice was beneficial in early cases of ring worm.	A small annual shrub (1 to 2 feet) A small annual shrub (1 to 2 feet) in garden and roadside through out in garden and roadside through out the plains of India
5	<i>Achyranthes aspera</i>	Prickly chaff flower	<i>H-Latjira</i> <i>B-Apang</i> <i>M-Aghadha</i> <i>G-Aghedo</i> <i>Tel-Uttaren</i> <i>T-Nayurivi</i> <i>Kan-Uttarane</i>	The flowering spikes or seeds (paste form) are used as an external application for poisonous insect bites. Decoction of the entire plant possesses diuretic properties. It is occasionally useful in rural dropsies. The plant may be valued as green manure.	A stiff erect herb, 1 to 3 feet high, commonly found as a weed through out India up to 3000 feet.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
6	Aconitum balfourii	-	Dar-Gobriya B- Goari	It's root contains pseudo-aconitine. Pseudo-aconitine is highly toxic and biologically 1.5 times as active as aconitine. The drug is useful as an expectorant and mild bronchial anti-spasmodic. The alkaloid produces a slight fall of blood pressure, followed by a rise to the original level, and an increase in the amplitude heart beats and a slowing of the rhythm. It is a useful remedy in asthma specially in combination with Belladonna. The insecticidal and anti-septic properties is attributed to vasicine. They are sometime used as a green manure in paddy cultivation.	The plant occurs in the sub-alpine and alpine Himalayas from Gharwal to Nepal between 12000 to 14000 feet.
7	Aconitum chasmanthum	Indian napllus	H-Hazara B-Balnag	Indaconitine, (C ₃₄ H ₄₇ O ₁₀ N) is isolated from the root. The total alkaloidal content of the root is about 4.3%.	It occurs in the sub-alpine and alpine zones of western Himalayas, from Chitral and Hazara to Kashmir between 7000 to 12000 feet.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
8	<i>Acorus calamus</i>	Sweet flag	<i>H-Bach</i> <i>B-Bach</i> <i>M-Vekhand</i> <i>G-Vekhand</i> <i>Tel-Vasa</i> <i>T-Vasambu</i> <i>Kan-Bajegida</i> <i>Mal-Vavambu</i>	The dry rhizomes contain 1.5 to 3.5% yellow aromatic volatile oil. It has mellow odour resembling that of Patchouli. Indian oil has much higher asarone (C ₁₂ H ₁₆ O ₈) content than commercial oil. It also contains small amount of sesquiterpenes alcohols. The root contain glucoside named acorin. Dried rhizome gives beneficial results in dyspepsia and chronic diarrhoea. It possesses ematic and antispasmodic properties. It produces beneficial results in case of dyspepsia and chronic diarrhoea. Powdered rhizome also possesses insecticidal properties and useful against bed bugs, moths, lice etc	It is semi-aquatic perennial herb with a creeping and much branched aromatic rhizome. It is found wild and cultivated throughout India and Sri Lanka, ascending to 6000 feet in the Himalayas. It is plentiful in the marshy tracts of Kashmir and Sirmoor, in Manipur and Naga Hills.
9	<i>Adhatoda vasica</i>	-	<i>H-Arusha</i> <i>B-Bakas</i> <i>G-Alduso</i> <i>Tel-Adasaramu</i> <i>T-Adadodai</i> <i>Kan-Adusoge</i> <i>Mal-Atalotakann</i>	The leaves and roots are anti-spasmodic and efficacious in cough. The leaves contain very small amount of essential oil, crystalline acid and white crystalline alkaloid vasicine. Useful in <i>asthama</i> , in combination with beladona, insecticial and antiseptic properties attributed to vasicine. Useful as green manure in paddy cultivation	Small gregarious evergreen shrub, occurring through out the plains of India and in sub-Himalayan tracts, ascending up to 4000 feet.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
10	<i>Aegle marmelos</i>	Bael tree	<i>H-Bel</i> <i>H-Bel</i> <i>M-Bel</i> <i>G-Bil</i> <i>Tel-Maredu</i> <i>T-Vilvam</i> <i>Mal-Vilvam</i> <i>Kan-Bilpatre</i>	Unripe fruit is beneficial in diarrhoea and dysentery. The ripe fruit is sweet, aromatic and cooling. The marmelosin, furocoumarin are active constituents. The root bark and some times the stem bark is administered in intermittent fever. Gummy mucous substance surrounding the seeds serve as good adhesive. The marmelosin acts as a laxative and diuretic. It causes slight lowering of perspiration and some sleeplessness. Bark contains umberiferon and other coumarins, different marmelosin obtained from fruits.	A deciduous tree, 20–25 feet in height and 3–4 feet in girth with straight sharp axillary thorns and trifoliate aromatic leaves. The trees are found wild in the sub-Himalayan tract, in central and South India. It is also cultivated in North India.
11	<i>Aerva lanata</i>	-	-	The plant possesses diuretic and demulcent properties. It is reported to contain some tannin.	A genus of erect, prostrate or climbing herbaceous weeds, common through out the hotter parts of India and ascend to 3000 feet on the hills. It also occurs in Sri Lanka.
12	<i>Agave americana</i>	Century plant	-	Juice when fermented yields pulque, the national drink of Mexico. The distilled spirit is known as <i>mescal</i> .	It is found in India only as a garden ornamental plant.
13	<i>Ailanthus excelsa</i>	-	<i>H-Maharuk</i> <i>M-Maharuk</i> <i>G-Ardusi</i> <i>Tel-Peddamanu</i> <i>T-Perumaram</i> <i>Kan-Doddamara</i> <i>MalMattipongilyam</i>	The tree yields an inferior type of Bassora or Hog-gum. Its bark is used as a febrifuge and tonic. The timber is used for packing cases, fishing floats, boats, etc.	A large deciduous tree, 60–80 feet in height with rough, light-grey bark. It is found in Bihar, Jharkhand, Madhya Pradesh, Gujarat and in the forest of Ganjan, Vizakapatnam and Deccan.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
14	<i>Albizzia amara</i>	-	<i>M-Lalle</i> <i>G-Motosarsio</i> <i>Tel-Nallarenga</i> <i>T-Wunja</i> <i>Kan-Chigare</i> <i>Mal-Varachi</i>	The timber is very strong and moderately hard and is, therefore, useful in making tools, handles, mallet heads. It is commonly used for carving turnery and agricultural implements. Leaves are also used for green manure.	A moderately sized, much branched deciduous tree, with crooked bole up to 8–10 feet. It is found through out the drier region of South India and Sri Lanka.
15	<i>Albizzia lebbek</i>	Siris	<i>H-Siris</i> <i>B-Sirish</i> <i>G-Pitosarsio</i> <i>Tel-Dirasana</i> <i>T-Vagei</i> <i>Kan-Bagemara</i> <i>Mal-Vaga</i>	The wood is excellent for high class furniture, internal decoration and paneling, and is valued for parquet and strip flooring, paneling and railway carriage work. It is useful for construction purposes, agricultural implements, oil pressures and cane-crushers. Reddish- brown gum exudes from bark. The bark contains tannin (7–11%) and some saponin. It is said to be used in Madras to tan fishing nets .The leaves make good manure. The leaves and twigs are lopped for fodder.	A large, erect deciduous tree with an umbrella shaped crown. It is found all over Barma and in the Andaman. The sapwood is white or yellowish-white and heartwood is dark-brown. It occurs scattered in mixed deciduous forests and ascend to 4000 feet in the Himalayas.
16	<i>Allium cepa</i>	Onion	<i>H-Piyaz</i> <i>B-Pyanj</i> <i>M-Kanda</i> <i>G-Dungari</i> <i>Tel-Nirulli</i> <i>T-Vengayam</i> <i>Kan-Nirulli</i> <i>Mal-Chuvannavlli</i>	It contains 1.2% protein, 11.6% carbohydrates, vitamin A-25 IU. The bulb and fresh herbs yield 0.005% of an essential oil which has acrid taste and unpleasant odour. The chief constituents of the crude oil is allyl-propyl disulphide. Onion possesses stimulant, diuretic and expectorant properties and is considered useful in flatulence and dysentery. Freshly expressed juice has moderate bactericide properties.	The plant is bulbous, biennial herb, bearing linear and umbel, small white flowers. Onion is extensively cultivated in India. In south India and Bengal, the bulbs are planted at end of monsoon and the planting is continued until hot weather.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
17	Allium sativum	Garlic	H-Lahsun G-Lahsun B-Lahsun M-Lahsun Tel-Velluli Mal-Velluli T-Vellaipundu Kan-Belluli	Inhalation of fresh garlic juice is useful in pulmonary tuberculosis. It has been found useful in atonic dyspepsia, flatulence and colic. As external application, juice of garlic is used as a rubefacient in skin diseases and as an ear drop. Bulb also contains allylpropyl disulphide, diallyl-disulphide compounds. The oil is rarely used medicinally, although it has been recommended for internal use as tonic and stimulant to the stomach and as vermifuge.	It is a bulbous herb mostly indigenous to northern temperate regions. It has long been cultivated in India as an important spice or condiments crop. It is a hardy perennial with narrow, flat leaf and bear small white flowers, and bulbils. Bulb consist of several smaller bulbs called cloves.
18	Aloe vera	Indian aloe	H-Ghee Kunvar B-Ghrita kumari M-Korphad G-Kumarpathu T-Chirukattali TelChinnakataband Kan-Loli sara Mal-Kumari	In Indian medicine Aloe is used as a stomachic, purgative and emmenagogue. It is regarded as valuable treatment of piles and rectal fishers. The mucilage is cooling and use to poultice inflammation. It also contains resins and gums. It contains 13.6% aloin.	It is a native of North Africa, Canary Island and Spain and has spread to East and West Indies, India, China and other countries. The plants are generally propagated by suckers.
19	Alternanthera sessilis	-	Tel-Ponnagantakura TPonnangannikeeray MalPonnangannikeeray Kan-Honagonasoppu	The young shoots are nutritious and contained 5% protein.	A prostrate herb occurring as a weed through out India and Sri Lanka. It is often cultivated as a pot herb.
20	Amaranthus spinosus	Prickly amaranthus	H-Kataili or Chaulai	It is boiled with pulses and fed to cattle to increase milk yield. It contains 3% protein.	An erect spinous herbs varying in colour from green to red or purple. It is found as a field weed throughout India and used by a poor as a pot-herb.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
21	Amorphophallus campanulatus	-	H-Zaminkand G-Suran M-Suran Tel-Kande T-Karnakilangu Kan-Suvarnagadde Mal-Chena	The corms of wild plants are highly irritant on account of the presence of crystal of calcium oxalate. They are also reported to be administered in certain aurvedic preparations recommended for piles and dysentery. Corms are used for edible purpose (curries and pickles) after washing and prolonged cooking.	This is a stout herbaceous plant with an underground corm, which is hemispherical and depressed, 8-10 inch diameter and of a dull brown colour. There are several wild and cultivated varieties. It is cultivated through out the plains of India and Sri Lanka. The tuberous out growth from the fully developed corms are planted during May to June.
22	Anethum graveolens	European dill	H-Sowa B-Sowa G-Surva T-Sata-kuppi Kan-Sabsige	Its oil is used as an aromatic carminative in the flatulence of children. It's oil is also used in soap and perfume.	It is indigenous to south Europe and is cultivated in England, Germany, Romania and the Mediterranean region.
22	Anethum sowa	Dill	H-Sowa B-Sowa G-Surva T-Satakuppi Kan-Sabsige	Dill water is considered to be an aromatic carminative specially useful in the flatulence in children. It's seeds are also used in condiments.	A herb 1–3 feet high with pinnately divided leaves found through out India. Its fruits are longer than those of European species and their dorsal ridges are pale in colour. It is cultivated as cold weather crop.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
24	Annona squamosa	Custard apple	H-Sharifa B-Ata	The pulp contains moisture (73.2%), glucose (14.5%), saccharose (1.7%) and protein (0.8%). It is rich in Vitamin C. The unripe fruit, seed, leaf and root are considered medicinal and are used for destroying insects and lice. The seeds are abortifacient. The roots are drastic purgative. Leaves are used for poultice to produce suppuration. It has poisonous constituent abrin which has been resolved into globulin and albuminose. Poultice of seed is used as suppository regarding abortion.	A small, more or less evergreen tree, 15–20 feet high, bearing yellowish-green fruits, trees occurs wild and is also cultivated all over India.
25	Annona reticulata	Bullock's heart	H-Ramphal B-Nona	The unripe fruit is considered anthelmintic, the bark is a powerful astringent and the leaves and seeds are insecticidal. It's bark contain alkaloid anonaine (C ₁₆ H ₁₇ O ₃ N).	A small deciduous or semi-deciduous tree 20 to 25 feet high bearing heart-shaped, yellowish-red fruit 3 to 5 inch in diameter. It is completely naturalized in India.
26	Anogeissus latifolia	-	H-Dhawa, Dhaura M-Dhaura G-Dhavdo Tel-Chirimanu T-Vellaynaga Kan-Dinduga MalMarukinchiram	Leaves and twigs are tanniferous. The leaves especially tender ones are very rich in tannin and they can be used satisfactorily in light leather industry. The dry bark contains 10–15% tannin. The tree yields a gum which occurs in straw colored, wormiform tears and dries without cracking.	It is a large moderate sized gregarious tree with an erect trunk. It attains a height of 60 feet. The deep red foliage is shed in February and tree remain leafless until April–May, flowering takes place during September to January. Fruit ripens during December to March.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
27	Apium graveolens	Celery	H-Salari, Ajmud B-Randhuni	This is known as celery seed oil and is much valued both as a fixative and as an ingredient of novel perfume. Dried fruits are used as a spice. They are stimulant and carminative and are used as nervine sedative and tonic. The root is considered alterative and diuretic; and is given in anasarca and colic. It has been successfully employed in rheumatoidal, arthritis and acts as an intestinal antiseptic.	The variety 'Dulce' is an erect herb, 2 to 3 feet high with conspicuously joint stem bearing, well developed leaves on long expended petiole. It has small fruit and contains minute seeds. The variety 'Rapaceum' is smaller in size, dark-green foliage with less developed stalks and swollen roots. In colder climate celery is a biennial plant and produces seeds only in the second year but in plains it become annual.
28	Arachis hypogaea	Groundnut	H-Mungphali B-Chinibadam M-Bhuimug Tel-Verusenagalu T-Verkadalai Kan-Nelagadale Mal-Nelakadala	Fleshy cotyledon rich in oil and protein. The principle constituents of groundnut protein are the two globulins, arachin and conarachin. In veterinary medicine it is used as a nutritive, laxative and emollient. It has been employed in the form of emulsion for the control of several insect-pests of plant and increases the toxicity of insecticidal like derris, nicotin, etc. Groundnut cake is one of the cheapest oil cake and has a high nutritive value. Groundnut cake constitutes a very valuable concentrated feeding stuff for cattle and other farm animals. It contains a high preparation of protein and oil than any other oil cake. Groundnut cake is good organic nitrogenous manure.	A small branched herb which grows erect (height 1–2 feet) or trails on the ground and bears small yellow flowers. Brazil is regarded as home of the groundnut but it is now cultivated in all tropical and sub-tropical countries.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
29	Argemon mexicana	Prickly poppy	H-Bharband B-Siyalkanta T-Kudiyoetti Kan-Datturi Ma-Ponnummattam	Seed yields 22 to 36% of a nauseous, bitter, non-edible oil. It is considered remedy for skin disease. In small amount, it is a cathartic, in larger doses causes purging and vomiting. Content of argemon oil is probably responsible for outbreak of epidemic dropsy.	An annual with prickly leaves, bright yellow flowers, and bristly capsules, containing many seeds resembling black mustard seed. It is an American plant, which is run wild in India and is now a troublesome weed.
30	Aristolochia bracteata	Bracteated birthwort	H-Kiramar G-Kidamari M-Kidemar T – Aduthinapalai MalAduthinapalai TelGadidhagadappa KanAdumuttadagida	The expressed juice of leaves is said to destroy maggots, when applied to foul and neglected ulcers. Decoction of the root was found to be generally efficacious in expelling round worms. Bruised leaves mixed with castor oil is applied externally in obstinate cases of exzema on children's leg.	A slender perennial herb found in the upper gangetic plain, Bengal, the western Peninsula and in the North-West Bundelkhand. It grows abundantly on the black soils of the Deccan and Gujarat.
31	Aristolochia indica	Indian birth wort	H-Ishvarimul G-Arkmula M-Sapasan	The roots have been found to contain alkaloid, aristolochin, $C_{17}H_{19}O_3N$, a yellow bitter principle isoaristolochic acid, $C_{17}H_{11}O_7N$ and allantoin. In indigenous medicine, the roots are used for treatment of snake bite, fever and minor ailments of children such as flatulence and dyspepsia. The powdered root in honey is reported to be given for leucoderma and the juice of the leaves is regarded as cobra poison.	Shrubby or herbaceous twinner with a woody root stock found through out the low hills and plains of India from Nepal and lower Bengal to Chittagong, in the Deccan Peninsula from Konkan south wards and in Sri Lanka up to 3000 feet.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
32	Artemisia vulgaris	Indian worm wood	H-Nagdona B-Nagdona M-Dhordavana T-Machipatri	In Indian medicine, leaves and flower tops are administered in the form of infusion in nervous and spasmodic affection. It is also said to be antiseptic, expectorant and anthelmintic. The oil has been found to be good larvicidal like kerosene although it is only feeble insecticide.	A tall aromatic shrub found through out the mountainous district of India, ascending to 12000 feet in the western Himalayas and to 5000-8000' in Sikkim, Khasi, Ava and Martaban mountains.
33	Artocarpus heterophyllus	Jack tree	H-Kathal B-Kanthali M-Phanas T-Pilapalam Kan-Halasu Mal-Chakka	Extract of the heartwood with alum is used by Buddhist priests for dyeing their robes yellow. The wood yields yellow colouring matter, morin and cyanomacilurin. Tannin is present in small quantity (3.3%) in the bark.	A large tropical fruit tree with a dense crown, reaching a height of 50 feet or more. The plant is indigenous to India, probably the western ghats where it grows wild. It is grown plentiful through out the warmer part of the country, especially in Bengal, Bihar and Deccan.
34	Asparagus racemosus	Asparagus	H-Satawar B-Satamuli M-Satawarmul G-Satawari TelChallagadda TShimaishadavar KanMajjigegadde Mal-Shatawali	Several medicinal properties are attributed to the root. It is said to be tonic and diuretic and useful as a galactagogue. A mixture of honey and fresh root juice is given as a demulcent in dyspepsia. The root is largely used in the preparation of the medicated oil, prescribed for nervous and rheumatic complaints.	A scandent climber distributed through out tropical Asia, Africa and Australia. It is common in India ascending up to an altitude 4000 feet in the Himalayas and in Sri Lanka.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
35	<i>Azadirachta indica</i>	Neem	H-Nim B-Nim Mar-Limba G-Limba Tel-Vepa T-Vepa Mal-Vepa Kan-Bevu	The seed oil is acrid, yellow, and bitter in taste and has disagreeable garlic like odour. It is used in skin diseases such as scrofula, indolent ulcers, and sores and ring worm. Bitter principle is due to presence of Nimbidin. The bark is a bitter tonic, astringent and anti-periodic. The bark is also considered useful in skin diseases. The seeds are reported to contain up to 45% oil. It is reported to possess anthelmintic and insecticidal properties. The odour is produced by the burning of powdered leaf is said to be fatal to insects. The dry flowers are considered as tonic and stomachic. The berries are purgative and emolient and anthelmintic. Oil cake is regarded as useful fertilizer.	A medium sized tree with a clear bole of 10–25 feet. It is evergreen, in dry areas it becomes deciduous. The flowers appear from March to May, the fruits ripen during June-August.
36	<i>Bahunia variegata</i>	Bahunia	H-Kachnar	Tree yields gum similar to cherry gum. Its bark is reported to be used in dyeing to obtain various shades of brown. The bark is described as astringent, alterative tonic, and useful in scorfulla, skin diseases and ulcers. The plant provides good fodder.	A medium sized tree, flowering during hot season, distributed in sub-Himalayan tract, Indus-east wards, also in dry forests over eastern, central and South India and in Burma.
37	<i>Balanites aegyptiaca</i>	Delile	H-Hingan Hingot M-Hinganabet G-Regorea Tel-Gari T-Nanjunda	The pulp of fruit contains some saponine but not astringent. The seeds, fruits, bark and leaves are reported to be anthelmintic and purgative. In western India, bark is used as an anthelmintic for cattle.	A small spiny tree about 20 feet high with bifoliate ashy-green leaves. The fruits, ripen in winter are ovoid drupes. The tree is characteristic of the drier parts of India and Burma.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
38	Bambusa arundinaceae	Thorny gum	H-Bans M-Bans G-Bans B-Ketua Kutuasi TelBonguveduru, Pentu-veduru T-Mungil Mal-Mungil Kan-Biduru A-Kotoha	The young shoot contains cyanogenetic glucoside and is poisonous. Young shoot contains 0.03% of HCN and are lethal to mosquito larvae. The leaves are reported to be given to horses as a remedy for coughs and colds. It's leaves and twigs are used as fodder and are largely consumed by cattle and elephant.	A tall thorny bamboo with a central root stock, bearing bright green, shiny-pulp, culms, 80–100 feet high. The species is wild through out the greater part of country, especially in the hill forest of western and southern India.
39	Barleria cristata	-	-	The leaves and roots are used for cough and in inflammations.	The genus comprises approximately 180 species of under shrubs or shrubs, distributed in the warmer parts of the world. Of these about 30 species occur in India. Several species bear handsome flowers and are cultivated as ornamental hedge plants.
40	Barleria prionitis	-	H-Jhinti, Katsareya B-Kanta jati M-Pivali koranti G-Kantashelio TelMullugoranta T-Shemmuli Mal-Shemmuli KanMullugorante	The juice of leaves is slightly bitter and acid. It is generally administered with little honey or sugar in catarrhal infection of children which are accompanied by fever and much phlegm. The leaves are also chewed to relieve toothache.	A spiny shrub reaching a height of 2–5 feet. It flowers in the cold season and bears orange-yellow and cream-coloured flowers. It is found through out the hotter parts of India, Burma and Malaya.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
41	Benincasa hispida	Ashgourd	H-Petha B-Chalkumra G-Bhurukohlu M-Kohala T-Pushanikai Tel-Budidagummadi KanBudagumbalakayi Mal-Kumbalangai	The seeds are said to possess anthelmintic properties and the oil is equally efficacious. The juice of ripe fruit is considered useful in haemoptysis and other internal discharge. The young fruit is used as vegetable while ripe fruit is used as petha.	An extensive, trailing or climbing herb. The bruish, white waxy bloom, which exudes from its surface can be collected. The plant is probably a native of Malaysia but is now found through out the tropics. It is cultivated for its fruits, through out the plains of India, Burma and Sri Lanka, and on the hills up to 4000 feet.
42	Berberis aristata	Indian barberry	H-Chitra B-Darhaldi M-Daruhald	The root bark is rich in alkaloid content. The berberine, the principal alkaloid, can be easily obtained from the roots in the form of salts.	An erect spinous shrub 6–8 feet high. Flowers are golden-yellow. It occurs on the Himalayas from 6000 to 10500 feet and also on Nilgiri hills and in Sri Lanka.
43	Bergia odorata	-	-	Medicinal and aromatic shrub.	A genus of herbs and under shrubs, including about 25 species, distributed in tropical and temperate countries. Of these, 4 are found in India. It is a medicinal aromatic under shrub, is found in western Rajputana, Gujarat and Sind.
44	Biophytum sensitivum	-	-	It is to be used for chest complaints and it's ash for stomachache.	It is a herb with sensitive leaves, occurring in warmer countries. It is also found in India.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
45	Boerhavia diffusa	Spreading hog-weed	H-Sant B-Punarnava Tel- Punarnava M-Tamvdivasu G-Vakhakhaparo T-Mukarattekirei	The root of the plant is considered laxative and diuretic. It has also expectorant properties and is used in asthma. The active constituent of the drug is the alkaloid, punar-navin. The drug has more powerful effect on early cirrhosis of liver and chronic peritonitis.	A perennial creeping weed with pinkish flowers found through out the India.
46	Borassus flabellifera	Palmira palm	H-Tad B-Tal B-Tal Tel-Tatichettu T-Panai Kan-Tale Mal-Pana	It is one of the palms, yielding toddy, the country liquor. The fresh sap of the palm called sweet toddy or Nira contains about 12% sucrose. Nira is used as a stimulant and antiphelegmatic and is also considered useful in inflammatory affection and dropsy. Toddy is sometimes used in bread making. Talmisri is used in cough and pulmonary affection and as a laxative for children.	It is a native of tropical Africa and is found in many of the comparatively dry parts of India, Burma and Sri Lanka and is common along the coastal area of the Peninsula, Bihar, Bengal. It attains a height of 40 to 60 feet. The spathes begin to appear in November and December. Male and female flowers are borne on different plants.
47	Boswellia serrata	Indian olibanum	H-Salai B-Salai M-Salai T-Parangisambari TelParangisambari Kan-Madi	The tree on tapping exudes an oleo-gum-resin which is known as Indian olibanum. It exudes oil, resin and gum. The oil is usually pale-yellow. Oil is found to be suitable for paint making. The resin has been found suitable for preparation of varnishes. It is also good source of timber.	A moderate or large branching tree with a bole, 12–15 feet in height and 3–5 feet in girth, generally found in dry hilly areas. It is common in most parts of central provinces, the Deccan, Bihar, Orissa, Rajputana, central India, eastern states and north Gujarat.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
48	Brassica compestris	Brown sarson	H-Kali sarson	The oil is used in India for cooking. It is also used for oil bath and it is believed to strengthen the skin and to keep it cool and healthy. With camphor it forms an efficacious embrocation in muscular-rheumatism, stiff neck etc. The oil cake is used for cattle, while tender leaves and shoots are released as pot-herb.	The variety has many characters in common with toria. It has compressed stem with large rosette, bristly and hairy leaves. The species is highly self-sterile. It is grown all over Punjab.
49	Brassica nigra	Black mustard	H-Benarasirai M-Mohari T-Kadagu Tel-Avalu Kan-Sasive	The oil is optically inactive and consists almost entirely of allyl-isothio-cynate. The oil is extremely powerful irritant owing to its volatility and penetrating power and is responsible for the painful nature of blister caused by mustard. It is also used in pleurisy and pneumonia. In India, the seeds of black mustard are used in pickles and curries.	This species is highly self-sterile and is quite distinct from other Brassicas. It has been cultivated in Europe since thirteenth century. It appears comparatively recently into India, and grown to a limited extent in the Uttar Pradesh, Punjab and Tamil Nadu.
50	Butea monosperma	Flame of the forest	H-Palash, Dhak B-Palas M-Palas G-Khakra Tel-Moduga T-Parasa Kan-Mutthuga Mal-Palas in samatha	Fresh seeds are reported to contain proteolytic and lypolytic enzymes. The flower yields very fugitive yellow colouring matter. The leaves are much used throughout the country for making platters, cups, etc. Pyrocatechin is a powerful astringent and is given in many forms of chronic diarrhoea. The seed is valued as anthelmintic. Freshly powdered new seed given fairly good result against ascaris. Leaves are eaten by buffaloes and elephants. The dried leaves are used for beedi wrappers.	The medium size, deciduous tree, with crooked trunk is 10 to 15 feet in height. Its bright-orange red flower bloom in great profusion at the beginning of the hot season. It is common through out India, Burma and Sri Lanka (up to 4000 feet).
51	Byttneria herbacea	-	-	-	It is a larged perennial herb, found in Orissa and Deccan.

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52	Caesalpinia bonducella	Bonduc-nut	H- Karanju B-Nata M-Gajaga T-Kazhichikay Tel-Gachchakaya Mal-Kazanchikkuru Kan-Gajagakayi	The seeds are used as a substitute for marbles by children. In India it is used as a tonic and antipyretic. The leaves and seeds are used as external application for dispersing, inflammatory swelling. The leaves and bark are considered emmenagogue, febrifuge and anthelmintic. It's oil is used for stopping discharges from the ear.	A large scandant prickly shrub, found through out the hotter parts of India, Burma and Sri Lanka, particularly along the sea coast and up to 2500 feet on the hills. It is common in Bengal, Burma and South-India and is often grown as hedge plant. The flower is yellowish-white.
53	Cajanus cajan	Pigeonpea or redgram	H- Arhar B- Arhar M- Arhar T-Thovaray Tel-Kandulu Kan-Togare Mal-Thuvara	Seed is used for dal making. Some varieties of arhar are richer in protein of high digestibility. The husk of pods and seeds obtained during threshing constitute a valuable cattle feed. The green leaves and tops of the plant are also used as green manure.	An annual or perennial shrub 4 to 10 feet high, cultivated nearly through out India.
54	Calotropis gigantia	Madar	H-Aak B-Akaula M-Rui G-Akado Tel-Jilledu T-Arkkam KanArkagida Mal-Erikku	Latex contains traces of glutalione and a proteoclastic enzyme similar to papain. The latex is a strong irritant to skin and mucous membrane. Latex is used in indigenous medicine in combination with Euphorbia nerlifolia as drastic purgative. The stem, root, bark, flowers and leaves are also used in medicine. A tincture of the leaves is used for intermittent fever. Powdered flowers in small quantity are useful in the treatment of cold, cough, asthma and indigestion. Powdered root bark provides relief dysentery. The root bark is similar to ipecacuanha in its action. In small dose it is diaphoretic and expectorant, and in higher dose it is an emetic. Root bark contains beta amyryn, 2-isomeric crystalline alcohol, giganteol and iso-giganteol. Flower contain esters of alpha and beta calotropeols and beta-amyryn.	Shrub or small tree, 8-10 feet height, bearing unscented, pale-purple or white flowers. This species is common through out India.

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55	Camellia sinensis	Tea plant	H- Chai B- Chai M- Chai T-Thaiilai Tel-Theyaku	The more important constituents which give tea its distinctive character as a beverage are caffeine, polyphenol and essential oils. The leaf contains carotin, riboflavin, nicotinic acids, pantothenic acid and ascorbic acid. The most important constituents of both green and black tea is the purine-base alkaloid, caffeine. Tea tannin is regarded as the second-most valuable constituents of tea. Tannin is used in tanning industry.	Evergreen tree or shrub growing to a height of 30-50 feet. The flowers are white and fragrant. There appears to be two main axes of geographical distributions, one approximately east to west passing through Assam to China and others north to south extending from Assam to Indo-China.
56	Canna indica	Indian shot	H- Sarvajjya B-Sarbajaya M-Devakeli Kan-Hudingana T-Kalvalai TelKrishnatamara Mal-Kattuvala	The roots are used in indigenous medicine as diaphoretic and diuretics in fever and dropsy. It's fiber can be used as a substitute for jute in the manufacture of rope twine and sack cloth. The seeds yield a beautiful, evanescent, purple dye.	Perennial herb with light-scarlet or yellow flowers, widely cultivated through out India for its beautiful flower and foliage.
57	Cannabis sativa	True hemp	HBhang ,Charas Ganja B- Bhang, Charas, Ganja GBhang,Charas, Ganja Tel-Ganzai T-Ganja Kan-Bangi	Three products are obtained from the plant—fibre, oil and the narcotics, bhang, ganja and charas. Hemp-seed oil finds use in the plant and varnish industries as a substitute for linseed oil, and in the manufacture of soft soap.	A tall annual herb, 4–10 feet high with erect angular stem, bearing palmately divided leaves. The plant is dioecious, rarely monoecious. It is practically naturalized in the sub Himalayan tract in India and is abundantly met with in wastelands of Punjab eastward to Bengal and Bihar and extending south wards to Deccan.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
58	Capparis decidua	-	H-Kurrel M-Ker G-Ker Tel-Kariramu T-Sengam Kan-Chippuri Punjabi-Karil	The fruit is an astringent and useful in cardiac trouble and biliousness. The tender branches and leaves are used as plasters for boils and swelling. The bark is acrid, laxative, diaphoretic, alexeteric, anthelmintic and useful for cough, asthma and inflammation. Root and bark are pungent and bitter and given in intermittent fever and rheumatism.	A densely branching shrub or a small tree. It is met with chiefly in dry places in the Deccan peninsula, Rajputana, Punjab and Sind.
59	Capparis sepiaria	-	-	It is febrifuge, alterative and tonic and has been useful for skin diseases.	It is a large climbing shrub, distributed in dry season through out India, Burma, Sri Lanka and Andaman. It is useful hedge plant.
60	Capsicum annum	Chilli	H- Lal mirch B-Lankamorich Tel-Mirapakaya T-Milagay Kan- Mensinakai Mal-Mulaku	The pungent principle of chilli is capsaicin. Dry chilli is extensively used as a spice in India. Curry powder is made by grinding roasted dry chilli. It has tonic and carminative action, and is specially useful in atonic dyspepsia.	This is extensively cultivated throughout India. The fruits are bright-red, slender and thin wall.
61	Cardiospermum halicacabum	Balloon vine heart seed	H- Kanphuti B-Lataphatkari G-Karolio M-Kapalphodi TelBuddakakara T-Mudukottan	The root is diuretic, diaphoretic, emetic, laxative, rubefacient and useful as poultice for rheumatism. The leaf juice is said to be cure for earache.	A species common through out India in the plains.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
62	Careya arborea	Kumbi	H- Kumbi B- Kumbi M-Kumbia G-Kumbi Tel-Araya T-Ayma Kan-Kaval Mal-Alam	The bark is fibrous and can be used for making brown paper and coarse cordage. The bark is used as demulcent in cough and cold, in the preparation of emollient, embrocation and as antipyretic and anti-pruritic in eruptive fever, particularly small pox. The calyxes of the flower contain mucilage and are used as demulcent. The fruits contain astringent gum. Decoction of the fruit is given to promote digestion. Leaves are used for ulcer. The leaves contain 19% tannin.	A large deciduous tree 30–60 feet high, distributed throughout India up to an altitude 5000 feet.
63	Carica papaya	Papaya	H- Papeeta B-Pappaiya M-Papaya G-Papayi T-Pappali Tel-Boppayi KanParangimara	The fruit is rich source of Vitamin A. Glycoside, carposide and alkaloid, carpaine are found in the leaves, The leaves contain Vitamin C 286 mg/100 g. Sinigrin like glycoside probably identical with carposide, and myrosin like enzyme are found in the roots. The ripe fruit is stomachic, digestive, carminative and diuretic. The milky juice of the unripe fruit is anthelmintic particularly effective in the expulsion of lumbrici. Seeds are said to quench thirst. The roots are said to cure yaws and piles. Papain is used in combating dyspepsia and other disorders. It is also used for reducing tonsils. It is used as bacteriophage.	A herbaceous tree growing to a height of 10–25 feet bearing a crown of large, deeply lobed leaves giving a palm lobed like appearance. It is normally dioecious, but occasionally monoecious. Plants bearing hermaphrodite flowers have also been recorded. It is at present grown over the tropical and sub-tropical countries of the world. In India it has been successfully cultivated in Tamil Nadu, Maharashtra, West Bengal, Bihar and Uttar Pradesh.
64	Carrisa carandas	Karaunda	H- Karaunda B-Karancha Tel-Vaka T-Kalakkay KanKarekayi	It is said to possess anti-scorbutic properties. The fruit is useful as auxiliary in tannin and dyeing. The root is a bitter, stomachic and anthelmintic. Decoction of leaves is given in the early stage of remittent fever.	A dichotomously branched large shrub or small tree with strong or forked thorns in pairs. It is found throughout India, Burma, Sri Lanka and Malacca.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
65	Cassia auriculata	Tanner's cassia	H- Tarwar G-Awali M-Tarwad T-Avaram Tel-Tangedu Kan-Tangedu Mal-Avara	Its bark is the principle indigenous tanbark used in south-Indian tanneries. The bark is astringent, and the leaves and the fruits are anthelmintic. The root is used in the treatment of skin diseases.	A shrub with light-yellow flowers, growing wild in central provinces and western Peninsula and cultivated in other parts of India.
66	Carica papaya	Indian laburnum	H- Amaltas B-Sundali M-Bahava G-Garmala T-Konnei Tel-Rela Kan-Kakke	It contains tannin, ranges from 10–12%. The root bark extract is used in the treatment of black-water fever.	A moderate sized deciduous tree with a bole 12–15 feet high. It is indigenous to India, and naturalized in tropical Africa, south-America and West Indies. It is sometimes cultivated for its beautiful yellow flower which appear during April–June.
67	Cassia occidentalis	Negro coffee	H- Kasondi B-Kalkashunda T-Nattam-taka Tel-Kasinda MalNatramtakara	The leaves, roots and seeds are purgative. The seeds and leaves are also anti-periodic. The seeds are used as external application for skin diseases.	A defuse under shrub found through out India.
68	Cassia tora	-	H- Chakunda B- Chakunda G-Kovariya M-Takla Tel-Tantemu Tam-Tagarai	The seed contains glycoside and pleasant smelling fixed oil (5%), on saponification the oil yields oleic, linolics, palmitic and lignoceric acid. The seeds are used as coffee substitute. They are also reported to be used as a indigo dyeing. The leaves are useful in skin diseases and seeds are laxative. They can be used as a protein rich feed for livestock.	A common herbaceous annual occurring as a weed throughout India. The pods are 6-9 feet long and up to 1/4 feet in diameter, containing flattened dark seeds.

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69	Casuarina equisetifolia	Beef-wood	H- Jangli saru B-Jau M-Suru G-Vilayatisaru Tel-Sarugudu T-Savukku Kan-Sarvemara Mal-Chavukku	The bark of this tree is used in diarrhoea and dysentery. A lotion of it is reported to be efficacious in beriberi. Decoction of the leaves is used in colic and powdered seeds are applied as plaster in headache. The bark contains 6-18% of tannin.	A large evergreen tree with a straight cylindrical bole. The ultimate branches are slender, cylindrical, jointed and green with leaves reduce to minute scales. It occurs wild on the shores at the head of Bay of Bengal, Burma and Andaman.
70	Cedrus deodara	Deodar	H-Deodar	It is one of the most valuable Indian timber. It is considered suitable for second grade pencils. The wood possess diaphoretic, diuretic and carminative properties and is useful in fever, piles and pulmonary and urinary disorders. The bark is astringent and useful for fever, diarrhoea and dysentery. The oleoresin valued as an application to ulcers and skin diseases.	A large evergreen handsome tree with spreading branches and dark-green leaves. It occurs in the north-western Himalayas from Kashmir to Garhwal at altitude of 4000–10000 feet.
71	Cedrus deodara	Himalayan cedar	H-Deodar	Principal constituent of the oil is sesquiterpene which is associated with sesquiterpene alcohol. The oil is used as soap perfumery. The wood has diaphoretic, diuretic and carminative properties and is useful in fever, piles and pulmonary and urinary disorder. The bark is astringent and useful for fever, diarrhoea and dysentery. The oleoresin and dark coloured oil obtained from the wood is valued as an application for ulcer and skin disease.	A large evergreen, handsome tree with spreading branches, reaching up to 250 feet height. It occurs in north-western Himalayas from Kashmir to Garhwal at altitude of 4000 to 10000 feet and is most common conifer between 5500 and 8000 feet.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
72	Ceiba pentandra	True kapok tree	H- Safed simal B-Schwetsimul M-Salmali Tam-Ilavum Tel-Tellaburaga Kan-Buraga Mal-Ilavu	The kapok seed oil is used for same purpose as refined cotton seed oil. It is one of the adulterants in groundnut oil. The tree yields dark-red, almost opaque gum. It is astringent and is given in certain stage of bowel complaints. The root is diuretic. The leaves are used as emollient. The press cake and seeds are used as feed for cattle. It contains 26.2% crude protein, 7.5% fat and 23.2% carbohydrate. The cake is rich in mineral content.	A medium sized deciduous tree, 50–100 feet high . The branches are prickly and young and bear digitately compound leaves. The fruits are oblong capsule. The plant is widely distributed in the hotter parts of western and southern India, Andaman Islands, Sri Lanka, Burma, Malaya, Java, Indo-China and other south-east Asian countries.
73	Celastrus paniculatus	-	H- Malkangni B- Malkangni T-Valuluvai Kan-Kariganne Mal-Palulavam	The leaves are emmenagogue and the leaves sap is used as an antidote for opium poisoning. The bark is abortifacient. The seeds are bitter, laxative, emetic and tonic. They are used as a stimulant and diaphoretic in rheumatism, gout and various fevers. Flesh aril contains two alkaloids-celastrine and paniculatine. The stimulant action of celastrine specially manifest in the brain and is not followed by secondary depression.	A large climbing shrub with yellow fruits common all over the hilly parts of the country up to an altitude of 4000 feet. The seeds are brown and are covered by a scarlet aril.
74	Cenchrus ciliaris	-	H- Anzan T-Kollukattai Tel-Kusa	The grass can be fed green or turn into silage or made hay. It is said to increase milk in milch cattle and impart to them a sleek and glossy appearance, indicative of well doing stock.	A perennial tuft grass 6–18 feet high, erect or decumbent, common in the plains of India, particularly in sandy and dry regions. It is cultivated in Punjab and south India for fodder.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
75	Centella asiatica	Indian pennywort	H-Brahma-manduki B-Thol Khuri M-Karinga Tel-Brahmi Tam-Vallarei	The plant enjoys considerable reputation in Indian system of medicine as diuretic, alterative and tonic. An infusion of plant is used in India and Madagascar in the treatment of leprosy. A bitter principle, vellarine, pectic acid and resin are present in the leaves and roots of the plant. The glycoside, asiaticoside has been isolated in crystalline form. It has been shown to be active in the treatment of leprosy. The tree is also reported to possess insecticide properties.	A prostrate perennial, faintly aromatic herb found wild throughout India and Sri Lanka up to an altitude of 2000 feet.
76	Chenopodium album	Lamb's quarters	H-Bethusag B-Chandan betu T-Parupukkirai Tel-Pappukura	The plant contains ethereal oil, substance resembling cholesterol, and ammonia and amines both in free and combined forms. The plant may serve as a field indicator for magnesium element.	A small odorless herb occurring in many forms, wild and cultivated, throughout India up to an altitude of 14000 feet. In the western Himalayas. It is grown as pot herbs and grain crop.
77	Chenopodium ambrosioides	Mexican tea	-	The plant is anthelmintic, and volatile oil obtained from it is used as a medicine. The oil is effective against many forms of intestinal parasites. All parts of plant (specially the root) contain saponin. The ascaridol has anthelmintic principle. The oil is effective against many insecticidal parasites.	An erect much branched herb, 2 to 4 feet high with aromatic granular hair, occurring in Bengal, and south India. The flowers are minute and are clustered in leafy spike.
78	Chrysanthemum coronarium	Chrysanthemum	H-Guldaudi B-Guldaudi Urdu-Gulechini T-Shamantipu Tel-Chamanti Kan-Sevanti	The flower has very bitter taste, and is said to be stomachic and aperient. Leaves are used as depurative and prescribed in migraine.	This species is considered to be native of China and Japan and is extensively cultivated in Indian gardens for its ornamental multicoloured flower.

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79	Cicca acida	Stargoos berry	H- Harfarauri B-Hariphal Te- Rachyusirika T-Aranelli Kan- Aranelli Mal- Aranelli	The roots and seeds are cathartic. The juice of the root bark is used as a poison, it produces headache, sleepiness accompanied by severe abdominal pain. The root bark contains 80% tannin.	A small tree up to 20 feet high, reported to be indigenous to Madagascar but frequently cultivated in home yards and garden in India.
80	Cinnamomum cassia	Cinnamon	H-Dalchini	It is the source of cassia oil of commerce.	It is grown in China. This species has been introduced into Sri Lanka.
81	Cissampelos pareira	False pareira brava	H- Akanadi B- Akanadi G-Venivel M-Paharvel T-Appatta Tel-Adivi banka-tige Kan-Padavali	Root is bitter and possess diuretic, anti periodic and purgative properties. It is used in dyspepsia, diarrhoea, dropsy, cough and certain urinary troubles like cystitis. The leaves are used as external application for sores and itch. An alkaloid of the isoquinoline group, pelosine or beerin is present in in the roots to the extent of 5%.	A climbing shrub distributed through out warm parts of Asia, East-Africa and America, and common in India and Sri Lanka.
82	Cissus quadrangularis	Edible stemmedvine	H- Hadzora B-Hasjora M-Chaudhari G-Chudhari Tel-Nalleru Tam-Pirandai Kan- Mangaroli	The powder dry shoot is used in the digestive trouble. The juice of the plant is said to be beneficial in scurvy. The stems are made into paste and given in asthma and the powdered root is considered to be specific in the treatment of fractured bones and infusion of the plant is purgative. Fresh shoots are powdered and applied for burns and wounds.	A climber with stout fleshy quadrangular stems found throughout the hotter parts of India and Sri Lanka. The young leaves and tender shoot are used in the preparation of Pappadams and curries.

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83	Citrullus colocynthis	Bitter apple	H- Indrayan B- Indrayan G-Indrak M-Kaduvrin davana T-Peykkumutti Tel-Etipuchchha Kan-Pavame kkekayi	Pulp of colocynth is a drastic hydrogogue cathartic producing large watery evacuations within 2–3 hrs. The active principle of colocynth include a bitter emorphous alkaloid and resin, both of which have violent purgative action. The roots of the plant also possess purgative properties and are used in ascites, jaundice.	An annual and perennial herb with a prostrate or climbing stem, bearing a smooth spherical fruits. It is native of the warmer parts of Asia and Africa. It is found in Arabia, Syria and Egypt. It occurs through out India and is seen growing wild in the warm, arid and sandy tracts of north-west, central and south India
84	Citrus grandis	Pummelo	H- Chakotra B- Chakotra G-Obakotru M-Panis MalPamparamasam Kan-Chakotre T-Pambalimasu	Fruits are esteemed for dessert they are also made jams and marmalades. The fruit is considered to be nutritive and refrigerant. The leaves are useful in epilepsy, chorea and convulsive cough.	A bushy tree about 15 feet height. It is native of Malaysia, Polynasia and introduced to India and Sri Lanka from Java. It is grown on a small scale in Coorg, Mysore, Bombay, Patiala, Madras, Punjab and Uttar Pradesh.
85	Citrus lemon	Lemon	H-Nimbu	The fruit in the form of pickle is useful in hypertrophy of the spleen lemon peel is stomachic and carminative. Lemon oil is stimulant and rubefacient, when applied externally. Lemon juice is one of the best remedy of scurvy. It has been successfully employed in acute remedy, dysentery and diarrhoea. An anti-pneumonia factor is said to be present in lemon juice.	A straggling bush or small tree, 10–12 feet. high. The wild stalk is a native of north-west India ascending to 4000 feet. Lemon is cultivated in home garden and small size orchard in Uttar Pradesh, Maharashtra, Tamil Nadu and Mysore.

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86	Citrus medica	Citron	H-Bara nimbu	The fruits are used mainly for pickling. The juice is refrigerant and astringent. Preserved rind is used as remedy for dysentery.	A shrub or small tree about 10 feet high considered to be native of India. Wild citron has been reported from Chittagong, Sitakund hills, Khasi and Garo hills. Citron is now cultivated sparsely through out the warm, moist region of India.
87	Cleistanthus collinus	-	H- Garari B-Karlajuri	The leaves, roots and especially the fruits, act as violent gastro-intestinal irritants. The leaves are abortine facient. The leaves and bark contain saponin and tannin. Active principle present in the leaves is oduvin, a yellowish-white crystalline glucoside.	A small deciduous tree distributed from the Deccan peninsula, northwards up to Ganges. It thrives well on dry rocky ground.
88	Clerodendrum inermi	-	H- Lanjai B-Banjai M-Vanajai T-Anjali Tel- Takkulakamu Kan-Kundali Mal-Nirnochi	The leaves are mucilaginous, bitter and fragrant, and their medicinal properties resemble those of chiretta. Fresh and dry leaves posses alterative and febrifugal properties. A poultice of the leaves is used to resolve buboes. A liniment useful in rheumatism is obtained by boiling the root in oil. The leaves contain amorphous bitter principle resembling that found in chirayta.	A straggling shrub occurring near the coastal region of India and Sri Lanka.
89	Clerodendrum phlomidis	-	H- Arni G- Arni M- Arni T-Takkari Tel- Takkolamu Kan-Taggi Mal-Tirrutali	Root is aromatic and astringent and decoction of it is used as a demulcent in gonorrhoea. It is also used as a bitter tonic. The juice of leaves is useful as an alterative.	A large shrub occuring in many parts of India.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
90	Coccinia indica	Ivy gourd	H- Kunduri B-Telakucha Mar-Bimbi G-Ghobe K-Tonbekai T-Kovaikai Tel-Dondakaya	The root stem and leaves are used for the treatment of skin diseases, bronchial catarrh, bronchitis and diabetes.	A climbing or prostrate perennial herb, growing wild throughout India with long tuberous root.
91	Cocculus hirsutus	-	H-Jamfikibel	The juice of leaves contains mucilage, when mixed with water it forms the jelly which is taken as cooling medicine for gonorrhoea and used externally for eczema, prurigo and impetigo. The root is bitter, alterative, laxative and demulcent, and is used with other ingredients for bilious dyspepsia, rheumatism and stomachache of children.	A scandant shrub occurring throughout India.
92	Coffea arabica	Arabian coffee	H- Mamira G-Haladiovachnag B-Tita	It produces the finest quality of coffee. The 'chiks' variety of arabica yields large round beans, reputed for liquoring quality.	An evergreen shrub or small tree attaining a height of 15–30 feet. The flowers are white and fragrant. It is a native of Abyssinia and introduced into India through Arabia. It is cultivated in south India, Java, West Indies, East Africa and other South American states.
93	Commelina benghalensis	-	H- Kanchara M-Kena T-Kanavazhar	Its rhizome is starchy and mucilaginous is cooked as food. The leaves are used as a potherb in the times of scarcity. The plant is bitter and said to be beneficial in leprosy.	It is a succulent herb, common in moist region through out India.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
94	Commiphora weightii or Commiphora mukul	Indian bellium tree	H-Guggul	It is a source of indian bdellium, a gum resin obtained by the incision of the bark. The resin is largely used as incense as fixative in perfumery, in medicine. Guggul has wide range of usefulness in indigeneous medicine. It is astringent and antiseptic. When taken internally it act as bitter, stomachic and carminative and improving the digestion. Like all oleoresins it causes an increase of leucosides in the blood and stimulant fagocides. It acts as a diaphoretic expectorant and diuretic. The resin is used in the form of lotion for indolent ulcers.	A small tree or shrub with spinescent branches occuring in the arid rocky tracts of Rajputana, Khandesh, Berar, Sindh and Baluchistan. It is sometimes planted in large.
95	Coptis teeta	Gold thread	H-Mamira	The rhizome is an all round tonic and stomachic. It has been found efficacious in debility, atonic dyspepsia and in mild form of intermittant fevers. It is also used as a salve for the eyes.	This species occurs in Mishmi hills at the northern frontier of Assam and is reported to be cultivated in China.
96	Corallocarpus epigarus	-	H-Akasgaddah Mar-Akash Tel-Nagadonda T-Akasha-garundan Kan-Akashagoru	The root is bitter and sub-acid taste found is credited with alterative and laxative properties and is used in syphilitic rheumatism, later stage of dysentery and chronic mucous enteritis. The oil is externally used in chronic rheumatism. The root contains bitter principles allied to bryonine.	It is a tendril-bearing, climbing herbs distributed in tropical-Africa, Persian Gulf region and India.
97	Corchorus capsularis	White jute	B- Titapat A-Titamara	Jute is used principally for making coarse woven fabrics. The leaves are stomachic, laxative, carminative and stimulant. The dried leaves are given internally in dysentery.	It is reported to be wild in south China and appears to have come into India from China.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
98	Coriandrum sativum	Coriander	H- Dhania B-Dhane G-Konphir M-Dhanna Tel-Dhaniyalu T-Kothamalli Kan-Kothambri MalKothumpulori	The aromatic odour and taste of coriander fruit is due to an essential oil. Fruits are carminative, diuretic, tonic, stomachic, anti-billious, refrigerant and aphrodisiac. The oil is employed in medicine as a carminative. The residue left after the extraction of volatile oil has been used as feed to animals.	An annual herb, 1–3 feet high, with small, white or pinkish-purple flowers borne on compound terminal umbel. It is a native of mediteranian region and is extensively grown in India, Russia, central Europe, Asia-minor and Moracco. In India it is cultivated in all states.
99	Costus speciosus	-	H- Keu B- Keu M- Penva Tel-Chengal vakoshtu Kan-Chengal	The rhizome is edible and is used after cooking. The rhizome is credited with purgative and tonic properties. The root is said to be depurative. It is used in Uttar Pradesh as a tonic and anthelmintic.	A common plant with tuberous rhizome distributed through out India up to an altitude of 4000 feet. The bracts are red, flowers larged with white limbs and yellow centres. The plant is particularly common in Bengal and Konkan.
100	Couroupita guianensis	Cannon ball tree	H- Kenkra B-Kankra M-Khekra Kan-Aedi Mal-Nandu T-Nandu	The shells of the fruits are used as utensils and the pulp is said to be eaten and made beverage.	It is frequently found in botanical garden in India. It bears large curiously formed flowers with a pleasing combination of rosy, purple, white and yellow colors.
101	Crataeva nurvala	-	H- Barna B-Barun M-Voyavaran T-Moralingam	The bark contains tannin and also saponin, is bitter and anti periodic, tonic and demulcent, and has stimulating action on the liver an extract of it is given as a laxative and promoting appetite. The root bark is rubefacient and counter irritant. The flowers are astringent and cholagogue.	A moderate sized deciduous tree, common throughout India, Burma and Sri Lanka, either wild or cultivated.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
102	Crescentia cujete	Calabash tree	H-Bilayati bel T-Tiruvattukkay	Fruit pulp is diuretic, aperient, cooling and fabrifuge. Decoction of the bark is used for cleaning wounds and a poultice prepared from pounded leaves is applied for headache. The fruit pulp contains crescentic, tartaric, citric and tannic acids. The sap from the tree is stated to contain dye which was once used for dyeing silk black.	This species has been introduced into India and is commonly found in gardens. The fruit is ovoid, rounded up to 12 feet in diameter with a hard, smooth, wood shell, enclosing and acidic pulp and flattened seed.
103	Croton tiglium	Croton purging	H- Jamal-gota M- Jamal-gota Tel-Nepala Kan-Nepala T-Nevalam Mal-Nervalam	The oil content is 30–45% of the whole seed. Both the seed and oil possess dangerous toxic and purgative properties vesicating action. Both croton oil and croton resins loose their specific physiological action upon hydro-generations. Croton oil is most drastic of all purgatives. Even in minute doses it causes violent purging and vomiting. The glycosides present in the seed kernel to the extent of 1–4% and has been as a deriboside of two-hydroxy-six-amino-purine.	A small evergreen tree 15–20 feet high, distributed in Bengal, Asam, south India, Burma and Sri Lanka in naturalized or cultivated state. The fruits are oblong, obtusely 3 lobed, 17–25mm long, almost glabrous and 3-seeded.
104	Cucumis sativus	Cucumber	H- Khira B- Khira M- Khira Tel-Dosakaya T-Vellarikkai	The seeds are reported to be cooling tonic and diuretic. The seed kernels are edible and are used in confectionery.	A trailing or climbing annual, bearing elongated, thick, cylindrical fruits of varying sizes and forms. The plants are probably indigenous to north-India. It is widely cultivated in India.

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105	<i>Cuminum cyminum</i>	Cumin	H- Zira or Zeera Man-Jiregire T-Siragam Tel-Jilakara Kan-Jeerige M-Jorekam P-Zira-sufed	Cumin seed have an aromatic odour and a spicy, some what bitter taste. Cumin seed is stimulative and carminative. They are stomachic and useful in diarrhoea and dyspepsia. The oil (cumaldehyde) is used in perfumery and for flavouring liquors and cordials. It is also used as a carminative. The residue left after the volatile oil extraction contain 17.2% protein and 30% fat. It can be used as a cattle feed.	A small slender annual herb about 1 inch high, with a much branched angular or straited stem, bearing 2 or 3 partite linear leaves, bluish-green in colour and having sheathing bases. The flowers are white or rose coloured born in compound leaves. Plants are grown extensively in south eastern Europe and North Africa bordering the Mediterranean Sea and in India and China. It is cultivated in almost all states in India except Bengal and Assam.
106	<i>Curcuma longa</i>	Valeton turmeric	H- Haldi B- Haldi G- Haldi M- Haldi Tam-Manjal Tel-Pasupu Kan-Arishina	Turmeric (rhizome or powder) is used for dyeing wool, silk and unmordant cotton to which it imparts a yellow shade in an acid path. Turmeric is used to some extent as a stomachic, tonic and blood purifier, mixed with warm milk. Decoction of rhizome is said to relieve the pair purulent ophthalmia. Externally it is applied to indolent, ulcers and paste made from the powdered rhizome along with lime is a remedy for inflamed joints. The anti-oxident property of haldi powder is probably due to the phenolic characters of curcumin. The dyustuff act as a cholagogue causing contraction gall-bladder.	A perennial herb, 2–3 feet high with a short stem and tufted leaves. The plant is native of southern Asia (probably India) and is cultivated extensively throughout the warmer parts of the world. It is grown on a large scale in India, China and East Indies. It is cultivated in almost all states of India particularly Tamil Nadu, West Bengal and Maharashtra.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
107	Cuscuta reflexa		H- Akash Bel BHaldialgusilutta G-Akaswel M-Nirmuli Tel-Sitamma Pogunalu	The plant is purgative and is used internally in protracted fever, retention of wind and indurations of liver. It is applied externally for itch; decoction of plant is used as a wash for stores. The seeds are alterative and are used in purgative preparation. A cold infusion is given as a depurative. The seed contains pigment amarbelin. The seeds are tonic, diaphoretic and demulcent.	A parasitic climber, common throughout India and Sri Lanka up to an altitude of 8000 feet sometimes completely covering bushes trees.
108	Cyamopsis tetragonoloba	Cluster bean	H-Guar	Seed flour of guar is the commercial source of gum used in food, paper and textile industries.	Plant is probably indigenous to India, though it has never been found in wild species. It is cultivated nearly throughout the country. It is robust, erect annual, 3–10 feet high bearing cluster or thick fleshy pod.
109	Cycas circinalis	-	H-Jangli madan mast ka phul	The paste form of grounded bark and seed with coconut oil are used as poultice for sores and swellings. Juice of the tender leaves is said to be useful for flatulence and vomiting. The pollen is narcotic. The stem yields gum. The seeds contain toxic glucoside pakuoin, phytosterin.	It is a dioecious, 6–20 feet high, occurring wild in south-India and Orissa, and occasionally grown in Indian gardens.
110	Cyperus rotundus	Nut grass	H-Motha	The dry tubers of the plant are sold in bazars and is used in medicine, perfumery and for preparation of fragrant sticks called agarbatties. The tubers are said to be diaphoretic and astringent and in indigenous medicine. They are given for disorder of the stomach and irritation of the bowels.	A pestiferous perennial weed with dark-green, glabrous culms, 0.5–2 feet high, arising from a system of underground tubers. It is found throughout India up to an elevation of 6000 feet.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
111	Dalbergia sisso	Sissoo	H- Shisham B-Shisu G-Sisam Tel-Simsupa T-Sisuitti Kan-Agaru Mal-Agaru,Iruvil O-Sisu P-Tali	It is mainly used for timber purposes. It's leaves are used as a fodder. It contains 12.2-24.1% crude protein, 12.5–26.1% crude fibre. The leaves are bitter and stimulent. Decoction of leaves is used for gonorrhoea.	A deciduous tree often with crooked trunk and light crown. The tree attains a height of about 100 feet. It occurs throughout the sub-Himalayan tracts from Ravi to Assam, ascending up to 5000 feet. It is extensively cultivated in Punjab, Uttar Pradesh, West Bengal and Assam.
112	Datura arborea	-	-	Scopolamine is the chief alkaloid present in the plant. Chlorogenic acid is present in the leaves. The concentration of relative proportion of scopolamine, hyoscyamine and atropine present in leaves, stem, root, flowers and seeds vary with ecological conditions.	It is large shrub grown in gardens on the hills and is common in Mahabaleshwer. It bears large white flowers with musk-like odour and un-armed fruits.
113	Datura metel	-	-	The principal alkaloids is scopolamine. The green leaves are used for dyeing of cloths. Dried leaves and flower tops are known for narcotic and anti-spasmodic properties. Dried leaves are used in medicine for the same purpose as the leaves of Beladona and Stramonium.	A sub-glabrous spreading herb, sometimes becoming shrubby. It occurs through out India, and is occasionally grown in gardens.
114	Dendrocalamus strictus	Solid Bamboo	H- Bans B-Karail M-Bhariyel G-Nakor Vans Tel-Sadanapave-vduru T-Kalmungil Kan-Kiri bidiru Mal-Kalmungil	Male bamboo is a extensively employed as raw material for paper manufacture in India. The pulp is suitable for use in the rayon industry. The paper manufactured from it are not attacked by insects.	A densely tufted bamboo with a strong, elastic, thick walled, or solid gums varying in size according to locality. It is found in deciduous forest and in dry or moderately dry regions practically all over India up to 3500 feet. The flowers bloom from November to February and it's seeds fall to the ground from April to June.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
115	Derris trifoliata	-	B-Panlata Tel-Tigekranuga	The plant is used as a stimulant, antispasmodic and counter irritant. An oil prepared from it is used externally as an embrocation. The bark is used as an alterative rheumatism. The leaves are used as fodder.	A large evergreen glabrous, climbing shrub common in the coastal forest of India and Andaman. It is also found in eastern Himalayas and Assam.
116	Digera muricata	-	H- Latonhuria B-Gungatiya M-Gitana Tel-Chenchalikura T-Thoyyakeerai P-Tartara	It is sweetish and laxative in large doses. Flowers and seeds are reported to be given for urinary discharges.	It is an annual or perennial herb, 1–2 feet high found as a common weed in cultivated fields, pastures and waste lands through out the plains of India.
117	Digitalis purpurea	Common flox glove	-	It is used mainly for its effect on the cardio-vascular system, increasing the force of systolic contraction and the efficiency of the decompensated heart. It slows the heart rate and reduces cardiac, oedema with diuresis. It is used as myocardial stimulent in congested heart failure, auricular flutter and rapid auricular fibrillation. It is a diuretic, useful in dropsy and renal obstruction. The active constituents of digitalis are the several glycoside.	A biennial, sometimes perennial herb, 2–6 feet high, cultivated or found as an excape in hilly regions at altitude of 5,000 to 8,000 feet. It is now cultivated chiefly in Tanmar and Kishtawar in Kashmir. Cultivation in Mungpoo (Darjeeling) and Nilgiri hills has been practically abundant, but the plant has become naturalized in these areas. The plant flower in end of April or early May during second year.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
118	<i>Diospyros melanoxylon</i>	Coromandel ebony	H- Tendu M-Tendu G-Tamrug Tel- Mancigata T-Karai Kan-Abanasi Mal-Kari O-Kendu	The fruits are carminative and astringent. The leaves are diuretic, carminative, laxative and styptic. Dried flowers are reported to be useful in urinary, skin and blood diseases. The bark is astringent and its decoction is used in diarrhoea and dyspepsia. The dilute extract is used as an astringent lotion for the eyes.	A moderate sized tree attaining height of 60–80 feet with a straight cylindrical bole. It is distributed in the Indian Peninsula, extending North-ward to Bihar, Madhya Pradesh, and Bombay.
119	<i>Diospyros peregrina</i>	Gaub persimmon	H- Gab B-Gab Tel-Gabu T-Kattatti Kan-Kusharta Mal-Panachi O-Kendu M-Timburi	The unripe fruit is rich in tannin and used for tannin hides and dyeing cloths, fruit and stem bark posses astringent properties. The unripe fruit is acrid, bitter and oleaginous. An infusion of the fruit is used as garlic in aphthae and sore throat. Its juice forms useful for wounds and ulcers. The bark is used in dysentery and intermittent fevers. The oil extracted from seed is used for dysentery and diarrhoea. The ether extract of the fruit possess antibacterial activity against <i>Escherchia coli</i> .	A moderate sized evergreen tree with short, straight often fluted and spreading branches found practically through out India. The fruit fall to the ground from June or July onwards. Tree is a shade bearer in the natural state; young plants develop freely under fairly heavy canopy.
120	<i>Dolichos lablab</i>	Indian bean	H- Sem B-Shim G-Val M-Pavta Tel-Chikkudu T-Avarai Kan- Chapparada Mal-Avara	Seeds are fabrifuge, stomachic and is spasmodic and aphrodisiac. A plant is used as fodder for cattle.	A perennial or creeping herbs generally cultivated as an annual. Flowers are white-reddish or purple borne on axiliary racemes. It is distributed through out the tropical and temperate regions of Asia, Africa and America.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
121	Echinochloa frumentacea	Japanese barnyard millet	H- Sawa B-Shamula G-Samu M-Samul Tel-Bonta T- Kudraivalipillu Kan-Samai	It is mixed with rice and fermented for production of beer. The plant is sweet, acrid, oleaginous, cooling and digestible. It is said to be useful in biliousness and constipation. It is considered to be useful as late season feed of cattle. It is used for feeding dairy cows and may be fed green as silage or hays.	A robust tufted annuals 2–4 feet high, with broad leaves, large spiketet and small, smooth, shining seeds. It is cultivated over the greater part of India and on the Himalayas up to 6500 feet. It is grown in Gurdaspur and Hoshiarpur districts in Punjab, Ahmdabad and Punch-Mahal in Gujarat.
122	Echinops echinatus	-	H- Gokru G-Shuliyo M-Utanti	The plant is bitter, tonic and diuretic. It is used in hoarse cough, hysteria, dyspepsia, scrofulla and ophthalmia. Root is powdered and applied to wound on cattle to destroy microorganisms.	A pubescent annual 1-3 feet high with branches widely spreading from the base. Flower heads white, compact and globose. This species is found practically through out India ascending to 5000 feet on the hills.
123	Eclipta alba	Hassk	H-Bhringa Raj B-Kesuti M- Bhringuraja G-Bhanggra Tel- Galagara T-Garuga Kan- Garagada suppu Mal-Kyonni	The herb is used as a tonic and deobstruent in hepatic and spleen enlargement and in skin diseases. Plant juice is administered in combination with aromatic for catarrhal jaundice. The expressed leaf juice along with honey is a popular remedy for catarrh in infants. Juice of the leaves boiled with sesamum or coconut oil is used for anointing the head to render the hair black and luxuriant. Root is emetic and purgative. It is applied externally as antiseptic to ulcer. The shoot extract shows antibiotic activity against Staphylo coccus aureus and Escherchia coli.	An erect or prostrate much branched, stringosely hirsute, annual, often rooting at the nostle. This plant is a common weed in moist situations through out India, ascending up to 6000 feet on the hills.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
124	Elettaria cardamom	Cardamom	H- Choti elachi B- Choti elachi M-Veldode G-Elchi Tel- Yelakkayalu T-Yelakkai Kan-Yelakki Mal-Yelam	Cardamom is used as a spice and masticatory and in medicine. It is used for flavouring, curries, cake, bread and for other culinary purposes. It is also used for flavouring liquors. In medicine it is used as an adjuvant to carminative drugs. Powdered cardamom mixed with ginger, cloves and caraway is a good stomachic useful in atonic dyspepsia. Cardamom oil is useful in flavouring beverages. The principle constituents of oil are cineol, terpineol, terpenenes, etc.	A tall herbaceous perennial with branching sub-terrestrial root stock, from which arise number of upright leafy shoot 5–18 feet high. It is a native of moist evergreen forests of south India, growing wild in the western ghats, between 2500 feet and 5000 feet.
125	Eleusine coracana	Finger millet	H- Mandua B-Marua M-Nagli G-Bavto Tel-Ragulu T-Ragi Kan-Ragi Mal-Muttari	Protein content varies from 6-11% and a strain of white finger millet contains as much as 14% protein. At 5% level of protein intake, the biological values and digestibility coefficient of finger millet protein are 89% and 80% respectively. It is usually converted into flour and a variety of preparation—cakes, roti, pudding, porridge, etc. are made.	An erect annual grass 2–4 feet high with tillering tufted stems. It is considered to be of Indian or African origin and is a cultigen a wild species. In Tamil Nadu finger millet cultivation is concentrated in Coimbatore. The main finger millet growing areas are in Karnataka, Deccan and Gujarat, Andhra Pradesh, Anantapur and Vizag. In Bihar, finger millet is grown mainly in the upland tracts of Bhagalpur, Darbhanga, Gaya. In Jharkhand, Hazaribag and Ranchi districts. The principal area in Orissa lies in Koraput district.

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126	<i>Embelia ribes</i>	-	H- Baberang B-Biranga M-Vavading Tel- Vayuvilanga T- Vayuvilanga Mal- Vayuvilanga, Vizhal P-Babrun	The dried fruit is considered anthelmintic, astringent, carminative and stimulant. Dried fruits are used in decoction for fever and for the disease of the chest and skin and infusion of the root is given for cough and diarrhoea. It is reported to be effective against tape worm. An aqueous extract of fruits shows anti-bacterial activities.	A large scandant shrub with cylender branches and eliptic-lanceolates, gland dotted leaves, found through out India.
127	<i>Embolica officinalis</i>		H-Aonla B- Aonla G-Amali Tel- Amalakamu/usar T-Nelli Kan-Nelli Mal-Nelli	Its fruits are richest source of Vitamin C (600 mg/ 100 g). The fruit is used in the treatment of human scurvy. Fruit is acrid, cooling, refringerant, diuretic and laxative. Raw fruit is eaten as an aperient. Dried fruit is useful in haemorrhage, diarrhoea and dysentery. In combination with iron, it is used as remedy for anaemia, jaundice and dyspepsia. A fermented liquor prepared from fruit is used in jaundice, dyspepsia and cough. The flowers are cooling, refrigerant and aperient. The roots and barks are refrigerant. Fruits are used in the preparation of writing inks and hair dye. The dried food is detergent and is used as shampoo for head. The seeds are used in the treatment of asthama, bronchitis, biliousness.	A small or medium sized deciduous tree with smooth, greenish-grey exfoliating bark. The tree is common in the mixed deciduous forest in India ascending to 4500 feet on the hills. Flowers usually appear in hot season and fruits ripen during following winter.
128	<i>Enicostemma litorale</i>	-	H- Chhota chirayata M-Kadavinayi G-Mamijavi Tel-Valari	The plant is bitter, tonic, stomachic and laxative. Dry powdered form mixed with honey is used as a blood purifier and in dropsy, rheumatism, abdominal ulcers, hernia. It is reported to be effective against malaria.	A glabrous perennial herb, up to 50 cm high, found through out the greater part of India up to an altitude of 1500 feet and common in coastal areas. The flowers are white or bluish in whorled axillary clusters.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
129	Eruca vesicaria or Eruca sativa	Taramira or Rocket salad	H- Taramira B-Shwetsursha P-Assu	Its oil is used in pickles. The oil causes inflammation of the skin. The young plant is used as salad vegetable. Tender leaves of the plant are considered stimulant, stomachic, diuretic and anti-scorbutic, seeds are vesicant.	A variable erect annual, 2–4 feet high, with fleshy toothed leaves and yellow or lilac, self sterile flowers. The plant is cultivated mostly as a cold weather crop in north India and is met with in western Himalayas up to 10000 feet. It is grown in the highlands of Punjab, in areas where drought condition prevail. It is also grown to a small extent in Uttar Pradesh and Madhya Pradesh.
130	Erythrina suberosa	-	H- Madar G-Janghario M-Pangra Tel-Barijama T- Mullumurukku Kan- Kaduparivalu	Wood, bark and ash are used in dyeing. The bark yields a fibre suitable for cordage.	A medium sized to a large tree, 40–50 feet high with straight cylindrical bole. The tree is found scattered through out dry forest of India, from Himalayas to Sri Lanka and Burma.
131	Euphorbia hirta	-	H- Dudhi B-Baro-kheruie M-Dudhi G-Dudeli Tel-Bidarie T- Ama,patchaiarisi Mal-Nela-palai	It is used in the treatment of cough and asthma. It has a depresant action on the heart and respiration and relaxes the bronchioles in the form of tincture, it is considered useful in colic and dysentery, as vermifuge and in diseases of the genito-urinary tract. It is also used in gargles and as poultice.	An erect or ascending annual with hairy stem 15–50 cm high and opposite elliptic oblong or oblong lanceolate leaves, common in waste ground through out the hotter parts in India.

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Sl. No.	Botanical name	English name	Indian languages	Active ingredients	Geographical indicators
132	Euphorbia nerifolia	-	H- Sehund B-Mansasiji M-Mingut G-Thar Tel-Akujemudu T-Ilai-kalli Kan-Yalekalli Mal-Illakalli P-Gangichu	Latex is acrid, rubefacient, purgative and expectorant. It is liable to cause dermatitis. It is used to remove warts and cutaneous eruption. The juice is employed in earache, mixed with soot. It is applied in opthalmia.	A large succulent shrub or a small tree, up to 20 feet high with a jointed, cylindrical or 5 angled branches, bearing short, stipular thorns, more or less confluent in vertical or slightly spiral lines. The plant is common in rocky ground through out the Deccan peninsula and is often cultivated for hedges in village through out India.
133	Euphorbia tirucalli	Milk bush	H- Konpal B-Lankasij Mar-Shera G-Thardandalio Tel-Chemudu T-Tirukalli Kan-Bontakalli	The latex is vessicant and rubefacient and is used as an application for warts, rheumatism, neuralgia and tooth-ache. It acts as a purgative in small doses. It is an acrid irritant and ematic. It is also used in cough, asthma and earache. Decoction of the tender branches as also that of the root is administered in colic and gaestralzia.	An unarmed shrub as a small tree, with erect branching and smooth, cylindrical, polished, whorled branchlets bearing small linear oblong caducous leaves. It is native of Africa naturalized in India, specially in the dry parts of Bengal and south India, largely grown in hedges.
134	Evolvulus alsinoides	-	H- Sankhapushpi M- Vishnukramta G- Kalisankhavli Tel- Vishnukranta T-Vishnukrandi Kan- Vishnukranti Mal- Vistnaclandi	The plant is bitter and is reported to be used as a tonic and febrifuge. The plant is said to be used as a vermifuge and with oil, for promoting growth of hairs.	Perennial herb with spreading, prostrate branches arising from the small woody root stocks. Leaves nearly sessile, ovate or lanceolates, flowers are blue or white. The plant is common in open and grassy places almost through out India, ascending to 6000 feet in the Himalayas.

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135	Fagonia cretica		H- Damaham G-Dhamaso M-Dumaso Tel-Chittigara P-Dama	The plant used as a bitter, astringent, tonic and febrifuge. The plant has antiseptic properties and is applied to abscesses, wounds and scrofulous glands. It is also given as a prophylactic against small pox. The twigs are used as toothbrush and bark in scabies.	A small spiny under shrub with stiff or more or less prostrate, branches found in North-West India and Deccan.
136	Feronia elephantum	Elephant apple	H- Kavitha B- Kavitha G- Kavitha M- Kavitha Tel-Velaga T-Vilanga Kan-Bela Mal-Vila	The fruit is considered tonic, refreshing, cordiacal, astringent, anti-scorbutic and alexiformic. It is used as a substitute for bael in the treatment of diarrhoea and dysentery. The leaves are aromatic, carminative and astringent.	A small deciduous tree with a short erect, cylindrical stem, 30–40 feet high. The flowers are polygamous in lax panicles. The plant is native of India and Sri Lanka and is found through out the plains of India particularly in dry situation. It occurs wild or cultivated up to an elevation of 1500 feet in western Himalayas. It is more common in Deccan.
137	Ferula asafoetida	Asafoetida	H- Hing B- Hing M- Hing Kan- Ingu Tel-Inguva T-Perunga Mal-Perunga O-Hengu	It is an important source of gum resin. It is also used as condiments. Asafoetida is acrid and bitter in taste, and emits a strong alliaceous odour. It is extensively used in India for flavouring curries, sauces and pickles. Medicinally it stimulates the intestinal and respiratory tract and nervous system. It is useful in asthma, whooping cough and chronic bronchitis. It is also administered in hysterical and epileptic affections and in cholera.	A genus of perennial herbs distributed from the mediteranian region to central Asia.

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138	<i>Ferula narthex</i>	-	-	The powdered root of plant is used in Baltistan for fever. The green shoots are relished as vegetable.	Perennial odourous herb, 5–10 feet high found wild in Baltistan, especially in Astore beyond the Kamri and Burzil passes. The flowers are small yellow.
139	<i>Ficus benghalensis</i>	Banyan	H- Bargad B-Bar G-Vad M-Vada Tel-Marri T-Alam Kan-Ala Mal-Ala	The bark contains 11% tannin. The banyan tree is one of the recorded hosts of the Indian lac insect. The milky juice is externally applied for pains and bruises and as an anodyne in rheumatism and lumbago. It is also used as remedy for toothache. The leaves are heated and applied as poultic astringent and are used indysentery, diarrhoea and diabetes. An infusion of young bud is useful in diarrhoea and dysentery. The seeds are considered cooling and tonic.	A very large tree, with spreading branches attaining at times a height of 100 feet, aerial roots many, some developing into accessory trunk. The tree occurs through out the forest tracts of India both in sub-Himalayan region and in the deciduous forest of Deccan and South India.
140	<i>Ficus carica</i>	Common fig	H- Angir B- Angir G- Angir M- Angir Tel-Anjuru T-Tenatti Kan-Angura Mal-Simayatti	The principal acids in fresh fig are citric and acetic. The fruits, fresh or dried are valued for its laxative properties. It is diuretic, demulcent, emollient and nutritive. Figs are considered useful in the prevention of nutritional anaemia.	A small or moderate sized deciduous tree, 15–30 feet high. The fig plant is considered to be a native of Carica in Asia minor and is grown in nearly all tropical and sub tropical country. In India, its commercial production is limited to a few centers near Pune (Maharashtra), Bellary (Karnataka) and Anantapur district of Andhra Pradesh.

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141	Ficus glomerata	-	H- Gular B-Dumur M-Umbar G-Umar Tel-Atti T-Athi Kan-Athi Mal-Athi O-Dimri	The latex of tree contains 4–7.4% caoutchouc. The coagulum of the latex may be used in the manufacture of ground sheet and waterproof bonded paper. The plant is one of the recorded hosts of Indian lac insect. The bark contains 14% tannin. It is astringent and decoction of it is used as wash for wounds. The root is useful in dysentery. The fruit is astringent and stomachic and carminative. The milky juice is administered in piles and diarrhoea.	A moderate size to a large spread tree, with ovate, lanceolate or elliptic, dark-green leaves. It is found through out the greater part of India in moist locality, e.g. along banks of streams and sites of ravines. It is found also on rocky slopes, sometimes almost gregariously. It is often cultivated for edible fruits.
142	Ficus hispida	-	H- Daduri B-Dumoor M-Bokria G-Dhedavmaro Tel-Bodamamidi T-Peyatti Kan-Adaiatti Mal-Peyatti	Immature fruits are used in making curries, they are however likely to cause giddiness. They are considered tonic, lactagogue and emetic. The wood is soft and light and barks contain tannin. The leaves are used for poulticing boils.	A moderate sized shrub or tree with large opposite leaves. The tree is common through out the outer Himalayas from chenab east ward to Bengal, central and south India, and Andaman Island. It occurs in shaddy places and along revines, and flowers and fruits practically available through out the years.
143	Ficus infectoria	-	H- Kahimal B-Pakar M-Passari Tel-Badijuvvi T-Jovi Kan-Basari Mal-Bakri	The tree is one of the recorded host of the Indian lac insect. Young shoots are used in curries. Decoction of the bark is used as gargle and wash for ulcers. The wood and bark is reported to be suitable for paper pulp.	A large spreading tree epiphytic in early stages, sometimes sending down a few aerial roots. It is found nearly through out India, and is commonly planted as an avenue and ornamental tree. In South India, it is considered a good shade tree for coffee, fallen leaves act as heavy mulch.

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144	<i>Ficus religiosa</i>	Peepal	H- Pipal B-Ashathwa G-Jari Mar-Ashvatha Tel-Ashvatthamu T-Arasu Kan-Arali Mal-Arachu	The fruits and tender leaf buds are occasionally eaten in times of scarcity. The leaves and twigs are lopped for cattle and elephant fodder. The tree is one of the recorded hosts of the Indian lac insect in Madhya Pradesh, Bengal and Assam. The bark contains 4% tannin and is astringent. An infusion of it is used for ulcers and skin diseases. Leaves and tender shoots are used as purgative and in skin diseases. The fruit is laxative and the seeds are considered to be cooling, alterative and laxative.	A large deciduous tree, epiphytic banyan. The tree is found wild or cultivated nearly throughout India and is held sacred by Hindus and Buddhists. It is planted as an avenue and roadside.
145	<i>Foeniculum vulgare</i>	Fennel	H- Saunf B-Mauri G-Variari M-Badishep Tel-Sopu T-Shombu Kan-Badisopu	The plant is pleasantly aromatic and is used as pot herb. The leaves are reported to have diuretic properties. The roots are regarded as purgative. Dried fruits of fennel have a fragrant odour and a pleasant aromatic taste. The fruits are aromatic, stimulant and carminative. Fennel fruits contain a volatile oil. The main constituent of oil is anethol. Its oil is largely used as flavouring agent in culinary preparation, confectionary, cordials and liquors.	A stout, glabrous, aromatic herb 5–6 feet high, leaves pinnately decomposed, flowers small, yellow, in compound, terminal umbel. The plant is native of southern Europe and Asia.
146	<i>Fumaria officinalis</i>	-	-	The dried aerial parts are used as substitute for fumitory.	It is common in Europe
147	<i>Garcinia indica</i>	Kokam butter tree	H- Kokam G-Kokan M-Amsol T-Murgal Kan-Murgala Mal-Punampuli	The fruit is anthelmintic and cardiotonic and useful in piles, dysentery, tumours, pains and heart complaints. A syrup from the fruit juice is given in bilious infection. The root is astringent. Kokam butter is considered nutritive, demulcent, astringent and emollient. It is used as a local application to ulceration.	A cylindrical evergreen tree with drooping branches, leaves ovate or oblong lanceolate. The tree is found in the tropical rain forests of western ghat, from Konkan southwards to Mysore, Coorg and Wynad. It is often planted in the southern districts of Maharashtra.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
148	Gardenia gummifera	-	H- Dakamari B- Dakamari M- Dakamari G-Kamarri Tel-Manchi T-Dika-ma-lli Kan-Cittubikka O-Gurudu	The resin is anti-spasmodic, expectorant, carminative, diuretic and anthelmintic. It is also used to clean for ulcer. Decoction of resin is used in fever. Externally it is used as antiseptic and stimulant. The resin is extensively employed in veterinary medicine to keep away flies from sores, for destroying magots and wounds.	A large handsome shrub or a small tree, often with a crooked stem and rough twisted branches, found through out the Deccan Peninsula extending north wards to Bundelkhand and parts of Bihar.
149	Gentiana kurroo	-	H- Karu, Kutki B- Karu, Kutki P-Nilkant K-Nilkanth	Rhizome is used as a bitter tonic for improving appetite and stimulating gastric secretion. It enters into many stomachic. The drug is also administered in fever and urinary complaints.	A small perennial herb with a stout rhizome bearing decumbent flowering stem, each with 1–4 blue flowers, commonly found in Kashmir and north-western Himalayas, at an altitude of 5000 to 11000 feet.
150	Glycine soja	Soybean	H- Bhat, Bhatwar B-Garjkalai Assam-Patnijokra	The seeds have been used for centuries as an article of food in China, Japan and Korea and constitute a valuable protein supplement to the rice diet. The seeds are consumed green, dry or sprouted, whole or split. Green seeds are used as vegetable, roasted and slated seeds are used in cakes and candies. The seeds are ground into flour and used for bakery products. They are also processed to give a milk-like product, curd or cheese, soybean is often cultivated as a pasture, forage or fodder crop and used either as hay or as silage.	An annual with erect or climbing stem, reaching a height of 1.5–6 feet, densely clothed with hairs; leaves trifoliate, ovate, lanceolate, long petioled, flower small, inconspicuous, borne on short axillary racemes, white or purple to reddish-purple. Soybean is a native of south-eastern Asia. It is a slender, prostrate, twinning plant.

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151	Gossypium herbaceum	Cotton	H-Kapas	It is a rich source of cotton.	A diploid old world species. It includes small shrubs 2–8 feet high with thick and rigid stems. This species occurs in Africa, Middle East countries, central Asia and western India. Commercially, the cotton belonging to this species constitutes a fairly large percentage of medium stablecotton grown in India.
152	Grewia optiva	-	H- Biul Kan-Thidsal P-Dhaman	The bark yields fibre of inferior quality used for cottage and clothing. It is also reported to be suitable for paper. The leaves and young twigs are used for fodder.	A moderate sized tree up to 45 feet high and 4.5 feet in girth with A clear bole of 10–12 feet, distributed from Punjab to Bengal, ascending to an altitude of about 7000 feet.
153	Grewia sclerophylla	-	H- Pharsia	The wood is used for field tools and posts. The stem yields fibre used for making ropes. The root is used in cough and irritable conditions of the intestines and bladder, decoction of it is used as an emolient enema.	A small shrub of the tropical Himalayas distributed from Kumaon to Assam ascending to an altitude of 4000 feet. Flowers are white in umbellate cymes.
154	Guazuma ulmifolia	-	H- Rudraksh B-Nipaltunth Tel-Rudraksh T-Rudrasam Mal-Rudraksham Kan-Rudrakshi O-Debodara	The fruit is used as a pectoral in bronchitis. Roasted seeds are considered astringent. Extract of the leaves is said to reduce corpulence. The bark is tonic and demulcent.	A small or moderate sized tree with brown rough bark and spreading branches. It is cultivated in garden and as a roadside shade tree in warmer parts of India, especially in south.

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155	<i>Heliotropium indicum</i>	-	H-Hattajuri B-Hiti-sura M-Bhurundi G-Hatisund Tel-Nagadamti T-Nakkipoo Kan-Chalukondee Mal-Thekkada O-Hati-Sura	The plant is bitter and astringent. It is reported to possess emollient, vulnerary and diuretic properties. It is used as local application for ulcer, sores, wound gum boils, skin affections and rheumatisms. It is also used in poultice. Decoction of tender shoot is reported to be pectoral. Decoction of leaves are used in fever and urticaria. The roots are used in cough and fever. The flowers are considered emmenagogue in small doses and abortifacient a large doses. Seeds are masticated and swallowed and stomachic.	A coarse foetid herb up to 2 feet high with ascending hirsute branches found through out India. The flowers are blue or lily.
156	<i>Hemidesmus indicus</i>	Indian sarsaparilla	H-Anantmul B-Anantmul M-Anantmut G-Sariva Tel-Sugandhipala T-Nannari Kan-Sogade M-Naraninti O-Onontumulo	The root is used as tonic, alterative, demulcent, diaphoretic, diuretic and blood purifier. The milky latex of the plant is used in relieving inflammation of eye.	A slender, laticiferous twining, sometime prostrate or semi-erect shrub, occurring over the greater part of India from the upper gangetic plain east ward to Assam and through out central, western and southern India.
157	<i>Hibiscus rosasinensis</i>	Shoe flower	H- Jasun B-Joba M-Jasavanda G-Jasuva Tel-Dasana T-Semparuthi Kan-Dasavala Mal-Chembarathi O-Mondaro P-Jasum	Crused flowers yield dark-purplish dye which was formerly employed for blackening shoes. The flowers are considered demulscent, emolient, refrigerant aphrodisiac and emmanagogue. Decoction of flower is given in bronchial catarrh. The leaves are emolient, apparient, anodyne and laxative. Decoction of leaves is used as a lotion in fever. Fresh root juice is given for gonorrhoea and powdered root for menorrhagia. Root is used in Mysore for certain diseases of cattle.	An evergreen, woody glabrous, showy shrub, 5–8 feet high. The flowers solitary, axillary and bell-shaped. It is native of China. It is grown as an ornamental plant in gardens through out India and often planted as a hedge or fence plant.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
158	Hippophae rhamnides	Sea-buck thorn	H- Chuma, Tarwa P- Neicjhak	Fruit is acidic and is made jelly with sugar. Syrup is used in lung complaints. Decoction is used for cutaneous eruption. It is a rich source of Vit-C (1250 mg/100g). Bark contains 3.06% yellow-fatty oil, twig and leaves contain 4.5% tannin.	Diocious, usually spinescent shrub or a small tree up to 40 feet high, occuring in the river belts of the drier ranges of the north-western Himalayas at altitude of 7000 to 12000 feet.
159	Holarrhena antidysenterica	-	H- Kurchi B- Kurchi Guj-Dhowda Tel-Pala T-Veppalli Kan-Beppale Mal-Kodagapala O-Kherwa P-Kewar A-Dhutkhuri	The bark has astringent, antidysentric, anthelmintic, stomachic fabrifuge and tonic properties. It is used in the treatment of amoebic dysentery and diarrhoea. The principal alkaloid is conessine, a stenol etc.	A deciduous laticiferous shrub or small tree, 30–40 feet high with a clear bole of 10–20 feet, occurring almost through out India, up to an altitude of 4000 feet. It is specially abundant in the sub-Himalayan tract.
160	Holoptella integrifolia	-	H- Chilbil M-Vauli G-Kanjhu Tel-Thabasi T-Aya Kan-Thuvasi Mal-Aval O-Dauranja P-Rajain	The wood is suitable for plywood, packing cases and boxes. The bark may be pulped, made hard-board and insulation board. The bark is mucilagenous and used in external application for rheumatism. The leaves and young fruits are eaten though not relished by livestock.	Large deciduous tree distributed through out the greater part of India up to an altitude of 2000 feet.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
161	Hordeum vulgare	Barley	H- Jai B-Jab M-Java G-Jav Tel-Yavaka T-Barliyarisi Kan-Javegodhi P-Jaom	The bark of barley is ground to flour for local consumption . Barley grain is demulcent. Powdered parched grains are used in the form of a gel for painful and atonic dyspepsia. It is given in feverish disorder, inflammation of the membranes of the chest, diarrhoea and catarrhal disorder of bowel. The straw is used as a roughage for livestock.	An annual erect stout tufted herb, 2–4 feet high, resembling wheat in habit. The important producer of Barley are former USSR, China, USA, Canada and India. Barley has been cultivated since long in northern India. It is grown in the plains as well as in the hilly region of the Himalaya up to an altitude of 14000 feet. The major producing states in the order of importance are Uttar Pradesh, Rajasthan, Bihar and Madhya Pradesh.
162	Hyoscyamus niger	Henbane	H-Khurasaniajvayan	It has anodyne, narcotic and mydriatic properties. It is principally employed as sedative in nervous affection and irritable conditions, such as asthma and whooping cough. It is also used to counteract the griping action of purgative and to relieve spasms in the urinary tract. Principal alkaloids present in the various parts of the plant are hyoscyamine and hyoscyne. It is employed as a sedative in nervous affection and irritable conditions such as asthma and whooping cough.	An erect viscidly hairy, foetid annual or biennial, up to 5 feet high , occurring in western Himalayas from Kashmir to Kumaon at altitude of 5000 to 12000 feet.
163	Indigofera anil	West-Indian indigo	H-Vilayti nil	The plant is considered febrifugal, purgative, anti-spasmodic, diuretic and stomachic. It is given for syphilis and epilepsy. Decoction of root and seed is used for destroying vermin on human body and for urinary disease for ulcers.	Perennial shrub attaining a height of 3–6 feet native of tropical America and West Indies. The flowers are tiny pale- orange in colour.

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164	Indigofera tinctoria	Common indigo	-	An extract of plant is used in epilapsy in nervous disorders. The plant is also used in bronchitis and as an ointment for sore, old ulcer and haemorrhoids. The juice of leaves is used for hydrophobia. The Mundas of Chhota Nagpur used the roots for urinary complaints.	A shrub 4-6 feet high is found nearly as an escape from cultivation. Its flowers are red.
165	Jatropha curcas	Purging nut	H-Bagbherenda	The seeds possess poisonous and purgative properties, 3–5 seeds, slightly roasted and decorticated are sufficient for active catharsis. The seeds are considered anthelmintic. The juice of plant is used as a purgative and haemostatic. The leaves are considered rubefacient and lactagogue. The leaf juice is used as external applications for piles. It is applied for inflammation of the tongue in babies. Decoction of leaves and roots is given for diarrhoea. The root is reported to contain yellow oil with strong anthelmintic action. The root bark is used in external application for sores. Decoction of the bark is given for rheumatism and leprosy.	A large shrub 3–4 m high, native of tropical America, occurring through out India and in Andaman Island.
166	Kirganelia reticulata	-	H-Panjuli	Leaves of the plant are diuretic and cooling. The juice of the leaves is used with camphor and cubebs, for bleeding gums. It is also used in diarrhoea in infants. The fruit is astringent and useful in inflammation and in diseases of the blood. Decoction of the fruit is given to children for cough and catarrh and also for asthma. The bark has a faint sweet taste and is considered alterative, astringent and diuretic.	Large straggling or sub scandent shrub, 5–15 feet high occurring through out tropical India ascending to 5000–6000 feet in Khasi and Jentia hills and in Andaman Island.

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167	Lantana aculeata	Wild sage	H-Raimaniya	The stem is used as a tooth -brush and leaves for polishing wood. The plant is considered as vulnerary, diaphoretic carminative and anti-spasmodic. It is useful for fistulae, pustules and tumours. Decoction of plant is given in titanous, rheumatism and malaria. Decoction of leaves and fruit is used as a lotion. Fruits and infusion of leaves are taken internally for billious fever and cattarrh affection.	Low erect, sub-scandant shrub, 1.2–2.4 m high with stout, recurbed prickles and a strong odour of black currants, introduced into India as an ornamental and hedge plant, now completely naturalized and found through out India.
168	Lantana camara	-	-	Dwarf types have been developed for growing in boarders and hanging baskets. It is also used for hedge and fencing.	A hairy and unarmed or slightly prickly shrub, 0.3–1.8 m or more in height, native of tropical America and cultivated as an ornamental and high plant. Its flowers are yellow, orange changing to red or scarlet.
169	Lasiosiphon eriocephalus	-	K-Mukute	It yields fibre and has been tried as a raw-material for paper manufacture. The bark and leaves of the plant are acrid and poisonous. The bark contains a vesicant resin. The plant causes dermatitis and its leaves are applied to swelling, and contusions.	Small tree on much branched shrub, 1.8–3 m high found in open forest on the hills of Deccan and western ghats from Konkan south wards to Kerala, Nilgiri, Palini and Tirunelvelly hills ascending to altitude of 1200 - 2100 m. The flowers are small, yellow in dense terminal globose head.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
170	Lawsonia inermis	Henna	H-Mehndi	It is used also for dyeing hairs, beard and eyebrows. It is extensively used for dyeing silk or wool. Its leaves are used as prophylactic and against skin diseases. They have astringent properties. They are used externally in the form of paste or decoction against boils, burns, bruises and skin inflammations. Decoction is used as gargle for relaxed sore throat.	Glabrous, much branched shrub or small tree with greyish-brown bark. It is cultivated in many tropical and warm temperate region as a hedge plant. The more important centres of production are Faridabad in Gurgaon district and Bardoli and Madhi in Surat district which together accounts for 87% of the total production of henna leaves.
171	Lens culinaris	Lentil	H-Masur	It is mostly used as a dal. The presence of trypsin inhibitor in lentil has been reported. It is a source of commercial starch.	A small, erect, softly pubescent herb, 15–75 cm high with compound leaves and white, rose, red or violet flowers. Its cultivation in India is quite ancient. It is grown through out North-India, particularly in Uttar Pradesh, Madhya Pradesh, Bihar and West Bengal and to smaller extent in Punjab, Rajasthan, Maharashtra and Gujarat.
A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu					

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172	<i>Lepidium sativum</i>	Garden cress	H- Halim B- Halim M-Ahliva G-Asalio Tel-Adalavitulu T-Aliverai Kan-Allibija P-Halim	Its leaves are consumed as salad. They are also cooked with vegetable curry and is used as garnish. It is also a medicinal plant and is used in the treatment of asthma, cough and bleeding piles. Leaves are mildly stimulent and diuretic, useful in scorbutic diseases and liver complaints. The root is used in secondary syphilis and tenesmus. The seeds of the plant are rubefacient, galactagogue, emmenagogue, laxative, tonic, aphrodisiac and diuretic.	Small herbaceous, glabrous annual 15–45 cm high cultivated as a salad plant through out India.
173	<i>Leptadenia reticulata</i>	-	H- Dori M- Dodi G- Dori Tel-Kalasa T-Palaikkodi	The plant is stimulent and restorative. It is occasionally used in nose and ear troubles. The leaves and roots are useful in skin infection and wounds. The plant has been clinically tested and found useful in the treatment of habitual abortion in woman.	Much branched, twining shrub found in sub-Himalaya tracts of Punjab and Uttar Pradesh and through out the Deccan Peninsula up to an altitude of 900 m, particularly in hedges.
174	<i>Leptadenia, pyrotechnica</i>	-	H- Khip P-Kip	The plants yields fibre used for rope making . It is reported to be also suitable for paper manufacture. The tuberous root is consumed as vegetable.	A much branched often leafless shrub, up to 1.8 m high, found chiefly in dry and sandy places in Punjab, western Uttar Pradesh, Rajasthan and Northern parts of Bombay along the sea coast.
175	<i>Leucas aspera</i>	-	H- Chota B-Halkusa Tel-Tummi T-thumbai Kan-Thumbegide Mal-Thumba O-Bhutamari	The plant is fragrant and used as a pot herb. It is commonly used in anti-pyretic. The leaves juice is used as an external application for psoriasis, chronic sheme eruptions and painful swelling. In north Bengal, flowers are given with honey for cough and colds in children.	Herbacious much branched erect or diffuse annual 30–60 cm high found more or less through out India as weed in cultivated fields, waste lands and road sides.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
176	Leucas cephalotes	-	H- Dhurpi sag B-Baraha-lkusa M-Shetvad G-Kubu Tel-Peddattumni P-Chatra	The plant is pungent to taste. The seeds yield and oil used for illumination purposes. It is considered stimulant, diaphoretic, laxative, anthelmintic, antiseptic. Syrup of the flowers used as domestic remedy for cough and colds.	An erect scaberulous or pubescent, stout annual 30–100 cm high found as common weed in cultivated grounds and waste lands through out the greater parts of India, ascending up to 1,800 m in the Himalayas. Its flowers are small white.
177	Leucas lanata	-	-	Tender shoots of the plant are used as vegetable. They are given for cough after frying.	It is an erect perennial herb found in western Himalayas from Kashmir and Kumaon at altitude of 900–2,400 m. It is also found in upper gangetic plain, Nepal, Chhota-Nagpur, Darjeeling, Assam, Konkan and south India.
178	Leucas linifolia	-	H- Guma B- Halkasa M-Kuva G- Thinanpannikub Tel-Pulatumni Mal-Thunba O-Gaisa	The plant has a strong flavour and is reported to be used as a seasoning. Decoction or crushed leaves is used as sedative in nervous disorder. It is also used as vermifuge and stomachic. Poultice of fresh leaves is applied to old sore and wounds. Crushed leaves are used externally for dermatosis. Roots, stems are cyano-genetic.	Herbaceous erect, sylender annual, 30–60 feet high found as weed in fields, pastures and waste lands throughout the country.
179	Litsea sebifera	-	H- Maida Lakri B-Garur M-Maida Lakri G- Maida Lakri Tel-Narra alagi T-Uralli O-Jaisanda	Bark is used in diarrhoea and dysentery. Ground and paste material is used in emollient application for sprain, bruises and rheumatisms. Leaves are mucilaginous and considered emollient and anti-spasmodic. The root is sweetish, bitter, astringent, tonic.	An evergreen shrub or tree up to 25 m in high, found through out India, ascending up to an altitude of 1350 m in the outer Himalayas.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
180	Luffa acutangula	Ridge gourd	H- Kalitori B-Thing M-Shirola G-Ghisoda Tel-Birakaya T-Pirkamkai Kan-Hirukayi Mal-Pichengu	Leaves of the plant are used as poultice in haemorrhoids, leprosy and splenitis. The juice of fresh leaves is reported to be useful in granular conjunctivities in children. Ripe seeds are bitter, they are reputed to possess emetic and purgative properties.	Large climber with palmately 5–7 angled or lobbed leaves found wild in North-West India, Bihar, Bengal, Sikkim and Assam.
181	Luffa amara	-	H- Karvitori B-Titotari M-Ranturai G-kadvighisodhi Tel-Adavibira T-Peypirkan Kan-Kaduhire Mal-Athanga	All parts of the plant are very bitter. The plant possesses laxative and purgative properties and is reported to be useful in skin diseases and asthma. It is used as a diuretic and given in splenic enlargements. The dried fruit is powdered and used as snuff in jaundice. Seeds are considered emetic, expectorant and demulscent. Leaves are applied externally to sores in cattle.	Fairly large climber found in western, central and southern India and regarded as wild form of cultivated species.
182	Mangifera indica	Mango	H- Am B- Am M-Amba G-Amrli Tel-Mamidi T-Manga Kan-Mavu Mal-Cutem	Ripe fruit is considered invigorating, refreshing and fattening. The juice along with aromatics is recommended as a restorative tonic. It contains Vitamin A and C and is useful in heat apoplexy. The ash of burnt leaves is a house-hold remedy for burns and scalds. Dried mango flowers are astringent. They are given for diarrhoea, dysentery, cattarah of the bladder and gleet. The bark is astringent which contains mangeferin. It is used in dysphtheria and rheumatism. The kernel powder is used as a astringent in bleeding piles and also used as anthelmintics.	Large evergreen tree, 10–45 m high with dome-shaped crown and straight , stout bole It has been cultivated in India for at least 4000 years. Mango occurs wild or semi-wild nearly through out India, in tropical and sub-tropical hilly forests. It is common in sub-tropical Himalayas, hills of western or eastern parts and the forest.

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183	Manilkara kauki	-	H- Khirni G- Khirni M-Kauki T-Palai Kan-Hadari Mal- Manilkara O-Talvrynta	The root and bark of the tree are considered astringent and are given in infantile diarrhoea. They are also used for Beri-Beri. Ground leaves are used in paultices for tumours. The seeds are considered tonic and febrifuge.	Medium sized tree occasionally cultivated in different parts of India for ornament and its fruits. The flowers in dense cluster near ends of branches, white.
184	Melaleuca leucadendron	Cajuput tree	H- Kayaputi B-Cajaputte M-Cajaputa T-Kaiyappudai	The oil is used internally as an expectorant in chronic laryngitis and bronchitis and as carminative. It acts as an anthelmintic. The oil relieves toothache if introduced into holocarious teeth. The bark is used for stuffing cushions, pillows.	An evergreen tree of small or moderate size with pendulous branches, sometimes attaining a height of 21m. It is indigenous to Myanmar, Cambodia, Thailand and Malaya peninsula to Australia.
185	Mentha crispa	Water mint	-	It is used as emetic, stimulant and astringent. The crisped leaved mint is digestive. It is used in gall and stomach disorder. It is used also for flavouring foods and liquor.	A variable perennial herb with weak glabrous to distinctly pubescent stems probably cultivated in Indian gardens. The species is a native of Europe and has become naturalized in several other countries. The leaves are considered to be chance mutant of aquatic species.
186	Mentha viridis or M. spicata	Spear mint	H- Pudina B- Pudina M- Pudina	The herb is considered stimulant, carminative and antispasmodic. A sweetened infusion of the herb is given as remedy for infantile troubles, vomiting in pregnancy and hysteria. The leaves are used in fever and bronchitis.	A glabrous perennial, 30–90 cm high with creeping rhizomes, indigenous to north England, but grown all over the world. It is cultivated in Indian gardens. It is widely cultivated through out the plains of India.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
187	Micromeria biflora	Indian wild thyme	-	It is an aromatic herb reported to be used by Mundas as an application for worm infested wounds in cattle.	Dwarf herb usually 5–10 cm high found in tropical and temperate Himalayas from Kashmir to Bhutan and Punjab, Bihar, North-Circas, western ghats and hills of south India ascending up to 2100 m.
188	Mimosa pudica	Sensitive plant	H- Lajwanti B-Lajjavati M-Lajalu Tel-Attapatti T-Tottalvadi Kan-Lajja Mal-Tintarmani O-Lajkuri	Decoction of the root of the plant is considered useful in graves and other urinary complaints. The paste of the leaves is applied to glandular swelling. The juice of leaves is used in dressing for sinus and also as an application for sores and piles.	A defuse under shrub 50–90 cm high, native of tropical America, naturalized nearly through out the tropical and sub-tropical parts of India.
189	Mimosops hexandra	-	H- Khirni B-Khirkhejur G-Khirni Tel-Manjipal T-Palla Kan-Bakula Mal-Palla O-Khiri	It yields strong dense timber. Ripe fruits are sweet but astringent. Seed contains a bitter saponin. The tree yields gum. The bark contains 10% tannin and may be used for tannin purposes. It is used in fever and as an general tonic. The bark retard the fermentation of toddy. The seed oil is considered demulscent and emollient.	Small medium sized evergreen tree with a spreading crown and straight massive bole found in central India and Deccan Peninsula. It is cultivated through out the grater part of India for ornament and for sweet ediblefruit.

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190	Mirabilis jalapa	4 'O' Clock plant	H- Gul-abbas B-Sarpamani M-Gulbas G-Gubbaji Tel-Chandrakanta T-Andhimalligai Kan-Sanjama-Iliga Mal-Antimalari	Rhizomes are mildly purgative and used as substitute or adulterant of true Jalap. In powdered form root possess a distinct odour and a slightly acrid taste followed by tingling warm and numbing sensation, stimulating the flow of saliva. Juice of leaves is used in external application to wounds and bruises. Seeds are used as an adulterant of black pepper.	A perennial herb or under shrub 1m high grown for ornament through out India.
191	Mollugo cerviana	-	H-Ghinask M-Pada Tel-Parpatakamu T-Parpadagan	The herb is considered stomachic, apparient and antiseptic. The flower and tender shoots are diaphoretic and is given in fever. Oil in which roots are boiled is used as an application for gout and rheumatism.	An erect sylender annual 7.5–20 cm herb found in dry and sandy localities in upper gangetic plains, Rajasthan, Gujarat, Deccan and Orissa.
192	Momordica charantia	Bitter gourd	H- Karela B- Kerela M-Karle T-Pakal Kan-Hagal Mal-Kaippa	Fruit contains ascorbigen a bound form of ascorbic acid. The fruits and leaves of the plant contain two alkaloids, one of them being momordicin. The roots are also bitter. The fruits are considered tonic, stomachic, carminative and cooling. They are used in rheumatism, gout and diseases of liver and spleen. The fruits of uncultivated forms are used as febrifuge. The fruits, leaves and roots have been used in India as folk remedy for diabetes mellitus.	A monoccious climber found through out India, often undercultivation, up to an altitude of 1500 m. The plant is cultivated through out India as a vegetable crop.
193	Momordica diocia	Kakrol	H- Kaksa B-Ben-karela M-Kartolli Tel-Agakar T-Thollopavai Kan-Karlikai	Roots are astringent and contain traces of an alkaloid. They are applied in bleeding piles, bowel infection and urinary complaints. The root is pasted and applied over body as a sedative in fever.	A perennial, diocious climber with tuberous root found through out India from Himalayas to Sri Lanka up to an altitude of 1500 m.

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194	Moringa pterygosperma	Drumstick tree	H-Shajna B-Sajina M-Shevgi G-Midhosaragavo Tel-Mulaga T-Murungai Kan-Nugge Mal-Murinna	All parts of the tree are considered medicinal and used in the treatment of ascites, rheumatism, venomous bites and as cardiac and circulatory stimulants. The root of the young tree and also root bark are rubefacient and vasicant. The leaves are rich in Vitamin A and C, and are considered useful in curvy and catrrah affection. They are also used as emetic. A paste of leaves is used as an external application for wounds. Flowers are used as tonic, diuretic and cholagogue. The seeds are considered antipyretic, acrid and bitter. The seed oil applied in rheumatism in gout.	A small or medium sized tree about 10 m high, found wild in sub-Himalayan tract, from Chenab east wards to Sarda and cultivated all over the plains of India. The tree is indigenous to north-west India.
195	Morus alba	White mulberry	H- Tut B- Tut M- Tut G-Shetur Tel-Reshme T-Musukette Kan- Hiponerie O-Teto	The leaves are good source of ascorbic acid (200-300 mg/100 g). Mulberry leaves are principled diaphoretic and emollient. Decoction of leaves is used as gargle. The fruit is cooling and laxative. It is used for sore throat, dyspepsia and melancholia. The root is reported to possess anthelmintic and astringent properties. The bark is used as a purgative and vermifuge.	A monoccious occasionally dioccous shrub, moderate sized tree with a fairly straight grow up to 3 m high. It is indigenous to China. It is extensively cultivated through out the plains of India and in the hilly areas of Himalayas up to an elevation of 3,300 m.
196	Moschosma polystachyum	-	-	The crushed leaves are used as external application to sprains. Decoction of leaves is given as a sedative for epilepsia, palpitation of heart, neuralgia and convulsions. The juice of plant is used in curing headache in children.	A herbaceous, erect, much branched annual, 60–100 cm high found in wet places in Bihar, West Bengal, from Nellore south-wards to south Travancore, Konkan and Gujarat.

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197	Mucuna prurita	Common cowitch	H-Kiwach B-Alkushi G-Kivanch Tel-Dulagondi T-Poonaiipi-dukkan Kan-Nasukunni Mal-Naicorna O-Kaincho	The roots are tonic, stimulant, diuretic, purgative and emmenagogue. They are used for diseases of the nervous system, kidney troubles and dropsy. An ointment prepared from the roots is applied for elephantiasis. The seeds are astringent and tonic. The leaves of the plant are applied for ulcers.	Herbaceous twining annual found almost all over India and in Andaman and Nicobar Islands.
198	Murraya koenigi	Curry leaf tree	H- Meetha neem B-Barsanga M-Gandla G-Goraninb Tel-Karepaka T-Karivenpu Kan-Karibevu Mal-Kariveppilum O-Barsam	The leaves, root and bark are considered as tonic, stomachic and carminative. Leaves are used internally in dysentery and diarrhoea and also for checking vomiting. They are applied externally to bruises and eruptions. The juice of the root is taken to relieve pain associated with kidney.	Aromatic, more or less deciduous shrub or a small tree up to 6m in height and found almost through out India and Andaman Island up to an altitude of 1500 m.
199	Musa paradisiaca	Edible banana	H- Kela Tel-Arati T-Vazhai Kan-Bale Mal-Bazha	Banana peel is a potential source of pectin. Banana fruits possess mild laxative properties. The fruits aids in combating diarrhoea and dysentery and promotes the healing of intestinal region in ulcerative colitis. Banana powder is effective in the treatment of colic disease. The ripe fruit is useful in diabetes, uremia, nephritis, gout, hypertension and cardiac disease. Unripe fruit and cooked flowers are useful in diabetes. The ash of the root and also the entire plant is anthelmintic.	Edible bananas of hybrid origin valued for their seedless fruit are included under this specific name. They comprise of all the diploid, triploid or tetraploid plants, mainly hybrids of M. acuminata and M. balbisiana. It occupy among tropical fruits a position comparable to that of apples among temperate fruits.

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200	Myristica fragrans	Nutmeg tree	H-Jaiphall B-Jaiphall G-Jaiphall Tel-Jaiphall T-Jaiphall Kan-Jaiphall Mal-Jaiphall	Percentage of volatile oil in nutmeg varies from 6–16%. Nutmeg is stimulant, carminative, astringent and afrodisiac. It is used in tonic and electuaries, and forms a constituent of preparation prescribed for dysentery, stomachache, flatulence, nausea, vomiting, malaria, rheumatisms, sciatica and early stage of leprosy.	Diocious or occasionally monoecious, evergreen aromatic tree, usually 9–12 m high but sometime reaching a height of 20 m or more. It is a native of Moluccas, now cultivated in many tropical countries of both Hemisphere. In India, it is grown in Tamil Nadu. It is also found in various locations of Kerala, Assam and other states.
201	Nelumbium speciosum	Indian lotus	H-Kamal B-Padma M-Kamal G-Suriya Kamal Tel-Kalung T-Ambal Kan-Kamala Mal-Thamara O-Padam	The leaves contains three alkaloids-nuciferine, roemerin and nor-nuciferin. The flowers are used for ornament and as offering in temples. Paste of rhizome is applied in ring worm and other cutaneous affections, carpels demulscient and nutritive and are used to check vomiting. The milky viscid juice of leaf and flower stalk is used in diarrhoea.	Aquatic herb with stout, creeping rhizome found through out India, ascending up to 1800 m. It is native of China, Japan and possibly India.
202	Nerium indicum or N. odorum	Indian oleander	H-Kaner B-Karabi M-Kaneri G-Kagaer Tel-Kastouri Kan-kanagalu Mal-Areli O-Konera	Roots, bark and seeds contain cardioactive glycosides. The principal cardiogenic substance present in the leaves is oleandrin. A paste of the root is used as external application in haemorrhoids, cancer and ulceration, and oil extracted from root bark is used in skin diseases. Fresh juice of leaves dropped into the eyes for inducing lachrymation in ophthalmia.	A large evergreen shrub with milky juice found in the Himalayas from Nepal westwards to Kashmir up to 950 m and in upper gangetic plains and Madhya Pradesh.

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203	Nerium oleander	Oleander	-	The bark and flower posses cardio-tonic properties similar to leaves. The leaves of the plant are used in cutaneous eruptions. Decoction of leaves is used to destroy maggots infesting wounds.	An evergreen glabrous shrub up to 6m high, native of Mediterranean region and extending as far as Iran. It is often grown in Indian gardens for ornament and also as fence and wind break.
204	Nicotiana tabacum	Tobacco	H-Tambaku B-Tambaku M-Tambaku G-Tambaku Tel-Pogaku T-Pugaiyilai Kar-Hogesoppu Mal-Pokala	The bulk of tobacco produced in India is used for smoking in the form of cigarette, bidi,cigar, cheroot, chuttas and in pipe and hookah.It is used as a sedative, anti-spasmodic and vermifuge and in the treatment of various gaestro-intestinal disorder, skin diseases, and local affections.	Stout viscid annual, 1 to 3 m high, unknown in the wild state at present. It was first grown for commercial purposes in Gujarat and Maharashtra. The important tobacco cultivated areas in India lie in Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Tamil Nadu, Uttar Pradesh, Bihar and West Bengal.
205	Nigella sativa	Small funnel	H-Kalonji B-Kalijira G-Kalonji Jeera Tel-Nellajeela Kaira T-Karumji ragam Kan-Karujirage	Seeds are considered carminative, stimulent, diuretic, emmanagogue, galactagogue, and are used in the treatment of mild cases of puerperal fever. They are externally applied for eruption of skin.	Small herb 45 cm high, native of Levant, cultivated or occasionally found as weed in Punjab, Himachal Pradesh, Bihar and Assam.

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206	Ocimum basilicum	-	-	Oil is extensively used for flavouring for confectionary. It is used also for scenting dental and oral preparation. The plant is stomachic, anthelmintic, diaphoretic, expectorent, carminative, stimulent and pectoral. Seeds possess demulscent diuretic, stimulent, diaphoretic and cooling properties. Root's bark and leaves are cyno-genetic.	Very small, compact, bush-like herb found all over India. It resembles sweet basil but is smaller in all parts.
207	Ocimum sanctum	Sacred basil	H-Tulsi B-Tulsi M-Tulas G-Tulsi Tel-Tulasi T-Thulasi Kan-Tulasi Mal-Trittavu	Juice of leaves possess diaphoretic, anti-periodic, stimulating and expectorant properties. It is used in catarrh and bronchitis, applied to the skin and ring worm and other cutaneous diseases and dropped into the ear to relieve ear-ache and infusion of the leaves is used as a stomachic and gastric disorder in children . Decoction of the leaves is given as diaphoretic in malarial fever. The seeds are mucilagenous and demulscent, and are given in disorder of genito urinary system.	Erect, herbaceous, much branched, softly hairy annual, 30–75 cm high, found throughout India, ascending up to 1800 m under Himalayas and in the Andaman and Nicobar Islands.
208	Opuntia dillenii	Prickly pear	H-Nagphani B-Nagphani M-Chapal G-Chorhathalo Tel-Nagajenu T-Nagathali Kan-Papaskalli Mal-Palkakkalli O-Nagophenia	Plants yield coarse fibre for use as a source of paper pulp. The baked fruit is given for whooping cough and a syrup of the fruit is said to increase the secretion of bile and control spasmodic cough and expectoration.	Errect shrub about 2 m high with broadly ovate, dull-bluish joints, bearing 4–6 pale-yellow or light-horn coloured spines on each areole. This species is found nearly through out India, but more commonly in south India.

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209	Oryza sativa	Rice	H-Dnan B-Chal M-Dhan G-Dangar Tel-Vadlu T-Nellu Kan-Batta Mal-Nellu	Starch is the major constituent of rice. Whole rice is a good source of Vitamin B, particularly thiamine, guanidine, amino acid and uracil. The husk has been tried with some success as a raw material for making paper, hard board, rayon and linoleum.	Annual or perennial grass without rhizome, leaves long and narrow. Rice is one of the oldest food crops and has been in cultivation in India, China, Java and East Africa from very ancient times. It is mainly cultivated in Andhra Pradesh, Bihar, Assam, Gujarat, Jammu and Kashmir, Kerala, West Bengal, etc
210	Papaver somniferum	Opium poppy	H-Afim M-Aphu G-Aphina B-Pasto Tel-Abhini T-Abini Kan-Afim Mal-Afium	Used as narcotic, sedative, anodyne, antispasmodic, hypnotic and sudorific. Morphine is used to relieve pain, anxiety and sleeplessness due to pain.	Erect , rarely branched , usually glaucous annual, 60–120 cm high . The cultivation of opium poppy in India is controlled by the Government and is now confined to Uttar Pradesh, Madhya Pradesh and Rajasthan.
211	Paspalum scorbiculatum	Koda millet	H-Koda B-Koda dhan M-Kodra G-Kodra Tel-Arikalu T-Molvaagu Kan-Haraka O-Kodus	Newly harvested grain is powerful narcotic. A decoction of the roots and rhizome is used as an alterative in child birth and juice of the stem is useful in corneal opacity.	An annual grass found sometimes wild but mostly cultivated almost through out India.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
212	Pergularia daemia	-	H-Jutuk B-Bati M-Utarni G-Amaradudhli Tel-Dustupatige Kan-Balli Mal-Veliforatti O-Uturdi	The vine is credited with emetic, expectorant and anthelmintic properties. A decoction of leaves is given to children for asthma and their juice in infantile diarrhoea. Leaf juice is also used in preperation of purgative medicinal oil given in rheumatism, amenorrhoea and dysmenorrhoea. Root bark is used as purgative in rheumatism.	Foetid-smelling laticiferous twinner found in the plains through out the hotter parts of India ascending to an altitude of 1000 m.
213	Picrorhiza kurroa	-	H-Kutki B-Kutki M-Kutaki G-Kadu Tel-Katukrogani T-Katukrogani M-Katukrogani	It is considered to be a valuable bitter tonic, almost as efficacious as gentian. It is antiperiodic, cholagogue, stomachic, laxative.	More or less hairy perennial herb with an elongated stout, creeping root stock found in the alpine Himalayas from Kashmir to Sikkim at an altitude of 2700–4500 m.
214	Pinus roxburghii	Chirpine	H-Chir	Oleorasin from chir is the main source of turpentine oil. The rosin is utilized in the manufacture of fire work, match composition, shell-explosive, insecticide and disinfectant.	Tall tree, with a spreading crown, found in the Himalayas from Kashmir to Bhutan and in the Siwalik hill at an altitude of 450–2400 m.
215	Polyalthia longifolia	Cemetery tree	H-Asoka B-Debdora G-Asopalan Tel-Nara T-Assathi Kan-Kambadomora M-Arana O-Asupal	Bark is used as febrifuge in some parts of India and is often employed as substitute or adulterant of the bark of Saraka indica. Bark depresses the heart, lower blood pressure and stimulates respiration.	Tall, evergreen tree with a straight trunk considered to be a native of the drier parts of Sri Lanka, very commonly cultivated all over India in gardens and avenues.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
216	Polygonum aviculare	-	H-Machoti B-Machuti	Said to possess astringent, tonic, antipyretic, antiseptic, diuretic, haemostatic and vermifuge properties. It is used in treatment of diabetics, rheumatism, fever and external and internal ulcers. A decoction of the herb is given in dysentery, diarrhoea, bronchitis and bleeding piles.	Highly variable annual herb, with prostrate stem and branches up to 60 cm, distributed from Kashmir to Kumaoun at an altitude of 1800–3600.
217	Polygonum hydropiper	Water pepper	B-Packur	Herb possesses stimulant, diuretic, styptic, emmenagogue and lithontriptic properties. Liquid extract of the plant is used as an oral contraceptive. Infusion of the herb is used in uterine disorder and as a haemostatic. The bruised leaves and seeds are used as vesicants and are substitute for mustard poultice. The leaves are chewed to relieve toothache. The roots are bitter and possess stimulant, diuretic, carminative, tonic and anthelmintic properties. The juice (root) is used as wash for skin affections.	Glabrous often glandular, reddish, annual or perennial herb up to 80 cm high, distributed through out India in wet places, ascending up to an altitude of 2100 m in the Himalayas.
218	Pongamia pinnata	Karanj	H-Mar B-Mer G-Karanj Tel-Gaanuja T-Porya Kan-Honge M-Punga O-Karanju	Kuaranjn is the active principle for the curative effect of oil in the skin diseases. Oil possesses insecticidal and anti-bacterial properties. Leaf act as a galactagogue. Juice of the root is used for cleansing foul ulcer and cleaning teeth. Dried flowers are used in decoction to quench thirst in diabetes.	Medium sized glabrous tree, with a short bole, crown up to 180 m high, found almost through out India, up to an altitude of 1200 m.

A - Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
219	Premna integrifolia	-	H-Agetha B-Bhutbhiravi M-Aran G-Mothi-arni Tel-Pomanti T-Munnay Kan-Takkit Mal-Munna O-Aguyabat	The roots form a constituent of the well known ayurvedic medicine Dasamula, used as a cure for obstinate fever. Prescribed as a laxative, stomachic cordial and tonic. Leaves possess carminative and galactagogue properties and are used in the preparation of soup given as stomachic. Decoction of the leaves is used in the treatment of colic and flatulence. Aqueous extract of the plant showed a powerful action on the uterus of the animal.	Large thorny, deciduous shrub or a tree, up to 9 m in height, common along the Indian and the Andaman coasts. It also occurs in the plains of Assam and in Khasi hills.
220	Prosopis cineraria	-	H-Khar B-Shami M-Shemri G-Sami Tel-Jammi T-Jambu Kan-Banni M-Tombu O-Shami	Bark as well as galls formed on the leaves are used for the tanning.	Small to moderate -sized tree, evergreen or nearly so with light foliage found in the dry and arid hot region of India.
221	Psidium guajava	Common guava	H-Amrud B-Piyara M-Jamba G-Peru Tel-Goyya T-Koyya Kan-Sebe Mal-Pera	Used in the preperation of guava cheese, canned guava and guava jelly. Leaves contain wax, resins, sugar, carotene, Vitamin-B1,B 2 and B 6. The leaves are used for wound ulcer and astringent for bowel. The young leaves are used as tonic in the diseases of the digestive function . The decoction of leaves is used in cholera. The bark is valued for astringent properties and employed in diarrhoea in children. The flowers are said to cool the body and are used in bronchitis. The fruit is tonic, cooling and laxative and also useful in diarrhoea and dysentery.	Arborescent shrub or small tree upto 8 m high, flower white and fragrant . It is a native of tropical America. It grows nearly through out the country upto 1500 m and is cultivated commercially in almost all the states. The important growing states are Uttar Pradesh,Bihar, Maharashtra, Assam , West Bengal, Andhra Pradesh and Tamil Nadu.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
222	<i>Punica granatum</i>	Pomegranate	H-Anar B-Dalim M-Dalimba G-Dadam Tel-Danimma T-Madulai Kan-Dalimbo M-Matalam	Fresh juice is used as an ingredient of cooling and refrigerant mixture and of some medicine for dyspepsia. The rind is valued as an astringent in case of diarrhoea and dysentery . The expressed juice of the leaves and the young fruit, and the decoction of bark are used in dysentery . The powdered flower buds are used in branchitis. The seeds are considered to be stomachic and pulp cardiac and stomachic.	Shrub or small tree, 5–10 m high considered to be a native of Iran, Afganistan and Baluchistan found growing wild in the warm valley and outer hills of the Himalayas between 900 and 1800 m and cultivated through out India.
223	<i>Randia dumetorum</i>	Common emetic nut	H-Mainphal B-Mainphal M-Ghela G-Mindphal Tel-Manga T-Madkarai Kan-Kare Mal-Kara O-Patova	Pulp of the fruit dried and powdered is valuable emetic and used as a substitute for ipecacuanha. In smaller doses, it is nauseant, expectorant and diaphoretic. It is considered to have anthelmintic and abortifacient properties. The fruit is said to be useful as a nervine calmativ and antispasmodic.	Deciduous, thorny shrub or a small tree, up to 9 m in height and 90 cm in girth, found throughout India up to an elevation of 1,350 m in the hills.
224	<i>Raphanus sativus</i>	Radish	H-Muli B-Muli G-Muli Tel-Mullangi T-Mullangi Kan-Mullangi Mal-Mullangi	Credited with refreshing and depurative properties. Raddish preperations are useful in liver and gall bladder trouble. In homeopathy they are used for neuralize headaches, sleeplessness and chronic diarrhoea. Roots, leaves, flowers and pods are active against gram positive bacteria. The roots are useful in urinary complaints, piles and in gatrodynia. The seeds are said to be peptic, expectorant, diuretic and carminative. The juice of fresh leaves is used as diuretic and laxative.	An annual or biennial bristly herb with a white or brightly-coloured tuberous tap root, cultivated through out India and up to an elevation of 3000 m in the Himalayas and other hilly regions.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
225	Ricinus communis	Castor	H-Erandi B- Bheranda G- Divuligy T- Amama Kku Tel- Amuda muchettu Mal-Erandi Kan- Haralu	Bulk of castor seed produced in India is utilized for expression of the oil. Small quantities of seeds are also used as clarifying agent in the preparation of gur and for medicinal purpose. Castor oil is used as cathartic. The seed cake obtained as a bioproduct is used mainly as manure. Small quantities of castor seed are used in the villages as a mild laxative for children.	Annual on perennial bush, occasionally a soft wooded small tree up to 6 m or more, found nearly through out India mostly under cultivation upto an elevation of 2000 m. It is believed to be a native of tropical Africa.
226	Riverhypo craterifolmis	Midnapore creeper	H- Phang B- Kalmilata M- Kulmiluta Tel- Boddikura T- Budthi kiray	Leaves of young shoots are eaten as vegetable and used in preparing bread. Root is given in Bihar to women after child birth.	Large climbing shrub found all most through out India. The flowers are white, fragrant, close scented, opening in the evening and closing during day.
227	Salvadora persica	Mustard tree	H- Jhak B- Jhal M- Miraj G- Pilu Tel- Ghunia T- Karlol Kan- Gomimari O- Pilu	Leaves are eaten as vegetable in eastern tropical Africa and are used in the preparation of sauce. A ferment drink is made from the fruits. Fresh root bark is used as vesicant and employed as an ingredient of snuff. Paste of root and the decoction is used against gonorrhoea and vesical catarrh. The extract of root is said to relief pain due to spleen troubles. Decoction of leaves is used in asthma and cough, and a poultice made out of it is applied to painful tumors and piles. They are also used as a external application in rheumatism. Fruit possess deobstruent, carminative, diuretic and stomachic properties and are used in billiousness and rheumatism. Seeds are considered purgative, diuretic and tonic. Seed oil is applied on the skin in rheumatism. It is also reported to contain fairly large amount of alkaloidal constituent (including trimethyl-amine and an unidentified alkaloid), small amount of resin and colouring matters.	Large much branched ever green shrub of tree found in the dry and arid regions in India and saline lands in coastal regions.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
228	Sapindus emarginatees or S. trifoliatius	Soap nut tree	H- Reetha B- Barareetha M-Reetha G- Aritha Tel- Homic T- Pubamkottai Kan- Amtawala Mal- Pasakotta O-Rettia	Fruit possess ematic, tonic, astringent and anthelmintic properties, and are used in the treatment of asthama, colic, indigestion, diarrhoea, cholera, paralysis of limbs and lumbago, Roots and bark are employed as mild expectorant and dimulescent. Decoction of bark is given to cattle suffering from worm infested ulcers after calving. Etheral extract of the pericarp shows activity against Staphylo coccus aureus and Escherichia coli. It is used in the preperation of certain fungicides and insecticides.	Medium sized to large, deciduous tree, up to 18 m height, common in Peninsular India, also cultivated for ornament and in avenues. Flowers are white, polygamous, male numerous. The tree is a native of south India on the coast in open forests at low elevation. A good avenue tree is occasionally cultivated in in West Bengal, Bihar, Madhya Pradesh and Uttar Pradesh.
229	Schleichera oleosa or S. trijuga	The lac tree	H- Kusum B- Kusum M- kusumb Tel- Busi T- Karanchi Kan- Sagada Mal- Puvam O- Kusama P-Sama	Oil cake has good manurial value. Kusum oil has long been used for hair dressing. It is used for external massage in rheumatism. Kusum oil could be utilized for soap manufacture and textile lubricant. Powdered seeds are applied to remove maggots from ulcers amd wounds of animals. flowers yield a dye and are source of nectar for honey bees.	Medium size to large, deciduous or nearly ever green tree up to an 32.3 m in height, found in the sub-Himalayan tract from Kashmir to West Bengal andin central and Peninsular India up to an altitude of 900 m. Flowers are yellow in colour.
230	Semecarpus anacardium	The marking Nut tree,oriental cashew	H- Bhela B- Bhela M- Bibha G- Bhilama Tel- Jidi T- Shendotti Kan- Goddugeru Mal- Dhera O- Balia P- Bhela	The pericarp of fruit abounds in a black oily, bitter and highly vesicant juice which has been traditionally used for marking linen. Kernel oil is used as food preservative against white ants.	Moderate sized deciduous tree reaching up to a height of 12-15 m, found in the outer Himalayas from Satlaj to Sikkim and fairly common through out the hotter parts of India as far east as Assam.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
231	Sesamum indicum	Sesamum	H- Til M- Til G- Tal Tel- Nubbulu T- Ellu Kan- Ellu Mal- Karuthellu O- Khasa P- Til	Oleaginous edible seeds of sesamum indicum, tradinally steamed for oil. Sesamum seeds are emollient, diuretic, lactagogue and nourishing tonic. It is helpful in piles. Decoction of the seed is said to be emmenagogue and is also given in cough. Sesamum oil is widely used as an ingredient of confectionary and for making margarine. It can be used in the manufacture of soaps, cosmetics, insecticides and pharmaceutical products. Sesamum cake or meal obtained as a bio product of oil milling industry is highly esteemed as a livestock feed. The cakes from ghani, expeller and solvent extraction process are comparable with respect to the digestibility of total carbohydrate.	Erect branched or unbranched annual 60–180 cm, cultivated through out the plains of India and up to an altitude of 1200 m. The flowers are white, pink of mauve-pink, with darker marking.
232	Shorea robusta	Sal	H- Sal B- Sal M - Ral G- Ral Tel- Gugal T- Kungiliyam Kan- Kabba Mal- Mara – maram O- Sal	Sal is the most universally used timber in North, east and central India. Sal is one of the primary hosts of tasar silk worm. A paste made from fruit is used in diarrhoea. It is a good source of resin and oil. Sal oil cakes contains 10 to 12 % protein and about 50% starch and can be used as cattle and poultry feed.	Large sub-deciduous tree, seldom quite leaders found extensively in parts of North-East and central India. Under average condition, Sal attains a height of 18–30 m, though under very favorable condition grows up to 45 m.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
233	Solanum surattense	Yellow berried, yellow night shade	H-Katcli B-Kanta-Kali M-Bhuiringani G-Bhoyaringani Tel-Venkuda T-Kandan Mal-Kantiri O-Ankranti P-Maholi	Root is expectorant, forming an ingredient of a well known ayurvedic medicine, dasamula. It is employed in cough, asthma and pains in chest, being used in the form of a decoction. Stem, flowers, and fruits are bitter and carminative. The juice of berry is used in sore throat. The plant is credited with diuretic properties is used to cure dropsy. The juice of the leaves, mixed with black pepper is prescribed in rheumatism. Solasonine is present in fruit. Both glycoalkaloid and fatty acid fractions of the extract cause liberation of histamine from chopped lungs tissue. The beneficial effect of the drug on Bronchial asthma is attributed to depletion of histamine from the bronchial and lung tissue. Extract of whole plant shows anti-viral activity against Rani-khet disease.	Very spiny diffused herb up to 1.2 m tall, commonly found through out India. The flowers are blue in lateral cyme.
234	Solanum melongena	Egg plant or Brinjal	H-Baingan B- Begon M- Vangi G- Vantak Tel- Nifuvanga T- Vankay Kan- Vazhuthana O- Baigun P- Baigan	Root of brinjal plant is credited in the indigenous medicine as anti-asthmatics and general stimulant. Leaves possess sialagogue and narcotic properties and are used in cholera, bronchitis, dysuria and asthma. The seeds are used as a stimulant but are apt to lead to dyspepsia and constipation. Brinjal is reported to stimulate the intra-hepatic metabolism of cholesterol. The various parts of the plants are known to contain steroidal alkaloid. The presence of solasodine in the green fruit has been reported.	Herbaceous prickly or sometimes unarmed perennial 0.62 to 2.4 m tall cultivated through out India as annual for its edible fruits.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
235	Soyamida febrifuga	Indian red wood	H- Rohun B- Rohun M- Ruhin G- Rohina O- Sohan	The wood is used in house building as posts, rafters and beams. Bark contains a resinous bitter principle and is a popular drug. It is an astringent and antipatriotic property. The bark is used in the treatment of diarrhoea, dysentery and fever and as a bitter tonic in genesal debility. Indian red wood bark is a rich source of tannin. Decoction of bark is used for gargles, vaginary infection and enemata. The bark also yields a strong red fibre used for making ropes. Some times the bark is used in dyeing cotton clothes.	A lofty deciduous tree 22–25 m. height. Distributed in the dry forest of Peninsular India right upto Kerela and also occurs in Gujarat, Uttar Pradesh, Bihar and central India.
236	Stephania glabra	-	-	Tubers are acrid, and also used in the treatment of pulmonary tuberculosis asthma and intestinal complaints. Tubers are rich source of several alkaloids. Alkaloids present in the tubers are tetrahydro oalmitine (Gindarin rotundine), palmitine (Gindarinine), etc. Aerial parts of plant grown in the caucasus region, are reported to yield more than 1% total alkaloids containing cycleanine and a base C ₁₉ H ₂₄ O ₄ . Palmitin exhibits antibiotic activities against staphylococci in vitro. stepharin exhibits anti-cholinnesterace activity, where as cycleanine and a base shows anti-inflammatory properties and hyndarine, sedative action. tetra-hydro palmitin produces sedative and anti-convulsant effects on rats, mice, cats and rabies.	Glabrous, dextrose climber with smooth terete stems attaining a length up to 7m found in the Himalayas and Assam in the western ghats up to the Nilgiris and Tirunelvelli hills, ascending to an altitude of 2100 m.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
237	Streblus asper	Siamese	H-Rusa B-Sehora M-Kharota Tel-Barinki T-Tira Mal-Paruka Kan-Punje O-Sahuda P-Jindi	The twigs are chewed to make brushes for cleaning teeth and to cure pyorrhea. The leaves are used as a glactagogue. A paste of the leaf applied to swelling and buboes and is given to stop excessive perspiration and infusion of leaves is taken as a substitute for tea. A poultice of root is applied to ulcers, sinuses, inflamed swellings and boils. The powdered roots are prescribed in dysentery. a decoction of root is said to be given in syphilis and that of the bark in fever, dysentery and diarrhoea. Seeds are used in epistaxis, piles and diarrhoea.	Evergreen, rigid shrub or tree upto 15 m high, distributed in Himalayas from Himachal Pradesh to West Bengal and in the hills and plains of Assam and Tripura, ascending to an altitude of 450 m. It also occurs in the Peninsular India up to 600 m, specially in dry parts and in the Andaman.
238	Struchnos nux-vomica	Nuxvomica	H-Bailewa B-Kuchila M-Kar G-Kuchla Kan-Itti Mal-Kanguram O-Kachila P-Rajra	Used for nervous disorder. It is used as tonic, stimulant and febrifuge. The leaves are applied as a poultice on sloughing wounds and maggot infected ulcers. Root and bark are used in fever and infusion of the latter is prescribed for epilepsy. Strychnine and brucine are the most important and strongly toxic alkaloids present in this plant. These alkaloids occur not only in seed but also in the root, wood, bark, leaves, fruit pulp and hard fruit cells. Strychnine is used as a cardial vascular and respiratory stimulant and bitter tonic, stimulating all part of central nervous system.	Evergreen or deciduous tree, usually 13m high, found through out tropical India up to an altitude of 360m. The tree occurs to a considerable extent in Uttar Pradesh, Bihar and Orissa. The Coromandel coast, Andhra Pradesh and Mysore and is most common in the monsoonal forest along the western coast.
239	Strychnos potatorum	The clearing nut	H-Nirmali B-Nirmali Tel-Indupachettu T-Tettran Kan-Chilu Mal-Tetran-taran O-Kotaku	Ripe seeds are used for clearing muddy water. They are reported to be very effective as coagulent aids. Leaves are used as poultice over maggot infected ulcers. Powdered bark mixed with lime juice is given in cholera. Albumin and other colloides sensitise the suspension and the coagulation is the caused by the alkaloidal ions.	A 13m tall tree plentiful in deciduous forest of West Bengal, central and south India, up to 1200 m. Flowers are white and fragrant.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
240	<i>Syzygium cuminii</i>	Balck berry	H- Jaman M-Jaman Tel-Necreedu G-Zamli T-Naval Kan-Nerate Mal-Naval O-Jamo P-Jammu	Vitamins presents are V-4 (80-IA), and malic acid is the major acid (0.59% of the weight of fruit). Malic acid and tannin accounts for astringency of fruit. Oleanolic acid is also found in the flower. Glucose and fructose are principal sugar in the ripe fruits. The stem bark contains betulinic acid, beta-sitosterol. The leaves are palatable fodder for cattle, sheep and goats. The seeds are used as feed for livestock. The seeds may be used as a replacement for oil cakes in animal feed upto 75%. The bark is used in dyeing and tanning and for coloring fishnets. Extract of bark stems, leaves, buds and flowers possess moderate antibiotic activity against <i>Micrococcus pyogenes</i> var. <i>aureus</i> . Extract of the leaves also showed moderate activity against <i>Escherichia coli</i> . Bark is astringent and is used in the preparation of gargles and mouth wash. Decoction of bark and leaves are used for treatment of diabetes. The bark extract has an effect on glycogenolysis and glycogen storage in animals. The fruits are used in the treatment of diabetes. Extract of the bark is toxic to <i>Piricularia oryzae</i> and <i>Physalospora tucumanensis</i> .	Large evergreen tree attaining 30m in height and 3.6 m in girth with bole up to 15 m, found through out India, up to an altitude of 1800 m. The flowers are greenish-white, fragrant, in trichotomus panicles. The tree grows widely in differing localities, but is generally found in streams and in damped places.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
241	Tamarindus indica	Tamarind	H-Imli B-Tentul M-Chinch G-Amli Tel-Chinta-chette T-Puli Kan-Huli Mal-Puli O-Tentuli P-Imbli	Invert sugar (30–40%) is the most important constituent. Tartaric acid is the principal acid in the pulp. Pulp is much used in the Indian medicine as a refrigerant, carminative and laxative and is also commonly prescribed in febrile diseases and billious disorders. The pulp is also reported to posses antiseptic and is recommended as a poultice on inflammatory swelling. Ground seed is useful for cattle feed. The seeds particularly the testae are astringent and are used to cure diarrhoea and dysentery. Infusion of the leaves is cooling and useful in billious fever. The bark is astringent and is given in diarrhoea. The leaves contain glycosides, bitaxin, orientin and iso-orientin.	A moderate to large evergreen tree, up to 24m in height, 7m in girth but generally small, cultivated or found naturalized almost through out the plain and sub-Himalayan tracts of India. Flowers are small, yellowish with pink strips.
241	Taverniera cuneifolia	East Indian money wort	M-Jetimad	Root is sweet and is used as a substitute for liquorice. The leaves are used in the form of poultice for sloughing wounds, The plant is browsed by camels, sheep, goat and other cattles.	Copiously branched under shrub, 30-60 cm high, occurring in the plains of Punjab, Gujarat and the Deccan. Flowers are red, axillary racemes.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
243	Tectona grandis	Teak	H-Sagwan B-Segun M-Sagwan G-Saga Tel-Adaviteeku T-Tekku Kan-Jadi Mal-Tekka O-Singura	Wood contains petroleum ether, alcohol, benzene, pentosans (19.43%), lignin (30.05%), holocellulose (61.1%), hemicellulose (11.3%) and silica. Most of the substituted anthraquinone and some other substances like lapachol, desoxy-lapachol and or cresyl-methyl-ether are responsible for the termite resistant property. Some constituents like lapachol have sensitizing effect and may cause allergic eczema or severe itching. Powder of teak wood is useful in allaying skin inflammation caused by melanorrhoea usitatissi. The leaves contain about 6% tannin. The kernel yields 44.4% fatty oil. Flowers are considered in billiousnes, bronchitis and urinary discharge. The bark contains tannin, petroleum ether, alcohol and benzene. The bark is regarded as an astringent and consider useful in bronchitis.	Tree with rounded crown, variable in size according to its habitat, indigenous to the peninsular India and Madhya Pradesh, is extending to the parts of Rajasthan, southern Uttar Pradesh and Orissa. In favorable conditions the tree attains large size with tall clean and cylindrical bole. In dry situation and seasons, the leaves fall from November–January.
244	Terminalia arjuna	-	H-Arjuna B-Arjhan M-Sadaru G-Sadado Tel-Yerramaddi T-Vellamatta Kan-Maddi O-Arjuno P-Arjan	Bark has been employed locally for many years for tanning. The dry bark from stem contains 20-24% tannin. The bark contains beta stosterol, ellagic acid and trihydroxy triterpene mono carboxylic acid. The leaves are fed to tassar silkworm. The bark is acreed and credited with styptic, tonic, febrifugal and antidysenteric properties. A decoction of the bark is used as a wash in a ulcer. The fruit is tonic and deobstruent. The juice of the fresh leaves is used in earache.	Large evergreen tree, with a spreading crown and drooping branches, common in most parts of India and also planted in many parts for shade and ornament. The tree is common through out the greater parts of the Indian Peninsula along rivers, streams, ravines and dry water courses. It extends north wards to the sub-Himalayan tract where it is distributed along the bank of streams.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
245	<i>Terminalia chebula</i>	Chebulic myrobalan	H- Harra B-Haritaki M-Hirda G-Harda Tel-Karkkai T-Kadukkai O-Haridra P-Har	The dried flesh surrounding the seed is rich in tannin (30-32%). The carbohydrate present in myrobalan are glucose and sebitol as major constituents. It is the one of the principle bloum yielding tans, due to its high ellagitannic acid content and is useful specially in the production of sole leather. The extract has been successfully tried for pretanning cow and buffalo hides. Maximum concentration of tannin occurs in fruits, followed by root, bark, heart wood, sap wood and leaves. The fruits are credited with laxative, stomachic and alterative properties. The fruit pulp is used as a dentifrice to cure bleeding and ulceration of gums.	Tree 15–24 m in height and 1.5–2.4 m in girth with a cylindrical bole of 4–9 m, a rounded crown and spreading branches found through out India. Flowers are yellowish-white, terminal spikes. It is found in the sub-Himalayan tracts from Ravi east ward to West Bengal and Assam, ascending up to an altitude of 1500 m in the Himalayas.
246	<i>Terminalia crenulata</i> Syn. <i>T. tomentosa</i>	-	H-Asan B-Asan M-Ain G-Sadar Tel-Tani T-Karramard Kan-Sadada O-Sahaja	Bark is bitter and styptic and has diuretic and cardiotonic properties. Decoction of the bark is taken internally in tonic, diarrhoea and is used locally as an application to weak, indolent ulcers. The tree exudes a jel like fluid which dry up to a light-yellow to umbel coloured gum, used as a purgative and as an adhesive. The isolation of galic, ellagic, chebulinic and chebulic acids from the leaves and fruits has been reported.	Large deciduous straight-stemmed tree, with spreading branches and heavy crown and attaining a height of 32m or more, distributed in the Himalayas from Kangra east wards to the Goalpara division of Assam and south wards through out the Peninsula, ascending to an altitude of 1200m. Flowers are dull-yellow, in terminal and auxiliary panicles. The tree is one of the commonest and most widely distributed of all important timber species.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
247	<i>Tinospora cardifolia</i>	Gulan-cha tinospo- ra	H-Amrita B-Golancha M-Gulvel G-Gulvel Tel-Tippateege T-Chimbil Kan-Madhuparne Mal-Amrytu O-Gulochi	It is mentioned in ayurvedic literature as a constituent of several compound preparations, used in general debility, dyspepsia, fevers and urinary diseases. Anti-viral property against Ranikhet disease in poultry have also been ascribed to this climber. The dry stem, with bark intact constitutes the drug. The bitter principle present in the drug showed anti-periodic, anti-spasmodic, anti-inflammatory and anti-pyretic. Alcoholic extracts of the stem shows activity against <i>Escherichia coli</i> . Decoction of leaves is used for the treatment of goat and young leaves, bruised in milk, is used as a liniment in erysipelas. Dried and powdered fruit, mixed with ghee or honey, is used as tonic and also in the treatment of jaundice and rheumatism. Root is a powerful emetic and is used for visceral obstructions.	A large glabrous deciduous climbing shrub found through out tropical India, ascending to an altitude of 300m. Flowers are small, yellow or greenish-yellow, appearing when plant is leafless.
248	<i>Tinospora sinensis</i>	-	H-Gloe B-Urti-poorti Kan-Sedarsnaballi	The plant is used for fumigation in piles and ulcerated wounds and for the preparation of medicated bath for liver complaints. Boiled roots are given in fever. Fresh leaves or stems are used in chronic rheumatism.	Large deciduous climber with rambling or dextrose stems, bearing aerial roots from branches, found almost through out India, ascending to an altitude of 1,000 m. The flowers are diocious, green, greenish-yellow or yellowish-green, with a leather disagreeable smell.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
249	Trachyspermum ammi	Ajowan	H-Ajowan B-Jowan M-Owa T-Omum Kan-Oma Mal-Oman	Ajowan with its characteristics smell and pungent taste is widely used as a spice in curries. It is also used in pickles, certain type of biscuits, confectionary and beverages. It is used as a remedy for indigestion. It is much valued for its antispasmodic, stimulant, tonic and carminative properties. It is administered in flatulence, atonic dyspepsia and diarrhoea, and often recommended for cholera. It is effective in relaxed sore throat and in bronchitis. It has been sown to possess anti-biotic activity against Salmonella typhosa, Micrococcus pyogenes var. aureus and Escherichia coli. The roots are reported to possess diuretic and carminative properties, and are used in febrile conditions and in stomach disorders. The oil is used in medicine. The principal constituents of the oil are the phenols, mainly thymol (35–60%) and some carvacrol. Its oil, both pure and dethymolized, is employed as an antiseptic and aromatic carminative.	Erect glabrous branched annual, up to 90 cm tall cultivated almost throughout India. The herb is native of Egypt. Although it is cultivated in the Mediterranean region, in south-west Asian countries, such as Iraq, Iran, Afghanistan and Pakistan, ajowan is chiefly produced in India. It is grown throughout the country, mainly in the plains but flourishes equally well at higher altitude in the plateaus of the hills. It is grown in commercial scale in Madhya Pradesh, Andhra Pradesh, Gujarat, Maharashtra and Uttar Pradesh.
250	Tribulus terrestris	Puncture vine	H- Gokhru B-Gakhrra O- Gakhrra M-Sarala G-Beta Gokhru Tel-Chinni pallere T-Nerumji Mal-Nerumji Kan-Sammaneggilu P-Lotak	Spiny fruits are liable to cause injury to the stomach in animals. The alkaloid, harman, has been reported from the herb and harmine from the seed. The plants contain saponin. The fruits are credited with diuretic and tonic properties and are used for the treatment of calculous affections. The leaves possess stomachache properties. A paste prepared from it is given for treatment of stones in the bladder. The root is credited with aperients and tonic properties.	Variable, prostrate annual upto 90cm in length, commonly found throughout India, upto an altitude of 5400m. The flowers are pale-yellow to yellow. The herb is a common weed and its flowers and fruits are available almost throughout the year.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
251	Trichodesma indicum	-	H-Chhota kulpha B-Chotokupa MChhota phulva G- Undha phull Tel- Guvva gutti T-Kazhuthaithu mbai Kan-Katletumbe soppu O-Hetamumdia	The herb is credited with emollient and diuretic properties and is used for making emollient poultices. It is prescribed by the ayurvedic physician for the expulsion of dead foetus. The root is pounded and made into paste for application on the swelling, particularly of the joints. The root is also used for the treatment of dysentery and fever. The flowers are used as a sudorific and pectoral.	Hispid, erect or diffuse annual herb, found as a weed through out the greater parts of India, ascending to an altitude of 1500m in Himalayas. Flowers are pale-blue, changing to pink or white, single, on drooping axillary stalks.
252	Trigonella foenum graecum	Fenugreek	H-Methi B-Methi M-Methi G-Methi Tel-Mentikoora T-Vendayam Kan-Menthya Mal-Uluva P-Methi	Alkaloid trigonelline is present in the seed. Saponin from the leaves yield diosgenin and gitogenin. The disogenin is the major constituent of the leaves. The plant possesses insect repellent properties. The seeds are aromatic, carminative, tonic and galactagogue. They are used externally in poultices for boils, abscesses and ulcer, and internally as emolient for inflammation of the intestinal tract. They find application also in veterinary medicines, and are used in paultices, ointments and plasters, and form a constituent of 'condition powders', for cattle, horses and sheep. The aqueous extract of seeds shows antibiotic activities against Micrococcus pyogenes var.aureus.	An aromatic annual 30–600 cm tall found wild in Kashmir, Punjab and the upper gangetic plains and widely cultivated in many parts of India. The flowers are white or yellowish.
253	Triumfetta rotundifolia	-	T-Mudappoondur Tel-Banki Kan-Tutturi	The plant is used as demulscent.	It is a small under shrub, found almost through out India.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
254	Vertilago denticulata willd	-	H-Pitti B-Ruktupita M-Sakalyel Tel-Errashi-ratalatige Kan-Kuriyadi O-Pittoli	The bark is powdered and applied on sprains. The sap is used for deafness.	Large scandent shrub found more or less through out India. The flowers are greenish with an offensive odour, in cluster on large, axillary or terminal pubescent panicle.
255	Vigna aconitifolia	Moth or Moth bean	H-Moth B-Kheri M-Math Guj-Mut Tel-Kumcumpesalu T-Tulukkapayir Kan-Madike	Tender pods are used considerably as vegetable and dried pulse is eaten as dal. The pulse is useful diet in case of flatulent and fever.	Perennial or annual herb found through out India from the Himalayas to Kannya Kumari, ascending upto 1200 m specially in the north-west. It is native of India. It is grown in Rajasthan, Madhya Pradesh, Maharashtra, Karnataka, Gujarat, Punjab, Harayana, Uttar Pradesh and Bihar.
256	Vigna radiata	Greengram	H-Moong B-Moong M-Mug Guj-Mag Tel-Uthulu T-Pasi payaru Kan-Hesaru Mal-Cherupayaru	Decoction of the seed is used as an effective diuretic in berry-berry. The herb is valued as a feed for cattle and horses. It may be used as a supplement to the culture medium in the production of streptomycin from Streptomyces griseus. An extract of the germinated pulse may be used as a substitute for corn steep-liquor in the production of penicillin.	Erect or sub-erect annual, cultivated almost through out India. The flowers are yellow or yellowish-green. It is supposed to be native of India and central Asia. The major producing areas are Andhra Pradesh, Maharashtra, Gujarat, Orissa and Tamil Nadu, whereas, Punjab, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal and Karnataka cultivate this crop to a lesser extent.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
257	<i>Viola serpens</i>	-	H-Banaf shah P-Banfsha	Decoction of the flower is administered for improving the complexion. Active principle of the herb is an alkaloid, violine. The herb is considered to possess medicinal properties.	A hirsute or glabrous herb found through out the temperate Himalayas upto an altitude of 2000 m extending east wards to the hills of Meghalaya, Nagaland and Manipur. It is also found in the Ganjam hills in Orissa and in the Nilgiris and Palni hills in Tamil Nadu at altitude of 1500m to 2000 m.
258	<i>Vitex negundo</i>	-	H-Shivari B-Samalo M-Niragun G-Nagoda Tel-Velvili T-Venmochi Kan-Nekki Mal-Vellamocchi O-Nirgundi P-Banna	Decoction of leaves, with addition of long pepper, is given in catarrh fever, with heaviness of the head and dullness of hearing. Decoction of leaves and the vapours are employed in baths for the treatment of febrile, catarrh and rheumatic affection. The juice of leaves is used for the treatment of foetid discharges. The leaves are reported to possess insecticidal properties and are used with stored grain toward off insects. The extract of leaves and twigs showed anti-bacterial activity against <i>Micrococcus pyogenes</i> var. <i>aureus</i> and <i>Escherichia coli</i> . The roots possess tonic febrifugal, expectorant and diuretic properties. They are used in dyspepsia and rheumatism. The powdered roots are prescribed as an anthelmintic and as a demoluscent in dysentery. The flowers are astringent and are used in fever, diarrhoea and liver complaints. Fruits are prescribed in headache, catarrh and watery eyes, when dried they are considered wormifuge.	Large aromatic shrub with quadrangular, densely whitish, tomentose branchlet, up to 4.5 m in height or some time a small, slender tree, found through out the greater parts of India ascending to an altitude of 1500 m in outer Himalayas.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
259	Wilthania somnifera	-	H-Punir B-Ashvaganda M-Askadhatilli G-Ghoda Tel-Panneru T-Amukkura Kan-Pannaere P-Asgand	Pharmological activity of root is attributed to the presence of several alkaloids. These alkaloids include cuscohygrime, anhygrine, tropine etc. The neuopharmological activity was accredited to the acetone soluble fraction of the total alkaloids. The total alkaloid showed relaxant and anti-spasmodic effect against several spasmogens on intestinal uterine, bronchia, tracheal and blood vascular muscles. It is useful in the treatment of inflammatory condition, ulcers and scabies when applied locally. The leaves contain withaferin which has curative properties. It has antibiotic and anti-tumour activities. Withaferin- A exhibits fairly potent anti-arthritic and anti-inflammatory activities. The green berries are bruised and rubbed on ring worm in human being, on animal sores and girth galls in horses.	Erect evergreen tomentose shrub, 30–150 cm high found through out the drier parts of India in waste places and on bunds.
260	Zea mays	Maize	H-Makai, B-Janar, M-Maka, G-Makkari Tel-Makka-janna T-Makka-Cholam Kan-Goinjol Mal-Cholam O-Maka	Among minerals, phosphorus in the grain occur mostly (about 85% as phytin). The vitamins present in maize are thiamine, riboflavin and myocin. Yellow variety of maize is richer in beta-carotin than white ones. Maize is good source of tocopherols with gama-tocopherol as the predominant component. An enzyme associated with starch granules, ADP glucose-starch glucosyl transferase, is present in the endosperm of maize seeds. The principle constituents of maize herbs are cellulose and hemicellulose. Maize oil may be used with linseed oil as paint material. Sulphonated maize oil finds application in tannin and processing of leather. In India maize oil is used for the manufacture of soap. Maize is a highly valued as green fodder, silage or grain in animal feeding. Maize silk (styles with stigmas) possess chlorotic, diuretic and astringent properties. stigmas) is reported to possess chlorotic, diuretic and astringent properties.	Robust, monocious annual grass though generally tall, varies in height from 0.43 m to sometimes over 6 m in different varieties and regional types. Maize is extensively cultivated in India, both in the plains and in the hills or specially in the areas with hot summer. Maize growing states are Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh and Punjab.

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Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
261	Zingiber officinale	Ginger	H-Adrak B-Ada M-Ale Tel-Sonthi T-Allam Kan-Hasisunti Mal-Inchi	Ginger contains small quantities of glucose and sucrose. The principle carbohydrate of rhizome is starch. The free amino acids present in ginger include glutamic acid, aspartic acid etc. The characteristic pleasant and aromatic odour of ginger, is due to an essential oil. The oil contains sesquiterpenes hydrocarbons (50% or more), sesquiterpenes alcohol, monoterpenoids and associated compounds. The pungency of ginger is due to oleoresin known as gingerin. Green ginger is the raw rhizome and substantial quantities of it are locally used as a condiment in culinary preparation, some quantities are also utilized in the preparation of pickle and canned ginger and soft drinks like ginger cocktail or gingerella.	A herbaceous, rhizomatous perennial reaching upto 90 cm in height under cultivation. Rhizomes are aromatic, thick, robed pale yellow, differing in shape and size in the different cultivated types. The important ginger growing states are Orissa, West Bengal, Madhya Pradesh and Himachal Pradesh.
262	Zizyphus jujuba	-	H-Pitniber P-Amlai K-Phitni	Fruits are credited with emollient and pectoral properties. The leaves are laxative and prescribed in scabies and throat troubles. The fruits and leaves are also used for fodder. The fruits of the wild plants are considered cooling, anodyne and tonic. They are used externally in poultices and application for wounds.	Deciduous tree upto 12 m in height, sometime large bush, found both cultivated and naturalized in Punjab. It is believed that this species is a native of north China.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

Sl. No.	Botanical name	English name	Names in Indian languages	Active ingredients	Geographical indicators
263	<i>Zyzyphus mauritiana</i>	Indian ber	H-Ber B-Ber M-Bera G-Bor Tel-Reegu T-Elandai Kan-Elanji Mal-Elemtha O-Backoli	Fruits are good source of Vitamin C (96 to 205 mg/100g). The fruits of wild trees are considered cooling anodyne and tonic. They enter into preparation of joshanda, a medicine used in chest complaints. The kernels are reported to have a sedative effect and are recommended as a soporific. They are prescribed to stop nausea, vomiting and relief from abdominal pain in pregnancy. They are also given as an antidote to aconite-poisoning and used in poultices and other application for wounds. The leaves are considered to be a good fodder for cattle and goats. The bark is sometime used in India for tanning purposes. The leaves are eaten with catechu as an astringent. They are regarded as diaphoretic and are prescribed for typhoid in children. They are also used as paultice. Decoction of bark is used for the treatment of diarrhoea and dysentery.	A small evergreen variable size, upto 15m or even more in height, with a spreading crown and stipular spines, found both wild and cultivated through out greater part of India, ascending to an altitude of 1500 m in the Himalayas. Low shrubby form is common. The flowers are greenish-yellow in axillary cyme. the old leaves fall during March–April and simultaneously the new leaves appear. The flowers appear during April to October. The plants are commercially grown in Punjab, Haryana, Rajasthan, Gujarat, Maharashtra and Uttar Pradesh.

A- Assamese, B-Bengali, G-Gujrati, H-Hindi, Kan-Kannada, M-Marathi, Mal-Malayalam, O-Oriya, P-Punjabi, T-Tamil, Tel-Telugu

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Key to Entry to the Book

Different aspects of indigenous technical knowledge (ITK) in agriculture and allied activities have been covered in 19 chapter:

Chapter

The chapters have been arranged in a manner to deal with a particular theme and each theme has subdivided.

Titles of the ITL

The titles have been modified to reflect on the practices described there after.

Practices

The practices have been described based on available information, wherever indicated, the rationale of the practices have also been given.

References

References indicate the name and year of disclosers of the indigenous practices.

Biological indicators

Information available in different volumes of Wealth of India published by Council of Scientific and Industrial Research in 1948 to 1988 on different plant materials used in the practices have been indicated in this chapter. This chapter has been incorporated in the book to establish claim that the plant materials used under different practices are available in the country.

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