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SAMPLE ENTRY

001 Paul, P.R.C.; Xavier, F.; Leena, A. (College of Veterinary and Animal Sciences, Trissur (India), Department, of Livestock Production Management) Dairysoft: A computer programme for dairy farms. Indian Journal of Animal Sciences (India). (Mar 2006).v. 76(3) p. 260-262 KEYWORDS: DAIRY FARMS; COMPUTER SOFTWARE

To exploit the full potential of dairy sector, a computerizd record management system dairysoft was developed. Visual Basis 6.0 was used as front end while MSAccess 97 was utilized as back end for the software. The menu base dairysoft was provided with facilities for obtaining necessary reports along with separate data entry options.

1. Entry number
2. Author(s)
3. Title in English
4. Source
5. Keywords
6. Organisation where work was carried out

A01 Agriculture - General aspects

1. Sona John; Coconut Development Board, Kochi (India). Realize the value of organic farming. Coconut Journal (India). (Oct 2014) v.LVII(6) p.6-8 KEYWORDS: FOODS. AGRICULTURE.

2. Vasantha Kumar, V.C.; Coconut Development Board, Kochi (India). Coconut Palm Insurance for minimizing the risk in coconut farming. Indian Coconut Journal (India). (Oct 2014) v.LVII (6) p.31-32 KEYWORDS: COCONUTS. INSURANCE. RISK.

3. Subhash, K.K.; Coconut Development Board, Kochi (India). The Future of coconut sector. Indian Coconut Journal (India). (Jan 2015) V.LVII (9) p.11-12 KEYWORDS: COCONUTS. OILSEEDS.

4. Simi Thomas; Coconut Development Board, Kochi (India). Hopeful days ahead for coconut farmers. Indian Coconut Journal (India). (Jan 2015) V.LVII(9) p.13-14 KEYWORDS: COCONUTS. FARMERS. PRICES.

A50 Agricultural research

5. Sreejitha, P.S.; CDB Institute of Technology, Aluva (India). Producing the heavenly drink from coconut. Indian Coconut Journal (India). (Feb 2014) v.LVI (10) p.19-20 KEYWORDS: COCONUTS.

6. Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India). Anitakumari, P.; Central Plantation Crops Research Institute, Kasaragod (India) Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India) Palaniswami, C.; Central Plantation Crops Research Institute, Kasaragod (India) Krishnakumar, V.; Central Plantation Crops Research Institute, Kasaragod (India). Production forecasting of coconut: Variation in Number of bearing palms and productivity in selected districts in India. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.314-320 KEYWORDS: COCONUTS. FORECASTING. PRODUCTION. YIELDS.

   Forecasting of coconut production in the country was attempted For three consecutive years from 2006-07. Stratified multistage Sampling design was employed. At district level, forecasting of Production was arrived by multiplying average predicted yield of Palms with the 'harvested-area' of the crop in that district. Ratio Estimator was constructed to obtain forecasting at different Administrative levels. The all India forecasts of coconut production in the years 2006-07 to 2008-09 were obtained as 13448, 16331 and 14183 million nuts against the published values of 15840, 14743 and 15729 in order. On observing noticeable reduction in area under Coconut in Kerala, the all India forecasting was revised as Separately working out the forecasts for Kerala and rest of India. By following this approach, the per cent

difference of Forecasts with published values were observed to be reduced from 15.1, -10.8, and 9.8 to 10.5, -5.2, and 6.0 in order in the years 2006-07 to 2008-09.

7. Sandip Shil; Central Plantation Crops Research Institute, Kahikuchi (India). Research Centre. Acharya, G.C.; Central Plantation Crops Research Institute, Kahikuchi (India). Research Centre. Jose, C.T.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Sit, A.K.; Central Plantation Crops Research Institute, Kahikuchi (India). Research Centre. George V. Thomas.; Central Plantation Crops Research Institute, Kasaragod (India). Forecasting of areca nut market price in north Eastern India: ARIMA modeling approach. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.330-337 KEYWORDS:ARECA. FORECASTING.

   The paper deals with forecasting of minimum, maximum and average arecanut (Areca catechu L.) prices in the major arecanut markets of the Assam as well as Meghalaya based on the monthly price data. Monthly minimum, maximum, and average market price data of arecanut (in Rs./quintal) for the period May-2003 to March-2012 (for Assam) and February-2003 to March-2012 (for Meghalaya) were used. Box Jenkins autoregressive integrated moving average (ARIMA) methodology was adopted for developing the models. An interrupted time-series model was also applied to resolve the problem of intervention point (October-2011) for Meghalaya price data. The proposed models were ARIMA (1, 0, 1), ARIMA (1, 1, 1), ARIMA (0, 1,1) (for Assam market price data series) and, log ARIMA (0, 1, 1), log ARIMA (1, 0, 1) with linear trend and a man-made intervention(Oct-2011) and log ARIMA (0, 1, 1) with linear trend and a manmade Intervention (Oct-2011) (for Meghalaya market price data series) for Minimum, maximum, and average monthly price series, respectively.

8. Dey, S.K.; Rubber Research Institute of India, Kunjaban (India). Regional Research Station. Data, B.; Rubber Research Institute of India, Kunjaban (India). Regional Research Station. High density planting - an option for higher productivity of rubber (Heveabrasiliensis) in north eastern region of India. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.338-342 KEYWORDS: GROWTH. HEVEA. YIELDS.

   The effect of planting density in rubber (Hevea brasiliensis)was studied in an experiment conducted with three densities viz.,420, 620, 824 trees ha-1. It was observed that lower density had higher percentage of trees ready for tapping during initial years, due to better growth. However, higher density achieved required girthing subsequent years. In spite of decrease in plant number over the years, the highest density had always lower girth even after 24 years of planting. Higher density also has higher percentage of too small trees, not suitable for harvesting latex. The higher plant densities resulted taller plants, increased crotch height and decreased the number of branches and thereby plant density affected yield per tree and yield per unit area. Though the yield per hectare increased with increased plant density during initial years, however declined later period. High yield per tree per tap was observed in the lowest density with lower yield per unit area. Yield increased in all densities with application of stimulant. Percentage of yield increase due to application of stimulant was higher (40%) in medium density (620 trees ha-1) compared to other plant densities. Percentage of wind damage was lower in high density planting during initial years. Total timber volume per hectare was high in

higher planting density and lower per tree volume of log compared to lower density. Maintaining a density of 620 trees per hectare appears to be most suitable for north eastern region of India.

9. Kiran Kumar R. Patil; University of Agricultural Sciences, Bangalore (India). GKVK. Aditya, K.S.; University of Agricultural Sciences, Bangalore (India). GKVK. Manjunatha, G.R.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India) Chinnappa, B.; University of Agricultural Sciences, Bangalore (India). GKVK. Market integration of arecanut in Karnataka state: An error correction model approach. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.404-410 KEYWORDS: ARECA.

   Arecanut, being an important commercial and plantation crop of Karnataka, its influence on state economy is significant and profound. To stabilize the vital arecanut economy in the state, government has to emphasize on both production and market related issues. But the existing government policies are favoring the production related aspects. While the existing fewer government policies related to marketing are devised devoid of information on market integration, which is unscientific. In order to formulate scientific policies in case of arecanut, consideration of market integration becomes imperative. In order to assess the existence of market integration in arecanut, data on monthly modal prices of arecanut was collected through Agmarknet from seven representative markets in Karnataka state. Co integration and error correction model were employed to test the presence of market integration and the results of the study revealed that the arecanut markets in the state are integrated with high speed of adjustment. Thus, it can be concluded that integrated arecanut markets are efficient in price transmission. Hence, in order to stabilize arecanut economy government has to stabilize the prices in one important market, which will be transmitted to other markets automatically with a speed equal to coefficient of error correction, eventually reducing the cost of stabilization.

10. Remany Gopalakrishnan; Coconut Development Board (India). Achieve bigger nut size and higher copra output for better price Realization. Indian Coconut Journal (India). (Mar 2014) v. LVI(11) P.10-14 KEYWORDS: COCONUTS. COPRA. PRICES.

11. Sugata Ghose. Quality in Coconut Cultivation. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.67 KEYWORDS: COCONUTS. QUALITY. CULTIVATION.

12. Amit P. Pratap; Institute of Chemical Technology, University of Mumbai, Nathlal Parekh Marg, Matunga (East), Mumbai (India). Quality Standards for coconut oil and coco chemicals. Indian Coconut Journal (India). (Apr-May 2014) v.LVI (12) & v.LVII (1) p.18-25 KEYWORDS: COCONUT OIL.QUALITY. PRODUCTS.

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14. Sreekumar Prodigal; Coconut Development Board, Kochi (India). CDB's pilot plant for preservation and packing of coconut neera Inaugurated. Indian Coconut Journal (India). (Jun 2014) v.LVII(2) P.31-32 KEYWORDS: PRESERVATION. PACKAGING..

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16. Vasudevan, D.M.; Amritha Institute of Medical Sciences, Kochi (India). Miracles of Coconut oil. Indian Coconut Journal (India). (Sep 2014) v.LVII(5) p.6-8 KEYWORDS: CHOLESTEROL. COCONUT OIL. HEART.

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21. Asna, A.C.; Kerala Agricultural University, Vellanikkara, Department of Plant Breeding & Genetics. Presannakumari, K.T.; Kerala Agricultural University, Vellanikkara, Department of Plant Breeding & Genetics. Minimol, J.S.; Department of Plant Breeding & Genetics, Cocoa Research Center, Vellanikkara (India). Krishnan, S.; Department of Agricultural Statistics, Vellanikkara (India). Variability analysis in bean characters of selected accessions of cocoa (Theobroma cacao L.). Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.246-251 KEYWORDS: CROPS.

22. Thirugnanasambantham, K.; Plant Health Diagnostic Centre, Biocontrol Laboratory, PKKVK, Pondicherry (India) Prabu, G.R.; Department of Biotechnology, Karpagam University, Tamil Nadu (India) Mandal, A.K.A.; School of Bio Science and Technology, IT University, TamilNadu(India). Akamandalrediffmail.com. Isolation and characterization of cDNA encoding cyclophilin gene from Dormant bud of Camellia sinensis (L.) O.Kuntze. Journal of Plantation Crops (India). (Aug 2014) v.42 (2) p.256-261 KEYWORDS: CAMELLIA SINENSIS. DORMANCY.

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24. Acharya, G.C.; Central Plantation Crops Research Institute, Kahikuchi(India). Research Centre.gobinda1971mail.com Ranjana Chakrabarty; Central Plantation Crops Research Institute, Kahikuchi(India).Research Centre. Himadri Rabha; Central Plantation Crops Research Institute, Kahikuchi (India). Research Centre. Sandip Shil; Central Plantation Crops Research Institute, Kahikuchi (India).Research Centre. Disease index for basal stem rot of arecanut in North East India. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.265-267 KEYWORDS: GANODERMA. STEMS.

25. Simi Thomas; Coconut Development Board, Regional Office, Bangalore(India). Oil from Coconut Shell. Indian Coconut Journal(India).(oct 2014) v.LVII(6) p.30-31 KEYWORDS: OILS. SHELL.

26. Sreelakshmi, N.; Coconut Development Board, Kochi (India). The Supply Chain Management System. Indian Coconut Journal (India). (Nov2014) v. LVII(7) p. 6-9 KEYWORDS: MANAGEMENT. COCONUTS.

27. Jacob George; Saintgits Institute of Management, Kottayam(India). A Blue Print for Neera Supply Chain. Indian Coconut Journal (India). (Nov2014) v. LVII(7) p.13-15 KEYWORDS: COCONUTS.

28. PhilipSabu;KeralaAgriculturalUniversity,Vellayanikkara(India).Farmer Owned and Market Driven Value Chain for Coconut. Indian Coconut Journal (India). (Nov 2014) v. LVII(7) p.16-18 KEYWORDS: FARMERS.MARKETING TECHNIQUES. COCONUTS.

29. YvonneT.V.Agustin; United Coconut Associations of the Philippines,(Philippines). Supply Chain of Coconut Products in the Philippines. Indian Coconut Journal (India).(Nov2014) v.LVII(7) p.1922KEYWORDS:COCONUTS.PHILIPPINES.

30. Rajitha, C.S.. Company Secretary & Cost Accountant. Managing Supply Chain for Sustainable Development. Indian Coconut Journal(India). (Nov 2014) v. LVII(7) p.23-25 KEYWORDS: AGRICULTURALRESEARCH.

31. Nisa James; Saintgits Institute of Management, Kottayam(India). Revamping Agri-Supply Chain: Corporate Perspective. Indian Coconut Journal(India). (Nov 2014) v. LVII(7) p.33-35 KEYWORDS:AGRICULTURALPRODUCTS. MARKETING.

32. Lalitha Ramaswamy; PSG College of Arts and Science, Coimbatore(India).Dept. of Nutrition and Dietetics Rajendran, R.Saraswathi, U.Sughanya, R. Geethadevi, C. Coconut milk-the real facts. Indian Coconut Journal (India). (Dec 2014) V. LVII(8) p. 25-27 KEYWORDS: COCONUT MILK. NUTRITIVEVALUE. HEALTH. TECHNOLOGY. COCONUT WATER.

33. Sebastian,M.A.;CoconutDevelopmentBoard,Kochi(India).Superintendent. The Future of Coconut during Globalization. Indian Coconut Journal(India). (Dec 2014) V.LVII(8) p. 28-36 KEYWORDS: COCONUTS. GLOBALIZATION. TRADE.

34. Arya Aravind; Coconut Development Board, Kochi (India).Journalist. Coconut oil-a natural cure. Indian Coconut Journal(India). (Dec 2014) V. LVII(8) p. 37-38 KEYWORDS: COCONUT OIL. HEALTH. THYROID GLAND.

35. Thondaiman, V.; Directorate of Medicinal and Aromatic Plants Research, Anand(India). thons1981mail.com Rajamani,K.;Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu(India). Dept. of Medicinal and Aromatic Plants. Correlation and path coefficient analysis of yield components in cocoa (Theobroma cacao L.). Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 358-363 KEYWORDS:THEOBROMA CACAO. COCOABEANS. STATISTICAL METHODS. YIELDS.

    Phenotypic correlations and their direct and indirect effects were estimated with twenty traits of 151 cocoa trees using path analysis. A high coefficient of phenotypic correlation was found between, tree girth, pod length, pod weight, pod volume, number of beans per pod, wet bean weight per pod before and after fermentation, dry bean weight per pod, single wet bean weight, single dry bean weight, number of pods per tree and polyphone content exhibited highly significant positive correlation with the dry bean yield per tree. However, path analysis revealed that coquetting height, tree girth, number of fan branches, pod girth, pod volume, pod wall thickness at furrows, wet bean per pod weight after fermentation, dry bean weight per pod, number of pods per tree, shelling percentage, fat content and polyphone exhibited significance at high level in positive direction.

C30 Documentation and information

36. Manu Prem; Coconut Development Board, Kochi(India). Indian Coconut Journal (India). (Nov 2014) v.LVII(7) p.26-27 KEYWORDS: COCONUTS WORLD WIDE WEB.

37. Manjunatha, A.N.; Central Coffee Research Institute, Chickmagalur (India). CRS.. rekhamanaswinimail.com Prasanna, S.M.; College of Horticulture, Bagalkot(India) D'Souza, M.V.; Central Coffee Research Institute, Chickmagalur (India). CRS.. Site specific nutrient management software for coffee. Journal of Plantation Crops(India). (Dec 2014) V. 42(3) p. 370-376 KEYWORDS: COFFEE. FERTILIZERS. SOIL ANALYSIS.

    Chemical fertilizers are integral part of agriculture and continue to be inevitable source of nutrients. A site specific soil test based nutrient management system ensures the judicious use of fertilizers by contributing to the sustainable and economic production without polluting the soil resources. Coffee is a major commercial crop of India and the site specific fertilizer recommendations for this crop have proved to have advantages over & lsquo; blanket fertilization & risqué; by improving the fertilizer use efficiency and profitability. The software was designed in such a way that entries corresponding to the block-wise soil test data viz.,soil pH, available N, P and K generate necessary information on the quantity of suitable and available fertilizers that need to be applied to each block to meet the demand of the crop and plant.

E10 Agricultural economics and policies

38. Sasi Kumar, C.; Coconut Development Board, Kochi (India). Pollachi farmers fix the price of tender coconut. Indian Coconut Journal(India). (Jan 2014) v. LVI(9) p.31-32 KEYWORDS: FARMERS. PRICE FIXING. COCONUTS.

39. Lija Subramanian; Coconut Development Board, Kochi (India). SFAC-A pathway to link farmers to the value chain. Indian Coconut Journal(India). (Feb 2014) v. LVI(10) p. 29-34 KEYWORDS: FARMERS. EMPOWERMENT.

40. Rajeevan, B.; Rubber Board, Kottayam (India). Rubber Production Department. Gopinath, M.N.; Rubber Board, Kottayam (India). Rubber Production Department. Oban Mathai; Rubber Board, Kottayam (India). Rubber Production Department. Ramesh, B. Nair; Rubber Board, Kottayam (India). Statistics & Planning Department. Productivity ratings in relation to holding size and resource-management in Indian rubber plantation sector. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.411-416 KEYWORDS: PRODUCTIVITY. RESOURCE MANAGEMENT. RUBBER.

    The small holdings dominate the natural rubber(NR) plantation industry in India. The holding size profile of the small holdings how that about 86 per cent are below 2 ha, 62 per cent of which falls within 0.5 -2.0 ha. The average unit size is above 1.0 ha innon-traditional (NT) area where NR plantation expansion is in progress. This study was taken up to analyze the relation between the holding size, resource management and productivity since resource-poor small holders ‘productivity is remarkably higher than that of lager units. The productivity and the resource availability management in small holdings falling under three categories,

viz., 0.5 ha, between 0.5 and 2.0 ha and 2.0 ha, we reanalyzed based on primary data collected from small holdings having linkage with RPSs. Data from respondent estates also were analyzed. The difference in the productivity between the three categories studied was found to be significant. The larger holdings enjoyed better resource availability than smaller ones; but, the latter was better in resource-management. Highest productivity was recorded from units 0.5 ha. Productivity and unit size were inversely proportional within the categories of small holdings analyzed. Measures to ensure prompt adoption of productivity enhancement practices in medium/large holdings by way of effective resource management possible through group approach have to be initiated to increase the production of NR in India as they occupy a major chunk of NR plantations. Estates too can attempt to tap the potentials of group synergy through workers'SHGs.Productivity enhancement through optimum resource-use has a direct bearing on sustainability of Indian NR industry. Bobby Issac; Lacon Quality Certification Pvt.Ltd, Thiruvalla,Kerala (India). Global GAP Certification. Indian Coconut Journal(India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.16-17 KEYWORDS: PRODUCTS. QUALITY ASSURANCE.

41. Directorate of Cashew and Cocoa Development,Kochi (India). Role of FPOs in Cocoa Production and Supply Chain. Indian Coconut Journal (India). (Nov 2014) v. LVII(7) p.30-32 KEYWORDS: THEOBROMA CACAO. COCOA INDUSTRY.

42. Deepthi Nair,S.;Asian and Pacific Coconut Community (APCC). Future Strategy-Climate Smart Agriculture and Carbon Credits through puts. Indian Coconut Journal (India). (Dec 2014) v. LVII(8) p.9-11 KEYWORDS: CLIMATE. CARBON.

43. Manu Prem; Coconut Development Board, Kochi (India). Coconut Producer Companies on Multi Commodity Exchange(MCX). Indian Coconut Journal (India). (Dec 2014) v. LVII(8) p.17-18 KEYWORDS: COCONUTS. COMMODITY MARKETS. GREENHOUSE GASES. CARBON. CLIMATIC CHANGE.

44. Sumodh G. Namboothiri; IRMA(Institute of Rural Management, Gujarat (India) Gadha Raj, N.; IRMA(Institute of Rural Management, Gujarat (India). Potential of a Coconut Producer Company. Indian Coconut Journal (India). (Dec 2014) v. LVII(8) p.23-24 KEYWORDS: COCONUTS. PRODUCER COOPERATIVES.

45. Pramod P. Kurian; Coconut Development Board,Kochi (India).Asst.Director. Coconut replanting and rejuvenation program me for the revival of coconut sector. Indian Coconut Journal (India). (Dec 2014)V. LVII(8) p. 32-35 KEYWORDS: COCONUTS. REPLANTING. PRODUCTION. INTERCROPPING.

E14 Development economics and policies

46. Farm tourism-a venture for realizing extra bonus to farmers.Indian Coconut Journal (India). (Jun 2014) v.LVII(2) p.69 KEYWORDS: FARMS.TOURISM. FARMERS. INCOME.

47. Perumbalam - a new model in organic farm tourism. Indian Coconut Journal (India). (Jun 2014) v. LVII(2) p.10-11 KEYWORDS: FARMS. TOURISM. FARMERS.

48. Viswan, T.S.; Chintha, Karikkad P O, Alapuzha, Kerala (India). Marari Beach Resort - farm tourism redefined. Indian Coconut Journal(India). (Jun 2014) v.LVII(2) p.12-14 KEYWORDS: TOURISM. FARM AREA. VEGETABLES. COCONUTS.

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50. Uron N. Salum; Asian and Pacific Coconut Community (APCC),Indonesia. A Glimpse at the Global Coconut Scenario. Indian Coconut Journal (India). (Jul 2014) v.LVII(3) p.6-8 KEYWORDS: COCONUTS. PRODUCTS. FARMERS.

51. National Institute of Rural Development and Panchayati Raj-for economic and social rural development. Indian Coconut Journal (India).(Aug 2014) v.LVII(4) p.29 KEYWORDS: RURAL DEVELOPMENT.

52. Sajitha, P.K.; Indian Institute of Spices Research, Kozhikode, Division of Crop Improvement and Biotechnology Prasath, D.; Indian Institute of Spices Research, Kozhikode, Division of Crop Improvement and Biotechnology sasiKumar, B.; Indian Institute of Spices Research, Kozhikode, Division of Crop Improvement and Biotechnology bhaskaransasikumarahoo.cm. Phonological variation into species of Curcuma. Journal of Plantation Crops (India). (Aug 2014) v. 42(2) p .252-255 KEYWORDS: CURCUMA AMADA. CURCUMA AROMATICA. PHENOLOGY. STARCH. YIELDS.

E16 Production economics

53. Thomas Mathew; Coconut Development Board (India). Price competitiveness of coconut oil. Indian Coconut Journal (India). (Mar2014) v.LVI(11) p.15-19 KEYWORDS: COCONUT OIL. PRICES.

54. Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India) Chandra, K.P.; Central Plantation Crops Research Institute,Kasaragod (India)Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India) Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Price stabilization through stakeholder synergy: the key to revitalize coconut sector.

Indian Coconut Journal (India). (Mar 2014) v.LVI(11) p.20-23 KEYWORDS: COCONUTS. PRICE STABILIZATION. TECHNOLOGY. PRODUCTS.

55. Mary George. Maintain high coconut prices to foster sustainable rural economy. Indian Coconut Journal (India). (Mar 2014)v.LVI(11) p.24-26 KEYWORDS: COCONUTS. PRICES. PRODUCTIVITY.

56. Minnie Mathew Aravindakshan, M. Sukumaran, A.; College of Cooperation (India) Philip Sabu; Kerala Agricultural University (India). How to ensure price stabilizatin in coconut sector. Indian Coconut Journal (India). (Mar 2014) v.LVI(11) p.2728 KEYWORDS: COCONUTS. PRICE STABILIZATION. FARMERS.

57. Sivakumar, P.J.; Kerafed, Thiruvananthapuram. Pricestabilisation in coconut. Indian Coconut Journal (India). (Mar 2014) v.LVI(11) p.29 KEYWORDS: COCONUTS. PRICE STABILIZATION.

58. Quality Standards for Coconut products. Indian Coconut Journal(India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.8-15 KEYWORDS: COCONUTS. PRODUCTS. QUALITY.

59. Romany Gopala Krishnan; Coconut Development Board(India). Policies, Programmes and Experience in India: Improving Productivity of Coconut Gardens through Replanting and Rejuvenation. Indian Coconut Journal (India). (Jul 2014) v.LVII(3) p.30-35 KEYWORDS: COCONUTS. PRODUCTIVITY. REPLANTING.

60. Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India)Chandra, K.P.; Central Plantation Crops Research Institute, Kasaragod (India) Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India). Coconut based farming system for higher income:Sucess story of a 'Kerakesari'. Indian Coconut Journal (India). (Jul 2014) v.LVII(3) p.36-38 KEYWORDS: COCONUTS. FARMING SYSTEMS. INCOME.

61. Basavaraju, T.B.; AICRP on Palms Horticulture Research Station,Arsikere (India). basvrajutbahoo.co.in Bhagya, H.P.; AICRP on Palms Horticulture Research Station, Arsikere (India) Prashanth, M.; AICRP on Palms Horticulture Research Station, Arsikere (India) Arulraj, S.; AICRP on Palms Horticulture Research Station, Arsikere (India) Maheswarappa, H.P.; AICRP on Palms Horticulture Research Station,Arsikere (India). Effect of fustigation on the productivity of coconut. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.198-204 KEYWORDS: COCONUTS. COPRA. FERTIGATION. PRODUCTIVITY.

62. Sajeev, M.V.; Directorate of Cashew Research, Puttur (India). Saroj, P.L.; Directorate of Cashew Research, Puttur (India) Lakshmisha, R.; Directorate of Cashew Research, Puttur (India) Socio-economic correlates and determinants of cashew productivity: An analysis of Dakshina Kannada district. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.215-222 KEYWORDS: CASHEWS. KARNATAKA. PRODUCTIVITY.

63. Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India). Chandra, K.P.; Central Plantation Crops Research Institute, Kasaragod (India) Radhika, C.; Central Plantation Crops Research Institute, Kasaragod (India) Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India) Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India). Puzzlements in an evolving commodity chain: The case of tender coconut market in kerala. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.228-230 KEYWORDS: MARKETING. CONSUMPTION.

E-20 Organization, administration and management of agricultural enterprises or farms

64. Sreekumar Poduval; Coconut Development Board, Kochi(India).Technologies for production and preservation of coconut neera. Indian Coconut Journal (India). (Feb 2014) v. LVI(10) p. 16-18 KEYWORDS: TECHNOLOGY. PRODUCTION. PRESERVATION. SAP.

65. Excellence in eco-friendly business innovation with coconut nectar-a Thailand model. Indian Coconut Journal (India). (Feb 2014) v. LVI(10) p. 24-26 KEYWORDS: COCONUTS. NECTAR. THAILAND.

66. Krishnakumar, V.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.Kalavathi, S.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.Regi, J.Thomas; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station. George V Thomas; Central Plantation Crops Research Institute, Kasaragod (India). Diversification of coconut based farming system through community based organizations for income generation and sustaining productivity.. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.271-276 KEYWORDS: INTERCROPPING.

    Community based organizations (CBO) were formed in three coconut growing areas in Kerala during 2005-2008 and through farmer participatory process, various technological interventions for diversification of cropping system appropriate to the local community as well as subsidiary enterprises were taken up for income generation. The interventions included (a) intercropping with various crop species (cash and food security crops) aiming at year round farm income, (b) subsidiary enterprise comprising of animal husbandry component, (c) product diversification and value addition of coconut and intercrops as well as, (d) recycling of waste biomass through vermicomposting. The project not only brought out significant change in area put under crop diversification by way of inter/mixed cropping, but also in the average income derived from such farming system. Significant improvement in income was achieved through crop and enterprise diversification. While inclusion of various intercrops improved the share by 83 per cent compared to the income from coconut alone, it was up by 195 per cent when subsidiary enterprises like rearing of live stock and value addition were also considered, thus indicating the sustainability of crop and enterprise diversificationin the project areas. The significant reduction in the value of Herfindahl Index, a measure of diversification, from 0.70 to 0.57 signified the improvement in the extent of

diversification in various CBOs. Diversification of crops and adoption of coconut-based subsidiary enterprises through CBOs were found to be ideal strategies for sustaining productivity and rural upliftment in terms of income generation.

67. Minu Sagar; Coconut Development Board, Kochi (India). Designand model of a successful Farmer Producer Organization. Indian Coconut Journal (India). (Jul 2014) v. LVII(3) p.11-13 KEYWORDS: COOPERATIVES. ORGANIZATIONS.

68. Pramod P. Kurian; Coconut Development Board, Hyderabad State Centre. Coconut Producer Companies in Andhra Pradesh marching head. Indian Coconut Journal (India). (Jul2014) v. LVII(3) p. 16-27 KEYWORDS: COCONUTS.PRODUCER COOPERATIVES. PRODUCTS.

69. Rupak G. Madassery; Coconut Development Board, Kochi(India).Supply Chain Management in Agri-food Processing and Marketing. Indian Coconut Journal (India). (Nov 2014) v. LVII(7) p. 10-12 KEYWORDS:FOOD PROCESSING. SUPPLY BALANCE. MARKETING.

70. Remany Gopalakrishnan; Coconut Development Board, Kochi(India).Consultant. India hosts the 51st APCC Session. Indian Coconut Journal(India). (Jan 2015) V. LVII(9) p.31-34 KEYWORDS: COCONUTS. ORGANIZATIONS.

71. Senapati, N; French National Institute for Agriculture, Poitou-Charentes , Lusignan, (India)Gosh, S; Centre for urben Greenery and Ecology, National Park Board, (Singapore) Rakshit, A; School of Environmental and Rural sciences, University of New England (Australia). Towards Management practices for sustainable Agriculture Modeling Initiative. Satsa Mukhapatra. (Feb 2015) v.19, p. 49-58 KEYWORDS: MANAGEMENT. SUSTAINABILITY. AGRICULTURE.

    A sustainable agricultural system is getting importance, looking at the persistence and the continuous support base it provides for our food and fiber along with economic and social services. Here, sustainable agricultural system is defined as a system which is capable of maintaining its productivity, satisfying livelihood of communities with minimal effect on the environment and safeguarding natural resources. Different agricultural management practices can help towards a sustainable agricultural production system, and these practices can be simulated through different process-based mechanistic models. This paper describes the role of these system models in designing a sustainable agricultural production system. The potential use of these models for future monitoring, investigating and maintaining sustainability through different management practices have also briefly been summarized.

72. Ray, B.R; Sugarcane Research Station,Bethuadahari , Nadia , west Bengal, (India). Agri- Business development and Regulatory Authority.

73. Mukhapatra. (Feb 2015) v.19, p.140-144 KEYWORDS: AGRICULTURE. ENTERPRISES. FARMERS. WTO.

E21 Agro-industry

74. Abdul Razak; The jaswini Coconut Producers Company, Kannur (India). FPOs take up organic farming. Indian Coconut Journal (India). (oct 2014) v.LVII(6) p.14-15 KEYWORDS: FARMING SYSTEMS. COCONUTOIL. BRAIN.

75. Deepthi Nair, S.; Coconut Development Board, Kochi (India). Neera Technicians-Innovative 'green collar job' in coconut sector. Indian Coconut Journal (India). (oct 2014) v.LVII(6) p.16-18 KEYWORDS: COCONUTS.

76. Mini Mathew; Coconut Development Board, Kochi (India). Clinical studies-Need of the hour for product positioning:Dr Varsha. Indian Coconut Journal (India). (oct 2014) v.LVII(6) p.19-22 KEYWORDS: PRODUCTS.

77. Nagwekar, D.D.; Regional Coconut Research Station ,Rathnagiri(India) Haldanka, P.M.; Regional Coconut Research Station, Rathnagiri(India) Arul raj, S.; Directorate of Oil Palm Research, Pedavegi(India) Jadhav, B.B.; Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli(India) Maheswarappa, H.P.; Central Plantation Crops Research Institute, Kasaragod (India). Lakhi Baug for realizing maximum income from coconut. Indian Coconut Journal (India). (oct 2014) v.LVII(6) p.23-26 KEYWORDS: INCOME. COCONUTS.

78. Simi Thomas; Coconut Development Board, Regional Office, Bangalore(India). FPO get deep rooted in KARNATAKA. Indian Coconut Journal (India). (oct2014) v.LVII(6) p.27-28 KEYWORDS :FARMERS. COCONUTS. PRODUCTIVITY.

79. Latharani, J.E.; Coconut Development Board, Regional Office, Bangalore(India). Great opportunities for the upcoming CPCs in Mysore. Indian Coconut Journal (India). (oct 2014) v.LVII(6) p.28-29 KEYWORDS: AGRICULTURE. COCONUTS.

80. Madhujith,N.; Palakkad Coconut Producer Company Limited, Palakkad (India) Raseena Salim; Palakkad Coconut Producer Company Limited, Palakkad (India).Cold Chain for Coconut Neera. Indian Coconut Journal (India). (Nov 2014) v. LVII(7) p.36 KEYWORDS: COCONUTS. COLD CHAIN. TEMPERATURE.

81. Jnanadevan, R.; Coconut Development Board, Kochi(India).Deputy Director. Neera tapping for making coconut the most profitable horticultural crop for future. Indian Coconut Journal(India). (Dec2014) v.LVII(8) p.6-8 KEYWORDS: COCONUTS. HORTICULTURE. TAPPING.

82. Agarwal, R.K.; Pondicherry University, Puthucherry (India).Dept. of Food Science and Technology Bosco, S.J.D.; Pondicherry University, Puthucherry (India). Dept. of Food Science and Technology. sjdboscoahoo.com. Effect of extraction processes on physiochemical properties and antioxidant activity of virgin coconut oil. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p.329-335 KEYWORDS: ANTIOXIDANTS. OILS. EXTRACTION. PHENOLICCONTENT. COCONUT OIL.

The present study was to investigate the physiochemical and antioxidant properties of virgin coconut oil (VCO) through different extraction processes including aqueous extraction (AE), aqueous enzymatic extraction (AEE), cold extraction (CE), hotplate heating process (HPH) and microwave extraction (MOH). Physiochemical properties of all the extracted oils were observed to be within the range of Asian and Pacific Coconut Community (APCC) standards with lower iodine, peroxide and free fatty acid values in AE, AEE and CE than those observed in MOH and HPH methods with reference to commercial VCO. However, total phenolic content ranged from 26.4 to42.1 mg GAE 100 g-1 of oil with the effect of extraction processes. As correlation analysis showed significant correlation between total phenol content and 1,1-diphenyl-2-picryl-hydrazyl (DPPH)scavenging activity,β-carotene bleaching activity and total antioxidant activity, oils extracted by CE, AE and AEE had the highest antioxidant activity corresponding to their highest phenolic contentas compared to those of HPH and MOH with reference to commercial VCO.Hence, the present study concluded that CE, AE and AEE could extract CO with desirable quality and highest antioxidant activity than the other methods of extraction.

E70 Trade, marketing and distribution

83. Sebastian, K.S.; Coconut Development Board (India). Stability in price for a sustainable future. Indian Coconut Journal (India). (March 2014) v.LVI(11) p.6-9 KEYWORDS: PRICE STABILIZATION. PRODUCTS. FARMERS.

84. Bindhu Siva; Coconut Development Board(India). Neera, the health drink of God's own country to hit the market soon. Indian Coconut Journal (India). (Mar 2014) v.LVI(11) p.39-40 KEYWORDS: COCONUTS.

85. Deepthi Nair, S.; Coconut Development Board, Kochi (India). Tough times never last, but tough people do. Indian Coconut Journal(India).(Jul2014) v.LVII(3) p.6-10KEYWORDS:COCONUTS.FARMERS.PRODUCTS.MARKETING.

86. Rupak G. Madassery; Coconut Development Board, Kochi (India). Coconut sugar-A healthy sweetener with high business potential. Indian Coconut Journal (India). (Aug 2014)v.LVII(4)p.23-24 KEYWORDS:COCONUTS.PRODUCTS. FARMERS.

87. Remany Gopalakrishnan; Coconut Development Board, Kochi(India).COCOTECHA Rare Global Plat form for Coconut stakeholders. Indian Coconut Journal(India). (Sep 2014) v.LVII(5) p.29-35 KEYWORDS: COCONUTS. TECHNOLOGY. PRODUCTS. RESEARCH.

88. Anjali Krishna; Coconut Development Board, Kochi (India). Everything is at your door step now. Indian Coconut Journal(India). (Nov2014) v.LVII(7) p. 28-29 KEYWORDS: MARKETING.AGRICULTURALPRODUCTS.DIVERSIFICATION. COCONUTS.

E72 Domestic trade

89. Deolankar, k.P; Agriculture Research station, Naphad(India) Gosavi,A.B.; Agriculture Research station, Naphad(India) Kolse,R; Agriculture Research station, Naphad (India)Todmal, S.M.; Agriculture Research station, Naphad (India) Rasal, P.N.; Agriculture Research station, Naphad (India). Performance of wheat at Foliar Application of nutrients under different sowing conditions. Journal of agriculture Research and Technology (India). (Sep 2015) v.40(3) p.379-384 KEYWORDS: WHEATS.SOWING.NITROGEN.FERTILIZERS. PHOSPHORUS. SOWING.

    A field experiment was conducted to know performance of wheat under different sowing period and to foliar nutrient sprays during 2010-11 to 2012-13. Based on three years of the experimentation, it was observed that sowing of wheat in 45th meteorological week significantly gave higher grain yield (45.64 q ha-1, 13.45 % increase over 48th meteorological week) and straw yield (63.68 q ha^{-1}, 14.84% increase over 48th meteorological week). Similarly, spraying of 19:19:19 N:P_20_5:K_2O 2per cent produced significantly higher grain yield (46.73 q ha^{-1}, 21.19% increase over water spray) and straw yield (65.55 q ha^{-1}, 22.91% increase over water spray). Improvement in ancillary characters of wheat sown at 4sth meteorological week, viz., 1000 grain weight, number of earheads square-^{1} meter and number of grains earhead^{-1} due to foliar spraying of 19:19:19 N:P205:KZO 2per cent was observed. The B:C ratio (1.92 and 1.89 for sowing time and foliar sprays) of the same combination of treatments was also observed higher over other treatments.

90. Waskar, D.P; Department of horticulture, vasantrao naik Marathwara krishi vidya peeth, Parbhani (India) khandare, V.S; Department of horticulture, vasantrao naik Marathwara krishi vidyapeeth, Parbhani(India) Kalalbandi. B.M; Department of horticulture, vasantrao naik Marathwara krishividyapee, Parbhani (India) Shelke, P.S; Department of horticulture, vasantraonaik Marathwara krishi vidyapeeth, Parbhani(India). Effect of polyamine on storability and quality of pomegranate fruit (Punica granatum L.)Cv. Bhagwa. Journal of agriculture Research and Technology (India). (Sep 2015) v.40(3), p.385-388 KEYWORDS: PUNICA GRANATUM.POLYAMINES. QUALITY.

    The present investigation was carried out to study the effect of polyamines on storability and quality of pomegranate fruit. The study revealed that the treatment consisting of 1 mM putrescine resulted in minimum PLW%, CI, and titrable acidity over rest of the treatments under study in different storage conditions and storage periods. Treatment consisting of untreated fruits recorded maximum physiological loss in weight(PLW%), chilling injury (CI) and titrable acidity.Teatment consisting of 1 mM sperm dine recorded noCI, and maximum per cent juice recovery over other treatments. Treatment of 2 mM putrescine recorded maximum TSS, while minimum in treatment control at ambient storage conditions. Overall SO storage conditions proved to be superior over go Candroom condition storage at different storage periods.

91. Kumar, Mahender.R; Indian Institute of Rice Research, Rajendra Nagar Hyderabad (India) Tuti, M.D; Indian Institute of Rice Research, Rajendra Nagar ,Hyderabad(India) Sreedevi, B; Indian Institute of Rice Research, Rajendra Nagar, Hyderabad(India) Surekha, K; Indian Institute of Rice Research, Rajendra Nagar , Hyderabad (India)

Babu,Ravindra. v; Indian Institute of Rice Research, Rajendra Nagar ,Hydrabad (India). Rice Agronomy Towards Improving Productivity and Sustaining soil Health.. Satsa Mukhapatra. (Feb 2016) v.20, p. 15-25 KEYWORDS: PLANT ESTABLISHMENT. RICE. SOIL. AGRONOMY.

Soil quality is consider edasakey element of sustainable agriculture. Several experiments have been conducted across the states ophidian to assess different crop establishment method sand management practices to enhance the productivity and to sustain the soil fertility. There is a need to manage the variability in indigenous nutrient supplies for sustaining the productivity under different rice ecosystems. The genetic potential of any variety can be realize donly when the crop management practices are optimized in presence of favorable climatic, edaphic and biotic environment. The prime objective of using improved crop and soil management practices is to help sustain the productivity of high potential lands and to exploit the potential of underutilized lands through improved land preparation, crop establishment, weed management, integrated nutrient management and conservation agriculture.

92. Dutta, S.K; International Plant Nutritional Institute, Kolkata (India) Majumdar, K; International Plant Nutritional Institute, Gurgaon (India) Satyanarayana, T; International Plant Nutritional Institute , Hyderabad (India)Singh, A.K; Zonal Project Directorate, Kolkata (India). 4R Nutrient stewardship - A way forward towar sustainable Agriculture. Satsa Mukhapatra. (Feb 2015) v.19, p.19-35 KEYWORDS: ENVIRONMENT. FERTILIZERS. FOOD PRODUCTION. NUTRIENTS.

93. Ghosh, D.K; Department of Spices and Plantation Crops, AICR Pon Palms, Bidhan Chandra Krishi Viswavidyalya Mohanpur, west Bangal(India). Nutrients Management in coconut towards sustainable production.Satsa Mukhapatra. (Feb 2016) v.19, p.97-102 KEYWORDS: COCONUTS.NUTRIENTS. MANAGEMENT. ORGANIC FERTILIZERS.

Experiment was conducted at Horticultural Research Station,(Bidhan Chandra Krishi Viswavidyalaya), Mondouri, Nadia, West Bengal to study the' impact of different nutrient management treatments in coconut plantation (cv. ECT) of 10 years. Five treatments viz.control, recommended fertilizer dose,100%N (composted coirpith,CCP) +PK (chemical fertilizers, CFs) ,50% N (CCP) + rest of NPK(CFs), and neem cake + bone meal + ash (on equivalent nutrient basis)were replicated four times in a randomized block design and evaluated consecutively for five years (2006-10). It was found that the application of 50% N (CCP) -l- rest of NPK (CFs) registered maximum number of leaves palm:' (32.6), length of leaves (403.6 ern) and leaflet number leaf ; (178.7). Significant variations with respect to; bunch and nut production and copra yield were observed under different treatments. Yield attributes were found to be superior under the treatment 50% N (CCP) + rest of NPK (CFs) in comparison to the others. NPK contents in leaves and soils under different integrated nutrient management (I N M) treatments increased over their initial status, indicating beneficial effect of IN M,leading to higher yields.

94. Patra, S.R; Water Management Research Station, Begopara,Ranaghat West Bengal , Directorate of Agriculture, Kolkata west Bengal (India) S,Das; Water Management Research Station, Begopara,Ranaghat West Bengal, (India). System of assured rice

production : Towards combating climate change and resorting soil Health. Satsa Mukhapatra. (Feb 2015) v.19, p.103-112 KEYWORDS: SEEDLINGS. PLANTING STOCK. MANAGEMENT. RICE. PRODUCTION.

The system of assured rice production (SARP) is a new method involving scientific principle and simple indigenous practices towards producing healthy seedlings, prolonging nurser duration and shortening main field duration of transplanted rice in wet (kharif) season. Tl: basic principles include production of healthy seedlings using very low seeding density (10-15 g m') and adequate addition of organic manure (2.5-5.0 kg m ;) in nursery; flexibly in seedling age 1'01' transplanting in main field, based on prevailing weather situation; an reduced requirement of quality seeds. SARP can be viewed as an ideal alternative (contingent cropping, combating changing climatic situation and restoring soil health. Ear sowing, delayed transplanting and early harvesting of kharif.tice would allow enough tirr for raising a green manuring crop and its incorporation in rice cultivation through SAR and timely sowing of succeeding rabbi pulses and oilseeds, thereby benefiting soil healtl SARP suits belleI' in adopting the common crop sequence of jute-rice in West Bengal.

95. Biswas, P. K; Department of ASEPAN, Institute of Agriculture, West Bengal (India) Bhowmick, M.K; Rice Research Station, Chinusurah, west Bengal (India). Nutrients Management for Improving Productivity of urdbean and Sustaining soil Health. Satsa Mukhapatra. (Feb 2015) v.19, p. 113-119 KEYWORDS: BIOFERTILIZERS. MICROBIAL FLORA. ROOTNODULATION. SEED. VIGNA MUNGO.

A two-year field experiment was conducted during kharif season of 2012 and 2013 at Agricultural Research Farm, Visva-Bharati,Sriniketan, Brigham, West Bengal to find out an appropriate nutrient management practice for improving urdbean productivity in the red and lateritic zone of West Bengal. Compared with 100% recommended dose of fertilizers (RDF) at 20:40:20 kg N : P_20_5: K ha^{-1} (1,231 kg ha^{-1} and 75% RDF (1,187 kg ha^{-1}, the treatment J 00% RDF + seed inoculation with biofertilizers (Rhizobium + Azotobacter + PSB) recorded the highest seed yield (J, 420 kg ha^{-1} due to significant improvement in nodulation along with most of the growth and yield attributes studied. Because of better crop growth and nodulation, yield advantages of 7.11-15.36% could be obtained due to application of I 00% RDF + biofertilizers (either seed inoculation or soil application at 3-7 days after sowing) in comparison the only addition of 100% RDF. Also, there were positive trends in respect of nutrient availability and microbial population in the plots treated with biofertilizers, signifying their importance in improving crop productivity vis-it-vis soil health.

F08 Cropping patterns and systems

96. Nagwekar, D.D.; AICRP on Palms, Ratnagiri(India). Regional Coconut Research Station. dilip.nagwekarmail.com Sawant, V.S.; AICRPon Palms, Ratnagiri(India). Regional Coconut Research Station Haldankar, P.M.; AICRP on Palms, Ratnagiri(India). Regional Coconut Research Station Jadhav, B.B.; AICRP on Palms, Ratnagiri(India).Regional Coconut Research Station Arul raj, S.; Directorate of Oil Palm Research, Pedavegi(India) Maheswarappa, H. P.; Central Plantation Crops

Research Institute, Kasaragod (India). PC Palms Cell. Performance of medicinal and aromatic plants as intercrops in coconut plantations in Konkan region of Maharashtra. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.384-388 KEYWORDS: COCONUTS. DRUG PLANTS.

A field experiment was conducted at Regional Coconut Research Station, Bhatye, Ratnagiri (AICRP on Palms) during 2006-2011 to develop appropriate cropping system with medicinal and aromatic plants as inter crops compatible with coconut. The experiment consisted & lsquo; shatavari & rsquo;(Asparagus racehorses), & lsquo; adulasa & rsquo; (Adhatodavasica), arrowroot (Marantaarundincea), lemon grass (Cymbopogum citratus) and citronella (Cymbopogum winteriness) replicated four times in randomized block design. The yield of different medicinal/aromatic plants was maximum in lemon grass (31 t ha-1) followed by citronella (22 t ha-1),arrowroot (16 t ha-1), adulsa (2.1 t ha-1) and shatavari (0.8 tha-1). The yield of intercrops in terms of coconut equivalent yieldwas higher with lemongrass (7750 nuts ha-1) followed by arrowroot (6000 nuts ha-1), adulasa (4725 nuts ha-1), citronella (4125 nutsha-1) and shatavari (3500 nuts ha-1). The yield of coconut increased from 12 to 21 per cent after planting the intercrops. The net return was maximum in coconut + lemongrass (Rs. 96,200/- per ha) followed by coconut + arrowroot (Rs. 93,200/- per ha), coconut + shatavari (Rs.83,300/- per ha), coconut + adulasa (Rs. 78,300/- per ha) and coconut+ citronella (Rs. 73,800/- per ha). Further, it was observed thatshatavarin and saponins in shatavari, alkaloid in adulasa, citranolin citronella and sugar in arrowroot were higher with intercropping whereas citral in lemon grass slightly reduced with intercropping. Considering the performance of different medicinal crops as intercropand market demand, arrowroot, lemongrass, adulasa, citronella and shatavari have been recommended as intercrops in coconut plantation for Konkan region of Maharashtra.

97. Siju, T; Rubber Research Institute of India, Kottayam (India). Veeraputhran, S; Rubber Research Institute of India, Kottayam (India) Joby Joseph; Rubber Research Institute of India, Kottayam (India) Tharian George, K; Rubber Research Institute of India, Kottayam (India). Trends in adoption of planting density in rubber smallholdings in the traditional regions of India. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.425-427 KEYWORDS: RUBBER. SPACING.

The analysis of planting density of rubber in small holdings for the period 2004-2010 indicated multifaceted features over time. In the traditional belt, except in North Kerala, the planting density of new planting was higher than that of replanting. After the release of RRII 400 series in the year 2005, significantly higher planting density was adopted for it in South Kerala. In all other regions, no significant difference in planting density was noticed between RRII105 and RRII 400 series in the case of new planting, but higher density was adopted for replanting of RRII105.An inverse relationship was observed between the size of holdings and planting density.

98. Kavitha, P.R,; Kerala Agricultural University, Thrissur (India). College of Horticulture Meera V. Menon; Kerala Agricultural University, Thrissur (India) College of Horticulture. Management of K, S, Ca and Mg for productivity improvement of kacholam (Kaempferia galanga L.) intercropped in coconut. Journal of Plantation

Crops (India). (Dec 2013) v.41(3) p. 437-440 KEYWORDS: COCONUTS. INTERCROPPING. KAEMPFERIA.

99. Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India) Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India) Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India) Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Group approach for technology integration in coconut holdings.. Indian Coconut Journal (India). (Mar 2014) v.LVI(11) p.30-35 KEYWORDS: COCONUTS. TECHNOLOGY. RECYCLING. INTERCROPPING. MIXED CROPPING.

100. Krishna Kumar, V.; Central Plantation Crops ResearchInstitute,Kayamkulam (India). Regional Station.. Intercropping in coconut garden and model coconut farms. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.26-29 KEYWORDS: INTERCROPPING.

101. Abe Jacob; Coconut Development Board, Kochi (India). Coconut based cropping for realizing best returns. Indian Coconut Journal(India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.31-32 KEYWORDS: COCONUTS. INTERCROPPING. FARMERS.

102. Intercropping in coconut garden for ensuring stable and better income. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) &v.LVII(1) p.33-34 KEYWORDS: INTERCROPPING. INCOME.

103. Intercropping- best alternative to boost income from farming. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) & v.LVII(1)p.34-35 KEYWORDS: INTERCROPPING. INCOME. FARMING SYSTEMS.

104. Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India)Thamban, C.; Central Plantation Crops Research Institute,Kasaragod (India). Intercropping of fodder crops in coconut garden. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) & v.LVII(1) p.36-40 KEYWORDS: INTERCROPPING.

105. Venkatesh N. Hubbali; Cashew and Cocoa Directorate, Kochi,Kerala (India). Coconut and Cocoa - the best companion crops. Indian Coconut Journal (India). (Jun 2014) v.LVII(2) p.19-23 KEYWORDS: COCONUTS. INTERCROPPING.

106. Kshirsagar, P.J.; Dr. B. S.Konkan Krishi Vidyapeeth,Dapoli(India)Talathi, J.M.; Dr. B. S. KonkanKrishiVidyapeeth,Dapoli(India)Kulkarni,S.M.;Dr.B.S.KonkanKrishiVidyapeeth ,Dapoli(India) Torane, S.R.; Dr.B.S.Konkan Krishi Vidyapeeth,Dapoli(India). Coconut based cropping system(Lakhibaug) for better yield. Indian Coconut Journal (India). (Aug 2014) v.LVII(4) p.30-34 KEYWORDS: INTERCROPPING. COCONUTS. CROPPING SYSTEMS.

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108. Ajaikumar,S.; A.V.Thomas Group Companies, Elappara(India).ajaikumarvtdt.in Siby Mathew; UPASI Tea Research Foundation,Vandiperiyar, Idukki, Kerala. (India) Regional Centre Raj Kumar,R.;UPASI Tea Research Foundation,Valparai(India) Mohan Kumar, P.; UPASITea Research Foundation, Valparai (India). Mechanical harvesting intea:A case study of Pasuparai estate. Journal of Plantation Crops(India). (Aug 2014) v.42(2) p.191-197 KEYWORDS: HARVESTING. MECHANIZATION. PLUCKING. SHEARS. YIELDS. TEA.

109. Jeena Mathew; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.. jeenu8ahoo.com Krishnakumar,V.; Central Plantation Crops Research Institute, Kayamkulam (India).Regional Station.Narayanan Namboothiri, C.G.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.. Potential of native weed species as nutrient contributors of coconut garden in an Entisol. Journal of Plantation Crops (India). (Aug 2014)v.42(2) p.231-237 KEYWORDS: NUTRIENTS. COCONUTS. WEEDS.

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113. Dhara, M.C.; Rice Research Station, Hoogly India) Bhowmick, M.K.; Rice Research Station, Hoogly (India). Method of Crop establishment and nutrient management with and without soil conditioner in summer rice. Satsa Mukhapatra. (Feb 2015) v.19, p.130-134. KEYWORDS: PLANT ESTABLISHMENT. RICE. MANAGEMENT.

    A three year field experiment was conducted at Rice Research Station, chinsurah, hoogly (west Bengal) to study the effect of varying level of nutrients management with and without soil conditioner on yield performance of summer rice (Var. MTU 1010)under two different establishment method (normal transplanting and SRI) In dry(boro) season of 2010-2011, 2011-12 and 2012-

2013.Different nutrients level including 100% recommended fertilizer dose (RFD) ie. N:P_2:o_5:K_2o @130:65:65 Kg ha^{-1}
100% RFD+Vermicomposting @3 t ha^{-1} 100% RFD+ soil conditioner@ 50kg ha^{-1} The soil conditioner taken for the study was kauvery, a granular powder development by IARI,Pusa, New Delhi. Regardless of establishment methods, use of vermicompost @3t ha^{-1} .+75% RFD+soil conditioner@50kgha^{-1} significantly Recorded the highest grain yield (6.47 t ha^{-1})due to maximum production of panicle number (399 m^{-2}) and weight (3.46g). use of soil conditioner along with chemical fertilizer helps in improving grain yield attributes through effective absorption of nutrients and their supply in presence of moisture to crop plants. Compared with normal transplanting (4.88 t ha^{-1}), SRI significantly proved to be superior (5.85 t ha^{-1}) in respect of grain yield.

F30 Plant genetics and breeding

114. Jeena Devasia; Central Coffee Research Institute, Chickmagalur (India). Central Coffee Research Station. Madhura, J.N.; University of Agricultural Sciences, Bangalore (India) Raj Kumar, R.; ITC, Bangalore (India). R&D Centre. Seshasayee, M.S.; Central Coffee Research Institute, Chickmagalur (India). Central Coffee Research Station. Kulkarni, R.S.; University of Agricultural Sciences, Bangalore (India). Dayakumar, M.; University of Agricultural Sciences, Bangalore (India). Jayarama; Central Coffee Research Institute, Chickmagalur (India). Central Coffee Research Station. Development of SSR markers for Robusta coffee (Coffea canephora). Journal of Plantation Crops. (Dec 2013) v.41(3) p.277-286 KEYWORDS: BIOINFORMATICS. COFFEA CANEPHORA. ROBUSTA COFFEE.

Coffee has long been bred with the view of improving important agronomic characteristics such as yield, bean size, cup quality, caffeine content, disease, drought resistance etc. However, the progress in coffee breeding using conventional approaches has been slow due to the narrow genetic base of cultivated coffee and the long generation time. The use of modern tools of molecular biology holds great promise for the faster development of improved varieties. Aprimary prerequisite is the availability of suitable marker systems. Co-dominant maker systems like SSRs provides comprehensive genome coverage, are locus specific and multi allelic. However the number of SSR markers available for coffee is limited and there is an urgent need for generating large number of micro satellite markers. Aim of the study was to develop and characterize a comprehensive set of genomic and genic SSR markers for Robusta coffee by pre-cloning enrichment strategy and also by annotating Robusta specific unigene sequences. The pre cloning enrichment (selective hybridization)strategy followed in the study resulted in identification of 405 SSRsin 267 sequences. The 405 SSRs isolated consisted of more of mono-nucleotide repeats (40.2%) followed by penta (33.3%), di(12.1%), tri (10.6%) and tetra (3.7%) nucleotide repeats. Among the genic SSRs identified, 43.7 per cent contained penta-repeat motifs followed by 22.5 per cent and 22.5 per cent sequences with hexa and mono repeat motifs respectively. The remaining identified motifs consisted of 5.5 per cent tri nucleotide repeat motifs, 3.5 per centdi repeat motifs and 2.2 per cent tetra repeat

motifs. The study resulted in development of 31 genomic SSRs and 86 genic SSRs which were validated for locus specific amplification.

115. Mercy, M.A.; Rubber Research Institute of India, Kottayam(India). mamercyubberboard.org.in Meena Singh; Rubber Research Institute of India, Dapchari(India). Regional research Station. Early evaluation of wild Hevea germplasm for drought tolerance in north Konkan region. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p. 287-291 KEYWORDS: DROUGHT RESISTANCE. HEVEA. PROVENANCE.

    The expedition conducted by International Rubber Research and Development Board (IRRDB) in 1981 in the Amazon forests of Brazil, resulted in a collection of 4548 wild germplasm accessions of Heveabrasiliensis in India. Being a likely repository of genes conferring tolerance to various biotic and abiotic stresses, early evaluation of this germplasm accessions at a drought prone area can provide an indication towards their drought tolerance potential. Hence, preliminary field screening in a set of 130 wild accessions was conducted along with four check clones for a period of six years at the drought prone area of Daycare in Maharashtra. Growth performance of these accessions in the drought prone situation was assessed interms field observations of plants. Test tapping was done at the age of four years to assess their yield potential under drought. Wide variability was noticed in growth and yield of plants among the accessions indicating the scope for selection of potential accessions. Out of 130 accessions evaluated, fourteen potential accessions could be identified as drought tolerant plants for further detailed field evaluation.

116. Shobha, D.; Directorate of Cashew Research, Puttur (India) Thimmappaiah; Directorate of Cashew Research, Puttur (India) Jose,C.T.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Molecular characterization and association analysis in cashew using RAPD and ISSR markers. Journal of Plantation Crops (India). (Dec 2013) v.40(3) p.292-299 KEYWORDS: CASHEWS.

    Assessment of genetic diversity in 146 accessions of cashew using RAPD and ISSR markers and its phenotypic evaluation carried out on14 traits revealed considerable variability existing among the accessions. An association analysis was carried out using 96 polymorphic markers (40 RAPD and 56 ISSR) used in diversity analysis with the 14 phenotypic traits studied. Stepwise multiple regression analysis revealed 24 markers in RAPD, 33 markers in ISSR and 48 combined (RAPD and ISSR) markers associating with at least one or more of the phenotypic traits. Several markers associating with a single phenotypic trait and a single marker associating simultaneously with several phenotypic traits (pleiotropy)were observed. The number of markers regressing on each phenotype varied from 1 to 8 in RAPD, 3 to 10 in ISSR and from 3 to 12 with combined markers. Maximum number of RAPD markers (8) was associated with serration followed by 5 markers for flowering intensity (%) and 4 markers for tree spread. Similarly, highest numbers of ISSR markers (10)were associated with inter-node length followed by 8 markers each for percentage of flowering intensity and sex ratio. Highest numbers of combined markers (13) were associated with twig diameter followed by 12 markers for flowering intensity, 11 markers for inter-node length and 10 markers

for sex ratio. Least number of markers (1-3) was associated with apple weight followed by number of leaves /twig and kernel weight. R2 value improved with inclusion of ISSR and combined markers. Markers with significant association are of value if deployed in MAS after due validation.

117. Sobha, S.; Rubber Research Institute of India, Kottayam (India). Advanced centre for Molecular Biology and Biotechnology. Rekha, K.; Rubber Research Institute of India, Kottayam(India). Advanced centre for Molecular Biology and Biotechnology. Sushama Kumara, S.; Rubber Research Institute of India, Kottayam (India). Advanced centre for Molecular Biology and Biotechnology. Jayashree, R.; Rubber Research Institute of India, Kottayam (India). Advanced Centre for Molecular Biology and Biotechnology. R.G.; Rubber Research Institute of India, Kottayam (India). Advanced centre for Molecular Biology and Biotechnology. Jayasree, P.; Rubber Research Institute of India, Kottayam (India). Advanced centre for Molecular Biology and Biotechnology. Deepa, K.; Rubber Research Institute of India, Kottayam (India). Advanced Centre for Molecular Biology and Biotechnology. Thulaseedharan, A.; Rubber Research Institute of India, Kottayam (India). Advanced centre for Molecular Biology and Biotechnology. High frequency Agro bacterium mediated genetic transformation in rubber tree via. vacuum infiltration. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p. 300-306 KEYWORDS: GENETIC TRANSFORMATION. RUBBER.

In a tree species like Hevea brasiliensis, genetic transformation offers a viable approach for crop improvement within a short period. Hevea being highly recalcitrant to in vitro culture, an efficient transformation protocol is necessary for generating large number of transgenic plants with stable foreign gene expression. After several modifications in the initial transformation protocol, the transformation frequency was increased to 14 per contusing proliferated anther callus. Therefore, vacuum infiltration was attempted for enhancing the transformation frequency. In the present work the conditions for vacuum infiltration viz. vacuum pressure and period of infiltration were standardized. Vacuum infiltration at 30psi pressure for 10 minutes was found to be ideal for getting high frequency transformation in Hevea brasiliensis. Irrespective of the gene constructs experimented, transformation frequency was significantly improved by adopting vacuum infiltration. Employing this technique, the transformation efficiency of MnSOD gene construct with FMV34S promoter could be enhanced from 14 to 50 per cent.

118. Karthik Kumar, R.B.; Tamil Nadu Agriculture University, Coimbatore (India). Horticulture College and Research Institute. Jansirani, P.; Tamil Nadu Agriculture University, Coimbatore (India).Horticulture College and Research Institute Iyankar,K.;TamilNadu Agriculture University, Coimbatore (India). Horticulture College and Research Institute Paramaguru, P.; Tamil Nadu Agriculture University, Coimbatore(India). Horticulture College and Research Institute Kumar,N.; Tamil Nadu Agriculture University, Coimbatore(India). Horticulture College and Research Institute. Principal component analysis and association studies for yield component

traits in plustrees of The obroma cacao. Journal of Plantation Crops (India). (Dec 2013) v.40(3) p.307-313 KEYWORDS: ASSOCIATIONS. THEOBROMA CACAO.

A survey conducted in the major cocoa growing tracts of TamilNadu could identify 27 plus trees. These trees were observed for period of two years to study the variability in yield and quality traits and to generate knowledge on the correlation between the ten different traits. Principal component analysis was used to identify the distinguishing traits and grouping them in clusters. The selected plus trees showed large variability in yield and biochemical traits. The number of pods per tree per year ranged from 57.6 to 93.9 with an average pod yield of 73.6. The average dry bean weight was 1.06 which is a desirable trait in selection of the individuals having high processing efficiency in factory. The dry bean yield per tree per year was 2590 to 3665 g and the average yield was 3131 g. GRest analysis scored the plus trees based on the weight age of the desirable traits of individual trees. The first four PC axes explained 81.3 per cent of the total variation among the 27 plustrees of cocoa and all the traits studied were grouped in five basic clusters. The number of pods per tree (NP) was positively correlated with the pod value (PV) and dry bean weight per tree (DBYT).

119. Dasmohapatra, R.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Agriculture. Rath, S.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Agriculture. Rout, G.R.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Agriculture. Analysis of genetic relationships in cashew(Anacardium occidentale L.) varieties using morphological characters and ISSR markers. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.312-329 KEYWORDS: ANACARDIUM OCCIDENTALE.

In the present paper genetic relationships of twenty five varieties of cashew are described on the basis of morphological characters and ISSR markers. Results obtained for the phenotypic characters based on similarity coefficient were divided into four clusters with 70 per cent similarity. By means of similarity coefficients (SG), at 70 per cent phonon level the genotypes were broadly grouped into four clusters i.e., cluster I and cluster II both comprising of a single variety Bhaskara and Chintamani-1respectively, cluster III having six varieties and cluster IV with 17 varieties. The analysis using ISSR markers allowed us to distinguish 25 varieties. A total of 81 distinct DNA fragments ranging from 0.1to 2.5 kb were amplified by using 10 selected ISSR primers. Genetic similarity analysis was conducted for the presence or absence of bands in the ISSR profile. Cluster analysis clearly showed that 25 varieties of cashew could be grouped into two major clusters based on similarity indices. The first major cluster consists of Priyanka and Madakkathara-1, two moderate yielding varieties. The other major cluster was divided into two sub-minor clusters, one sub-minor cluster having single variety and the other sub-minor cluster was represented by 22 varieties. Among the 25 varieties, Kanaka andVridhachalam-3 showed the highest similarity indices (92%). The analysis of genetic relationships in cashew using morphological traits and ISSR banding data can be useful for plant improvement, descriptions of new varieties and also for assessment of varietal purity in plant certification programmes.

120. Alagar, M.; Central Plantation Crops Research Institute, Vittal(India). Regional Station.. siaamalagarmail.com Rachana, K.E.; Central Plantation Crops Research Institute, Kasaragod (India) Keshava Bhat,S.; Central Plantation Crops Research Institute, Vittal (India).Regional Station.Shafeeq Rahman; Central Plantation Crops Research Institute, Kasaragod (India)Rajesh, M. K.; Central Plantation Crops Research Institute, Kasaragod (India). Biology, damage potential and molecular identification of Conogethes punctiferalis Guenee in cocoa(Theobroma cacao Linn.). Journal of Plantation Crops (India). (Dec2013) v.41(3) p.350-356 KEYWORDS: THEOBROMA CACAO.

    Conogethes punctiferalis is an important polyphagous pest attacking many economically important crops. Recently, C.punctiferalis has been found to be an emerging pest in cocoa and was found to feed and bore into cocoa pods. The larvae feed on the rind of cocoa cheerless/pods, later bore into pods, feed the internal contents of the pods, the granular faecal pellets are seen outside the pods. When pods/cheerless touch each other, it is easy for the larvae to damage more than one pod/cherelle. Pods damaged by Conogethes are exposed to secondary infection by pathogens that lead to pod rot. The larvae sometimes feed on flower buds and flowers cushions. The damaged flower cushions may dry and shed prematurely. The damage of C. punctiferalis on cocoa is observed from December and peak incidence is noticed during March to May. On an average 2 percent damage was recorded in the Central Plantation Crops Research Institute, Regional Station, Vittal. In order to develop a DNA-based molecular identification system for this species, primers were designed based on two nuclear genes viz., ribosomal protein S5(RPS5) gene and carbamoyl phosphate syntheses/aspirate trans carbamylase/ dihydroorotase (CAD). PCR-amenable DNA was isolated from C. puntiferalis larva. The designed primers amplified single bands of expected sizes using genomic DNA as template. The ampliconswere purified, cloned and sequenced and sequence analysis revealed close homology to the gene of interest from related moths.

121. Samsudeen, K.; Central Plantation Crops Research Institute, Kasaragod (India) Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India) Niral, V.; Central Plantation Crops Research Institute, Kasaragod (India) Augustine Jerard, B.; Central Plantation Crops Research Institute, Kasaragod (India) Rajesh, M. K.;Central Plantation Crops Research Institute, Kasaragod (India) Manjula, C.; Nehru Arts and Science College, Kanhangad(India).Devadas, K.; Central Plantation Crops Research Institute, Kasaragod(India)Anitha Karun; Central Plantation Crops Research Institute, Kasaragod (India). In situ approach for rapid characterization to aidon farm conservation of coconut germplasm - A case study of two ecotypes from West coast of India. Journal of Plantation Crops(India). (Dec 2013) v. 41(3) p.357-363 KEYWORDS: COCONUTS. ECOTYPES. GENETIC RESOURCES.

    Characterization and evaluation of coconut germplasm have conventionally been undertaken in ex situ gene banks, which take aminimum duration of fifteen years. On the other hand, utilization of coconut populations in situ can effectively reduce the time required for characterization of the populations. Hence, a concept to make aparadigm shift in the existing approach of coconut germplasm characterization is advocated in this study with a view to broaden the conservation

base and facilitate inclusion of identified diverse ecotypes. The methodology has been applied to identify, locate and characterize two tall coconut ecotypes viz., Bedakam and Kuttiyadi,from northern Kerala. Agronomic traits,viz., higher number of nuts per palm, higher copra content and better performance under marginal management conditions along with adaptation to the environment, were the major reasons for preference of these ecotypes among the farmers. Comparison of the two ecotypes revealed that the traits, trunk girth, length of internodes, number of leaves, number of bunches with nuts, number of nuts, shell weight, husked fruit weight and fruit weight were higher in Kuttiyadi than in Bedakam ecotype. On the other hand, number of leaf scars per meter, length of inflorescence, fruit breadth, husk weight, nut cavity volume and copra weight were higher in Bedakam compared to Kuttiyadi ecotype. Relevance, utility and importance of the study are discussed from the perspective of effective utilization of the coconut diversity in situ and their possible further use in coconut improvement efforts through conservation strategies.

122. Mercykutty, V.C.; Rubber Research Institute of India, Kottayam(India). Meenakumari, T.; Rubber Research Institute of India, Kottayam (India) Kavitha K. Mydin; Rubber Research Institute of India, Kottayam (India). Promising latex timber clones of Hevea brasiliensis evolved by ortet selection. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.364-372 KEYWORDS: HEVEA BRASILIENSIS.

    On the basis of systematic screening of large seedling population of mature trees originated from Tjir 1 seeds and planted in 552 ha during 1961 at Plantation Corporation of Kerala, seventy-five elite trees were initially selected for a detailed study. Forty two ortets were finally selected based on yield, girt hand yield per unit length of tapping cut, of which, thirty-nineortets were cloned and evaluated in two small scale trials with onset of 27 clones and another set of 16 clones in a randomized block design with three replications. The check clones were RRII 105 and RRIM 600 in both the trials for comparison. Clonal performance was evaluated till eight years of tapping. The criteria for evaluation were yield, yield components, girth and secondary attributes. Timber yield was estimated at the 15th year of planting in terms of clear bole volume. Significant clonal variation for the traits resulted in selection of promising latex-timber clones and promising timber yielders. Three clones viz. KnO 39, KnO 36, KnO 49 recorded a mean yield of 55.25 g t-1 t-1, 53.38 g t-1 t-1 and 55.97 g t-1 t-1respectively and they were showing higher yield comparable to that of RRII 105 with 50.54 g t-1 t-1. These clones appear to be promising latex-timber clones as they had recorded significantly high bole volume and possess desirable secondary characters also. Seventeen clones were promising timber yielders as evident from the higher clear bole volume. The superiority of ortets with respect to specific traits is discussed in detail with emphasis to three promising selections based on latex and timber yield.

123. Arunachalam, V.; ICAR Research Complex for Goa(India). Augustine Jerard, B.; Central Plantation Crops Research Institute, Kasaragod (India) Elain Apshara, S; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Jayabose, C.; Sugarcane Breeding Institute, Coimbatore (India) Subaharan, K.; Central Plantation Crops Research Institute, Kasaragod (India) Ravikumar, N.;

Central Research Institute for Dryland Agriculture, Hyderabad (India) Palaniswami, C.; Sugarcane Breeding Institute, Coimbatore (India). Digital phenotyping of coconut and morphological traits associated with eriophyid mite infestation. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p. 417-424 KEYWORDS: COLOUR. PENETROMETERS. PALMAE.

Observations were recorded on traits associated with mite infestation related at two stages of button on six different coconut cultivars over three years. Highly significant correlation was found between mite damage score with color or weight of tepa!. Step-wise multiple regression of the data analysis showed color of inertial as major trait associated with infestation by eriophyid mite. Other traits are ratio of tepal weight to tepal area, per cent of buttons with pink discoloration or with resin, tepals of regular aestivation and gap between fruit and tepa!. Digital phenotype data of 83 image files were used to calculate color signature and correlated the same to mite damage score over three years . Red spectral values were found to vary from 14 to 251, green values to12 to 237 and blue to vary from 5 to 183. Spectral values red max, green max, 3 ; Red + Green max had high significant negative correlation (-0.4) with mite damage. Color and firmness of fruits and tepals of three coconut varieties were further analyzed where, fruits and tepals of COD variety showed high red/green (a ; value of Hunter lab) 12. Firmness of 3 month old tepal and fruit of Benualim (BGRT) tall variety was (penetrometer reading 38) higher than other varieties.

124. Bilich Dan Bara; Coconut Development Board, Vegiwada, Andhra Pradesh (India). DSP Farm. Coconut Tissue culture. Indian Coconut Journal (India). (Dec 2014) v.LVII(8) p.12-16 KEYWORDS:COCONUTS. TISSUE CULTURE.

125. Jnanadevan, R.; Coconut Development Board, Kochi (India). Varieties with reduced height and branching nature for the future. Indian Coconut Journal (India). (Dec 2014) v. LVII(8) p.19-22KEYWORDS: VARIETIES. COCONUTS. DWARFS. CROPS.

126. Rajesh, M. K.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Rijith, J.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Shafeeq Rahman; Central Plantation Crops Research Institute, Kasaragod(India). Crop Improvement

127. Preethi, P.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Rachana, K.E.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement.Sajini, K.K.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Anitha Karun; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement. Estimation of out crossing rates in populations of West Coast Tall cultivar of coconut using microsatellite markers. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 277-288 KEYWORDS: COCONUTS. MICROSATELLITES. OUTBREEDING.

Understanding of mating system of a plant species has fundamental importance for formulation of genetic conservation strategies and breeding programmers. The pattern of gene flow, via pollen, has a profound influence on

the genetic structure within population. Various genetic parameters, obtained from molecular marker studies, can be used to assess estimates of mating system. The aim of this study was to estimate the rate of out crossing in West Coast Tall (WCT) cultivar of coconut, which is predominant in India, using microsatellite simple sequence repeats (SSR). Two WCT mother palms and their 88 progenies, collected as embryos for five months, were screened using 15 highly polymorphic microsatellite primers. The mating parameters were estimated using mixed mating model (MLTRsoftware) and the extents of similarity between the mother palms and their progenies were analyzed using the NTSYS software. The percentage similarity between the mother palm and its progenies, as deduced using microsatellite data, ranged from 55 to 74 per cent. The progenies were also analyzed using a RAPD primer capable of distinguishing Tall and Dwarf palms. All the progenies were found to possess the Tall-type marker indicating that the pollen was derived from Tall palms in all the cases. The results revealed the WCTcultivar to be pre-dominantly out-crossing and indicated that proper sampling and indicated that proper sampling and breeding strategies are required to sustain the high genetic diversity found.

128. Manjula, C.;Nehru Arts and Science College ,Kanhangad(India) manjucnascmail.com Samsudeen, K.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Shafeeq Rahman; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement Rajesh, M. K.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Improvement. Characterization of Kuttiyadi ecotype of coconut (Cocos nucifera L.) using morphological and microsatellite markers. Journal of Plantation Crops (India). (Dec 2014) V.42(3) p.301-315 KEYWORDS: GENETIC RESOURCES. BIODIVERSITY. GENETIC VARIATION. COCONUTS. ECOTYPES. MICROSATELLITES.

West Coast Tall (WCT) is the most popular coconut cultivar grown by the farmers in Kerala, which occupies over 95 per cent of the area under coconut. The long history of coconut cultivation throughout Kerala state has resulted in the development of many ecotypes of WCT.The present work compares the similarity/diversity of the morphological and molecular characteristics of the Kuttiyadi ecotype growing in the hilly, mid land region of Kozhikode District, Kerala with those of the WCT cultivar of the coastal region of Kasaragod District, Kerala, using vegetative, reproductive and fruit component characters and microsatellite markers. Geographically, these two locations show a wide range of variation for soil and climactic factors. The vegetative, reproductive and fruit component characteristics and microsatellite markers showed wide variations between selected WCT palms from Kasaragod and Kuttiyadi. The similarity index based on Dice & rsquo;s coefficient, obtained after pair-wise comparison of Kuttiyadi and WCT samples with 15 SSR markers, revealed that the percentage similarity varied from the coefficient range 0.20 to 0.97 between the WCT and Kuttiyadi palms.UPGMA clustering clearly distinguished the two populations with WCTand Kuttiyadi forming separate clusters. STRUCTURE analysis was also carried out, which also showed that the two populations studied were distinct.

129. Ambily, P.K.; Rubber Research Institute of India, Kottayam(India) Molly Thomas; Rubber Research Institute of India, Kottayam(India).mollyubberboard.org.in Krishnakumar, R.; Rubber Research Institute of India, Kottayam (India) Mohamed Sathik; Rubber Research Institute of India, Kottayam (India) Annamalainathan, K.; Rubber Research Institute of India, Kottayam (India). Cloning and expression of hmgr1 gene from Hevea brasiliensis. Journal of Plantation Crops(India). (Dec 2014) V. 42(3) p. 336-340 KEYWORDS: HEVEA BRASILIENSIS. RUBBER. GENES.

    Biosynthesis of natural rubber(cis1,4polyisoprene)takes place through mevalonate pathway in Hevea. The enzyme 3-hydroxy-3-methyl glutaryl-CoA reeducates (HMGR), which catalyses the synthesis of mevalonate from HMG-CoA is a key regulatory enzyme in this pathway. This study aimed to clone and express hmgr1 gene, in order to obtain the HMGR protein in vitro and to further use this proteinas a marker for yield potential in Hevea. For this purpose, mRNA was isolated from the latex of Hevea (cloneRRII105). cDNA was synthesized and PCR amplification of coding region of hmgr1 was performed using hmgr1 specific primers.ThePCR amplified product(~1.8 kb) was cloned into an expression vector (pRSET-A) and transformed into E. coli (BL21DE3) cells. Protein expression in transformed cells when monitored by SDS-PAGE analysis indicated the presence of HMGR protein (61.6 kDa). The protein would be used for developing specific antibody that could be further utilized for the quantification of HMGR in different Hevea clones for screening the yield potential. The details of cloning and expression of hmgr1 are presented and discussed.

130. Anil Paul; Central Plantation Crops Research Institute, Kasaragod (India) Hemalatha, N.; St. Aloysius College, Mangalore (India) Rajesh, M.K.; Central Plantation Crops Research Institute, Kasaragod (India). mkraju.cpcrimail.com. LTTRPred: A tool for prediction of LysR-type transcriptional regulator of pyoluteorin pathway in plant growth promoting Pseudomonas spp.. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 377-385 KEYWORDS: ANTAGONISM. PHOSPHATES. TEA. SOIL.

    Plant growth promoting pseudomonas spp. produce an antifungal compound called pyoluteorin (Plt) that suppress diseases caused by phytopathogenic fungi. The pathway specific regulator PltR, a typically-type transcriptional regulator (LTTR), is responsible for the transcriptional activation of the Plt biosynthetic operon. The LTTR family represents one of the largest classes of bacterial transcriptional regulatory proteins. A large number of LTTRs possess function as global transcriptional activators or repressors of unlinked genes or operons involved in metabolism, quinoline signal, virulence etc. The proposed method, LTTRPred, is an useful tool developed for identifying and predicting the LTTR, which irresponsible for the activation of Plt transcription regulators, from whole genomes of various Pseudomonas spp. LTTRPred was developed using support vector machine (SVM) and Waikato Environment foreknowledge Analysis (WEKA) based on the composition of amino acid and amino acid pairs. Modules in SVM were developed using traditional amino acid, dipeptide (n+1) and hybrid amino acid composition modules and an overall accuracy of 100, 100 and 98 per cent respectively, was achieved. Modules in WEKA were also developed using the same modules and an overall accuracy of 100 per cent achieved for all. The

performance of the tool was tested using various datasets of LTTR genes from different Pseudomonas spp. The best performing SVM and WEKA modules from the present investigation was implemented as dynamic web server & lsquo;LTTR Pred & rsquo;, which is freely available and can be accessed online (http://210.212.229.56/lttrpred/). This tool can be used for the functional annotation of the Pseudomonasspp. possessing LTTR genes.

131. Das, H.S; Pulse and oil research Station, Berhampore (India). Kundagrami, S; Department of Genetic and Plant Breeding, University of Calcutta, (India). Sarkar, M; Department of Genetic and Plant Breeding, University of Calcutta, (India) Sarkar, S; Department of Genetic and Plant Breeding, University of Calcutta, (India) Naskar, B; Directorate of Agriculture, Kolkata, (India). Genetic Variability and trait association of Seed yield and Yield component in moonbeam (Vigna radiata (L.) Wilczek). Satsa Mukhapatra. (Feb 2016) v.20, p.161-166 KEYWORDS: GENOTYPES. CORROSION. STATISTICAL METHODS. FRUIT. SEED.

Genetic variability and heritability along with their association on yield are essential for crop improvement. Sixty two mungbean genotypes were studied at Pulses and Oilseeds Research Station, Berharnpore, West Bengal during kharif season of 2013 to assess variability and degree to which various plant traits were associated with seed yield. Very high genetic variability was observed for plant height, pods plant:', total plant weight and seed yield. Rest of the studied traits exhibited moderate to high heritability. Positive, but non-significant genotypic and phenotypic correlation was observed between primary branches, clusters plant, pods plant^{-1}, seeds pod^{-1} and 100-seed weight with plot yield. The present findings would be useful in establishing selection criteria of high seed yield in munbeam breeding.

132. Dutta, A; Pulse and oil Seed Research Station, berhampore, West Bengal (India). Effect of Pollination on Hybrid and Inbred lines of Sunflower (Helianthus Annuus L.). Satsa Mukhapatra. (Feb 2016) v.20, p.177-179 KEYWORDS: HELIANTHUS ANNUUS. POLLINATION. HYBRIDS. INBREEDING.

133. Mandal,N.P; Central rain fed Upland rice Research station, Jharkhand(India)Rice Breeding for Stress environment of Upland Plateau in India.. Mukhapatra. (Feb 2015) v.19, p.59-68 KEYWORDS: BREEDING METHODS. DROUGHT. HIGHLANDS. CHOICE OF SPECIES.

India has an area of about 6.0 million hectares (m ha) undertrained upland rice with its maximum coverage of about 4.61 m ha in eastern region, comprising the states of Assam, Bihar. Jharkhand, West Bengal, Odisha and eastern parts of Madhya Pradesh and Uttar Pradesh. Although upland rice accounts for about 13% of total rice area in the country, its contribution to total rice production is very less (only 10%). Upland rice cultivation poses a serious challenge to agricultural research for increasing productivity and nullifying food insecurity issues. Upland rice technology is still lagging behind, mostly because of environmental diversity and research constraints including lack of appropriate screening techniques for most of the plant characters imparting tolerance to adverse conditions. Research accomplishments in last three decades have successfully led to the identification

and prioritization of various physical, biological and technological constraints, limiting productivity 01' upland rice in South and South East Asia. Drought is the most common production constraint in upland ecosystem. Breeding programmers have been focusing towards widening the genetic base with the emphasis on drought tolerance through introduction of new gene sources. Genetic enhancement of varieties suitable for rainfed uplands has become successful. Different breeding strategies to achieve the target yield through improving plant characters of upland rice have been discussed. Breeding through marker-assisted. Election would be of much use in increasing yield potential of upland rice varieties through introgression of drought and blast tolerance, besides combating other abiotic and biotic stresses. Future endeavors for grain yield enhancement of upland rice through genetic improvement have also been outlined.

F60 Plant physiology and biochemistry

134. Annamalainathan, K.;Rubber Research Institute of India, Kottayam (India). annamalainathanahoo.co.in Joby Joseph; Rubber Research Institute of India, Kottayam (India) Badre Alam; National Research Centre for Agro forestry, Jhansi (India) Satheesh, P.R.; Rubber Research Institute of India, Kottayam (India) James Jacob; Rubber Research Institute of India, Kottayam (India). Seasonal changes in xylem sap flow rate in mature rubber plants. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.343-349 KEYWORDS: HEVEAYBRASILIENSIS. WATER USE. XYLEM.

The rate of flow of xylem sap of mature rubber tree was recorded round the clock continuously for two years using a Granier type thermal dissipation probe (TDP). The measurements were made on 19 year old trees of the clones, RRII 5 and PR 255 with a mean girth of 78 and 82 cm, respectively at 150 cm above bud union. Overall, the average rate of water mining by a tree was to the tune of 22±3 L day^{-1}. The diurnal and seasonal differences in the sap flow rate were very evident which responded to the ambient weather conditions such as intensity of sunlight, temperature, rainfall etching the morning hours, as the sunlight intensity increased there was a corresponding sharp increase in sap flow rate which attained maximum level around mid-day. In the evening, as the light intensity declined, the sap flow rate also declined. The maximum rate of sap flow per day was recorded in December and the minimum in February coinciding with complete defoliation of the canopy. Taking a mean water consumption of 22 L $tree^{-1}$ day^{-1} and assuming there are 400 trees ha^{-1}, the water consumption works out to be in the range of 1-2 mm day^{-1}. This insignificantly lesser than the potential evapo-transpiration (ET) of an open field in this traditional region. Taking the long-term average rain fall in the region (3000 mm $year^{-1}$), it can be seen that the water loss due to transpiration (T) by the trees amounted only to 11 percent of the annual rainfall.

135. Vengaiah, P.C.; AICRP on Palms, Pandirimamidi (India). Horticulture Research Station, Dr.Y.S.R. Horticulture University. Murthy, G.N.; AICRP on Palms, Pandirimamidi (India). Horticulture Research Station, Dr. Y.S.R. Horticulture University. Prasad, K.R.; AICRP on Palms, Pandirimamidi(India). Horticulture

Research Station, Dr. Y.S.R.Horticulture University .Kumari, K.U.;AICR Pon Palms,Pandirimamidi(India). Horticulture Research Station.Y.S.R. Horticulture University. Arulraj, S.; AICRP on Palms, Pandirimamidi (India). Horticulture Research Station, Dr. Y.S.R. Horticulture University. Physico-chemical and functional characteristics of palmyrah (Borassus flabelliform L) tuber flour. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.437-440 KEYWORDS: BORASSUS FLABELLIFER. ENERGY VALUE.

136. Hebbar, K.B.; Central Plantation Crops Research Institute, Kasaragod (India) Arivalagan, M.; Central Plantation Crops Research Institute,Kasaragod (India). Climate change adaptation in coconut: A coconut based farming system approach. Indian Coconut Journal (India). (Dec 2014) V.LVII(8) p.28-31 KEYWORDS: COCONUTS. CLIMATICCHANGE. ADAPTATION. FARMING SYSTEMS. DROUGHT. SOIL WATER CONTENT. TEMPERATURE.

F61 Plant physiology - Nutrition

137. Lakshmipathi; Directorate of Cashew Research, Puttur (India). Dinakara Adika, J.; Directorate of Cashew Research, Puttur (India) Kalaivanan, D.; Directorate of Cashew Research, Puttur (India) Saroj, P.L.; Directorate of Cashew Research, Puttur (India). Response of cashew (Anacardium occidentale L.) too smopriming with gibberellic acid (GA3). Journal of Plantation Crops(India). (Dec 2013) v.41(3) p.455-459 KEYWORDS: GIBBERELLIC ACID. CASHEWS. GERMINATION. GROWTH.

138. Selvamani, V.; Central Plantation Crops Research Institute, Kasaragod (India). Duraisami, V.P.; Tamil Nadu Agriculture University, Coimbatore (India). Identifying and mapping leaf nutrient based constraints for coconut productivity in Coimbatore and Tiruppur districts of Tamil Nadu state, India. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.163-169 KEYWORDS: COCONUTS. CONSTRAINTS. LEAVES. NUTRIENTS.

139. Bhagyalakshmi, B.; K.S. Rangasamy College of Technology, Tiruchengode (India). Dept. of Biotechnology. Ponmurugan, P.; K.S. Rangasamy College of Technology, Tiruchengode (India). Dept. of Biotechnology. Balamurugan, A.; UPASI Tea Research Foundation, Valparai (India). Studies on nutrient solubilization, biocontrol and plant growth promoting traits of Burkholderia cepacia from tea soil. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 316-322 KEYWORDS: ANTAGONISM. PHOSPHATE FERTILIZERS. POTASSIUM.

A study was undertaken to isolate a novel indigenous bacterial strain namely Burkholderia cepacia from tea soils to solubilize potassium (K) and phosphorus (P) sources respectively. The isolated strain was screened based on its solubilization potential in both broth and agarized medium amended with various K and P sources. Plant growth promoting traits and biocontrol activity of the purified strain against tea pathogens such as Pestalotiopsis theae, Glomerellacingulata, Poria hypolateritia, Phomopsis theae and Hypoxylon serpenswere studied. Results revealed a significant solubilizing zone in agar medium blended with muriate of potash (MOP) (2.0 cm), sulphate of potash (SOP) (1.2 cm), rock phosphate (1.6 cm)

and single superphosphate (0.8 cm). The release of available K was quantified in liquid medium supplemented with MOP and was found to be higher (41.5mg L-1) than SOP. Among different P sources, rock phosphate (35.2 mgL-1) showed higher solubilization than single super phosphate (30.2mg L-1) by the test organism on 5th day of incubation. B. cepacia was found to produce a large amount of bioactive compounds likes iderophore (12.3 μg mL-1), IAA (263.3 μg mL-1) andGA3(14.9 μg mL-1) including exo-polysaccharides (46.8 ppm).The test organism also showed a remarkable biocontrol activity against P. theae (52.5%), G. cingulated (42.5%), H. serpens (47.5%), Phomopsistheae (32.7%) and P. hypolateritia (30.9%). The secondary metabolites production by an efficient strain B. cepacia revealed that the strain could produce a wide range of volatile compounds.

140. Surekha, K.; Indian Institute of Rice Research, Hyderabad (India). Kumar, Mukehnder R; Indian Institute of Rice Research, Hyderabad (India). Tuti, M.D.; Indian Institute of Rice Research, Hydrabad (India). Babu, Ravindra; Indian Institute of Rice Research, Hyderabad (India). Efficient nutrient management practices for sustaining soil health and improving rice productivity.

141. Mukhapatra. (Feb 2016) v.20, p.26-38 KEYWORDS: CROPPING SYSTEMS. NUTRIENT AVAILABILITY. RICE. SOIL.

Being the most important staple food crop, rice plays a vital role in food security of many countries including India. Rice production needs to be enhanced by 2.0-2.5 million tones year:' to meet the growing. demand of burgeoning population in next 15-20years. Healthy soils play an important role in maintaining sufficient biological activity, improving root growth, providing sufficient nutrients to crop plants and sustaining crop productivity. The present paper deals with different factors relating to integrated nutrient management, various options, cropping systems, conservation agriculture practices, and their effect on soil health and productivity of rice and rice-based cropping systems. Efficient nutrient management practices lead to balanced nutrition and maintain soil health for sustaining productivity of any cropping system.

142. Jana, T.K; Fertilizer Control Laboratory, West Bengal (India). Bhowmick, M.K.; Rice Research Station, Chinsurah , West Bengal (India). Surekha, K.; Indian Institute of Rice Research, Hydrabad (India). Nutrient management for improving grain yield nutrients uptake and quality of aromatic rice varieties. Satsa Mukhapatra. (Feb 2016) v.20 p.138-144 KEYWORDS: RICE. GRAIN. NUTRIENTAVAILABILITY.MANAGEMENT.

A two-year field experiment was conducted in kharif season at Rice Research Station, Chinsurah, West Bengal, India in factorial randomized block design with three replications. There were four nutrient management practices viz. 100% NPK (100:50:50 kg $N:P_2o_5:K_2o$ ha^{-1}) through inorganic fertilizers, green manuring with dhaincha (6 t h^{-1}) + FYM (5 t ha^{-1}) + 50% NPK (50:25:25 $N:P_2o_5:K_2o$ ha^{-1})through inorganic fertilizers, green manuring with dhaincha (12 ha^{-1}) + FYM (10t ha^{-1}) and 100% NPK though inorganic fertilizers followed by two sprayings of 500 ppm cycocel with surfactant around boot leaf stage; and three different varieties viz.

Vasumathi(improved basrnati), Taraori Basmati (traditional basmati) and Kalonunia (local non-basmati). The results revealed that there was significant influence of different nutrient sources on grain and straw yields along with quality parameters in both the years of study. J integrated use of organ ics (green manure + FYM) along with50% inorganic NPK produced the highest grain yield and was followed by the application of 100% inorganic NPK + cycocel spray. Among the varieties, Vasumathi significantly recorded the highest grain yields it could accumulate more of major nutrients whereas Kalonuniaproved its superiority in respect of straw yield and head rice recovery. Amongst other quality characters, milling characteristics,amylose content and gel consistency were also higher for improved basmati. Hence, either integrated use of green manure + FYM and 50%inorganic NPK or sole use of 100% inorganic NPK along with cycocelspray proved to be an effective nutrient management practice towards achieving higher productivity and better grain quality of aromatic rice varieties.

143. Ghos, D.K; All Indian Coordinate Research Project on Plams (ICAR),Bidhan Chandra krishi Viswavidyalaya, Kalyani Nadia, West Bengal(India) Maheswarappa; Central plantation crops Research Institute Kasaragod, Kerala (India). Integrated Nutrients management for higher productivity of hybrid coconut in west Bengal. Satsa Mukhapatra. (Feb2016) v. 20, p.145-153 KEYWORDS: HYBRIDS. NUTRIENTS. MANAGEMENT. COCONUTS. YIELDS.

A field experiment was conducted at Horticultural Research Station, Bidhan Chandra Krishi Viswavidyalaya, Mondouri, Nadia, West Bengal in coconut hybrid, Chandra Sankara (Chowghat Orange Dwarf x West Coast Tall). Coconut palms of 18 years' old were spaced. at 7.5m x 7.5 m. The experiment consisted of27 treatment combinations of three levels for each of N (0, 500 and 1,000 g palm^{-1} year^{-1}),P_2,O_5, (0, 250 and 500 g palm^{1} year^{1}) and K_2O (0,1,000 and 2,000 g palm^{-1} year^{-1}). Chemical fertilizers were applied in the form of urea (N), single super phosphate (P) and muriate of potash (K) into equal splits during June and October. Graded levels of N, P_2O_5,and K_2O were found to enhance bunch production. Interactions among different treatments showed that 1,000 g N + 2,000 g K_2O palm-^{1} year-^{1} recorded maximum number of bunches (8.3 palm^{-1}) with the highest nut yield (103.6 nuts palm^{-1}) and copra yield (14.8 kg palm^{-1}). However, the highest values of gross return (Rs. 65,667ha^{-1}) and net return (Rs. 30,975 ha^{-1}) were obtained when palms were nourished with 1,000 g N + 500 g P_2O_5, + 1,000 g K_2p palm^{-1} year^{-1}l (supplementing 50% N through vermicompost). The nutrient combination of 500 g N (50% N through vermicompost) + 250 g P_2O_5 +1,000 g K,O palm-^{1} year^{-1}was also found to be cost-effective in obtaining optimum nut yields with higher economic return. An integrated nutrient management practice including appropriate nutrient combinations is suggested for growing coconut hybrid in the New Alluvial Zone of West Bengal.

144. Sarkar,D; Department of soil science sand Agriculture chemistry, Banaras Hindu University, Varanasi(India) Mukhopadhay,P; Department of soil sciences and agriculture Chemistry, west Bengal (India). In Vitro studies of Phosphomonoesterases Activity under the influence of phosphate solubilization

bacteria. Satsa Mukhapatra. (Feb 2016) v.20, p. 172-176 KEYWORDS: PHOSPHORUS. AGRICULTURE. BACTERIA. INVITRO.

145. Sen, P; Directorate of Agriculture , Kolkata, West Bengal (India) Sen,P; West Bengal State Seed Corporation Limited, Kolkata , West Bengal(India). Micronutrients Management for reconciling Agricultural Sustainability with Productivity. Satsa Mukhapatra. (Feb 2015) v.19,p.36-42 KEYWORDS: TRACE ELEMENTS. MANAGEMENT. AGRICULTURE. SUSTAINABILITY. PRODUCTIVITY.

Indian soils have become deficient not only in major and secondary plant nutrients, but also in micronutrients such as zinc(Zn), boron (B) and to a limited extent iron (Fe), manganese (Mn),copper (Cu) and molybdenum (Mo). Deficiency of micro nutrients during last three decades has grown in both, magnitude and extent because of increased use of high analysis fertilizers, use of high-yielding crop varieties and increase in cropping intensity. This has become a major constraint to agricultural production and productivity. The ultimate goal of high productive sustainable agriculture in the country can be achieved with constant monitoring and replenishment of micronutrient sin lithosphere.

F62 Plant physiology - Growth and development

146. Elain Apshara, S; Central Plantation Crops Research Institute, Vittal (India). Regional Station.. elain_apsharaahoo.co.in Rajesh, M.K.; Central Plantation Crops Research Institute, Kasaragod (India)Balasimha, D.; Central Plantation Crops Research Institute, Vittal(India). Regional Station. Assessment of morphological, physiological and molecular characteristics of cocoa accessions from Central and South America in relation to drought tolerance. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.389-397 KEYWORDS: THEOBROMA CACAO. DROUGHT RESISTANCE.

Eleven cocoa accessions, representing collections from five central and south American countries, were assessed for their morphological, molecular and physiological parameters. Growth characters were observed in three year old plants and initial pod yields were recorded. Photosynthesis, related parameters and chlorophyll indices, measured during two seasons, showed significant differences between non-stress and stress periods as well as among the genotypes. The transpiration water loss was reduced within creased stomata closure, which is a favorable drought trait in crops. The results indicated that the genotypes showing higher water potential and Fv/Fm ratio can be considered as drought tolerant. The rank sums of these parameters showed that genotypes JA-1/19, POU-16/A and SC-4 were the most drought-tolerant. Microsatellite markers were used to assess the extent of genetic diversity between clones. The amplification of DNA from the 11 accessions using the 15 microsatellite loci revealed a total of 80 consistent and scorablealleles with an average of 5.33 alleles per locus and all the loci were 100 per cent polymorphic, the most polymorphic locus beingmTcCIR33 with 8 alleles. The observed heterozygosis ranged from 0.36to 0.63 with an average of 0.52. The inbreeding co-efficient (f)ranged from -0.22 (mTcCIR8) to 0.58 (mTcCIR40) with an average of 0.32. The microsatellite marker analysis revealed that the genotypes possess a wide genetic diversity. The drought tolerant types

identified in this study viz., JA-1/19, POU-16/A and SC-4 could be used for cultivation in areas with moisture deficient stress and in selective cocoa breeding programs for drought tolerance.

147. Dinakara Adiga, J.;Directorate of Cashew Research Puttur (India). Kalaivanan, D.; Directorate of Cashew Research, Puttur (India).Influence of dwarf root stocks on growth and vigor of popular cashew cultivars. Journal of Plantation Crops (India). (Dec2013) v.41(3) p.428-432 KEYWORD: DWARFS. ROOTSTOCKS .CASHEWS. GRAFTING.

148. Vikram, H.C.; KRC College of Horticulture, Arabhavi(India) Hegde, N.K.; KRC College of Horticulture, Arabhavi(India).nkhegdeahoo.comJ agadeesh, R.C.; KRC College of Horticulture, Arabhavi(India). Performance of cashew (Anacardium occidentale L.)varieties under northern transition zone of Karnataka. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.441-443 KEYWORDS: CASHEWS.

149. Radha Lakshmanan; Rubber Research Institute of India, padiyoor,Kannur, Kerala(India) Meenakumari, T.; Rubber Research Institute of India, Kottayam(India) Chandrasekhar,T.R.; Hevea Breeding Substation, Kadaba,D.K.Dist, Karnataka(India) Nazeer, M. A.; Rubber Research Institute of India, Kottayam (India). Growth and yield performance of some exotic clones of Hevea brasiliensis in North Kerala region.. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.155-162 KEYWORDS: GROWTH. HEVEA BRASILIENSIS. CLONES. RUBBER.

150. Gopika Gopal; Rubber Research Institute of India, Kottayam(India)Vinoth Thomas.; Rubber Research Institute of India, Kottayam(India) .vtubberboard.or.in. Localization of peroxidase enzyme in the bark of Heveabrasiliensis and its implication in anatomy. Journal of Plantation Crops(India).(Dec 2014) V. 42(3) p. 294-300 KEYWORDS: PHENOLIC COMPOUNDS. HEVEA. RUBBER. PEROXIDASES.

    Localization of peroxidase enzyme with respect to seasons has-been carried out in the bark of mature trees of Hevea brasiliensis using guaiacol and hydrogen peroxide as the substrate. Cell walls of sieve tubes including sieve plates, and cytoplasm of phloic rays both in the soft and hard region of the bark showed positive indication of peroxidase activity with reddish brown coloration. Sieve tubes differentiated recently from the derivatives of cambium also stained deeply. The cell wall of the phloic rays remained passive for peroxidase activity but the cytoplasm appeared to be granulated and was in a state of streaming motion which was evident in cross sectional view of the bark. Companion cells did not give any indication of peroxidase activity but it was localized in the intercellular spaces of axial parenchyma cells in the soft bark.Phloic rays exhibited seasonal variation for peroxidase enzyme while the activity was localized throughout the year in the sieve tubes. In the samples taken during December- January, phloic rays were unstained throughout the bark. Bark samples collected in the month of March and April showed deep coloration for phloic rays extending from the phellogen to the periphery of the cambial zone. In the month of June, the partially differentiated phloic rays in the cambial zone stained for peroxidase and subsequently differentiated ones were completely unstained. The phloic rays in the months of

September and October remain unstained in the soft bark while it gave a brown coloration in the hard bark region.

151. Bodhale,Ashvini; Department of Botany, Mahatma Phulae Krishi vidyapeeth, Rahur (India) inhered, R.W.; Department of Botany, Mahatma Phulae Krishi vidyapeeth, Rahur(India) Deshmukh, D.V.;Department of Botany, Mahatma Phulae Krishi vidyapeeth,Rahur (India). Photosynthesis efficiency and active radiation in relation to growth and yield of sesamum (sesamum Indicum L.) Genotypes. Journal of agriculture Research and Technology(India).(Sep 2015) v.40(33), p 367-378 KEYWORDS: SESAMUM. PHOTOSYNTHESIS. YIELDS. CARBOHYDRATECONTENT. GENOTYPES. RADIATION.

The experiment on thirty seven sesamum genotypes was laid out in randomized block design (RBD) with two replications to investigate the photosynthesis, water use efficiency and active radiation and to assess the effect of photosynthetic parameter on growth and yield of sesamum. The genotypes significantly differed in respect of yield plant. The highest seed yield (kg ha-1) was recorded by the genotypes JLS-1l6, JLS-506- 3, JLS-613-1-1 and JLT-7, JLSG-05-11 due to higher rate of photosynthesis, transpiration rate, stomata conductance, water use efficiency, CO2 concentration and water vapourat atmospheric and intercellular partial pressure, photosynthetically active radiations, yield contributing characters viz., number of capsules planr l, seed yield plant (g) and seed yield (Kg) plotl and harvest index (%). The oil, carbohydrate, protein, oleic acid, linoleic acid and linolenic acid content were higher in the genotype KMK-28, JLS-608-2-1, JLS- 301-24, SI-2334-2JL-SeI-07-11 and JLS-301-24. There were significant differences in the oil content of the genotypes ranging from 41.33 to 59.57 percent. The genotypes JLT-7, JLS-506-3, JLS-613-1-1, JLSG- 05-11 andJLS-116 may be utilized for the yield heterosis, whereas the genotypes KMK-28, JLS-608-2-1, JLS-301-24, SI-2334-2, JL-Sel-07-11and JLS-301-24 for improving oil, carbohydrate, protein, oleic acid, linoleic acid and linolenic acid content in further breeding program. Therefore, it can be concluded that, the significant variation in yield could be seen in different genotypes due to their differential behavior in respect of growth, development, phenology,total dry matter production potential and translocation of photosynthesis from source to sink. In high yielding genotypes the photosynthetic rate, transpiration rate, water use efficiency,photosynthetically active radiation, number of capsules, seed weight, harvest index and chlorophyll content were observed to be the major yield contributing characters.

152. Srivastva, A.K; International Rice Research Institute, New Delhi(India)Singh, S; International Rice Research Institute, New Delhi(India) Dar, M.H; International Rice Research Institute, New Delhi(India) Singh. S.U; International Rice Research Institute, New Delhi(India). Stress- Tolerant Rice Verities and conforming management Practices for intensification of Rained Ecosystem in India. Satsa Mukhapatra. (Feb 2016) v.20. p.1-14 KEYWORDS: DROUGHT. MANAGEMENT. VARIETIES. SALINITY.

Rice is a major staple food crop of India, covering an area of about 43.5 million hectares with relatively low average productivity. Different abiotic factors

like drought, flood and salinity / sodicity adversely affect rice production in more than 50% of total rice area, reducing the average yield to about 2 t ha^{-1}, compared with 5 t ha^{-1}in input-intensive irrigated systems. However, there exists substantial potential for increasing productivity in the stress- prone rainfedareas with the development of stress-tolerant rice varieties (STRVs) by the International Rice Research Institute (IRRI) in collaboration with the National Agricultural Research and Extension System (NARES)partners in recent years. Incorporating stress tolerance into popular high-yielding varieties has proved to be a very effective approach to develop climate-resilient varieties that can cope with these situations. The main advantages of these varieties include1.0-1.5 t ha^{-1} higher yields when grown under stresses, better fertilizer responsiveness and lower disease susceptibility. Toachieve higher production along with sustainability of rain fed lowlands, the variety-driven changes must be accompanied by improved and adapted crop and natural resource management options. The cost-effective management approaches in nursery as well as main field have provided yield advantage of I t ha^{-1}over the STRVs itself instress-prone rainfed areas. These cost-effective management options, besides improving farmers' livelihood in rain fed lowlands, can also contribute substantially to the rice production increment needed in the imminent future to compensate for high population growth rate and loss of farmlands, and to withstand the ill-effects of climate change on rice productivity.

H10 Pests of plants

153. Rajamanickam, K.; Tamil Nadu Agricultural University, Aliyarnagar (India). Coconut Research Station. Johnson, I.; TamilNadu Agricultural University, Aliyarnagar (India). Coconut Research Station.Subaharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). subaharan_70ahoo.com. Evaluation of egg larval predator anthocorid bug Cardiastethus exiguous Poppius againstOpinsina are nosella in Tamil Nadu. Journal of Plantation Crops(India). (Dec 2013) v. 41(3) p.444-446 KEYWORDS: ANTHOCORIDAE. COCONUTS. OPISINA.

154. Shanmugapriyan, R; UPASI Tea Research Foundation, Vandiperiyar, Idukki, Kerala. (India) Regional Centre. drrshanmugapriyanahoo.co.in Siby Mathew; UPASI Tea Research Foundation, Vandiperiyar, Idukki, Kerala. (India) Regional CentreRadhakrisnan, B.; UPASI Tea Research Foundation, Valparai (India). Resistance development status in tea mosquito bug (Helopeltis theivora Water house) against certain insecticides. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.447-449 KEYWORDS: HELOPELTIS. TOXICITY. DOSAGE.

155. Himadri Rabha; Central Plantation Crops Research Institute, Kahikuchi(India). Research Centre.Ranjana Chakrabarty; Central Plantation Crops Research Institute, Kahikuchi(India). Research Centre.Acharya, G.C.; Central Plantation Crops Research Institute, Kahikuchi(India). Research Centre. Preliminary assessment of eriophyid mite infestation on coconut in Assam. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.450-454 KEYWORDS: ACERIA GUERRERONIS. ASSAM. COCONUTS.

156. Chalapathy Rao, N.B.V.; AICRP on Palms, Pandirimamidi(India). Horticulture Research Station, Dr. Y.S.R. Horticulture University. Emmanuel.; AICRP on Palms,Pandirimamidi(India). Horticulture Research Station, Dr. Y.S.R.Horticulture University.Subaharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Impact of olfactory conditioned parasitoid Goniozus nephantidis (Muse beck) in suppression of Opisina arenosella Walker under field conditions in east coast of Andhra Pradesh. Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.460-462 KEYWORDS: GONIOZUS. OPISINA.

157. Deeshma, K.P.; Indian Institute of Spices Research, Calicut(India). Division of Crop Protection hat, A. I.; Indian Institute of Spices Research, Calcutta(India). Division of Crop Protection.ishwarabhatpices.res.in. Further evidence of true seed transmission of Piper yellow mottle virus in black pepper (Piper nigrum L.). Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 289-293 KEYWORDS: PEPPER. POLLEN. SEED. TRANSMISSIONS.

    A study was conducted to detect the presence of Piper yellow mottle virus (PYMoV) in pollen and different parts of black pepper berries. Total DNA isolated from anthers, embryo, endosperm andperisperm of berries from PYMoV infected and healthy black pepper plants were subjected to polymerase chain reaction (PCR) using PYMoV specific primers. PCR results clearly indicated the presence of PYMoVin embryo, endosperm and perisperm of berries from infected plants of all the three varieties tested (Panniyur-1, IISR-Thevam, and Subhakara) and in anthers of var. Panniyur-1 but was absent in all these parts of healthy plants. The identity of the PCR product was confirmed by sequencing. Seedlings raised from infected berries were symptomatic and were PCR positive. The present study confirmed true seed transmission of PYMoV and the possibility for pollen transmission of the virus.

158. Mandal, P.K.; Directorate of Oil Palm Research ,Pedavegi (India). Kochu Babu, M.; Directorate of Oil Palm Research, Pedavegi(India) Jayanthi, M; Directorate of Oil Palm Research, Pedavegi (India) Satyavani, V.; Directorate of Oil Palm Research, Pedavegi(India). PCR based early detection of Ganoderma sp.causing basal stem rot of oil palm in India. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 392-394 KEYWORDS: GANODERMA. PCR. DIAGNOSIS.

159. Jayasree, A.; Coconut Development Board, Neriamangalam (India).DSP Farm. Farm Manager. Red Alert: Invasive pests of coconut. Indian Coconut Journal (India). (Jan 2015) V. LVII(9) p.24-26 KEYWORDS: PESTS. PESTS OF PLANTS. COCONUTS. CHRYSOMELIDAE.

160. Sontakke, B.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Agriculture, Department of Entomology. Mohapatra, L.N; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Agriculture, Department of Entomology. Bioefficacy of buprofezin 25SC against, Scirtothripsdorsalis (Hood) and yellow mite, Polyphagotarsonemus latus (Banks)

infesting chilli. Indian Journal of Entomology. (Sept. 2014) v.76(3)p.177-180 KEYWORDS: BUPROFEZIN.

Two dosages of buprofezin 25 SC viz., 75 g a.i/ha and 150 ga.i./ha, along with its market samples and treated checks i.e.,ethion (225 g a.i./ha) and profenofos (500 g a.i./ha) were field evaluated against mixed population of thrips, Scirtothrips dorsalis(Hood) and yellow mite, Polyphagotarsonemus latus (Banks) infestingchilli at the Central Farm of Orissa University of Agriculture and Technology, Bhubaneswar during kharif 2009 and 2010. Buprofezin 25 SCin both the doses (75 and 150 g a.i./ha) was the most effective in checking both thrips and mite. Buprofezin 25 SC in any formulation and even in higher doses was safe to the natural enemies.

161. Satoru,Takeuchi; Takamatsu, Kahoku, Ishikawa(Japan). prostacolonahoo.co.jp. Chalcosoma argregs sp. nov. from Malaysia(Coleoptera: Scarabaeidae: dynastinae). Indian Journal of Entomology.(Sept. 2014) v.76(3) p.188-191 KEYWORDS: COLEOPTERA.

162. A new species of Scarabaeidae from Malaysia, Chalcosomaargregssp.nov is described. It is compared with other species and diagnostic features illustrated and discussed. Kumar, Rajesh; CCS Haryana Agricultural University, Hisar(India). Department of Entomology rajesh_entorediffmail.com Singh, Maan; CCS Haryana Agricultural University, Hisar(India) Department of Entomology.Kumar,Narendra; CCS Haryana Agricultural University, Hisar(India) Department of Entomology. Bionomics of Atherigona soccata (Rondani) on resistant and susceptible maize genot ypes.Indian Journal of Entomology.(Sept.2014) v.76(3) p.192-196 KEYWORDS: ATHERIGONA SOCCATA. MAIZE. ECOLOGY.

Biology of A. soccata was studied on two resistant (193-2x161,C-78) and two susceptible maize genotypes (1128x163, 1348-6-2). Shoofly laid creamy white, cigar shaped eggs singly on underside of the leaves parallel to midrib. They hatched within 2.2 days and the hatchability ranged between 64.73 to 74.38 per cent on resistant and susceptible maize genotypes. The larval period was observed maximum on resistant genotypes than susceptible one & rsquo;s. The total larval period extended up to 12.87 days on resistant hybrid 193-2x161 and minimum (8.02 days) on susceptible inbred 1348-6-2. Pupation took place in the seedlings but sometimes it was also observed in the soil near the base of the seedling. The pupal period was recorded minimum(6.92 days) on susceptible inbred 1348-6-2 and maximum (9.73 days) on resistant hybrid 193-2x161. The developmental period was observed maximum (21days) on resistant hybrid 193-2x161 and minimum (14.5days) on susceptible inbred 1348-6-2. Adult emergence was observed75.2 and 72.5% on inbred 1348-6-2 and C-78, respectively. The female always outnumbered the males when this pest was reared on any of the genotypes and sex ratio male to female was found maximum (1:1.44) on susceptible inbred 1348-6-2 and minimum (1:1.38) on resistant hybrid193- 2x161. A. soccata laid more number of eggs when reared on inbred than hybrids. Single female laid maximum (32.7 eggs) on susceptible inbred 1348-6-2 and minimum (13.6 eggs) on resistant hybrid193-2x161in its total life span. However, resistant and susceptible genotypes did not affect the sex ratio and incubation period.

163. Pandey, Ajay Kumar; G. B. Pant University of Agri. & Tech.,Pantnagar, Udham Singh Nagar(India).College of Agriculture, Department of Entomology.Maurya, R. P.; G. B. Pant University of Agri. & Tech., Pantnagar, Udham Singh Nagar(India).College of Agriculture, Department of Entomology. Mall, Pramod; G. B. Pant University of Agri. & Tech., Pantnagar, Udham Singh agar(India).College of Agriculture, Department of Entomology. Bioefficacy of fenpyroximate 5EC against European red Mite,Panonychus Ulmi Koch. infesting apple. Indian Journal of Entomology. (Sept. 2014) v.76(3)p.197-201 KEYWORDS: PANONYCHUS ULMI. APPLES.

    Field trials were laid out to test the effectiveness of neweracaricide i.e. fenpyroximate (Pyromite) 5 EC against European red mite, Panonychus ulmi Koch, infesting apple in Harsil area of Uttarkashi district of Uttarakhand. The experiment was conducted on12-15 years old apple trees cv. Golden delicious under randomized block design with three replications. Various dosage viz. 0.25, 0.5,0.75, 1.0 and 2.0 ml/l of fenpyroximate were compared with conventional acaricides viz fenazaquin 10 EC (0.5 ml/l), sulfer (0.5ml/l) and water spray against P. ulmi during 2010 and 2011. At highest dosage (2.0 ml/l), there was 83.88 and 85.67% reduction of mite population on first day after spray (DAS) which increased 97.33and 98.33% on 10th DAS during 2010 and 2011, respectively. This was significantly superior with fenazaquin 10 EC (0.5 ml/l) and sulfer(0.5 ml/l) where 82.30 and 80.00; 82.30 and 78.60% reduction was recorded during two consecutive years, respectively. However, sulfur was found to be at par with fenazaquin. Significantly, highest yield(171.33 and 158.25 kg/tree) was recorded with highest dosage of fenpyroximate (2.0 ml/l) which was at par with lower dosage (1.0ml/l) of fenpyroximate (170.25 and 155.25 kg/tree) (p 0.05 = 6.428and 5.810) during two consecutive years. At 0.5 ml/l dosage,fenazaquin 10 EC (150.25 & 143.75 kg/tree) proved to be at par with fenpyroximate (155.75 & 148.25 kg/tree) (p 0.05= 6.4298 & 5.810).

164. Sujithra M.; Indian Agricultural Research Institute, New Delhi(India).Division of Entomology. hander Subhash; Indian Agricultural Research Institute, New Delhi(India).Division of Entomology.. Seasonal incidence and damage of major insect pests of pigeon pea, Cajanus Cajon (L.). Indian Journal of Entomology. (Sept.2014) v.76(3) p.202-206 KEYWORDS: MARUCA VITRATA. PEST INSECTS.

    Seasonal dynamics of insect pests in pigeon pea cultivar, Pusa992 during kharif 2011 and kharif 2012 revealed that pest activity commenced from 36th standard meteorological week (SMW) and continued until 46th SMW. The 38th and 39 SMW were found to be more congenial for pest attack in pigeon pea. Highest larval population of Marucavitrata was found to be 8.10 and 17.77 larva per plant while that of Grapholita critical was 5.77 and 6.07 larva per plant during two years, respectively. During kharif 2012, pod borer complex caused19.11 per cent pod damage that could be attributed to M. vitrata (9.7%), pod fly (5.3%), gram pod borer (2.6%) and leaf Webber (2.3%).To undertake an effective IPM strategy in pigeon pea crop, location specific information on occurrence and seasonal dynamics of insect pests is indispensible.

165. Devi M. Bhubaneswari; D.M. College of Science, Imphal(India).P.G. Department of Zoology.mbhubaneshwariahoo.com Devi O. Sandhyarani; D.M. College of Science, Imphal(India). P.G. Department of Zoology. Singh, S. Dineshwar; D.M. College of Science,Imphal(India). P.G. Department of Zoology. Singh, P. Ranabir; D.M.College of Science, Imphal(India). P.G. Department of Zoology.. A preliminary survey of aquatic beetles with some new records from the fresh water lake, Loktak of Manipur, Northeast India. Indian Journal of Entomology. (Sept. 2014) V.76(3)p. 207-214 KEYWORDS: COLEOPTERA. INSECTA.

    Water beetles (Coleoptera) are an important part of most aquatic ecosystems both in larval and adult stages. Of the 14 families of aquatic coleopterans, a large number of species are of in the family Dytiscidae and Hydrophilidae followed by Noteridae, Chrysomelidae,Elmidae, Curculionidae and Hydraenidae as has been found in the Loktak Lake. The distribution and diversity of 24 aquatic beetles based on the work conducted from 2012-2013 in the 12 collection sites of Loktak Lake of Manipur is given. 11 new records are reported.

166. Thube, S.H.; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology..gagan_gkediffmail.com Mahapatro, G.K.; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology. Kumar M.B. Arun; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology.. In vitro evaluation of insecticidal seed treatments in wheat. Indian Journal of Entomology. (Sept. 2014) v.76(3) p.215-218 KEYWORDS: CHLORPYRIFOS. INTEGRATED PEST MANAGEMENT.

    Seed treatment plays crucial role in protecting the emerging seedlings from insect-pests and diseases. Recommendations of seed treatment for various crops are offered by Government of India underits most ambitious programme Total Seed Treatment Campaign since2007. Use of seed treatments in field crops (cereals, pulses and oil seeds) has increased considerably over the past few years. But mostly the field recommendations are not based on in vitro investigation. Thus laboratory evaluations were made with three insecticides – imidacloprid (600 FS), fipronil (5 FS) and chlorpyriphos (20 EC) (each at three doses) to verify deleterious effects of test-doses for wheat – a major cereal crop, following in between paper method. It is advocated that – imidacloprid 3-5;fipronil 4 and chlorpyriphos 2 ml/kg seeds is safe for the emerging wheat seedlings, accordingly location-specific IPM-packages may be formulated.

167. Chanu, Laishram Chitra; Central Agricultural University, Imphal(India). College of Agriculture, Department of Entomology.mkguptacauahoo.in Gupta M. K.; Central Agricultural University, Imphal(India). College of Agriculture, Department of Entomology. Temperatures vs development and fecundity of Myzus persicae sulzer. Indian Journal of Entomology. (Sept. 2014) v.76(3) p.219-223 KEYWORDS:MYZUS PERSICAE. FERTILITY.

    Influence of six temperatures viz., 10^{O}C, 15^{O}C, 18^{O}C, 20^{O}C, 25^{O}Cand 30^{O}C was studied on the development and fecundity of green peachaphid, Myzus persicae. The nymphal development was fastest at 25^{O}C.The longest pre – reproductive (2.97 days), reproductive (31.8 days)and post – reproductive periods (2.03 days) was at extremely low temperature of 10^{O}C compared to shorter duration of these

parameter sat optimum temperature of 25^{O}C. The total life cycle decreased significantly with the increase in the temperature. Maximum fecundity was at 25^{O}C (54.8 nymphs/female) and minimum was 22.8 and 32.4nymph/female, respectively at 10^{O}C and 15^{O}C. Fecundity decreased at extreme high temperature of 30^{O}C compared to 25^{O}C. The nymphal body length, body width, antennal length and cornicle length were maximum at 25^{O}C and minimum at 10^{O}C.

168. Suroshe, Sachin S.; Indian Agricultural Research Institute, New Delhi(India).Division of Entomology.. sachinsuroshemail.com Gautam, R. D.; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology. and, Babasaheb B.; National Institute of Abiotic Stress Management, Malegaon, Baramati(India)..Safety of insecticides against Aenasius bambawalei hayat (Hymenoptera:Encyrtidae). Indian Journal of Entomology. (Sept. 2014) v.76(3) p.224-228 KEYWORDS: INSECTICIDES. HYMENOPTERA. ENCYRTIDAE.

Six insecticides viz; chlorpyriphos 20 EC (0.1%), endosulfan 35EC (0.14%), monocrotophos 36 SL (0.08%), malathion 50 EC(0.25%),dichlorvos 76 EC (0.3%), and alphamethrin 10 EC (0.02%) were evaluated for their toxicity against Aenasius bambawalei the solitary end of parasite of mealy bug, Phenacoccus solenopsis. At the recommended field dose their residual toxicity was extremely high, registering 100% mortality at 24 hrs of exposure. However, when dose was reduced by twenty times the contact toxicity of alphamethrin(55.23%) followed by monocrotophos (78.57%) was less. It was noticed that endosulfan as contact poison was more toxic (85.23%) than as stomach poison (10.88%) and unlike alphamethrin; which showed 55.23% mortality as contact poison while 65.30% as stomach poison. The only insecticide, which did not record mortality after 1 hr exposure, was alphamethrin.

169. Shashank, P. R.; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology.. spathourmail.com Singh L. RoniKumar; Indian Agricultural Research Institute, New Delhi(India). Division of Entomology.. Checklist of the subfamily plusiinae(Lepidoptera: noctuidae) from India. Indian Journal of Entomology. (Sept. 2014) v.76(3)p.229-240 KEYWORDS: LEPIDOPTERA. NOCTUIDAE.

170. Sreedevi K.; Indian Agricultural Research Institute, New Delhi(India), Division of Entomology. kolla. sreedevimail.com TyagiSakshi; Indian Agricultural Research Institute, New Delhi(India), Division of Entomology Sharma Veena; Banasthali Vidyapeeth,Rajasthan(India) Division of Biotechnology.. Species abundance of white grubs associated with sugarcane in Uttar Pradesh. Indian Journal of Entomology. (Sept.2014) vol.76(3)p.241-244 KEYWORDS: BIODIVERSITY. SUGARCANE. SPECIES. UTTAR PRADESH.

Species diversity and abundance of phytophagous Scarabaeidae(Coleoptera) associated with sugarcane was monitored at fortnightly intervals in Amroha district of Uttar Pradesh, during May - July2013. The collections were made with light traps using black and mercury vapor lamps as light source. Studies revealed that Melolonthinae and Rutelinae were represented with 6 and 7 species under 4 and 2 genera, respectively and Dynastinae was poorly represented with one species. In total, 14 species under 7 genera were attracted to the light traps and seasonal variations in the species diversity and abundance were observed. Whittaker rank

abundance curve depicted the presence of Holotrichia nagpurensis Khanand Ghai, Lepidiota mansueta Burmeister followed by Anomala dimidiate(Hope) and Maladera insanabilis (Brenske) as common species.

171. Kaur, Jaswinder; Directorate of Maize Research, Pusa Campus, New Delhi(India).jasspauahoo.com Kumar Pradyumn; Directorate of Maize Research, Pusa Campus, New Delhi(India).Singh Jagbir; Punjabi University, Patiala(India).Suby SB; Directorate of Maize Research,Pusa Campus, New Delhi(India).Plant-age preference for ovipositor by Sesamia inferens (Walker) on maize, Zea mize L.. Indian Journal of Entomology. (sept.2014) v.76(3) p.245-249 KEYWORDS: SESAMIA INFERENS. MAIZE. SESAMIA INFERENS.

    Studies to find out the most preferred host plant-age for ovipositor by Sesamia inferens (Walker) on maize were conducted during Spring, 2012 in green house under controlled conditions at Directorate of Maize Research, Indian Agricultural Research Institute, New Delhi. To get the variable ovipositor expression, a highly susceptible maize cultivar, Basi-local and a least susceptible cultivar, HQPM1 were used and age profile of 4 to 24 day-old plants was exposed to S. inferens adult pairs in a versatile insect rearing cage. The total number of eggs was found more on HQPM1 compared to Basi local both in multi-choice as well as no-choice tests. Inmulti-choice test with HQPM1, the average number of eggs laid per plant by S. inferens was 124.4 on 12-day old plant which was significantly higher than the number of eggs laid on 4, 8, 16, 20 and24-day old plants. In multi-choice test for Basi local, the number of eggs laid on 12 and 16-day old plants were highest and significantly more than the number of eggs laid on other plant ages. The lowest number of eggs was found to be laid on 24-day old plants. In no choice test with HQPM1 however, the number of eggs laid on 8, 12 and 16 day old plants were significantly higher than the number of eggs laid another plant ages. Similarly 12 and 16-day old plant of Basi local received significantly higher number of eggs followed by 20, 24 and8-day old plant under no-choice test. The fecundity expression was better observed in choice scenario than in no choice.

172. Yadav, Ashok Singh; Rajmata Vijay Raj Scindia, Krishi VishwaVidyalaya, Morena (India) Krishi Vigyan Kendra. Farmers participatory on farm evaluation of IPM technology against semilooper and tobacco caterpillar in Soybean. Indian Journal of Entomology. (Sept. 2014) v.76(3) p.250-251 KEYWORDS: INTEGRATED PEST MANAGEMENT. TOBACCO. SOYBEANS.

173. Shameem, K.M.; Kerala Agricultural University ,Vellayani, Trivandrum (India). Department of Entomology. Prathapan K.D.; Kerala Agricultural University, Vellayani Trivandrum (India). Department of Entomology. Rattancane Calamus travancoricus - A new host plant record for spindle bug of are canutpalm, Mircarvalhoia arecae (Miller& China). Indian Journal of Entomology.(Sept. 2014) v.76(3) p.252-253 KEYWORDS: PLANT DISEASES. INSECTA.

174. Aherkar S.K.; Dr. PDKV, Akola(India). Entomology Section College of Agriculture Kulkarni U.S.; Dr. PDKV, Akola(India).Entomology Section College of Agriculture Kale S.N.; Dr. PDKV,Akola(India). Entomology Section College of Agriculture.

Incidence of Zygogramma bicolorata on Xanthium. Indian Journal of Entomology. (Sept.2014) v.76(3) p.253-254 KEYWORDS: XANTHIUM.

175. Mandal Pubali; University of Kalyani, Kalyani Nadia, West Bengal(India). Department of Zoology Saha Arpita, Bandyopadhay P. K;University of Kalyani, Kalyani Nadia, West Bengal(India). Department of Zoology Karmakar Krishna; B.C.K.V. Kalyani, Nadia, West Bengal(India). AINP on Agricultural Acarology. Field evaluation of garlic varieties against Aceria tulipae (keifer) (Acari:Eriophyioidea). Indian Journal of Entomology. (Sept. 2014) v.76(3)p.253-254 KEYWORDS: ACERIA TULIPAE. PEST INSECTS.

176. Ayekpam Natasha; Manipur University, Canchipur(India). Centre of Advanced Study in Life Sciences. Singh N.I.; Manipur University, Canchipur(India). Centre of Advanced Study in Life Sciences. SinghT.K.; Manipur University, Canchipur(India). Centre of Advanced Studying Life Sciences.. tksingh06ahoo.co.in. Edible and medicinal insects of Manipur. Indian Journal of Entomology. (Sept.2014) v.76(3) p.256-259 KEYWORDS: INSECTA. MANIPUR.

177. Sengani S.H.; Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar (India). C.P. College of Agriculture, Department of Agricultural Entomology. Vekaria, M.V.; Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar(India). C.P. College of Agriculture, Department of Agricultural Entomology. Laboratory investigations on the biology of mealy bug, Phenacoccus solenopsis tinsley on BT Cotton. Indian Journal of Entomology. (Sep2014) v.76(3) p.259-261 KEYWORDS: PESTINSECTS.COTTON. PHENACOCCUS.

178. Sharma Devinder; SKUASTJ, Chatha,Jammu(India). Division of Entomology.Ahmad Hafeez; SKUAST-J, Chatha, Jammu(India). Division of Entomology. Srivastva Kuldeep; SKUASTJ,Chatha,Jammu(India).Division of Entomology. Jamwal V.V.S.; SKUASTJ, Chatha, Jammu(India). Division of Entomology. Screening of rose cultivars against rose aphid, Macrosiphum rosae L.(Hemiptera: Aphididae).Indian Journal of Entomology. (Sep 2014) v.76(3) p.262-263 KEYWORDS: MACROSIPHUMROSAE. PEST INSECTS. APHIDIDAE.

179. Sema Tinatoly; Nagaland University, Medziphema(India). School of Agricultural Sciences and Rural Development, Department of Entomology.. tinatolyahoo.com. Dates of sowing and land races against rice ear head bug complex in rice in Nagaland. Indian Journal of Entomology. (Sep 2014) v.76(3) p.264 KEYWORDS: PEST INSECTS. RICE. NAGALAND.

180. Sema Tinatoly; Nagaland University, Medziphema (India). School of Agricultural Sciences and Rural Development, Department of Entomology. Waluniba; Nagaland University ,Medziphema(India).School of Agricultural Sciences and Rural Development, Department of Entomology.. Dates of sowing and land races against rice stem borer complex in Nagaland. Indian Journal of Entomology. (Sep 2014) v.76(3) p.265-267 KEYWORDS: PEST INSECTS. RICE. NAGALAND. SCIRPOPHAGA INCERTULAS.

181. Singh, N; National Research Station for integrated Pest management pusa, New Delhi (India) Tanwar, R.K; National Research Station for integrated Pest management , Pusa, New Delhi (India) Ahuja, D.B; National Research Station for integrated Pest Management, Pusa, New Delhi (India) Sharma, O.P; National Research Station for Integrated Pest Management , Pusa, New Delhi (India). Vanilla, S; National Research Station for Integrated Pest Management , Pusa, New Delhi (India). ICT- Based integrated pest management system in India. SatsaMukhapatra. (Feb 2016) v.20, p.39-45 KEYWORDS: INTEGRATED PESTMANAGEMENT. HORTICULTURE. INNOVATION.

    The Information Communication Technology (ICT)-based system of pest surveillance has become indispensable component of integrated pest management system. The National Research Centre for Integrated Pest Management (NClPM) has developed an lCT-based system that encompasses computer-based storage, transfer, retrieval, sharing, and reporting of pest data for appropriate and timely decision-making for better pest management. The technology on e-pest surveillance and advisory was developed with the aim of collection and transfer of data on insect ; pests and diseases from remote villages to NCIPM through internet and issue of pest management advisories to the main stakeholders in the form of short message service '(SMS) to the mobile phones of the registered farmers. Since the inception of unique ICT-based pest surveillance system during 2008, NCI PM has developed several ICT-based pest surveillance systems vis. National Information System for Pest Management (NISPM) / On-Line Pest Monitoring and Advisory Services (OPMAS), Crop Pest Surveillance and Advisory Project (CROPSAP), Horticulture Surveillance and Advisory Project (HortiSAP), Accelerated Pulses Production Programme (A3P),National Innovations on Climate Resilient Agriculture (NlCRA), pest surveillance programme in Malawi (Africa), etc. and successfully managed pest problems in several crops of India and abroad. Timely issue of appropriate plant protection advisories is helpful inappropriate decision-making which may not only result in saving crops worth millions of rupees but also save environmental cost and conserve the beneficial organisms.

182. Saha,K.; Rice Research Station, Chinsurah, West Bangal (india) Gosh,S; Department of Entomology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur West Bangal (India) Sarkar, P.K; Department of Entomology, Bidhan Chandra Krishi Viswavidyalaya, Mohaanpur, West Bangal (India). Rice Sheath Mite (Steneotarsonemus Spinki Smiley): An Emerging pest and its Occurrence in popular Rice varieties of West Bengal. Satsa. (Feb 2006) v. 20, p.154-160 KEYWORDS: RICE. STENEOTARSONEMUS. MITE CONTROL.

    The rice sheath mite, Steneotarsonemus spinki Smiley (Acari:Tarsonernidae). is becoming a serious pest of rice crop in West Bengal as well as India. Forty three commonly grown early, mid.early, medium, late and long duration rice varieties were screened for their tolerance and susceptibility levels against the mite at Rice Research Station, Chinsurah, West Bengal during kharif season of 2011 and 2012. Mite infestation was noticed on leaf sheath as well as grains with brownish patches, leading to higher proportion of chaffy grains in panicles with substantial yield losses. None of the varieties were found to be resistant. However, some rice

varieties viz. Jaldi 13 (12.33), PR 113 (13.33), Pratikkha (11.31), Triguna(16.17), Chapakhusi (7.77), Jayasilet (8.21), Mandira (5.21), SambaMashuri (5.66) and Ranjit (3.42) proved to be tolerant with comparatively lower mite population, whereas some others viz. lET 4786 (127.07), IR 36 (117.45), IR 64 (90.67), PNR 519 (84.67),Sasyasree (68.33), lET 5656 (40.56), CN 1039-9 (42.64) and MTU 7029(35.56) were found to be susceptible owing to more mite incidence. Of different morphological characters of rice varieties studied, only chaffy grain and grain yield showed significantly positive and negative correlation with mite population, respectively. Mite population was negatively correlated with rainfall and minimum temperature, whereas the correlation was positive with sunshine hours and maximum temperature.

183. Mahmoud M. Abdel-Azim; King Saud University, Riyadh (Saudi Arabia). College of Agricultural Sciences. Dept.of Plant Protection Rashid M. Khan; King Saud University, Riyadh (Saudi Arabia). College of Agricultural Sciences. Dept.of Plant ProtectionSaleh A. Aldosari;King Saud University, Riyadh (Saudi Arabia). College of Agricultural Sciences. Dept.of Plant ProtectionVidyasagar, P.S.P.V.; King SaudUniersity, Riyadh (Saudi Arabia). College of Agricultural Sciences. Dept.of Plant Protections my M. Ibrahim; King Saud University, Riyadh(Saudi Arabia). College of Agricultural Sciences. Dept.of Plant Protection Paraj Shukla; King Saud University, Riyadh (Saudi Arabia).College of Agricultural Sciences. Dept.of Plant Protection. Studies for colour-selection of Rhynchophorus ferruginous pheromone trap. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 386-391 KEYWORDS: PHOENIX DACTYLIFERA. PHEROMONE TRAPS. RHYNCHOPHORUSFERRUGINEUS.

H20 Plant diseases

184. Sadanand K. Mushrif; Rubber Research Institute of India,Kottayam (India). sadanandubberboard.org.inKavitha K. Mydin; Rubber Research Institute of India, Kottayam (India) Edwin Prem, E.; Rubber Research Institute of India, Kottayam (India). Reaction of the polycross progenies to two major lea diseases of rubber (Heveabrasiliensis). Journal of Plantation Crops (India). (Dec 2013) v.41(3) p.398-403 KEYWORDS: LEAF FALL. PHYTOPHTHORA. MILDEWS. OIDIUM.

A three-year study was undertaken to evaluate the polycrossprogeny of proponent clones for their tolerance /susceptibility for abnormal leaf fall (ALF) disease caused by Phytophthora spp. and powdery mildew (PM) disease caused by Odium heave at the Central Experiment Station of Rubber Research Institute of India at Chethackal in Ranni. The clones were evaluated during 11th to 13thyear after planting. The data obtained were analyzed and computed progeny wise and clone wise. The pooled data of three years showed that for ALF disease, the clone P 128 (progeny of AVT 73) was superior over other clones with leaf retention of 76 per cent followed by the clones P 75 (progeny of PB 217) and P 69 (progeny of PB 252) showing leaf retention of 75 per cent. However, the evaluation of the progenies and clones within each progeny against PMdisease were not encouraging as lot of variation was observed among the progenies and clones and the disease intensity in general, was very high. The pooled data of three years of assessment on PM disease revealed that the clone P60 evolved from the progeny

of RRII 105 and the clones P 54 and P 104 evolved from the progeny of 5/76 showed less than 25 per cent of PDI and thus, were tolerant. The ALF disease tolerant clones P 132, P 69 and P 128 are also reported to be promising in terms of latex and timber yield.

185. Napoleon,P.; UPASI Tea Research Foundation, Valparaiso (India) Balamurugan, A.; UPASI Tea Research Foundation,Valparai (India) Jayanthi, R.; UPASI Tea Research Foundation, Valparaiso(India) Mareeswaran, J.; UPASI Tea Research Foundation, Valparaiso(India) Premkumar, R.; UPASI Tea Research Foundation, Valparai (India). Bio efficacy of certain chemical and bio fungicides against Hypoxylonspp. causing wood rot disease in tea. Journal of Plantation Crops(India). (Dec 2014) V. 42(3) p. 341-347 KEYWORDS: BIOLOGICAL CONTROL. CONTROL METHODS. FUNGICIDES. HYPOXYLON. TEA. WOOD DECAY.

Wood rot disease caused by Hypoxylon serpens is the most widespread and serious stem disease in tea. Among the 350 bacteria land 35 fungal biocontrol isolates collected from several tea growing regions of southern India, three bacterial isolates produced higher antagonistic potential against this fungal pathogen. Two of the efficient strains were identified as Bacillus sp. (HBCWR-3 andWR46-2) and third one was Pseudomonas sp. (WR5-4). In case of fungal biocontrol agents, the type culture Trichoderma viride procured from Microbial Type Culture Collection (MTCC) performed better in controlling the pathogen over T. harzianum. Five systemic fungicides, hexaconazole, carbendazim, tebuconazole, tridemorph, benomyl and acontact fungicide, copper ox chloride were evaluated for studying their bioefficacy against wood rot pathogen. In this study, benomyl50% WP or copper ox chloride at the lowest concentration (0.01%)completely inhibited the growth of the fungus in vitro. Moreover, bioefficacy of certain plant aqueous extracts of Azadirachta indica,acetone extracts of Pongamia pinnata, Cinnamon, Artemisia nilagirica,Lantana camera, Ageratum conyzoides and a bryophyte, Heteroscyphus argutus were also studied against H. serpens. Among them, A.nilagirica followed by H. argutus and A. indica were effective in controlling the wood rot pathogen. In the case of liquid biofungicides tested, ‘Expel’ controlled the tea pathogen efficiently. The present study revealed that, chemical fungicide(Benomyl or copper ox chloride at 0.01%), botanical extracts at 10%(A. nilagirica, H. argutus, Azadirachta and ‘Expel’) and biocontrol agents (Bacillus sp., Pseudomonas sp. and T. viride) were effective in controlling wood rot pathogen under in vitro condition.

186. Johnson, I.; Tamil Nadu Agricultural University, Aliyarnagar (India). Coconut Research Station. B.; Tamil Nadu Agriculture University , Coimbatore, Tamil Nadu (India). Dept. of Medicinal and Aromatic Plants. Rajamanickam, K.; Tamil NaduAgricultural University, Aliyarnagar (India). Coconut Research Station.. Biological management of leaf blight disease of coconut using rhizosphere microbes. Journal of Plantation Crops (India). (Dec2014) V. 42(3) p. 364-369 KEYWORDS: COCONUTS. BIOLOGICAL CONTROL. BOTRYODIPLODIA THEOBROMAE. BOTRYODIPLODIA. LEAVES. BLIGHT. PSEUDOMONAS FLUORESCENS.

The production and productivity of coconut is seriously affected by various factors including pest and diseases. Among the foliar diseases, the leaf blight caused by Lasiodiplodia the obromae is a serious problem accounting 10-24 per cent yield reduction in TamilNadu. Several fungicides were found to be effective for the management of coconut leaf blight disease. Continuous use of fungicides leads to inherent ill-effects like residual toxicity, resistance to fungicide, environmental pollution etc. Hence, biological control is the only alternative method which is cheap, easy to use and eco-friendly. In the present study, a total of twenty-five fungal (Trichoderma viride) and bacterial (Pseudomonas fluoresces and Bacillus subtilis) antagonists were isolated from the rhizosphere soil and screened against L. the obromae. In vitro evaluation revealed that the rhizospere bacteria P. fluorescensisolate Pf1 was found to be highly effective against L. the obromaecompared to the other bacterial and fungal antagonists. Further, the best antagonist Pf1 was evaluated as root feeding of 100 per cent culture suspension with different combinations and durations for two-year (2010-11 and 2011-12) against leaf blight disease under field condition in three different locations viz., Kambalapatti,Karianchetti palayam and Samathur villages of Pollachi taluk,Coimbatore. Observations were recorded on 0-5 scale and the per centdisease index (PDI) was calculated. Among the treatments imposed, root feeding of P. fluorescens culture suspension 25 mL at quarterly interval combined with soil application of P. fluoresces talc formulation (50 g) + Neem cake 5 kg was found to be the best and significantly reduced the incidence to 12.9, 11.9 and 7.9 per cent during 2010-11 and 8.1, 8.1 and 6.5 per cent during 2011-12 in the locations viz., Kambalapatti, Karianchetti palayam and Samathur, respectively.

187. Meena, B.; Tamil Nadu Agriculture University ,Coimbatore ,TamilNadu(India). meepathediffmail.com Ramjegathesh, R.;TamilNadu Agriculture University, Coimbatore, TamilNadu(India) Ramyabharathi,S.A.;TamilNadu Agriculture University, Coimbatore ,Tamil Nadu(India). Evaluation of biocontrol agents and fungicides against stem bleeding disease of coconut. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 395-399 KEYWORDS: COCONUTS. STEMS. HAEMORRHAGE. CERATOCYSTIS PARADOXA.

188. Kumar, G; Department of mycology and pathology , Banaras Hindu University, Varanasi (India)Sarma, B.K; Department of mycology and pathology , Banaras Hindu University, Varanasi (India). Eco- friendly Management of soil born Plant pathogens Through plant growth promoting Rhizobacteria.. Satsa Mukhapatra. (Feb 2016) v. 20,p.167-171KEYWORDS:MANAGEMENT.PLANTPATHOLOGY.MICROBIALECOLOGY.

H60 Weeds

189. Phebe Joseph; Rubber Research Institute of India, Kottayam (India). Jessy, M.D.; Rubber Research Institute of India, Kottayam (India). Agro-economic evaluation of different weed control methods in rubber plantation. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.380--383 KEYWORDS: CONTROLMETHODS. WEED CONTROL.

The selection of the most suitable method of weed control has an important role in the efficient and economical control of weeds in rubber plantations. A comparative evaluation of work capacity, energy consumption, cost of operation and rate of weed regeneration(efficiency of weed control) of different weed control methods were studied in a field experiment at the Central Experiment Station of the Rubber Research Institute of India, Chethackal, Central Kerala. The weeding methods included slashing of weeds with sickle (manual weeding), spraying of herbicide (glyphosate 2 L ha-1) and mechanical weeding by weed cutters. The results of the study revealed that there was significant difference in work capacity, energy consumption, cost of operation and rate of regeneration of weeds among different weed control methods. The highest work capacity of 16 h ha-1 was observed in the mechanical weed control whereas the energy consumption (38.03MJ ha-1) and rate of regeneration of weeds were the lowest in chemical weed control method. Compared to manual weeding, the cost comparison of different weed control methods showed that the weeding cost can be reduced by 65 and 75 per cent by chemical and mechanical weed control methods respectively. Considering the long term sustainability, environmental factors, scarcity of labourers and economics, mechanical weed control by weed cutters is the most suitable method for weed control in rubber plantations.

190. Hazra, D; Department of ASEPAN , Institute of Agriculture Birbham,west Bengal (India)Duary , B; Department of ASEPAN ,Institute of Agriculture Birbham , west Bengal (India). Emergence profile of different categories of weed in summer sesame (Sesamum indicum L.). Satsa Mukhapatra. (Feb 2015) v.19, p. 120-125 KEYWORDS: WEED CONTROL. SESAMUM INDICUM. FARMS. SESAMUM INDICUM.

A field investigation was carried out during summer season of 2006 and 2007 at the Agricultural Farm, Visva-Bharati, Sriniketan(West Bengal) to study the emergence profile of different weed categories in summer sesame (Sesamum indicum L.). The soil was sandy loam, moderately fertile and acidic iI) nature. The experimental field was infested with eight weed species (four grasses and four broad leaved weeds). Digitaria sanguinalis (among grasses) and Spilanthes.acmella (among broad leaved weeds) were found to be mostpre- dominant species. The results revealed that the grassy weeds emerged first, followed by broad leaved weeds in summer sesame during both the years. Emergence of grassy weeds commenced from 5 and 4 days after sowing (DAS), whereas broad leaved weeds started to appear from 10 and 6 DAS in first and second year, respectively. Two peak periods of emergence for grasses and three peaks for broad leave weeds were observed. Emergence of grassy weeds was more dependent on soil moisture while that of broad leaved weeds was influenced both by soil moisture and temperature

N01 Agricultural engineering

191. Balasubramanian, D.; Directorate of Cashew Research, Puttur(India). Joycy Rodriguez Lyra Kokila; Directorate of Cashew Research, Puttur (India). Performance evaluation of mechanized shelling machines for steam treated raw cashew nuts.

Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.185-190 KEYWORDS: CASHEWS. PROCESSING.

192. Prasannakumari, P.; Rubber Research Institute of India,Kottayam (India). prasannakumariubberboard.org.in Mercykutty Joseph; Rubber Research Institute of India, Kottayam (India) Jessy, M.D.;Rubber Research Institute of India, Kottayam (India) Annie Philip; Rubber Research Institute of India, Kottayam (India). Estimates of nitrogen fixation by legume cover crops grown in young rubber plantation using 15N isotope dilution technique. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.205-209 KEYWORDS: RUBBER. CROPS.

193. Mary Rani, K.L.; Directorate of Oil Palm Research,Pedavegi(India). klmaryranimail.com Prasad, M.V.; Directorate of Oil Palm Research, Pedavegi(India) Arul raj, S.; Directorate of Oil Palm Research, Pedavegi(India) Krishna Hemanth, G.; Directorate of Oil Palm Research, Pedavegi(India). Software design and application for oil palm kisan mobile message services in India. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.272-275 KEYWORDS: DATABASES. OILPALMS.

194. Mohankumar, C.; SCMS Institute of Bioscience and Biotechnology Research& Development, Cochin (India) Balachandran, C.; SCMS Institute of Bioscience and Biotechnology Research & Developement,Cochin (India)Salini Bhasker; SCMS Institute of Bioscience and Biotechnology Research & Development, Cochin (India)Harish, M.; SCMS Institute of Bioscience and Biotechnology Research & Developement,Cochin (India)Rajesh, M.D.; SCMS Institute of Bioscience and Biotechnology Research & Development, Cochin (India) PradeepThevanoor; SCMS School of Engineering and Technology, Ernakulum(India). Coconut oil as biofuel for diesel engines. Indian Coconut Journal (India). (Jan 2015) V. LVII(9) p. 17-23 KEYWORDS: COCONUTOIL. BIOFUELS. DIESEL ENGINES.

N02 Farm layout

195. Simi Thomas; Coconut Development Board, Regional Office,Banglore (India). Sri Bhagyalakshmi farms, the true lakshmi of nagaraj. Indian Coconut Journal (India). (Apr-May 2014) v.LVI(12) &v.LVII(1) p.30-31 KEYWORDS: FARMS. COCONUTS. FARMERS.

N10 Agricultural structures

196. Manjunath M. Klamath; Palakkad Coconut Producer Company Limited, Palatka(India). PCPCL-A role model for FPOs. Indian Coconut Journal (India). (Nov 2014) v. LVII(7) p.37-40 KEYWORDS: MODELS. COCONUTS.

N20 Agricultural machinery and equipment

197. Balasubramanian, D.; Directorate of Cashew Research, Puttur (India). Comparative performance of mechanized peeling machines for unpeeled cashew kernels – A

case study. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 323-328 KEYWORDS:CASHEWS. MECHANICAL METHODS. PEELING.

Mechanization of cashew nut processing in India has become inevitable due to growing problem of non-availability of work force at various stages of processing. Peeling is the process of removing the outer skin called testa to obtain edible kernels. Traditionally shelled kernels were peeled manually using wooden pellets or knives after drying. Qualitative and quantitative efficiency vary depending on the skill of labour involved in the operation. Mechanized peeling machines were introduced in the Indian cashew processing system for twin reasons, to tackle the problem of labour shortage and to enhancerate of production. This study deals about the performance of three different mechanized peeling machines viz., shear type, brush type and abrasion type available in the line of processing in terms of operational capacity, peeling efficiency and whole kernel recovery. Operational capacity found to be in the range of 108 to 332 kg h^{-1} for the type of peeling machines and origin of the cashewnuts.Variation in the adherence of testa with the kernel afterpiece-treatment would be the key factor influencing the operation capacity with respect to different origin of cashew nuts considered. Mean values of whole kernel recovery (70.1) and peeling efficiency (79.1) recorded for shear type peeling machine and raw cashew nut so btained from Maharashtra were found to be higher than all other trials. Whole kernels obtained at the end of peeling process were higher during the first pass than the second pass. Possibly, the forces viz. impact or shear or abrasion force depending on the type of peeling machine, acted on these kernels during first pass, once again applied with the same intensity during second pass resulted ina marginal reduction in the whole kernel recovery. The performance parameters such as operational capacity, whole kernel recovery and peeling efficiency were found to be non-significant among the machines considered for the present investigation. Besides, cost economics was worked out and compared with existing manual peeling process. Increase in the net benefit was 53.9, 68.4 and 47.4 per cent respectively for shear, brush and abrasion type mechanical peeling machines.

198. Venkatesha, M.M.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Babou, C.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kamala Bai, S.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Raghuramulu, Y.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Studies on comparative efficiency of different mechanical harvesters in coffee with reference to manual harvesting. Journal of Plantation Crops (India). (Dec 2014) V. 42(3) p. 400-403 KEYWORDS: COFFEE. EFFICIENCY. HARVESTING. MECHANICAL METHODS.

P30 Soil science and management

199. Meti, S.; University of Horticultural Sciences, Bagalkot,(India). shankarmetimail.com Meerabai, M.;Kerala Agricultural University,Vellayani, Trivandrum(India). College of AgricultureJacob,J.; Rubber Research Institute of India, Kottayam (India) Saifudeen,M.; Kerala Agricultural University,Vellayani,

Trivandrum(India).College of Agriculture. Geospatial variability of soil and climate on performance of rubber (Hevea brasiliensis Muell. Arg.)in traditional region of India. Journal of Plantation Crops (India). (Aug 2014) v.42(2) p.175-184 KEYWORDS: CLIMATE. RUBBER. WATER BALANCE.

200. Maji, B; Central Soil Salinity Research Institute, Regional Research Station, West Bengal, (India)Lama, D.T; Central Soil Salinity Research Institute, Regional Research Station, West Bengal, (India). Improving productivity of vulnerable coastal soil under changing Climate.. Satsa Mukhapatra. (Feb 2016) v. 20, v.46-52 KEYWORDS: SOIL. SALINITY. CLIMATIC CHANGE. SUSTAINABILITY. LAND.

The coastal zone of India which plays a vital role 15 contributing to the national economy and supports the livelihoods of several million people is highly fragile and vulnerable to degradation and the impacts of climate change. Soil salinity and water logging are the major land degradation problems in the region. Salinity build-up in the coastal soils is mainly due to salinity in grass of ground water aquifers owing to presence of high saline ground water table, excessive withdrawal of ground water, sea water in gress, and poor land and water management. Coastal regions having flat topography with impeded drainage face prolonged water logging during kharif season. Enhancing agricultural productivity for ensuring food and livelihood security of the coastal people is the biggest challenge. There are ample opportunities for improving agricultural productivity in the region through improved land and water management practices including careful choice of crops adapted to the region. Such land shaping techniques involving farm ponds, deep furrow and high ridge, shallow furrow and medium ridge, broad bed and furrow, three- tier land configuration, paired bed technique, paddy-cum-fish cultivation and brackish water aquaculture pond have the potential to tackle the problem of land degradation and declining productivity to a great extent.

201. Das, K; National Bureau of soil survey and Land use Planning, Kolkata, West BengalSarkar, D; Department of Agriculture Chemistry and soil sciences, west Bengal, (India). Soil degradation: status and management Options in west Bengal. Satsa Mukhapatra. (Feb 2016) v.20, p.63-76 KEYWORDS: SOIL. DEGRADATION. MANAGEMENT. FERTILITY.

Soil degradation in West Bengal is estimated to be occurring in 21 ,40,000 hectares of land, covering about 25% of the total geographic area of the state. Major cause of soil degradation is water erosion which affects 14% area of the state. Other significant causes are soil acidity, soil salinity and water logging. Serne agricultural practices such as continuous cropping with limited supply of organic amendments, using high analysis chemical fertilizers, removal of crop residues and excessive tillage are the reasons for soil degradation. The negative effects of faulty agricultural practice son soils of the concerned areas are: decline in soil organic carbon, loss of soil fertility and contamination of soil with arsenic. The most promising strategies to restore degraded soils of the state areto develop appropriate site- specific management practices so that soil organic carbon is increased, soil fertility is enhanced and all forms of erosion are reduced. This will

enable us to meet rapidly increasing food, feed, fiber, and fuel needs of our population, while protecting our vital soil resources.

202. Rakshit, A; Department of soil science and Agricultural Chemistry,BHU, Varanasi (India). Parihar, A Department of soil science and Agricultural Chemistry, BHU, Varanasi (India)Yadev, R.S; Department of soil science and Agricultural Chemistry, BHU, Varanasi (India) Abhilash, P.C; Department of soil science and Agricultural Chemistry,BHU, Varanasi (India). soil are Back at center stage: Development and Trends. Satsa Mukhapatra. (Feb 2016) v. 20, p. 77-80 KEYWORDS: DEGRADATION. FOOD PRODUCTION. NATURAL RESOURCES. SUSTAINABILITY.

    Our soils are in danger because of expanding cities, deforestation, unsustainable land use and management practices, pollution, overgrazing and climate change. The current rate of soil degradation threatens the capacity t9 meet the needs of future generations. The promotion of sustainable soil management is central to ensuring a productive food system, improved rural livelihood and a healthy environment for the generations to come.

203. Rai, s; Department of Soil Sciences and Agriculture Chemistry , BHU ,Varanasi, (India)Rakshit, P; Department of Soil Sciences and Agriculture Chemistry , BHU , Varanasi, (India)Rani, P; Department of Soil Sciences and Agriculture Chemistry , BHU , Varanasi, (India)Rai,A.K; Department of Soil Sciences and Agriculture Chemistry , BHU,Varanasi, (India)Kumar, M; Department of Soil Sciences and Agriculture Chemistry, BHU, Varanasi, (India) Bhowmick, M.K; Rice Research Station, chinsurah (India). Potential Appraisal of Biocharin Agriculture : Farm soil health to Crop productivity. SatsaMukhapatra. (Feb 2016) v. 20, p.81-92 KEYWORDS: AGRICULTURE.GREENHOUSES. SOIL FERTILITY. CLIMATIC CHANGE.

    Use of biochar in agriculture is not a new one; rather it is a traditional practice in several regions of the world. But its use assoil amendment is proposed as a new approach towards mitigating climate change and improving soil productivity. Biochar refers to akind of charcoal made from biomass. Unlike charcoal made for fuel,biochar has properties which make it a valuable soil amendment. The decrease in biomass production, decrease in organic matter supplyand increased decomposition rate are the primary factors to reduction in soil organic matter. Biochar is a stable carbon compound created when biomass is heated to temperatures between 300 and 1000 Degree, under low oxygen concentrations. Biochar is attracting attention as a means for sequestering carbon and as a potentially valuable input for agriculture to improve soil fertility and sustainable production. Soil health management with biochar is evaluated globally as a means to improve soil fertility and to mitigate climate change.

204. Ray, De,M; soil Testing Laboratory, Berhampur, west bangal, (India)Ghosh, P.P; Krishi Vigyan Kalyan, Purulia (India). Organic soil amendment : A holistic Strategy for Resilient Agriculture. Satsa Mukhapatra. (Feb 2016) v. 20,p.93-103 KEYWORDS: PLANT CONDITION. SOIL. MANAGEMENT. AGRICULTURE.

    Various types of composts and organic soil amendments play a pivotal role in sustaining the soil fertility and plant health for their intrinsic acquired abilities to perform an array of functions such as soil humus formation, plant growth

promotion, biological control of pest organisms, improvement of soil tilth and structure,etc. Varieties of carbon enriched compounds present in organic amendments influence the dynamics and activities of beneficial micro biota in soil. Usual addition of organic residues can increase soil physical fertility, mainly by improving aggregate stability,decreasing soil bulk density and increasing water holding capacity. Organic residues are particularly important for plant nutrition as they provide plants not only with available nitrogen, phosphorus, potassium and different secondary and micro-nutrients but also with physiologically active substances that stimulate plant growth. Soils oppressiveness towards soil-borne plant pathogens can be achieved by altering the diversity and balance of microorganisms in soil by repeated application of different types of compost and decaying organic matter. Application of different types of organic amendments in soil for long run will not only have an impact on sustainable economic development, but also contribute to a resilient agricultural ecosystem.

205. MukherJee, s; Institute of Bio- und geowissenschaften, Julich,(germany)Tappe, W; Institute of Bio- und geowissenschaften, Julich,(germany)Weihermuller, L; Sustainable Camp, Julich, (germany). soil using decontamination of point source pollution of ground and surface water in combination with Bio- energy Residues. Satsa Mukhapatra. (Feb 2015) v.19, p.83-87 KEYWORDS: POLLUTION. RESIDUES. RESPIRATION. RESPIRATION.

To overcome the problem of on-farm point pollution originated from cleaning pesticide spraying equipment, easy and cheap on-farmbiopurificationsystems are under development. To optimize such systems, the combination of soil amended with biochar and/ordigestate are under investigations. Therefore, a sophisticated screening procedure based on respiration, degradation adsorption/desorption are under investigations to identify themostappropriate mixture with respect to different radiolabel led pesticide classes (herbicides, fungicides and mixtures). The present paper is aimed mainly to focus on the outcomes of the screening steps which will already provide information about the microbial activity and efficiency of the suitable mixture for the bio purification system.

P34 Soil biology

206. Kumar G. V. Suneel; Acharya N. G. Ranga Agricultural University(India). Agricultural Research Station, DarsiPrasad, B. Ram; AcharyaN. G. Ranga Agricultural University(India). District Agricultural Advisory and Transfer of Technology Centre, Warangal. Assessment of transgenic cotton with cry1ac and cry2ab genes on population dynamics of soil dwelling non-target organisms. Indian Journal of Entomology. (Sept. 2014) v.76(3) p.181-187 KEYWORDS: OLIGOCHAETA. BACILLUSTHURINGIENSIS. BIOASSAYS.

Field and laboratory studies were conducted in Andhra Pradesh, to assess the impact of Bollgard cotton expressing stacked genes of Cry1Ac and Cry2Ab on soil dwelling non-target organisms. The sampling was done by pit fall traps during the cropping season 2008-09. Average number of earthworms at 114 days sampling time-point at central India was 2.67 to 20.00 for Bollgard II, 21.00 for Bollgard,6.67 for NHH 44 and 4.67 for local check. The level of Cry proteins in the soil samples was determined by soil-diet incorporation bioassays. The mean % larval survival of

H. armigera was 97.8, 97.9and 98.1 and for E. vittella was 97.8, 97.7 and 97.7 for Bollgard II,Bollgard and non-Bollgard plots, respectively. These findings revealed that Bollgard II cotton did not adversely affect soil dwelling non-target and beneficial soil organisms and no detectable Cry proteins were present in any of the soil samples examined.

207. Saha, S; Indian Institute of Vegetable Research, Varanasi(India) Loganathan, M; Indian Institute of Vegetables Research, Varanassi(India). Rai, A.B; Indian Institute of Vegetable Research, Varanassi(India) Garg, R; Indian Institute of Vegetables Research,Varanassi(India). Role of microbes in soil Health Improvement. Satsa Mukhapatra. (Feb. 2016) v. 20, p.53-62 KEYWORDS: MICROORGANISMS. SOIL. AGRICULTURE.

Interaction, whether mutuality, symbiotic or suppressive, that coexists in soil ecosystem within the plants, microbes or micro fauna, is the most important phenomenon which regulates the soil health vis-a-vis the plant health. The most intense interaction between microbes and plants takes place at the rhizosphere, where complex biological and biochemical activities between microbes-microbes, microbes-plants and plants-plants are always going on to influence the biodiversity of beneficial organisms, suppression of pathogenic micro flora and physico-chemical behavior-of soil. Microorganisms appear to be excellent indicators of soil health as they respond quickly to changes in soil eco-system and have intimate relations with their surroundings owing to their high surface to volume ratio. The useful microorganisms can be exploited for the improvement of soil health since they are involved in many soil processes.

208. Rakshit, A; Department of soil sciences and Agriculturechemistry,BHU, Varanasi (India). Soil Biodiversity : Stars Beneath our Feet. Satsa Mukhapatra. (Feb 2015) v.19, p.43-48 KEYWORDS: SOIL. ORGANICMATTER. SOIL BIOLOGY. CLIMATIC CHANGE.

The large but often forgotten section of global biodiversity that should no longer be ignored is soil biodiversity. A healthy soil depends on a vibrant range of life forms living below the ground, from bacteria and fungi to tiny insects, earth worms and moles. Together, this rich biodiversity brings immeasurable benefits to life on Earth. It plays a vital role in mitigating climate change, storing and purifying water, providing antibiotics and preventing erosion. The well-being of all plants and land-based animals depends on the complex processes that take place in soil. With the existence of living organisms on Earth and the value of biodiversity to outlives, it calls for having a look beneath our feet to discover and prize the unfamiliar world.

209. Roy, D. M; Soil Testing laboratory,Berhampore (west Bangal)Sarkar, K;Department of Plant pathology, Bidham chadra Krishi Viswavidyalaya Mohanpur, (India) Department of Microbiology , Vidyasagar university ,west bangal (India)Ghosh, P.P; Department of Plant pathology, Bidhamchadra Krishi Viswavidyalaya Mohanpur, (India), Krishi vigyan Kendra, Kalyan , West Bengal (India)Dutta, S; Department of Plant pathology, Bidham chadra Krishi Viswavidyalaya Mohanpur, (India). use of microbial inoculation in resilient agriculture : Prospects and Limitations. Satsa

Mukhapatra. (Feb 2015) v.19, p. 88-96 KEYWORDS: BIOFERTILIZERS. PLANT GROWTH SUBSTANCES. SOIL.

Modern crop varieties and hybnds have resulted pnenornenarmcrease III productivity with the intensive use of chemical inputs. With mostly agriculture-based economies, developing countries have achieved food self sufficiency along with rising rural income and economic growth. While such gains have been very impressive, the input-intensive agriculture has resulted in some undesirable effects on the environment, particularly soil health and farming system sustainability. Exploitation of beneficial microbes as biofertilizersis of paramount importance in agriculture for their potential rolesin food safety and sustainable crop production. These microbial inoculants(biofertilizers) supply nutrients, improve availability of unavailable forms of certain others, provide protection against several plant pathogens and/or plant diseases. etc. Their roles in supplementing nutrition make them ideally suitable in integrated nutrient management systems. The present review illustrates the opportunities for their prospective exploitation as an important component of sustainable agriculture, and certain limitations in their practical usage.

P35 Soil fertility

210. Srinivasan, R.; National Bureau of Soil survey and Land use planning, Kolkata(India). Regional Centre. srinivasan. suryamail.com Natarajan, A.; National Bureau of Soil survey and Land use planning, Bangalore (India) Kalaivanan, D.; Directorate of Cashew Research,Puttur(India)Anil Kumar, K.S.; National Bureau of Soil survey and Land use planning, Bangalore (India). Soil fertility status of cashew growing soils of Dashing Kannada district of coastal Karnataka. Journal of Plantation Crops (India). (Dec 2013) v. 41(3) p.373-379 KEYWORDS: CASHEWS. FERTILITY. NUTRIENTS. MICRONUTRIENT FERTILIZERS.

Soil fertility status of six pedons of cashew growing regions of coastal Karnataka in Dakshina Kannada district were determined. The soils were acidic in reaction, non-saline in nature (free of soluble salts) and low (subsurface soil) to high (surface soil) in organic carbon status. The clay distribution, cation exchange capacity and base saturation of the soils varied from 24.5 to 66.4 per cent, 7.60to 19.8 cmol (p+) kg-1 and 4 to 32 per cent, respectively. The macronutrients status of the soil samples indicated that the available nitrogen content varied from low to medium in all the pedons, the soils were low in available phosphorus, low to medium in available potassium and available sculpture. Among the DTPA extractable micronutrients, iron and manganese were in sufficient range in most soils, available copper was sufficient and available zinc was deficient. The available macronutrient and micronutrient content were found to decrease with increasing the depth of the soils. Phosphorus and zinc were highly deficient in all the pedons of the cashew growing areas of Dakshina Kannada.

211. Selvamani, V.; Central Plantation Crops Research Institute, Kasaragod (India). selvamanivmail.com Duraisami, V.P.; Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu(India). Identifying and mapping soil fertility constraints for coconut in Coimbatore and Tiruppur districts of Tamil Nadu state, India. Journal of

Plantation Crops (India). (Dec 2014) V. 42(3) p. 348-357 KEYWORDS: COCONUTS. CONSTRAINTS. SOIL FERTILITY.

The plantation crops like coconut being perennial in nature mine nutrients from limited volume of soil for a long time and hence, to sustain the high productivity, soil nutrients status should be monitored and have to be replenished. The present study was carried out to identify and map the soil fertility constraints for enabling site-specific nutrient management to enhance the productivity of soil. Study area was the coconut land cover of Coimbatore andTiruppur districts of Tamil Nadu state. In this study, survey was carried out in the coconut plantations of these districts (73 sitesin Coimbatore and 37 sites in Tripper) and soil samples were collected and analyzed for their physico-chemical and chemical properties. Using the analytical results thematic maps on soil fertility constraints were prepared. The developed maps showed that 62 and 30 per cent of soils of coconut land cover found to be immoderately alkaline and alkaline condition respectively. Around 96 per cent area was in non-saline condition. Organic carbon status was low in 65 per cent of the coconut land cover. Available N, P, and Kwere low in 65, 0.8 and 0.02 per cent area respectively and S was deficient in 0.05 per cent area. Fe deficiency was recorded in 7 percent of the area and there was no Mn deficiency in the study area. Available Zn, Cu and B were deficient in 89, 62 and 5 per cent area respectively.

Q01 Food science and technology

212. Social entrepreneur urges farmers to look beyond copra. Indian Coconut Journal (India). (Aug 2014) v.LVII(4) p.25 KEYWORDS: COCONUTS. COPRA. COCONUT WATER. PRODUCTS.

213. Hegde, B. M. hegdebmmail.com. Visiting Prof. of Cardiology, London University;Prof. Human Health, University of Northern Colorado, USA;Visiting Prof. Indian Institute of Advanced Study,Shimla;Retired Vice Chancellor, Manipal. Coconut the best food for human beings' health and longevity. Indian Coconut Journal (India). (Jan 2015) V. LVII(9) p. 15-16 KEYWORDS: COCONUTS. MANKIND. HEALTH. LONGEVITY.

Q02 Food processing and preservation

214. Sreekumar Poduval; Coconut Development Board, Kochi (India). Packaging technologies for coconut water. Indian Coconut Journal(India). (Jan 2014) v. LVI(9) p.27-28 KEYWORDS: PACKAGING. TECHNOLOGY. COCONUT WATER.

Q04 Food composition

215. Annie Eapen; CDB Institute of Technology, Vazhakkulam(India)Aneeta Joy; CDB Institute of Technology, Vazhakkulam(India). Sweet sand confectionaries from coconut neera. Indian Coconut Journal(India). (Feb 2014) v. LVI(10) p. 21-22 KEYWORDS: SUGAR CONFECTIONERY. CAKES. CHOCOLATE. SUGAR CONFECTIONERY. ICECREAM. DESSERTS.

216. Hebbar, K. B.; Central Plantation Crops Research Institute,Kasaragod (India). HD (PB&PHT)Arivalagan, M.; Central Plantation Crops Research Institute, Kasaragod (India). Scientist. Health Benefits of Coconut Oil. Indian Coconut Journal (India). (Jan 2015) V. LVII(9) p.27-30 KEYWORDS: COCONUT OIL. HEALTH.

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