Vol. 12, No. 1, January-June 2013 ISSN : 0973-0214

The Indian Agricultural Sciences ABSTRACTS

Indian Council of Agricultural Research
New Delhi

Vol. 12, No. 1 January-June 2013

The Indian Agricultural Sciences ABSTRACTS

Published by

Directorate of Knowledge Management in Agriculture
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-I,
Pusa, New Delhi 110012

Published : July 2013

Project Director (DKMA) : Dr Rameshwar Singh

Compilation and Technical Editing : Hans Raj
Information Systems Officer
V.S. Kaushik
Chief Technical Officer

Published by Dr Rameshwar Singh, Project Director, Directorate of Knowledge Management in Agriculture, Indian Council of Agricultural Research, Krishi Anusandhan Bhawan I, Pusa, New Delhi 110012

SAMPLE ENTRY

1 ← 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

2 → author(s)

3 → title in English

4 → source

5 → keywords

6 → organisation where work was carried out

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

A50 AGRICULTURAL RESEARCH

1. Balakrishnan, P.C.; College of Agriculture, Padnekkad (India). Coconut Research Highlights in Kerala Agricultural University. Indian Coconut Journal (India). (Feb 2011) v.73(10) p.2-9 KEYWORDS: AGRICULTURAL DEVELOPMENT. RESEARCH.

2. Thombre, B.B.; B.S. Konkan Krishi Vidyapeeth, Dapoli(India). Jishi, M.S.; B.S. Konkan Krishi Vidyapeeth, Dapoli (India). Quantification of rhizosphere microflora of coconut in sandy and lateritic soils. Indian Coconut Journal (India). (Feb 2011) v.73(10) p.19-21 KEYWORDS: COCONUTS. SANDY SOILS.

3. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Research and Development support Vital for promoting organic agriculture in coconut. Indian Coconut Journal (India). (Mar 2011) v.73(11) p.2-6 KEYWORDS: VITAL STATISTICS. ORGANIC AGRICULTURE.

4. Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India). Dhanapal, R.; Central Plantation Crops Research Institute, Kasaragod (India). Palaniswami, C.; Central Plantation Crops Research Institute, Kasaragod (India). Gupta, Alka; Central Plantation Crops Research Institute, Kasaragod (India). Maheswarappa, H.P.; Central Plantation Crops Research Institute, Kasaragod (India). Agro-techniques for higher coconut productivity under coastal sandy soil. Indian Coconut Journal (India). (Mar 2011) v.73(11) p.7-15 KEYWORDS: TECHNOLOGY.

5. Girijesh, G.K.; College of Agriculture, Shimoga (India). Vageesh, T.S.; College of Agriculture, Shimoga (India). Nagaraj, R.; College of Agriculture, Shimoga (India). Kumaraswamy, R.S.; College of Agriculture, Shimoga (India). Dineshkumar, M.; College of Agriculture, Shimoga (India). Vermicompost production using dry coconut fronds - A waste recycling technology in coconut gardens. Indian Coconut Journal (India). (Mar 2011) v.73(11) p.16-19 KEYWORDS: VERMICULTURE. POLLUTION.

6. Thomas, Mathew M.; Coconut Developement Board, Kochi (India). Baby, P.O.; Coconut Developement Board, Kochi (India). Coconut Oil, rolling back to its premium position. Indian Coconut Journal (India). (Apr 2011) v.73(12) p.2-10 KEYWORDS: COCONUT OIL.

7. Anithakumari, P.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Lekha, G.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Gender participation and training need analysis in coconut cultivation. Indian Coconut Journal (India). (May 2011) v.74(01) p.23-29 KEYWORDS: TRAINING. CULTIVATION.

C20 Extension

8. Mishra, Yagya Dev; Krishi Vigyan Kendra, Rudraprayag (India). Factors affecting utilization of mass media by the farmers. Pantnagar Journal of Research (India). (Jan-Jun

2008) v.6(1) p.173-175 KEYWORDS: MASS MEDIA. RURAL DEVELOPMENT. FARMERS. EXTENSION PROGRAMMES.

Utilization pattern of four mass media viz., newspaper, magazine, radio, and television was studied among 126 farmers from 11 randomly selected villages of community development block Kannauj district, Uttar Pradesh. Out of four mass media, radio was most popular medium for agricultural information among farmers. Inability to read, inability to subscribe, lack of time, poor supply of electricity and adverse affect on children were the major factors responsible for less utilization of mass media by the farmers.

9. Sharma, Arpita; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Communication. Rathore, Surya; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Communication. Bhardwaj, S.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Experiment Station. Media-mix: A powerful communication tool for imparting nutrition education among rural women. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.243-245 KEYWORDS: MASS MEDIA. NUTRITION EDUCATION. RURAL DEVELOPMENT. WOMEN.

The scientific messages related to health or various aspects can be transmitted through communication media among the rural women. Though this is an era of Information and Communication Technology but still women being a weaker sex suffer from a lot of health related problems due to lack of information media. Among all these media, it is difficult to say which media is most effective among rural women for nutrition education. Present investigation is an attempt to give scientific information related to health effectively among rural women through media-mix in Rudrapur block of Uttarakhand. Booklet plus Power point presentation was used as media mix for communicating message among rural women. Interview schedule was used for data collection. The findings suggested that knowledge was increased through media-mix.

C30 Documentation and Information

10. Kaushik, Arundhati; G.B. Pant University of Agriculture and Technology, Pantnagar (india). University Library. Haldua, Hema; G.B. Pant University of Agriculture and Technology, Pantnagar (india). University Library. Arya, Chanda; G.B. Pant University of Agriculture and Technology, Pantnagar (india). University Library. Pantnagar Journal of Research : A bibliometric study. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.123-130 KEYWORDS: RESEARCH. AGRICULTURAL RESEARCH. QUANTITATIVE ANALYSIS. METHODS.

This paper examines 369 articles published in the Journal, Pantnagar Journal of Research, from the year 2003-2008. This paper analyses the year-wise distribution of articles, physical growth of volumes, references cited total, national and international, average length of papers, authorship pattern, degree of collaboration, illustrations and tables included, articles with/without abstracts, college & department-wise contributions of the university, and other states and countries.

11. Manimekalai, R.; Rakesh, V.H.; Anoop, S.; Thomas, George V. Cocoa and Oil palm putative gene database. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.311-318 KEYWORDS: COCOA BEANS. DATABASES. OIL PALMS.

Oil palm and cocoa are important plantation crops and require bioinformatics tools to hasten the research output and aid in crop improvement programmes. The current work was undertaken to assign putative function to available Expressed Sequence Tags (EST's) of oil palm and cocoa. Annotated EST's of cocoa and oil palm were developed into searchable database. EST's of oil palm and cocoa were first retrieved from dbEST. FASTA formatted EST sequences were converted into countigs by running in CAP3. The countigs sequences were run in BLAST tool and their putative functions were predicted based on homology. A database of annotated EST's was developed using MySQL and PHP programs. In this database, EST's of cocoa and oil palm, BLAST results and gene information were stored as different tables. The database homepage contains six menus namely 'Home', 'About database', 'Tool', 'Useful links', 'Site map' and 'Contact us'. The same page contains annotated gene information for cocoa and oil palm separately. For browsing the annotated EST's of cocoa and oilpalm, separate text boxes are provided such as 'EST's', 'blast results' and 'gene information'. The text box 'EST's' of oil palm has links to six different tables which stores information about six different tissues and cocoa contains seven different tables, which stores information about seven different tissues. The 'gene information' contains the 'countig number', 'similarities found in each organism', 'accession number', 'structure accession number' and 'gene function'. The cocoa and oil palm putative gene database - COPGENE is hosted at CPCRI bioinformatics website (*www.bioinfcpcri.org*).

E10 Agricultural Economics and Policies

12. Shukla, A.N.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Economics. Rawat, Ruchi; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Economics. Tewari, S.K.; G. B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Economics. Dubey, P.P.; K.A.P.G. College, Allahabad (India). Agricultural credit flow in Kumaon region of Uttarakhand: status and prospects. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.181-185 KEYWORDS: CREDIT. AGRICULTURAL ECONOMICS. AGRICULTURAL ECONOMICS.

The role of credit is that of giving a push to the development process. In Indian perspective the economic development centres around its agricultural development which at present stage of economy is possible mainly through increased land productivity via adoption of improved agricultural technology and adequate infrastructural facilities. The findings show that flow of credit for infrastructural facilities and also credit deposit ratio is low in Kumaon region.

13. Singh, Jitendra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Economics. Singh, S.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Economics. Impact of sugar factories on employment and income of sugarcane growers in district Faizabad of Uttar Pradesh. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.186-191 KEYWORDS: SUGAR INDUSTRY. AGRICULTURAL ECONOMICS. SUGARCANE. UTTAR PRADESH. EMPLOYMENT. INCOME. CROPPING SYSTEMS.

The study aims to find out employment and income in agricultural vis-a-vis non-agricultural sector in district Faizabad of Uttar Pradesh. The data pertained to the agricultural year 2000-01. The study revealed that the generation of employment days were

found increasing with the increase in the size of farm in both the area of sugar factories. Study shows that total employment was 980 man days/farm/annum, out of which 86.94 per cent and 13.03 per cent was contributed by agricultural and non-agricultural sector in command area. In out side area total employment is 1101 man days/farm/ annum, out of which 88.13 per cent and 11.87 per cent is shared by agricultural and non-agricultural sector. Total per farm income was higher i.e. Rs. 60334.25 in command area than Rs. 44998.20 in out side area, thus obviously benefits the impact of sugar factories on employment and income of sugarcane growers particularly crops including sugarcane as well as agricultural sector in the study area.

14. Anithakumari, P.; Central Plantation Crops Research Institute, Regional Station, Kayangulam (India). Rajeev, M.S.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. George, Jissy; Central Plantation Crops Research Institute, Kayangulam (India)Regional Station. Improving income from coconut cultivation through farm level value addition - An analysis. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.131-136 KEYWORDS: COFFEE. PRICES.

The study was conducted during 2009-10 with the objectives to analyze the profile of farm level processors, coconut value addition, constraints faced by them and offer suggestions to farmers adopting minimal processing, direct marketing of tender nuts, copra making, coconut oil/virgin coconut oil, soap and food products. It was found that 63.3 % of the respondents were of middle age group, literate, experienced in coconut value addition for less than 8 years; low income group and 80% of them were women. Further the entrepreneurship behavior of the respondents were found to be positively and significantly correlated with their credit availed, annual income and investment made. The need for reorientation of training curricula in terms of project preparation techniques, communication/marketing skills etc., is emanated from the study. The value addition obtained per nut was found to vary from Rs. 0.5 to 15 depending on the products. The constraints and suggestions for improving farm level value addition activities are also furnished as perceived by the respondent farmers. The study showed that there is tremendous potential for farm level value addition for utilizing the marketable surplus locally and the benefits to be mutually shared by the coconut growers, with further technology and developmental support.

15. Bhat, Shripad; University of Agricultural Sciences, GKVK, Bangalore (India). Umesh, K.B.; University of Agricultural Sciences, GKVK, Bangalore (India). Murthy, Sreenivasa; Indian Institute of Horticulture Research, Bangalore (India). Determinants of Indian Coffee Prices: An econometric analysis. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.137-140 KEYWORDS: EVALUATION. MODELS.

An attempt was made in this study to analyze the Indian coffee prices and to identify the factors affecting the Indian coffee prices. For the analysis of Indian coffee prices, the period of study was divided into two periods viz., before deregulation of coffee trade (1980-1991) and after deregulation of coffee trade (1992-2007) as deregulation of coffee trade was a major event, which brought a major change in Indian coffee trade. Analysis showed that the instability in prices has increased during the post deregulation period owing to opening up of Indian coffee market to world market. In terms of real prices, the growth was positive during the post deregulation period. During the post deregulation period, the world coffee prices were found to have a significant impact on Indian coffee prices both in Arabica

and Robusta coffee. The impact of Indian production and consumption on Indian coffee prices was found not significant.

16. Arumuganathan, T.; Central Plantation Crops Research Institute, Kasaragod (India). Madhavan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Mathew, A.C.; Central Plantation Crops Research Institute, Kasaragod (India). Padmanabhan, Sugada; Central Plantation Crops Research Institute, Kasaragod (India). Lipid profile of virgin coconut oil processed by different methods. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.247-251 KEYWORDS: FREE FATTY ACIDS. LAURIC ACID.

17. Tejaswini, A.B.; University of Agricultural Sciences, GKVK, Bangalore (India). Sri Kantha Murthy, P.S.; University of Agricultural Sciences, GKVK, Bangalore (India). Chandrakanth, M.G.; University of Agricultural Sciences, GKVK, Bangalore (India). Nagaraj, N.; University of Agricultural Sciences, GKVK, Bangalore (India). Chandrashekar, H.; University of Agricultural Sciences, GKVK, Bangalore (India). Sreeramu, B.S.; University of Agricultural Sciences, GKVK, Bangalore (India). An economic analysis of desiccated coconut production in major coconut growing regions of Karnataka. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.260-264 KEYWORDS: DESICCATED COCONUT. ECONOMIC VIABILITY. FINANCIAL POLICIES.

18. Nair, Deepthi S.; Coconut Developement Board, Kochi (India). Unite to Triumph than perspire to succumb. Indian Coconut Journal (India). (Aug 2011) v. 74(04) p. 19-22 KEYWORDS: AGRICULTURAL ECONOMICS.

19. Gotmare, Shantanu P.; District Collectorate, Bongaigaon Assam (India). Bongaigaon model for diversification of agriculture economy. Indian Coconut Journal (India). (Aug 2011) v. 74(04) p.24 KEYWORDS: ECONOMIC THEORIES. RURAL DEVELOPMENT.

20. Muralidharan, K.; Coconut Developement Board, Kochi (India). Jayashree, A.; Coconut Developement Board, Kochi (India). Coconut development mission approach generates positive impact. Indian Coconut Journal (India). (Sep 2011) v. 74(05) p. 21-24 KEYWORDS: INTEGRATED CONTROL.

21. Sukumaran, A; Kerala Agricultural University, Vellayanikkara (India). A Farmer friendly strategic vision for coconut in a globalised world. Indian Coconut Journal (India). (Oct 2011) v. 74(06) p. 14-15 KEYWORDS: COCONUTS. ECONOMIC ANALYSIS.

22. Babu, Sathish K.; Kerala Agricultural University, Vellayanikkara (India). Agricultural Market Intelligence cell. Coconut economy in India : Status, options and the roadmap ahead. Indian Coconut Journal (India). (Oct 2011) v. 74(06) p. 24-27 KEYWORDS: COCONUTS.

23. Kurian, Binoi K.; Rubber Board, Kottayam (India). Agriculture marketing, Major concerns, post WTO. Indian Coconut Journal (India). (Oct 2011) v.74(06) p.28-29 KEYWORDS: AGRICULTURE. MARKETING.

24. Gopalakrishnan, Ramani; Coconut Developement Board, Kochi (India). APCC - An intergovernmental organization for the cause of coconut industry. Indian Coconut Journal (India). (Oct 2011) v.74(06) p.30-33 KEYWORDS: ORGANIZATIONS. INDUSTRY.

25. Mridula, K.; Coconut Developement Board, Kochi (India). India in the global coconut economy. Indian Coconut Journal (India). (Oct 2011) v. 4(06) p.34-37 KEYWORDS: INTERNATIONAL TRADE.

26. Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Thamban, C; Central Plantation Crops Research Institute, Kasaragod (India). Lagina, M.M.; Central Plantation Crops Research Institute, Kasaragod (India). Processing of coconut chips the Kalpakam and Kerasree success stories. Indian Coconut Journal (India). (Nov 2011) v.74(07) p.19-20 KEYWORDS: COCONUT MILK. COCONUT OIL. COCONUTS.

27. Nair, Anup; Edappally (India). Prospects of coconut value added products in the export markets in the post WTO regime. Indian Coconut Journal (India). (Nov 2011) v.74(07) p.21-22 KEYWORDS: WTO. COPRA.

E11 Land Economics and Policies

28. Hussain, M.; Central Plantation Crops Research Institute, Kahikuchi (India). Research Centre. Ray, A.K.; Central Plantation Crops Research Institute, Kahikuchi (India).Research Centre. Maheswarappa, H.P.; Central Plantation Crops Research Institute, Kasaragod (India). Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India). Bhat, Ravi; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Krishnakumar, V.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Acharya, G.C.; Central Plantation Crops Research Institute, Kahikuchi. (India). Research Centre. Sustainable productivity and economics of arecanut based high density multi-species cropping system under Brahmaputra valley region of Assam. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.68-72 KEYWORDS: HARVESTING. CROPPING SYSTEMS.

Field investigations were carried out on arecanut based high density multi-species cropping system at Central Plantation Crops Research Institute, Research Centre, Kahikuchi, Guwahati from 1998 to 2008 to find out productivity and economics of the system. Arecanut, banana, citrus and black pepper crops were tried in two models with full, 2/3rd and 1/3rd of recommended fertilizer levels along with recycling organic biomass in the form of compost. The results on yield of different crops indicated that there was increase in the yield of main crop and component crops over the years. Yield of arecanut, citrus, pepper were higher at 2/3rd of recommended level of fertilizer coupled with organic biomass recycling in the form of compost. Banana yield was higher at full dose of recommended fertilizer. The major share of the production cost was towards labour (55 to 65%) followed by fertilizers (30 to 40%). The employment generated in the system was 450-475 man days compared to 250-275 man days in arecanut monocrop. The net income and B:C ratio were higher under 2/3rd of recommended fertiliser level compared to full dose and 1/3rd of recommended level of fertiliser.

29. Srinivasan, R.; Natarajan, A.; Kumar, Anil; Kalaivanan, D.K.S. Land suitability evaluation of soils of Dakshina Kannada district of Karnataka for cashew production. Journal

of Plantation Crops (India). (Aug 2011) v.39(2) p.325-329 KEYWORDS: CLIMATE. CASHEWS. EVALUATION. LAND USE.

E14 Development Economics And Policies

30. Mathew, Thomas M.; Coconut Developement Board, Kochi (India). Thirty years of triumph and tribulations in integrated of coconut industry in India. Indian Coconut Journal (India). (Jan 2011) v.73(9) p.14-24 KEYWORDS: DEVELOPMENT PLANS. CULTIVATION.

31. Jnanadevan, R.; Directorate of Cashewnut and Cocoa Development, Kochi (India). Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India). Coconut sector experiencing a pricerise regime. Indian Coconut Journal (India). (Aug 2011) v. 74(04) p.26-30 KEYWORDS: PRICES. COCONUT OIL.

32. Jayashree, A.; Coconut Developement Board, Kochi (India). Opportunities for availing assistance for coconut processing units under TMOC. Indian Coconut Journal (India). (Nov 2011) v. 74(07) p. 27-28 KEYWORDS: PROCESSING. POSTHARVEST CONTROL.

E16 Production Economics

33. Murugesan, P.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Merlin, J. Meenu; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Joseph, Dipu; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Bindu, S.J.; Oil Palm India Limited Kalayanthani, Idukki, (India). Pillai, R.S.N.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Nampoothiri, K.U.K.; MSSRF Makaput(India). Regional Centre. Yield potential and phenotypic variation of fruit and seed characteristics of oil palm duras at Thodupuzha. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.114-118 KEYWORDS: OIL PALM. PALMS. FRUIT.

The research work of the Oil Palm improvement in India was started with selections from dura palms planted at Oil Research Station at Thodupuzha, Kerala during 1961. Initially, the performance of the population was assessed on the basis of Fresh Fruit Bunch (FFB) yield and number of bunches for nine years (1974-82). Limited number of palms were exploited for hybridization and population improvement. Selected palms were utilized for hybridization and production of hybrids. Although this population is widely utilized for seed production and genetic improvement, there was no information about its phenotypic variations especially for fruit quality components. A total of 341 dura palms of Thodupuzha materials were assessed for different fruit and seed characteristics. Fruit form analysis revealed that seven palms (2%) are teneras out of 341 palms and rest of the palms are duras. The percentage of co-efficient of variation was high for shell weight followed by kernel weight and lowest variation was recorded for percentage of mesocarp and kernel oil per fruit. This study also unearths potentiality of unexploited dura palms (US356 US225, US147, US239, US380, US297, S285 and US375) mainly on the basis of mesocarp content and oil per fruit (84%). Promising palms could be effectively utilised for introgression into the current breeding programme.

34. Radhakrishnan, V.V.; University of Calicut, Kozhikode (India). Dept. of Botany. Kuruvilla, K.M.; Indian Cardamom Research Institute, Myladumpara (India).

Madhusoodanan, K.J.; Indian Cardamom Research Institute, Myladumpara (India). Mohanan, K.V.; University of Calicut, Kozhikode (India). Dept. of Botany. Thomas, J.; Indian Cardamom Research Institute, Myladumpara (India). ICRI-7 : A high yielding cardamom variety for Wayanad. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.187-189 KEYWORDS: PRODUCTION. CARDAMOMS. EVALUATION.

35. Malarkannan, S.P.; Veterinary Dispensary, Pattambi (India). Pandiyan, C.; Veterinary College and Research Institute, Namakkal (India). Geewarghese, P. I.; Veterinary College and Animal Science, Pookot (India). Evaluation of filled type yogurt by incorporating condensed coconut water. Indian Coconut Journal (India). (Apr 2011) v.73(12) p.24-27 KEYWORDS: COCONUT WATER. FLAVOUR.

36. Thomas, J.; Rubber Board, Kottayam(India). Empowering farmers for direct market interventions. Indian Coconut Journal (India). (Aug 2011) v. 74(04) p. 10-11 KEYWORDS: PRICE STABILIZATION. EMPOWERMENT.

37. Vijayan, N.; VFPCK, Kakkanad (India). Farmer Groups for better production and Marketing. Indian Coconut Journal (India). (Aug 2011) v.74(04) p.17-18 KEYWORDS: MARKETING. PRODUCTION.

E20 Organization, Adminstration and Management of Agricultural Etreprises or Farms

38. Helen, S.; Kerala Agricultural University, Mannuthy (India). Communication Centre. Ahamed, P.; Kerala Agricultural University, Mannuthy (India). Communication Centre. Sustainability of the interventions in coconut based homesteads of Central Kerala. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.305-310 KEYWORDS: SUSTAINABLE DEVELOPMENT. PERFORMING ANIMALS.

An ICAR adhoc scheme on 'Possible Diversifications and Restructuring of Coconut based Homesteads' was implemented in the six agro-ecosystems of Central zone of Kerala covering three districts namely Palakkad, Thrissur and Ernakulam with the holistic approach in coconut based homesteads from 2005 to 2008 by the participation of all the stakeholders. A comparative index namely Sustainability Development Index was developed for the study, which contained specific indices for economic, social, ecological sustainability, productivity, stability and equity dimensions. After three years of interventions, Sustainability Development Index was found to be the highest at High Elevation- Medium Rainfall (HEMR) situation (Kizhakkenchery) with 41.92. Economic sustainability (56.40) was the highest among all the dimensions because of the visibility of enhanced economic returns and increased employment opportunities. Ecological sustainability and stability were the two dimensions which contributed less for the Sustainability Development Index of the selected homesteads. It was concluded that the interventions on diversifications of coconut based homesteads indicated sustainability.

39. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Entrepreneurial skill in Farming Yields striking results. Indian Coconut Journal (India). (Feb 2011) v.73(10) p.10-13 KEYWORDS: FARMING SYSTEMS. CROPPING SYSTEMS.

E21 Agro-industry

40. Binesh, V.R.; Krishi Bhavan, Kadakkavoor (India). Reaping success by good extension practices. Indian Coconut Journal (India). (Aug 2011) v.74(04) p.25 KEYWORDS: EXTENSIVE FARMING. PRODUCTIVITY.

E40 Cooperatives

41. Sebastian, K. S.; Coconut Developement Board, Kochi (India). What is a CPS. Indian Coconut Journal (India). (Aug 2011) v.74(04) p.23 KEYWORDS: COOPERATIVE ACTIVITIES. FARMERS.

E70 Trade, Marketing And Distribution

42. Singh, Saurabh; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Agribusiness Management. Singh, Poonam; Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (India). Department of Family Resource Management. Singh, Neelam; Krishi Vigyan Kendra (NDUA&T), Sohna (India). Evaluation of Pioneer Hi-Bred International Seeds and Advance Booking Scheme with its Competitors in Eastern Uttar Pradesh. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.206-211 KEYWORDS: HYBRIDS. SEED PRODUCTION. INTERNATIONAL TRADE. UTTAR PRADESH. ECONOMIC DEVELOPMENT.

The attractiveness of scheme, feedback of farmers regarding performance of the brand in the previous year, and numerous other factors together play a significant role in influencing the decision making process of any retailer. These factors assume prime importance when the retailers get exposed a sales promotion scheme, which lures them into betting their money in advance in a particular product. The Pioneer Hi – Bred International Seeds had launched such a scheme in Eastern Uttar Pradesh and had termed it as Advance Booking Scheme. Some other important factors and established facts of trade counterbalance the risk being taken, by the way of providing the retailers a safeguard against shortage of stock, which is costlier and might results into loosing the customers and business to competitors. This helps the retailers in retaining the existing customers, as well as reputation of their respective counters. Thus, the benefits offered by such schemes cannot be overlooked. Of the many innovative ideas, some of the most recent are ensuring the reach of company personnel to every nook-and-corner of the villages and making the availability of Advance Booking Scheme (ABS) brochures in the most common used language of North India, Hindi which have definitely proved its edge in the market owing to which one of the territories of Uttar Pradesh, covering the districts of Bahraich, Gonda, Shravasti and Balrampur recorded a landmark booking. PHI Seeds Sales and Marketing teams continuously keep a watch and come up with new below-the-line (BTL) activities for giving focused attention to the prevailing market conditions. Launching Free Good Scheme (FGO) as an incentive to the ABS is one such BTL schemes and has been quite successful in its attempt of extracting majority of funds from the market. The recent study supports the fact that there is a gradual shift in the proportion of farmers seeking a brand by name as compared to those following the retailers advice owing to increasing level of extension activities from company's side which in turn leads to enhancement of awareness level amongst the farmers. Apart from these key issues, the biggest threat to the retailers at this point of time is the much talked about subsidy regarding hybrid paddy seeds. The season for

paddy seeds sale may vary from a week to a fortnight and if the subsidy be offered in the accurate time frame, retailer's position would really be threatened.

43. Singh, Saurabh; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Agribusiness Management. Singh, Neelam; Narendra Dev University of Agriculture and Technology, Sohna (India). Krishi Vigyan Kendra. Sikka, B.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Agribusiness Management. Marketing practices of livestock products by Self Help Groups in Burdwan District of West Bengal. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.89-96 KEYWORDS: MARKETING. ANIMAL PRODUCTS. SELF HELP. WEST BENGAL.

The Swarnjayanti Gram Swarojgar Yojana (SGSY) guide lines had a provision and mandate of forming number of Self Help Groups (SHGs) and then provide the self employment opportunities to all the members of the groups. The guidelines of SGSY concentrated more on the inputs, rather than the outputs, and their marketing. In such a scenario the study was conducted with the aim of exploring and profiling the marketing practices adopted by these Self Help Groups for marketing their livestock products, so as to generate revenue. The data was collected with the help of a structured questionnaires was used as an instrument for data collection followed by application of analytical tools like factor analysis, cross tabulation and chi–square test to draw inferences. Majority of the SHGs in the area of study have been found practicing mixed type of farming related to livestock and animal husbandry. This type of farming is fetching them higher returns as compared to other activities like dairy, poultry, goat rearing etc. The problems being encountered by SHG members were found to be mainly problems of distress sale, problem of transportation of products to specific markets and problems generated due to lack of market information. The volume of production being on the lower side and that too getting dented by the problems related to transportation were turning strong enough to force the SHG members to sell their products at lower prices and that too, through involvement of intermediaries. Distress-sale was also forced because of disease conditions, less bargaining power and false market information. The profit margins of the SHG members were getting affected by the costs involved in rearing unproductive animals also. In some cases Rhode Island Rhode (RIR) breed of poultry which these SHG members were rearing, was not having acceptance of the local customers. Improved transportation facility to specific local markets can enhance the profitability of the SHG members.

44. Raj Kumar, R.; UPASI Tea Research Foundation, Valparai (India). Thomas, Jibu; Karunya University, Coimbatore (India). Mandal, A.K.A.; VIT University, Vellore (India). Impact of continuous shear harvesting on photoassimilate compartmentalisation in mature tea. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.228-231 KEYWORDS: TECHNOLOGY. TEA.

E71 International Trade

45. Chand, Vinay; International Trade Centre, London (U.K.) Coconuts at the Crossroad. Indian Coconut Journal (India). (May 2011) v. 74(01) p. 3-14 KEYWORDS: COCONUTS. AGROINDUSTRIAL SECTOR.

E73 Consumer Economics

46. Nair, Deepthi; Coconut Developement Board, Kochi (India). Trend in prices of coconut and its products. Indian Coconut Journal (India) . (Jun & Jul 2011) v.74(2 & 3) p.41-42 KEYWORDS: PRICE POLICIES. PRICES.

47. George, Rajiv P.; Coconut Developement Board, Kochi (India). Farmers in Transition. Indian Coconut Journal (India). (Aug 2011) v.74(04) p.13-16 KEYWORDS: TRANSITIONAL FARMING. COOPERATIVE ACTIVITIES.

48. Mathew, Thomas M.; Coconut Developement Board, Kochi (India). Baby P.O.; Coconut Developement Board, Kochi (India). Global Competitive of Indian Coconut Oil-An Outlook. Indian Coconut Journal (India). (Oct 2011) v.73(06) p.5-13 KEYWORDS: COCONUT OIL. BASIC NEEDS.

49. Nair, Deepthi S.; Coconut Developement Board, Kochi (India). Prospects of ASEAN and FTAs for the Indian economy. Indian Coconut Journal (India). (Oct 2011) v.74(06) p.16-18 KEYWORDS: HORTICULTURE. TRADE LIBERALIZATION.

50. Sebastain, K.S.; Coconut Developement Board, Kochi (India). Indian export scenario of coconut and coconut products. Indian Coconut Journal (India). (Oct 2011) v.74(06) p.19-23 KEYWORDS: ECONOMICS. PRODUCTS.

51. Muralidharan, K.; Coconut Developement Board, Kochi (India). Jayashree, A.; Coconut Developement Board, Kochi (India). Value addition, product diversification and byproduct utilization in coconut. Indian Coconut Journal (India). (Nov 2011) v.74(07) p.2-10 KEYWORDS: VALUE ADDED. COCONUT WATER. COCONUTS.

52. Ragavarao, K.S.M.S.; Central Food Technological Research Institute, Mysore (India). Rastogi, Navin K.; Central Food Technological Research Institute, Mysore (India). Hrishikesh, A.; Central Food Technological Research Institute, Mysore (India). Value added products from coconut timber. Indian Coconut Journal (India). (Nov 2011) v.74(07) p.11-14 KEYWORDS: TIMBER TREES. HARDWOOD.

53. Poduval, Sreekumar; Coconut Developement Board, Kochi (India). Relevance of quality standards in global marketing of coconut products. Indian Coconut Journal (India). (Nov 2011) v.74(07) p.23-26 KEYWORDS: QUALITY. MARKETING.

E80 Home Economics, Industries and Crafts

54. Singh, Pratibha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Tewari, Poonam; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Sunita Rani; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Empowerment of farm women through efficient use of natural resources. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.155-157 KEYWORDS: AGRICULTURAL WORKERS. RURAL DEVELOPMENT. NATURAL RESOURCES. EMPOWERMENT. CAPACITY BUILDING.

A number of resources are available in the surroundings of the farm families. The families are not aware of their appropriate use. Identification of such on-farm and off-farm waste and their proper utilization is a profitable venture that needs to be promoted among rural women. Building capacity of rural women in efficient utilization of farm waste as the economic activity will bring about improvement in their quality of life. Training on mushroom cultivation and biogas production was organized in villages. Home visits by biogas experts were also organized to solve day-to-day problem related to gas production. Results of the study show that there was significant gain in the knowledge of the respondents as a result of the trainings. There is need to mobilize rural people to take up these activities at household level to provide livelihood security.

55. Singh, Pratibha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Tewari, Poonam; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Sunita Rani; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Mobilizing Self Help Groups for livelihood security. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.158-162 KEYWORDS: SELF HELP GROUPS. RURAL DEVELOPMENT. LIVING STANDARDS. CAPACITY BUILDING. WOMEN.

A number of resources are available in the surroundings of the farm families. The families are not aware of their appropriate use. Identification of such on-farm and off-farm waste and their proper utilization is a profitable venture that needs to be promoted among rural women. Building capacity of rural women in efficient utilization of farm waste as the economic activity will bring about improvement in their quality of life. Training on mushroom cultivation and biogas production was organized in villages. Home visits by biogas experts were also organized to solve day-to-day problem related to gas production. Results of the study show that there was significant gain in the knowledge of the respondents as a result of the trainings. There is need to mobilize rural people to take up these activities at household level to provide livelihood security.

56. Singh, Pratibha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Studies in dietary pattern of tribal adolescent girls of Distt. Udham Singh Nagar of Uttarakhand. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.163-167 KEYWORDS: NUTRITIVE VALUE. HUMAN NUTRITION. NUTRITION SURVEYS. DIET. ADOLESCENTS.

A dietary survey was conducted to study the diet and nutrient intake of Buxa adolescent girls residing in Bazpur block in distt. U.S. Nagar of Uttarakhand state. In total 85 adolescent girls were taken. Diet survey was conducted for three consecutive days using 24 hour recall method. Nutrient content in the food items consumed was worked out by using the nutritive values in different food items. Buxa adolescent girls had two meals per day and the left over food of the previous day was taken in the morning. Cereals-rice and wheat were the main ingredients of the food and these provided the required quantity of energy. The quantity of pulses, vegetables, fats and oils and milk consumed was grossly inadequate. Practically there were no food items of animal sources – milk, meat, egg, and fish in their diet. In terms of nutrients, the diet of Buxa tribal women had nearly adequate calories, protein, fat, iron, thiamine, and niacin. However, the diet was grossly inadequate in Calcium, ß Carotene and riboflavin. However, the quantity of protein was as per requirement, but

this protein was of poor quality. Similar was the case with iron where the quantity was adequate, which are not considered as good source of iron. The study brings out the fact that the diet of Buxa women was imbalanced and of low quality and deficient in certain vital nutrients.

57. Gupta, Sakshi; CSKHPKV, Palampur (India). Department of Food Science and Nutrition. Sood, Sangeeta; CSKHPKV, Palampur (India). Department of Food Science and Nutrition. Singh, Nageshwar; CSKHPKV, Palampur (India). Department of Chemistry and Biochemistry. Gupta, Minakshi; CSKHPKV, Palampur (India). Department of Chemistry and Biochemistry. Effect of Neelkanthi (Ajuga bracteosa) and Plakhar (Ficus lacor) on the energy expenditure of diabetic subjects. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.286-290 KEYWORDS: AJUGA. FICUS. DIABETES. ENERGY EXPENDITURE. CHOLESTEROL. BLOOD SUGAR.

The present investigation was carried out to determine the efficacy of two medicinal plant species i.e Neelkanthi (Ajuga bracteosa) and Plakhar(Ficus lacor) on energy expenditure of diabetic subjects. Energy expenditure was measured by using Wireless Heart Rate Monitor and Indian Council of Medical Research (ICMR) prediction equation. Study revealed that all the treatments and sub treatments resulted in the decrease of energy expenditure. Neelkanthi had reduced the energy expenditure to a lower level in comparison to Plakhar. Presence of fibre i.e. Neutral Detergent Fibre(NDF) and Acid Detergent Fibre(ADF) and antioxidants i.e. ƒÒ-carotene and vitamin-C stimulates the action of insulin and thus reduces the blood sugar level and ultimately reduces weight and decreases energy expenditure through reduction in heart beats/minutes and decrease the rate of gluconeogensis to maintain carbohydrate metabolism.

58. Massey, Shefali; Punjab Agricultural University, Ludhiana (India). Department of Clothing and Textiles. Shillon, Satnam; Punjab Agricultural University, Ludhiana (India). Department of Clothing and Textiles. Problems and constraints faced by machine embroidery workers of Ludhiana city. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.230-232 KEYWORDS: PUNJAB. CONSTRAINTS. MARKETING. WORKERS. FINANCIAL SITUATION. HANDICRAFTS.

The study revealed that respondents belonged to 20-30 years of age, were matric, and had training in embroidery for two years. The majority of respondents had a monthly personal income up to Rs. 4000-6000 and family income Rs. 4000-10,000. The average personal and family income was Rs. 4940 and Rs. 6555 with a range from Rs. 2000-8000 and Rs. 3000-16,000 respectively. The different problems faced by the workers were related to nonavailability of raw material, financial problems, marketing problems, and personal problems. Problems related to raw material were inferior quality material, non-availability of raw material in desired colour etc. Major financial problems were less profit and irregular income. They used to face marketing problems due to fast changing trends and no fixed place for selling embroidered articles. Respondents faced various personal problems like busy schedule, effect on general health, mentally challenging work etc.

59. Bora, Preeti; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Foods and Nutrition. Kulshrestha, Kalpana; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Foods and Nutrition. Chemical and physicochemical evaluation of green gram husk. Pantnagar Journal of

Research (India). (Jul-Dec 2010) v.8(2) p.233-235 KEYWORDS: CHEMICOPHYSICAL PROPERTIES. MUNG BEANS. VIGNA RADIATA. NUTRITIVE VALUE. NUTRITIONAL STATUS. HUSKS.

Dietary fiber is steadily gaining importance in human diet. Beneficial effects of dietary fiber have been attributed to its role in modifying some of the physiological activities in the body. Dietary fiber is generally considered as unavailable carbohydrate and used as mild laxative. It is also useful in the prevention and treatment of chronic diseases such as hypertension, coronary heart diseases, obesity, diabetes and certain cancers. Pulse husk is a major by-product of dal mills which is rich in fiber, basically used as ruminant feed but could be exploited for benefit of human being. Its nutritional significance is less known, in view of this, the present study was undertaken to evaluate green gram husk for its chemical and physicochemical characteristics. The result of the present study revealed that green gram husk is rich in crude and dietary fiber. The dietary fiber being 54 per cent of the husk is almost insoluble dietary fiber which is suitable for gastrointestinal health and relieving constipation.

60. Singh, Pratibha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Tewari, Poonam; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Participation profile of rural women in farm activities. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.236-242 KEYWORDS: WOMEN. RURAL DEVELOPMENT. AGRICULTURAL WORKERS. ROLE OF WOMEN. EXTENSION ACTIVITIES.

Gender role demarcates responsibilities between men and women in social and economic activities, access to resources and decision making authority. Assessing gender role differences helps in identifying the constraints and opportunities within the farming system. Present study was conducted in five villages of two blocks of Haridwar district of Uttarakhand state. From each village 30 households were selected, thereby, making a total of 150 households. Findings shows that all the farm activities i.e land preparation, transplanting, irrigation, Application of manure and fertilizers, weeding, harvesting, marketing, management of revenue were independently performed by rural men in majority of the families and they were having complete responsibility of it. Women performed few farm activities like transplanting, weeding, harvesting jointly with men in 40.67% - 60.78% households.

61. Singh, Pratibha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Tewari, Poonam; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Pathak, Seema; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Home Science Extension. Assessing the gender perspective in farm and allied activities. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.116-122 KEYWORDS: GENDER. AGRICULTURAL WORKERS. FARM MANAGEMENT. ROLE OF WOMEN.

Nearly 79 per cent of the total female work force is engaged in agriculture. However, the extent of their work participation varies across region. An effort has been made to know the extent of their participation, responsibility, access and control over farm and allied activities. The study was conducted in Rudarpur and Kashipur block of Tarai zone of Uttarakhand. Data was collected from all the four landholding categories. Result highlighted

that women s participation and responsibility was more in livestock management activities in comparison to farm and homestead gardening activities. Rural men had more access and control over farm related resources. In livestock management and household related resources both rural men and women had partial access and control over majority of the activities.

F01 Crop Husbandry

62. Dhandare, K.M.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, K.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, P.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, M.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Bayissa, Gonfa; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Variation of climatological parameters under environmental controlled and naturally ventilated polyhouses. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.142-147 KEYWORDS: CLIMATOLOGY. ENVIRONMENTAL FACTORS. GREENHOUSES. VENTILATION. CROP MANAGEMENT.

A field experiment was conducted to study the various climatological parameters taken under the environmental controlled and naturally ventilated polyhouse during March to July 2006. Both the polyhouses were planted with capsicum (Capsicum annuum L.). The climatic parameters such as temperature, relative humidity, and solar intensity were measured at 0900 hr, 1200 hr, and 1600 hr. The comparisons were also made with the ambient conditions prevailing in outside open field. The results reveal that the temperature was high at time 1200 hr followed by 1600 hr than 0900 hr. The temperature was observed higher in naturally ventilated polyhouse followed by the open field condition than environmental controlled polyhouse. Relative humidity was high in environmental controlled polyhouse followed by naturally ventilated polyhouse than open field condition; also, relative humidity was high at 0900 hr followed by 1600 hr than 1200 hr. The solar radiation was observed high in open field followed by environmental controlled polyhouse than naturally ventilated polyhouse, also observed high at 1200 hr followed by 1600 hr than 0900 hr.

63. Singh, Shailendra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, Govinda; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Effect of different crop establishment methods on rice and implication of soil physical properties. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.205-209 KEYWORDS: PLANT ESTABLISHMENT. RICE. SOIL CHEMICOPHYSICAL PROPERTIES. PUDDLING. TRANSPLANTATION.

The grain yield of rice, on an average, in all the three rice establishment methods was similar (5693, 5689 and 5684 kg ha-1 in DSR, WSR and TPR, respectively) when weeds were controlled using herbicide followed by two hand weedings. Variation in crop growth parameters were observed, with more number of panicle per unit area in WSR followed by DSR and TPR. The number of grains per panicle was highest in TPR followed by DSR and WSR. Less panicle number in the transplanted rice crop was compensated by larger panicle and more number of grains per panicle and vice-versa in case of DSR and WSR. Root number

when expressed in percentage in different layers, TPR had highest percentage of roots in 0-10 cm followed by DSR and WSR. In 10-20 cm, DSR had higher number of roots followed by TPR and WSR. At rice harvest in puddled fields the bulk density in 0-7 cm and 12-19 cm soil layer was higher and infiltration rate was lower as compared to unpuddled field.

64. Lal, R.L.; G.B. Pant University of Agricuture and Technology, Pantnagar (India). Department of Horticulture. Shukla, Pavan; G.B. Pant University of Agricuture and Technology, Pantnagar (India). Department of Horticulture. Effect of shoot pruning on yield and quality of litchi (Litchi chinensis Sonn.) cv. Rose scented. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.243-246 KEYWORDS: SHOOT PRUNING. LITCHI CHINENSIS. LYCHEES. QUALITY CONTROLS.

The present study, consisting of six intensities of pruning viz. harvesting of fruits only (T1), cutting the bearing shoot at its origin (T2), cutting the bearing shoots 20 cm below the panicle (T3), 40 cm below the panicle (T4), 60 cm below the panicle (T5), and 80 cm below the panicle (T6) was conducted to find out the suitable level of shoot pruning for maximum yield of quality fruits on 16 years old litchi trees. Results obtained indicated that pruning of the bearing shoot 40 cm below the panicle significantly increased the fruit yield, fruit weight and pulp recovery of litchi. Non-significant differences were observed in case of fruit drop, fruit cracking and size of seed due to various pruning intensities.

65. Paraye, P.M; Indira Gandhi Agricultural University, Bhatapara (India). KVK. Chaubey, A.K.; Indira Gandhi Agricultural University, Bhatapara (India). KVK. Effect of nutrient management and plant density on growth, yield attributes and yield of Sunflower (Helianthus annuus). Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.148-150 KEYWORDS: NUTRIENTS. PLANT POPULATION. HELIANTHUS ANNUUS. YIELD INCREASES.

A field experiment was conducted during winter season of 2006 at Regional Agricultural Research Station, IGKVV, Raigarh (C.G.), to study the effect of fertility and plant density on growth, yield attributes and yield of sunflower under sandy clay loam soils. The experiment was laid out in split-plot design with 3 replications, having 3 planting density (30 x 20 cm) S1, (40 x 20 cm) S2 & (50 x 20 cm) S3 as main plot treatments and 4 nutrient management including (Control: no fertilizer) F0, (40:32:30 Kg N. P2O5 & K2O ha-1) F1, (80:65:60 N, P2O5 & K2O Kg ha-1 RDF) F 2 & (120:97:90 Kg N. P2O5 & K2O ha-1) F 3 as sub plot treatments. Closer plant density S1 showed the highest seed yield of sunflower (9.26 q ha-1) which was significantly higher over wider plant density S2 & S3. Maximum plant height (41.9 cm) was obtained with highest fertility level F3 however, there was non significant difference in plant height either in lower fertility level F1 or in recommended dose of fertility level F2 but all the fertility levels were significant over control F0. Maximum value of head diameter of sunflower (40.1 cm) was obtained with highest fertility level F3 which was significantly superior over F0, F1 and F 2 fertility levels. Maximum value of stover yield (41.7 q ha-1) and seed yield (10.2 q ha-1) was obtained with highest fertility level F3 which was statistically similar with recommended fertility level F2 but these were significant over control F0 and lower fertility level F1.

66. Deep Chandra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Lal, R.L.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Mishra, D.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture.

Effect of girdling on yield and quality of litchi. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.51-54 KEYWORDS: GIRDLING. LITCHI. LITCHI CHINENSIS. LYCHEES. YIELD INCREASES.

The present investigation was carried out at Horticulture Research Centre of G.B.P.U.A&T., Pantnagar to study the effect of girdling on yield and quality of litchi cv. Rose Scented. All the plants which were subjected to different level of girdling have more fruit set, fruit retention, yield and quality of fruits. However, girdling of main trunk + 50% of primary branches in which 3 mm wide and 3 mm deep ring of bark was removed found effective for obtaining maximum fruit yield (90 kg/tone) and good quality fruit (TSS–19° Brix, acidity-0.62%, ascorbic acid- 29.86 mg/100 g pulp, total sugar-13.50% and TSS : acid ratio–30.93). Improvement in fruit yield and quality of litchi trees may be due to rapid translocation of photosynthates and minerals from other part of the plants to developing fruits and reduced flow of carbohydrates to the roots.

67. Karki, Kavita; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Srivastava, Ranjan; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Effect of gamma irradiation in gladiolus (Gladiolus grandiflorus L.). Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.55-63 KEYWORDS: GAMMA IRRADIATION. GLADIOLUS. FLORICULTURE. MUTAGENS.

The demand of Gladiolus is increasing day by day, therefore it needs attention towards genetic improvement of gladiolus. It is known that frequency and spectrum of mutations differ somewhat depending upon the mutagen used and the dose applied. The present study was conducted to see the effect of gamma irradiation on various growth and flowering attributes on 20 varieties of gladiolus. It was found that lower doses i.e. 0.5 and 1.5 Kr is effective in improving some important vegetative and floral parameters. Four mutants were obtained.

68. Borkar, A.R.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Irrigation and Drainage Engineering. Singh, P.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Irrigation and Drainage Engineering. Saini, B.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. In-situ determination of crop coefficient (Kc) for tea plantation in Kausani hills of Uttarakhand. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.112-115 KEYWORDS: CROP MANAGEMENT. CAMELLIA SINENSIS. PLANTATIONS. EVAPOTRANSPIRATION. WATER REQUIREMENTS.

The experiments were conducted at five locations during 2005-06 from March to May for the in-situ determination of crop coefficient in Kausani tea plantation of Uttarakhand. Reference evapotranspiration and actual crop evapotranspiration values were used to determine the crop coefficient. Actual crop evepotranspiration were determined using water balance approach. The average values of crop coefficients were 0.73, 0.94 and 0.96 during March, April and May respectively with standard deviation of 0.0386, 0.032 and 0.0354.

69. Rajkumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Tiwari, J.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Shant Lal; G.B. Pant University of Agriculture

and Technology, Pantnagar (India). Department of Horticulture. Influence of zinc sulphate and boric acid spray on vegetative growth and yield of winter season guava (Psidium guajava L.) cv. Pant Prabhat. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.135-138 KEYWORDS: ZINC SULPHATE. BORIC ACID. VEGETATIVE PROPAGATION. WINTER. GUAVAS. PSIDIUM GUAJAVA. SPRAYING.

F02 Plant Propagation

70. Negi, Meenaxi; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Singh, C.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Srivastava, R.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. In vitro multiplication of strawberry cv. Chandler. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.247-250 KEYWORDS: IN VITRO CULTURE. STRAWBERRIES. GROWTH CONTROL. IBA. SHOOTS. KINETIN. GIBBERELLIC ACID.

The investigation was conducted during the year 2005-2007 to standardize a protocol for production of strawberry plants. The establishment MS medium supplemented with BAP (0.5 mg/l) and kinetin (0.5 mg/l) was found best for culture survival (88.92%), earlier days to shoot emergence (9.81 days), shoot elongation (11.19 days) and number of shoots per explant (5.73). Different combinations of growth regulators BAP, IBA, kinetin, and GA3 were tried for further shoot multiplication. In BAP, IBA and GA3 combination MS medium supplemented with BAP (0.5 mg/l) in supplemented with IBA (0.5 mg/l) and GA3 (1.0 mg/l) resulted maximum shoot length (10.50 cm) while, maximum number of shoots (14.50) per explant was found on MS medium supplemented with BAP (0.5 mg/l) and IBA (0.5 mg/l). In BAP, kinetin and GA3 combination MS medium supplemented with BAP (0.5 mg/l), kinetin (0.5 mg/l) and GA3 (2.0 mg/l) was resulted maximum shoot length (4.60 cm), number of shoots (4.44), number of leaves (10.3) and number of fragments (3.71) per explant.

F03 Seed Production and Processing

71. Gopalakrishnan, Ramani; Coconut Developement Board, Kochi (India). The Demonstration cum-seed production for coconut, Neriamangalam, Kerala. Indian Coconut Journal (India). (June & Jul 2011) v. 74(2 & 3) p. 21-30 KEYWORDS: PLANTING. SEED TECHNOLOGY.

72. Jnanadevan, R.; Directorate of Cashewnut and Cocoa Development, Kochi (India). Restructuring the coconut gardens with Quality planting materials. Indian Coconut Journal (India). (June & Jul 2011) v. 74(2 & 3) p. 31-35 KEYWORDS: SEED. QUALITY. PLANTING.

73. Singh, M.K.; DSP Farm, Mandya (India). Demonstration cum seed production farm for coconut, Mandya-A model farm. Indian Coconut Journal (India). (Aug 2011) v. 74(04) p.31-32 KEYWORDS: SEED TECHNOLOGY. IRRIGATION.

F04 Fertilizing

74. Chakraborty, B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Tiwari, J.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Lal, Shant; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Raj Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Effect of organic manure and mulching on growth, yield and quality of winter season crop of guava (Psidium guajava L.) cv. Pant Prabhat. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.239-242 KEYWORDS: ORGANIC AGRICULTURE. ORGANIC FERTILIZERS. MULCHING. WINTER. GUAVAS. PSIDIUM GUAJAVA. HORTICULTURE.

Field experiment was conducted to find out the effect of organic manure and mulching on growth characters, yield and quality of guava. Integration of organic manures with mulching showed good effect on crop. Combination of 15 kg compost + 6 kg soybean mulch/tree/year found best among all other treatments with highest yield (76.82 kg/tree).

75. Agarwal, Mina; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Agnihotri, A.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Effect of different combinations of organic and inorganic sources of nutrients on mineralization of organic carbon and nitrogen in Mollisol. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.254-256 KEYWORDS: INORGANIC FERTILIZERS. ORGANIC AGRICULTURE. ORGANIC FERTILIZERS. MINERALIZATION. CARBON. NITROGEN.

A laboratory experiment was conducted to study the effect of different combinations of organic and inorganic sources of nutrients on mineralization of organic carbon and nitrogen with treatments viz. control, starter nitrogen, wheat straw, FYM, wheat straw +N, FYM+N, rice straw and rice straw +N, three replications of each treatment. Rice straw, wheat straw and FYM are applied at the rate of 5t /ha, 5t /ha, and 15 t/ ha respectively with or without starter dose of nitrogen (for straw 20 kg N/ ha and for FYM 90 kg N /ha). These treatments were incubated for 90 days. The mineralization of carbon and nitrogen were measured quantitatively following alkali trap method and incubation method respectively. The amount of carbon mineralized from the soil was maximum with the rice straw. Starter nitrogen treated soil showed highest amount of nitrogen mineralized at each date of observation.

76. Rajkumar; G.B. Pant University of Agriculture and Technology, Ranichauri (India). Department of Horticulture. Dimri, D.C.; G.B. Pant University of Agriculture and Technology, Ranichauri (India). Department of Horticulture. Singh, S.C.; G.B. Pant University of Agriculture and Technology, Ranichauri (India). Department of Horticulture. Effect of nitrogen supplement on rejuvenation in apple (Malus domestica borkh.) Cv. Red delicious. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.296-298 KEYWORDS: APPLES. MALUS PUMILA. NITROGEN. SUPPLEMENTS. SOIL FERTILITY.

77. Singh, Navneet; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Anand Prakash; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, Vijay Pal; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, I.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Sanyal, Debjani; G. B. Pant University of Agriculture and

Technology, Pantnagar (India). Department of Agronomy. Productivity of wheat as influenced by schedule of nitrogen and sulphur application. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.151-153 KEYWORDS: WHEATS. NITROGEN FERTILIZERS. SULPHUR FERTILIZERS. SOIL FERTILITY. PLANT PRODUCTION.

A field experiment was conducted during Rabi seasons of 2003-04 and 2004-05 to study the effect of nitrogen and sulphur application on yield attributes and yield of wheat (PBW-343). Two split application of nitrogen(1/3 basal+2/3 at first node) resulted higher number of spikes/m2, number of fertile spikelets per spike, grain weight per spike and grain yield as compared to three split application (1/2 basal+ 1/4 at tillering+1/4 at milk stage). Application of sulphur with Cosavat25 kg/ha was found optimum for obtaining significantly higher number of spike/m2, grain weight per spike and grain yield over control.

78. Singh, Rajnish; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Saxena, S.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Response to nutrient management on availability and uptake of NPK, PEI, fertility balance and apparent nutrient recovery in soybean (Glycine max L. Merrill.). Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.154-157 KEYWORDS: NUTRIENTS. NUTRIENT UPTAKE. NPK FERTILIZERS. SOIL FERTILITY. SOYBEANS. GLYCINE MAX. PLANT NUTRITION. SOIL MANAGEMENT.

An experiment was conducted during 2003-04 and 2004-05 to evaluate macro-nutrients combination on its availability, uptake, physiological efficiency indices (PEI), fertility balance and apparent nutrients recovery of NPK on soybean. The availability and uptake of N, P was significantly higher in T12 (N40P80K20). The PEI of N and K was maximum in T1 (control).

79. Sati, Avtari; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Singh, Sobaran; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Saxena, Anil Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Fertilizer prescription for targeted yield of Yellow Sarson (Brassica rapa var. PYS-I) in Mollisols of Uttarakhand. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.187-190 KEYWORDS: FERTILIZER APPLICATION. BRASSICA CAMPESTRIS. SOIL ANALYSIS. SOIL FERTILITY. ORGANIC AGRICULTURE. FARMYARD MANURE. NPK FERTILIZERS.

The response of yellow sarson to the selected combinations of 4 levels of each fertilizer N, P, K and 3 levels of FYM with simultaneous variations in initially available soil forms of these nutrients was studied as per technical programme of Soil Test Crop Response (STCR) in an Aquic Hapludoll of Crop Research Centre of G.B.P.U.A & T, Pantnagar Uttarakhand in year 2006-07.The straw and grain yield and plant and soil analysis data were utilized to formulate equations each for inorganic and organic mode connecting the fertilizer doses with varying yield targets at different fertility levels. The validity of the equations has been tested in the verification trial in the next year. It was found that fertilizer application based on yield target gave higher yields, net benefit and B/C ratio over the farmer's practice and general fertilizer recommendation.

80. Singh, Sobaran; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Sati, Avtari; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Mishra, Peeyush; G.B. Pant

University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Soil test based integrated N, P and K prescriptions for yield targets of maize in Mollisols of Uttarakhand. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.248-250 KEYWORDS: NPK FERTILIZERS. YIELD FORECASTING. YIELD INCREASES. MAIZE. SOIL FERTILITY.

81. Maheswarappa, H.P.; Central Plantation Crops Research Institute, Kasaragod (India). Thomas, George V.; Central Plantation Crops Research Institute, Kasaragod (India). Bhat, Ravi; Central Plantation Crops Research Institute, Kasaragod (India). Palaniswami, C.; Central Plantation Crops Research Institute, Kasaragod (India). Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India). Impact of inorganic fertilizer substitutions by vermicomposted coconut leaves on productivity and economics of coconut. Journal of Plantation Crops (India). (April 2011) v.39(1)p.30-34 KEYWORDS: FERTILIZER APPLICATION. VERMICULITES. COCONUTS. COPRA.

Investigations were carried out to study the impact of inorganic fertilizer substitutions by vermicompost on productivity of coconut during 2001 to 2009 at CPCRI, RS, Vittal in a 22 year old coconut garden under laterite soil. The treatments viz. recommended inorganic fertilizer (500g N, 320g P2O5 and 1200g K2O palm/year), 25% of N in the form of Vermicompost (VC) (9.6 kg/palm)+75% of NPK, 50% N in the form of Vermicompost VC (19.2 kg/palm)+50% of NPK, 75% N in the form of Vermicompost (VC) (28.8 kg/palm)+25% NPK and 100% N in the form of VC alone (38.5 kg/palm) were imposed in randomized block design. Five year pooled nut yield data indicated that, application of vermicompost in combination with inorganic fertilizer either at 25% Vermicompost (VC) + 75% NPK (65 nuts) or 50% VC + 50% NPK (63.2 nuts) resulted in significantly higher nut yield. The copra content and oil content did not differ significantly among the treatments. However, the copra content was ranged between 182.2 g to 184.4 g/nut and oil content ranged between 64.0 to 65.8 %. Economics of different treatments indicated that, the net return obtained under 2 % Vermicompost (VC) + 75% NPK and 50% VC + 50% NPK was higher (Rs. 16,673/- and Rs. 16,144/-per ha, respectively) compared to other treatments.

82. Poduval, Mini; Bidhan Chandra Krishi Viswavidyalaya, West Bengal (India) Regional Research Station. Yadukumar, N.; Directorate of Cashew Research, Puttur (India). Effect of different doses of fertilizers on different densities of cashew plantation. Journal of Plantation Crops (India). (Apr 2011) v.39(1)p.35-40 KEYWORDS: FERTILIZER APPLICATION.

Increasing pressure on land owing to diversion of orchard lands to other purposes as well as rising energy and land-costs, together with mounting demand for cashew have made it imperative to achieve higher productivity in cashew too. Therefore, maintenance of optimum population per unit area is most important for getting substantially high yield. Together with that a proper fertilizer recommendation is obviously required to maintain the population with its maximum productivity level. Thus the present study was undertaken with the objective of finding out the response of vegetatively propagated material of cashew to different doses of fertilizers at different plant densities. Considering the individual tree yield it was noticed that the plants under the density of 200 plants/ha supported the maximum yield 5.07 to 5.41 kg/tree at the age of 5years. But when the yield was calculated per unit area basis, highest yield was found with the plant density of 500 plants /ha (19.58 kg/tree) at the third harvest. Maximum Benefit : Cost ratio (2.26) was recorded with

application of fertilizer 75 kg N + 25 kg P2O5 + 25 kg K2O per ha per year under a tree density of 400 plants/ha.

F06 Irrigation

83. Bayissa, Gonfa; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, K.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, P.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, M.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Effect of cyclic irrigation and fertigation on off–season production of Capsicum (Capsicum annuum l.) under protected environment. Pantnagar Journal of Research (India). (Jan-Jun 2008) 6(1) p. v.6(1) p.134-141 KEYWORDS: IRRIGATION METHODS. FERTIGATION. OFF SEASON CULTIVATION. CAPSICUM ANNUUM. PROTECTED CULTIVATION. GREENHOUSES. WATER MANAGEMENT.

A field experiment was conducted at to study the effect of cyclic and fertigation on off-season production of capsicum (Capsicum annuum L.) under protected environment. The treatment consists of two irrigation levels (100 and 75% of water requirement) and three cycles level (One cycle per day, three cycles per day and six cycles per day) and two level of Fertigation in naturally ventilated polyhouse (NVPH) (normal and split fertigation) and only split Fertigation in environmentally controlled polyhouse (ECPH). The results revealed that the plant height was higher in NVPH where as the number of primary and secondary branches, canopy perimeter, yield, and yield attributes were higher in ECPH than NVPH. The irrigation treatment with three cycles per day under split fertigation (10.97, 10.10) has higher yield than six cycles (10.57, 9.33) and one cycle (7.59, 9.33) under split fertigation in ECPH and NVPH respectively. The water use efficiency was higher under treatment of three cycles per day with combination of 75 per cent of water requirement under split Fertigation in both polyhouse. The cyclic irrigation increased the water-use efficiency.

84. Rani, Manisha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Kushwaha, H.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Effect of planting dates, irrigation schedules and nitrogen dozes on performance of scented rice (Oryza sativa l.). Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.257-260 KEYWORDS: PLANTING DATE. CROPPING SYSTEMS. IRRIGATION SCHEDULING. NITROGEN FERTILIZERS. RICE. ORYZA SATIVA. MINERALIZATION.

A field experiment was conducted during kharif season of 2005 to know the most suitable transplanting date, irrigation schedule and fertilizer dozes to get high yield of the crop. The study showed that the second transplanting at 30th June with 120 kg N ha-1 and irrigation at 3 days after disappearance of ponded water is most suitable for good yield of the Pusa Sugandha-3.

85. Mishra, A.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agrometerology. Tripathi, Padmakar; Narendra Dev University of Agriculture and Technology, Faizabad (India). Department of Agricultural Meteorology. Effect of

irrigation frequencies on yield and water use efficiency of wheat varieties. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.1-4 KEYWORDS: IRRIGATION METHODS. IRRIGATION SCHEDULING. WATER UPTAKE. WATER USE. WHEATS. TRITICUM AESTIVUM.

Field experiment was conducted to study the effect of irrigation frequencies on yield and water use efficiency of wheat varieties during Rabi seasons of 2002-03 and 2003-04. The 12 treatment combinations comprised of four irrigation levels viz., I1 (one irrigation at CRI stage), I2 (two irrigations: one each at CRI and flowering stages), I3 (three irrigations: one each at CRI, LT and flowering stages) and I4 (four irrigations: one each at CRI + LT + LJ + ear head formation stages) along with the combination of three varieties viz., HUW-234, HD-2285 and PBW-154. Progressive increase in number of irrigations from 1 to 4 increased various yield contributing characters viz., effective tillers m-2, ear length, no. of grains ear-1 and test weight while three and four irrigations were found statistically at par with each other. The highest grain yield (40.65 q ha-1) was credited to I4 that was significantly superior over I1 and I2 but non-significant with I3. Consumptive use of water increased while water use efficiency gradually decreased with increase in number of irrigations. Among the varieties tested, HUW-234 recorded significantly higher yield and yield contributing characters and was found superior over rest two varieties. On the other hand, no significant difference was found between HD-2285 and PBW-154 for most of the yield characters. Highest consumptive use of water was credited to PBW-154 resulting in lowest water use efficiency. However maximum water use efficiency among the varieties was recorded in HUW-234.

86. Singh, Prabhat; G.B. Pant University of Agiculture and Technology, Pantnagar (India). Department of Horticulture. Lal, R.L.; G.B. Pant University of Agiculture and Technology, Pantnagar (India). Department of Horticulture. Singh, P.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage. Shukla, Pavan; G.B. Pant University of Agiculture and Technology, Pantnagar (India). Department of Horticulture. Response of microirrigation and fertigation on growth, yield and quality of litchi (Litchi chinensis Sonn.) cv. Rose Scented . Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.64-68 KEYWORDS: TRICKLE IRRIGATION. FERTIGATION. LITCHI. LITCHI CHINENSIS. LYCHEES. HORTICULTURE.

A field experiment was conducted at Horticulture Research Centre, Pattherchatta to study the response of microirrigation and fertigation on yield and quality of litchi cv. Rose Scented. Thirteen treatment combinations involving microirrigation (Bubbler) and fertigation with or without microsprinkler including control (Surface irrigaton and conventional fertilizer application) were applied for study. Data were analyzed on growth, yield and quality which revealed that the tree height and canopy spread were recorded at their maximum under bubbler discharge at 1.0 V level along with 125% level of fertigation. Maximum fruit set, fruit retention, fruit weight, fruit volume, fruit yield, ascorbic acid content with the minimum fruit cracking were recorded under treatment bubbler discharge at 1.0 V level + microspinkler + 125% level of fertigation, while the maximum TSS was recorded under bubbler discharge at 0.75% level + microsprinkler + 125% level of fertigation. Titrable acidity was maximum under control.

87. Mathew, A.C.; Central Plantation Crops Research Institute, Kasaragod (India). Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India). Irrigation

efficiency in coconut gardens-A comparative analysis of different systems of irrigation. Journal of Plantation Crops (India). (Apr 2011) v.39(1)p.48-56 KEYWORDS: IRRIGATION. ROOTS.

Coconut farmers practice different irrigation methods to overcome the water stress during the non-rainy season. A study has been undertaken to evaluate the field performance of prevailing irrigation systems, drip, sprinkler and basin irrigations, installed in farmer's field. It is evident from the study that substantial increase in yield is possible by providing irrigation to coconut. Majority of the farmers provide sufficient or more water to coconut and hence availability of water was not a limiting factor in the productivity of the palm under irrigated condition. Loss of irrigation water due to deep percolation occurred in most of the cases. Average distribution uniformity obtained by drip and sprinkler irrigations in the study is only 46%. Clogging of emitters and undulating topography are the main reasons for the poor distribution uniformity in drip irrigated plots. Clogging due to physical impurities and obstruction to the water jet due to intercrops and other vegetation are the main reasons for the poor distribution uniformity in sprinkler irrigation. In basin irrigated gardens all the farmers were doing irrigation manually and they took adequate care to distribute the applied water fairly uniformly in the whole basin. This is the reason for obtaining high distribution uniformity (90.33%) in basin irrigation. Irrigation application efficiency was less than 50% except in basin irrigation showing the improper utilization of irrigation water. In terms of volume of water, sprinkler irrigation consumed five times more water than that of drip irrigation and two times more water than that of basin irrigation in farmer's field.

88. Jayarama; Central Coffee Research Institute, Chickmagalur (India) CRS. Hareesh, S.B.; Central Coffee Research Institute, Chickmagalur (India) CRS. Keshavayya, J.; Kuvempu University, Shankaraghatta (India). Dept. of Chemistry. Prasanna, S.M.; Central Coffee Research Institute, Chickmagalur (India). CRS. D'Souza, Maria Violet; Central Coffee Research Institute, Chickmagalur (India). CRS. Impact of nutrition mode, shade and irrigation on leaf nutrient status and yield of robusta coffee (Coffea canephora). Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.167-170 KEYWORDS: IRRIGATION. SHADE.

89. Latha, A.; College of Horticulture, Vellanikkara (India). AICRP on Medicinal and Aromatic Plants. Radhakrishnan, V.V.; College of Horticulture Vellanikkara (India). AICRP on Medicinal and Aromatic Plants. Yield and plumbagin content as influenced by irrigation regimes in Plumabgo rosea as intercrop in coconut garden. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.181-183 KEYWORDS: IRRIGATION. PLUMBAGINACEAE.

90. Suseela, P.; Kerala Agricultural University, Vellayanikkara (India). Efficient Irrigation in coconut garden. Indian Coconut Journal (India). (Feb 2011) v.73(10) p. 14-18 KEYWORDS: IRRIGATION. COCONUTS.

F07 Soil Cultivation

91. D'Souza, Maria Violet; Central Coffee Research Institute, Chickmagalur (India). CRS. Prasanna, S.M.; Central Coffee Research Institute, Chickmagalur (India). CRS. Hareesh, B.S; Central Coffee Research Institute, Chickmagalur (India). CRS. Jayarama; Central Coffee Research Institute, Chickmagalur (India). CRS. Sherigara, B.S.; Kuvempu University,

Shankaraghatta (India). Dept. of Applied Botany. Competitive adsorption and Interaction of Cu, Zn, Pb and Cd in coffee growing soils of South India. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.62-67 KEYWORDS: SOIL. TOXIC SUBSTANCES.

Coffee growing soils receive trace metals like copper, zinc, lead and cadmium either through agro-inputs like fertilizers, urban compost, sewage sludge etc., or through plant protection chemicals like fungicides/herbicides. The extensive use of such inputs over long periods leads to accumulation of nutrient as well as toxic elements in soils. The presence of one element in excess can affect the uptake of the other and result into imbalance in supply of essential nutrients to the standing crop in that soil. Hence to understand the interaction of nutrient element like copper with another nutrient, zinc and two toxic elements, viz., lead and cadmium, batch equilibration study was taken up in coffee growing soils representing four major states of south India. The variation in adsorption pattern and sequence of affinity in binary systems was studied. The data indicated that the presence of any other element reduced the quantum of adsorption of copper in all the four soils (Balehonnur, Thandigudi, Chundale and R V Nagar) compared to that in a solitary system. The affinity sequence for the elements was Pb Cu Zn Cd in majority of the soils while that for Chundale soils was Cu Pb Zn Cd.

92. Oommen, Manoj; Indian Cardamom Research Institute, Myladumpara (India). Sundari, A.; Annamalai University, Chidambaram (India). Thomas, J.; Indian Cardamom Research Institute, Myladumpara (India). Optimisation of foliar application of zinc and boron in small cardamom (Elettaria cardamomum Maton). Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.285-289 KEYWORDS: BORON. CARDAMOMS. FOLIAR APPLICATION. YIELDS.

A field experiment was conducted at Indian Cardamom Research Institute, Spices Board, Myladumpara, Idukki district, Kerala during 2006-09 to study the response of foliar application of zinc and boron on growth, yield and its content in index leaves in small cardamom. The experiment was laid out in randomized block design with twelve treatments replicated thrice. The treatments were various levels of zinc (0.1, 0.25, 0.5, 0.75 and 0.9%) as zinc sulphate and boron (0.2, 0.4, 0.6, 0.8, 1.0 and 1.2%) as borax with a control. The zinc content in the leaves of zinc treated plants ranged from 53.79 mg kg-1 to 116.67 mg kg-1. The boron content in leaves of the boron treated plants ranged from 20.62 mg kg-1 to 34.37 mg kg-1. The DTPA extractable zinc in soil was 0.756 to 0.917 mg kg-1 in zinc treatments and 0.93 mg kg-1 in control plot. Hot water extractable boron in soil ranged between 0.90 mg kg-1 to 2.2 mg kg-1 in boron treatments and 0.850 mg kg-1 in control plot. Application of boron at 0.6 and 0.8% significantly improved the yield of cardamom compared to control. A significant quadratic relationship was established between yield and various levels of zinc and the quadratic curve gives the zinc optimum dose as 0.3 %. The yield attributing characters like number of panicles per clump and number of racemes per panicle were positively influenced by the foliar application of zinc and boron.

F08 Cropping Pattrens and Systems

93. Tripathi, Neeta; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Verma, R.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Assessment of grain quality attributes of basmati rice produced by organic system. Pantnagar Journal of Research

(India). (Jul-Dec 2008) v.6(2) p.192-195 KEYWORDS: RICE. ORGANIC AGRICULTURE. HUSKING. MILLING. AMYLOSE. COMPOSTING. OLIGOCHAETA.

An experiment on basmati rice cv. Pusa Basmati-1 was conducted during kharif 2004 and 2005 under different combinations of organic fertilization and plant protection measures to assess the effect of different treatments on grain quality parameters. Control with recommended cultural practices was also taken to compare with organic treatments. Green manure treatments exhibited high hulling and head rice recoveries, L/B ratio, elongation ratio and amylose content (%). The alkali spreading value ranged between 6.4-7.0 indicating low gelatinization temperature requirements for all the treatments. Almost similar response to different treatments was observed in case of aroma content of rice kernel during both the years.

94. Basavaraju, T.B.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Nanjappa, H.V.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Umesha, K.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Vasundhara, M.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Arulraj, S.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Intercropping of medicinal and aromatic plants in coconut gardens. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.299-304 KEYWORDS: COCONUTS. INTERCROPPING.

A field study was conducted at Horticulture Research Station, Arsikere, Karnataka during 2006-07 to 2008-09 to identify suitable medicinal and aromatic plants for intercropping in coconut gardens of maidan tract of Karnataka. The experiment consisted of 14 medicinal and aromatic crops viz., Kalmegh (Andrographis paniculata), Makoi (Solanum nigrum), Coleus (Coleus forskohlii), Garden rue (Ruta graveolens), Lepidium (Lepidium sativum), Tulsi (Ocimum sanctum), Arrow root (Maranta arundinaceae), Kacholam (Kaemferia galanga), Cowhage (Mucuna pruriens), Roselle (Hibiscus sabdariffa), Ambrette (Abelmoschus moschatus), Citronella (Cymbopogon winteranus), Lemon grass (Cymbopogon flexuosus) and Vetiver grass (Vetiveria zizanoides). The yield of all the medicinal and aromatic crops grown as intercrop in coconut garden were reduced compared to their sole crop yields. The reduction in yield was less in lemon grass (6.4 %), tulsi (23.5 %), arrow root (23.9 %), vetiver grass (25.1 %), kalmegh (25.7 %), makoi (29.1 %), citronella (30.2 %) and garden rue (30.5 %). The nut yield of coconut was improved with intercropping of medicinal and aromatic crops. The andrographolide content in kalmegh (4.40 to 3.20 %), rutin alkaloids in garden rue (1.68 to 1.40 %) and oil content in lepidium (19.60 to 17.23 %) were significantly reduced when grown as intercrops in coconut garden as compared to sole crop. However, the forskohlin content in coleus (0.43 to 0.61 %) and essential oil content in ambrette (0.24 to 0.29 %) were significantly increased by intercropping. In other medicinal and aromatic crops, the quality parameters were not significantly influenced by intercropping. The intercropping system of growing lemon grass under coconut recorded the highest net income (Rs. 91,561/ha) and B:C ratio (2.89) followed by garden rue (Rs. 81,865/ha and 2.79), tulsi (Rs. 77,472/ha and 2.71), kalmegh (Rs. 75,163/ha and 2.56), arrow root (Rs. 72,211/ha and 2.28) and makoi (Rs. 67,058/ha and 2.68). Hence, intercropping of lemon grass, garden rue, tulsi, kalmegh, arrow root and makoi with coconut can be recommended for maidan tract of Karnataka.

95. Yesh Pal; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, R.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Sachan, R.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Pandey, P.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Effect of integrated nutrient management practices on yield, nutrient uptake and economics of mustard (Brassica juncea L.) grown in the rice-mustard cropping system. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.199-204 KEYWORDS: NUTRIENTS. NUTRIENT UPTAKE. ECONOMICS. MUSTARD. BRASSICA JUNCEA. CROPPING SYSTEMS. ORGANIC AGRICULTURE.

A field experiment was carried out during 2002-03 and 2003-04 to assess the extent of reductions in yield due to application of inorganic fertilizers below the recommended level and also the benefits in yield due to integrated nutrient management (INM) in mustard (Brassica juncea L.) variety Kranti. The NPK levels applied were 100%, 75% and 50% of recommended fertilizer (RF) through inorganic fertilizers alone and in combination. Significant reduction in yield and yield contributing parameters like number of branches, number of siliquae and plant height was recorded with reduction in fertility levels during both the years. Similar trend was recorded in uptake of N, P, K, S, Zn and B nutrients. Significantly highest values of plant height, number of branches, number of siliquae, and seed and oil yield were recorded with T6 where complete INM package was applied along with 100 per cent of RF followed by T12 and T18 where the same INM package was applied along with 75 and 50% of RF level. Significantly higher uptake values of N, P, K, S, Zn, and B were also recorded in these treatments.

96. Bijalwan, Arvind; Institute of Forest Management, Bhopal (India). Faculty of Technical Forestry. Sharma, C.M.; H.N.B. Garhwal University, Srinagar, Garhwal (India). Department of Botany. Sah, V.K.; G.B. Pant University of Agriculture and Technology, Ranichauri (India). Kediyal, V.K.; G.B. Pant University of Agriculture and Technology, Ranichauri (India). Planting arrangement and regeneration status in existing agroforestry systems of Garhwal Himalaya. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.143-147 KEYWORDS: PLANTING. REGENERATION. AGROFORESTRY. HIMALAYAN REGION. LAND USE.

The present study summarizes that the MPTs (forest and horticultural trees) were planted along the bund, middle and other places of agricultural lands depending upon the geographical condition, need, economics and environmental status in the existing agroforestry systems of mid hill situation of Garhwal Himalaya between 1000 to 2000m. The highest 59.09% trees were present on the bunds in agrisilviculture (AS) system followed by 51.19% on the other places in agrihorticulture (AH) system whereas the middle portion of the field was generally shared by the horticultural trees in agrihortisilviculture (AHS) system. The regeneration status was observed to be very poor in the existing agroforestry systems. The availability of trees was reported as 4.41, 3.62, 4.86 tree/100m2, sapling as 0.95, 0.85, 0.85 sapling/100m2 and seedling as 0.24, 0.26, 0.30 seedling/100m2 in the AS, AHS and AH systems respectively. The regeneration status was comparatively higher in the northern aspect compared to southern.

97. Sanyal, Debjani; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Anand Prakash; G.B. Pant University of Agriculture and

Technology, Pantnagar (India). Department of Agronomy. Mahapatra, B.S.; CRIJAF, Barrackpore (India). Singh, V.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, I.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Yield and nutrient uptake of basmati rice in different cropping systems under organic mode of cultivation. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.158-160 KEYWORDS: NUTRIENT UPTAKE. CROPPING SYSTEMS. RICE. ORYZA SATIVA. ORGANIC AGRICULTURE.

A field experiment was conducted during rabi season of 2005-2006 to kharif season of 2006-2007 to study the yield, nutrient composition and uptake of basmati rice in different cropping systems under organic mode. The experiment was laid out in Split Plot Design with three cropping systems, viz. C1 (Sesbania- basmati rice-wheat), C2 (Sesbania-basmati rice-chickpea) and C3 (Sesbania-basmati rice-vegetable pea) in main plots and five organic manure treatments, viz. N1 (½ Enriched compost + ½ Vermicompost), N2 (½ Neem cake + ½ Vermicompost), N3 (½ Farm yard manure + ½ Vermicompost), N4 (¼ Enriched compost + ¼ Vermicompost + ¼ Farm yard manure + ¼ Neem cake) and N5 (no manure application) in sub-plots replicated for three times. Organic manures were applied only before sowing of rabi crops and basmati rice was grown solely depending on Sesbania green manuring. The crop yielded 7.60 and 8.80 q ha-1 more in C2 (Sesbania-basmati rice-chickpea) system over C1 (Sesbania-basmati rice-wheat) system in first and second year, respectively. Uptake of nutrients by basmati rice in different cropping systems was recorded to be higher in legume based cropping systems as compared to basmati rice-wheat system. Application of organic manures did not show any marked influence on yield and nutrient uptake of basmati rice.

98. Singh, Y.V.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department Vegetable Science. Nautiyal, M.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department Vegetable Science. Singh, B.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department Vegetable Science. Pandey, Bhawna; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department Vegetable Science. Sharma, C.L.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department Vegetable Science. Performance of short duration cowpea varieties for enhanced pulses production in different seasons under Tarai conditions of Uttarakhand. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.198-201 KEYWORDS: COWPEAS. GRAIN LEGUMES. SEASONAL CROPPING. CROPPING SYSTEMS. SOIL FERTILITY. FEED CROPS. FEED LEGUMES.

Per capita availability of pulses in India is constantly declining due to stagnant production of pulses and increasing rate of population. Therefore, concerted efforts are being made to increase pulses production by introducing short duration high yielding varieties as a niche crop in the rice-wheat system. Cowpea is one of the potential crops for this system because a number of high yielding cowpea varieties have recently been developed which mature in 60-70 days and require less irrigation and less fertilizers. This study was conducted to evaluate nine cowpea varieties including local and improved ones at Pantnagar but only 5 improved ones from IITA were evaluated at Majhera and Hawalbagh. The trials were conducted at three locations covering the plains and low hills. At Pantnagar., three varieties, IT-82D-889, IT97K-1042, and IT98K-1111 appeared very promising with mean yields of 1844.78 kg/ha, 1741.77 kg/ha and 1252.08 kg/ha respectively compared to Pusa Komal 887.85 kg/ha and local variety, 563.26 kg/ha . IT-1042 and Pusa Komal matured in 70-75 days but IT98K-1111and IT-205 matured in only 60-65 days. The other two varieties

from IITA, IT 93K-452 and IT98K-205 were also promising but their yields were low because of poor germination. IT97K-1042 was also very promising at Majhera and Hawalbagh with yields of 1467 kg/ha and 2139 kg/ha respectively but delayed in maturity. The results indicate a good possibility of increased cowpea cultivation.

99. Saran, P.L.; G.B. Pant University of Agriculture and Technology, Dhakrani (India). Horticulture Research and Extension Centre. Screening of papaya cultivars under Doon valley conditions. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.246-247 KEYWORDS: TESTING. PAPAYAS. CARICA PAPAYA. VALLEYS. VIROSES.

100. Saxena, S.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, Rajnish; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, Kuldeep; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Effect of nutrient management on yield attributes, yield, harvest index, quality and economics of soybean (Glycine max L. Merrill.) under Tarai conditions of Uttarakhand. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.8-10 KEYWORDS: NUTRIENTS. YIELD COMPONENTS. HARVEST INDEX. ECONOMICS. SOYBEANS. GLYCINE MAX. COST BENEFIT ANALYSIS.

A field experiment was conducted during Kharif season of 2003-04 and 2004-05 to evaluate the effect of nutrient management combinations on soybean yield and related parameters. Number of branches, LAI, dry matter accumulation per plant, number of pods per plant and 100-grain weight was highest in T12 (40 kg N + 80 kg P2O5 + 40 kg K2O ha-1). Grain yield (1794 kg ha-1), protein yield (627 kg ha-1), oil yield (321.06 kg ha-1) and gross return (Rs. 21887 ha-1) were maximum in same treatment (T12). However, net return (Rs. 12462 ha-1), and B: C ratio (1.40) were highest in T2 (20 kg N + 40 kg P2O5 + 20 kg K2O ha-1).

101. John, Jacob; Kerala Agricultural University, Karamana(India). Jose, Shirmila; Kerala Agricultural University, Karamana(India). Stephen, Roy; College of Agriculture, Vellayani (India). Investigations on the allelopathic compatibility of pepper with multipurpose trees for use as standard in homesteads. Journal of Plantation Crops (India). (Apr 2011) v.39(1)p.164-166 KEYWORDS: ALLELOPATHY. COCONUTS. PEPPER.

102. Ghosh, D.K.; Bidhan Chandra Krishi Viswavidyalaya Mohanpur (India). Department of Spices and Plantation Crops. AICRP on Palms. Hore, J.K.; Bidhan Chandra Krishi Viswavidyalaya Mohanpur (India). Department of Spices and Plantation Crops. AICRP on Palms. Bandyopadhyay, A.; Bidhan Chandra Krishi Viswavidyalaya Mohanpur (India). Department of Spices and Plantation Crops. AICRP on Palms. Effect of spacing and seed rhizome size on growth and yield of ginger grown as intercrop in coconut plantation in West Bengal. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.322-324 KEYWORDS: INTERCROPPING. SPACING.

103. Ghosh, D.K.; Chandra Krishi Viswavidyalaya Mohanpur (India). Department of Spices and Plantation Crops. AICRP on Palms. Hore, J.K.; Bidhan Chandra Krishi Viswavidyalaya Mohanpur (India). Department of Spices and Plantation Crops. AICRP on Palms. Bandopadhyay, A.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India). Department of

Spices and Plantation Crops. AICRP on Palms. Effect of spacing and size of planting material on growth and yield of turmeric grown in coconut plantation. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.337-339 KEYWORDS: COCONUTS. INTERCROPPING. TURMERIC. SPACING.

F30 Palnt Genetics and Breeding

104. Singh, Brajesh Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Molecular Biology and Genetic Engineering. Khanna, V. K.; G. B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Cloning of seed specific promoter of gamma-kafirin gene from sorghum. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.220-225 KEYWORDS: CLONING. SORGHUM. TRANSGENIC PLANTS. TRANSGENICS. STORAGE PROTEINS.

Seeds of sorghum variety M 35-1 (R-99) were taken for this study. This variety was selected on the basis of its high kafirin content as per the data available. The long-term goal of the present study is the production of transgenic sorghum, which has soft endosperm with HMW-gs gene of gluten protein of the wheat. This makes the sorghum flour more palatable for making roti and also increases the dough quality and lysine content. One of the approaches to achieve this goal is to transform the HMW-gs genes with the seed specific ƒ×-kafirin gene promoter. Present investigation records the results of our efforts on trying to clone the ƒ×-kafirin gene promoter. The DNA extracted from M 35-1 (R-99) variety of sorghum were used to amplify the promoters and cloned in the pGEM vector. Genomic DNA was extracted from fresh etiolated young leaves of M 35-1 (R-99) sorghum variety. DNA sample were purified. Forward and reverse primers pairs were designed based on the published gene sequence of ƒ×-kafirin protein gene. These genomic DNAs were used as template to amplify the promoters with designed primers. The combination of the primers was also used to amplify the promoter region of different sizes. The promoters were amplified on a large scale and purified. For vector preparation the pGEM vector were isolated from pre-transformed E. coli. The identification of pGEM plasmid was confirmed by restriction analysis. The vector were prepared in large quantity and treated with RNAase A and phenol: chloroform: isoamyl treatment to get purified plasmid DNA. The digested plasmid DNA was standardized with EcoR-1. Linearized plasmid and amplified promoter was then ligated using T4 DNA ligase. Ligation mixtures were used to transform bacterial strains DH 5ƒÑ host cells and plated on LB plates with ampicillin. The transformants are to be analysed for the presence of promoter inserts.

105. Deka, D. K.; Tezpur University (India). Dept. of Food Technology. Borah, D.; Tocklai Experimental Station, Jorhat (India). Plant Improvement Division. Lahon, T.; Tocklai Experimental Station, Jorhat (India). Plant Improvement Division. Baruah, U.; Tocklai Experimental Station, Jorhat (India). Plant Improvement Division. Handique, A.K.; Gauhati University (India). Department of Biotechnology. Barman, T.S.; Gauhati University (India). Department of Biotechnology. Selection of waterlogging tolerant tea (Camellia sinensis L.) genotypes. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.203-209 KEYWORDS: PHOTOSYNTHESIS.

106. Bhadana, Vijaipal; ICAR Research Complex for NEH Region, Lamphelpat (India) Manipur Centre. Division of Plant Breeding. Khanna, V.K.; G.B. University of Agriculture and

Technology, Pantnagar (India). Deparment of Genetics and Plant Breeding. Studies on ovule culture and the effect of growth regulators on in vitro fibre and embryo development in Gossypium arboreum and G. hirsutum. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.226-233 KEYWORDS: GOSSYPIUM ARBOREUM. GOSSYPIUM HERBACEUM. IN VITRO. EMBRYONIC DEVELOPMENT. GROWTH RATE. OVULE CULTURE. PLANT FIBRES. HYBRIDIZATION.

The response of two varieties each of Gossypium arboreum and G. hirsutum to ovule culture, in vitro fiber growth from immature ovules and the effect of growth regulators on in vitro fiber and embryo development was studied. More callus growth (7.04) from immature ovules was found in BD-5 in the medium having 1.0 mg/l IAA and 0.5 mg/l kinetin, whereas least (0.01) was recorded in LH-900. Hundred percent ovules of both Lohit and BD-5 produced callus in a number of media, whereas ovules of Vikas and LH-900 did not give 100% callus induction frequency in any of the media. BD-5 ovules produced maximum fiber in vitro (5.60) on the medium having 1.0 mg/l kinetin. In general, Vikas was found to be more responsive for in vitro fiber growth followed by LH-900, BD-5 and Lohit, respectively. LH-900 produced in vitro ovules of maximum size (8.85) on the medium supplemented with 1.0 mg/l each of kinetin and NAA, whereas, minimum growth of ovules was observed in Lohit on the medium having 1.0 mg/l each of IAA and NAA. Maximum frequency of normal ovules (65.36%) was recorded in Vikas, when the medium was supplemented with 2.0 mg/l IAA and 0.5 mg/l kinetin. Lohit and BD-5 did not produce normal ovules on a number of media. Normal embryos were obtained in maximum frequency in LH-900 (36.00%) when the medium was supplemented with 1.0 mg/l IAA and 0.5 mg/l each of kinetin and NAA. On some of the media none of the genotypes produced even a single embryo. There was a complete correspondence observed between normal ovule frequency and normal embryo development frequency. Callus growth was found to be significantly and positively correlated with callus induction frequency in all the genotypes, whereas both of these were negatively correlated with normal embryo development frequency. Normal ovule development frequency exhibited significant and positive correlation with normal embryo development frequency in all the genotypes. The effect of smearing stigmas with modified Taylor s medium was found to be significant in in vitro fertilization as it enhanced the frequency of hybrid embryos.

107. Joshi, Neelima; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Singh, Y.V.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Bhushan, K.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Heterosis for different quantitative traits in brinjal (Solanum melongena L.). Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.266-269 KEYWORDS: HETEROSIS. QUANTITATIVE ANALYSIS. QUANTITATIVE TRAIT LOCI. AUBERGINES. SOLANUM MELONGENA. GENOTYPES.

Present investigation was carried out with 47 genotypes including 11 lines, 3 testers and 33 F1s of brinjal. Best heterotic combinations over standard check for various characters were NDB 21 x PS and KS 356 x PU for days to 50% flowering (-32.65 and -28.57 %); PB 64 x PB 67 and NDB 21 x PB 67 for plant height (32.90 and 31.58 %); Punjab Sadabahar x PB 67 and PB 61 x PU for fruit length and diameter (51.62 and 200.42 %) respectively. The cross NDB 21 x PB 67 showed highest economic heterosis for most of the traits studied including the yield and yield attributing characters thus, this cross could be

advanced to recover desirable segregants for the improvement of yield and yield contributing characters. On the basis of standard heterosis, it can be concluded that the heterosis breeding would be advantageous for the improvement of brinjal for yield and its component quantitative traits. The crosses NDB 21 x PB 67, PB 64 x PB 67 and PB 64 x PB 67 could be exploited as commercial hybrids as they demonstrated highly significant heterosis, over the standard cultivar, Pant Samrat.

108. Jadli, Sandeep; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Singh, J.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Prasad, R.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Bhushan, K.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Thapliyal, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Potential verses actual seed performance of field pea (Pisum sativum L.). Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.270-274 KEYWORDS: PEAS. PISUM SATIVUM. VIGOUR. QUALITY. SEED.

Potential and actual seed performance of 11 field pea (Pisum sativum L.) cultivars was compared under lab and field conditions. Seeds of all the cultivars were evaluated for different laboratory vigour tests. Field performance was evaluated by flowering, maturity period, plant height at maturity, seed yield and other yield contributing characters. Results from the present investigation showed that most of the vigour tests were good indicator of field performance and results on coefficient of variation revealed that for all the characters the PCV were always found more than their respective GCV. High heritability was associated with test weight. Genetic advance and genetic gain was found highest for seedling vigour index-I and plant height at maturity, respectively.

109. Sharma, Rishika; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Malik, J.P.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Line X tester studies on two-line hybrids in rice (Oryza sativa L.). Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.293-295 KEYWORDS: RICE. ORYZA SATIVA. HYBRIDS. HYBRIDIZATION. HETEROSIS.

110. Sah, Shivjee; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Molecular Biology and Genetic Engineering. Khanna, V. K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Detection of diversity in germplasm collection of sorghum (Sorghum bicolor) using RAPD analysis. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.170-174 KEYWORDS: GENETIC DISTANCE. GERMPLASM. SORGHUM. RAPD. ISOENZYMES. GENOTYPES.

Eighteen accessions of Sorghum bicolor used for the present study consisted of 4 genotypes of forage sorghum i.e. UPFS-34, Pant Chari 4, UP Chari 2 and UP Chari 3 and 14 genotypes of grain sorghum. The seed of most of the genotypes of forage sorghum was reddish brown but the colour of the seed of grain sorghum was grayish. However, genetic variation at DNA level among 18 accessions of sorghum revealed that 3 forage sorghum out of 4 may have diverged long time back in evolution but one of these i.e. UP Chari 2 may

have evolved as a forage variety much later. The results suggest that forage sorghum might have evolved by gene arrangement of grain sorghum. In UP Chari and Swathi most of the genotypic characters are the same but there might be changes in gene patterns responsible for forage characters. However, three forage sorghums which got diversified indicate that most of the genotypes of forage sorghum were distantly related to grain sorghum.

111. Meena, S.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Sachan, J.N.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Inheritance of erucic and oleic acid content and correlation among fatty acids in Indian mustard [B. juncea (L) Czen & Coss.]. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.175-179 KEYWORDS: ERUCIC ACID. OLEIC ACID. FATTY ACIDS. BRASSICA JUNCEA. BREEDING METHODS.

Rapeseed-mustard oil is used as edible oil, as well as raw material for industrial products like soap, cosmetics, lubricants, paints, plasticizers, etc. In the present study six generations viz. P1, P2, F1, F2, BC1 and BC2 of three crosses, viz. PRQ-9701 x Kranti, JLM-23 x Kranti and PLEM-2003-9 x Varuna were grown in a RBD. The non-significant difference between F1 and their reciprocal F1 for erucic and oleic acid contents indicated absence of maternal influence. Estimation of effective factor pairs indicated that parents utilized in these crosses differed by at least two genes for both the fatty acids. For erucic acid content the observed ratio in F2 population (18:85:152:87:25) was not significantly different from the expected ratio (1:4:6:4:1), similarly for oleic acid the observed F2 ratio (23:86:150:84:25) was also not significantly different from the expected ratio which indicated digenic inheritance of these fatty acids. The simple additive-dominance model was adequate in the two crosses for erucic acid and in all the three crosses for oleic acid content, suggesting the absence of non-allelic interactions. In one cross additive x additive interaction was found significant for erucic acid but the additive effect had the highest magnitude. Therefore, the additive gene effects could be exploited by the pedigree method of breeding for selecting low erucic and high oleic acid content segregants in the F2 generation. Correlation studies among the major fatty acids revealed that erucic acid exhibited negative and significant correlation with palmitic, stearic, oleic, linoleic and linolenic acids. The linoleic and linolenic acids had a positive and significant association with each other as well as with oleic acid. Correlation studies revealed that the lines with 2% erucic acid coupled with approximately 40-45% oleic, 30-35% linoleic, 15-20% linolenic and 5% saturated fatty acids could be developed.

112. Reddy, S.V.R.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Molecular Biology and Genetic Engineering. Khanna, V.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Molecular fingerprinting of sorghum (Sorghum bicolor L. Moench) germplasm using simple sequence repeat markers. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.180-186 KEYWORDS: MOLECULAR GENETICS. GENETIC MARKERS. SORGHUM BICOLOR. SORGHUM. GERMPLASM. GENETIC DISTANCE.

SSR markers were used to study genetic diversity in sorghum. Fourteen diverse sorghum accessions were used for the present study. A set of 6 SSR specific primer pairs were used for PCR amplification. A total of 34 bands were amplified all of which were polymorphic and there were 3 unique bands. Accessions GFS-4 and UPFS-38 were very

similar with a value of 0.728 whereas GFS-5 and FSH 92079 showed the lowest similarity value of 0.384. Accessions from IARI and NRCS were related to each other with a similarity value of 0.515 on an average. Accessions from Pantnagar and HAU were distantly related whereas accessions from GAU and ProAgro were similar to each other. The information content of the SSR data was high. The data from just one SSR locus allows the accessions to be uniquely identified. These SSRs can provide data that are useful to support genetic conservation.

113. Choudhary, Harshawardhan; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Singh, D.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Correlation studies in germplasm lines of Cucumis sativus var. hardwickii. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.191-194 KEYWORDS: GERMPLASM. CUCUMIS SATIVUS. CUCUMBERS. WILD PLANTS. PHENOTYPES. GENOTYPES.

An experiment was conducted with twenty six germplasm lines of Cucumis sativus var. hardwickii to assess the association between various yield and fruit quality traits. Correlation study revealed that characters showing highly significant positive correlation with fruit yield per plant were pulp breadth, number of fruits per plant, average fruit weight, fruit length, fruit diameter, vine length and number of lateral branches per plant. Seed cavity size showed highly significant negative correlation with fruit yield per plant.

114. Choudhary, Harshawardhan; Central Institute of Temperate Horticulture, Srinagar (India). Verma, M. K.; Central Institute of Temperate Horticulture, Srinagar (India). Sofi, A.A.; Central Institute of Temperate Horticulture, Srinagar (India). Genetic variability, heritability and genetic advance for yield components in garden pea. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.195-197 KEYWORDS: GENETIC VARIATION. HERITABILITY. GENETIC GAIN. YIELD COMPONENTS. PEAS. PISUM SATIVUM.

Genetic variability, heritability and genetic advance for eleven yield contributing traits were studied in thirty three genotypes of garden pea. The study indicated existence of considerable amount of genetic variability for all the characters studied except pod breadth. Number of pods per plant, green pod yield per plant and plant height exhibited higher values of genotypic and phenotypic coefficient of variation. High estimates of heritability, genotypic coefficient of variation and genetic advance were observed for plant height, number of pods per plant and green pod yield per plant. These characters can be effectively improved through selection.

115. Singh, Gurubaksh; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Singh, D.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Vegetable Science. Bhardwaj, S.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Directorate of Experiment Station. Variability studies in November maturity group of Cauliflower (Brassica olderacea var. botrytis L.). Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.202-205 KEYWORDS: GENETIC VARIATION. MATURITY. CAULIFLOWERS. BRASSICA OLERACEA BOTRYTIS. HERITABILITY. GENETIC GAIN.

Forty five cauliflower genotypes of November maturity were evaluated at Vegetable Research Centre, G.B.Pant University of Agriculture and Technology, Pantnagar during 2007-

2008. Phenotypic coefficient of variation was higher than the genotypic coefficient of variation for all the characters. It indicates the role of environment on expression of characters. Plant height and whole plant weight had higher heritability along with high genetic advance indicated additive gene effects. Plant spread and curd diameter exhibited high heritability along with low genetic advance indicated non-additive gene effects.

116. Shalini; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Nambiar, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Chawla, H.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Agrobacterium tumefaciens mediated transformation of cauliflower (Brassica oleracea var. botrytis) with bacterial mannitol phosphodehydro-genase gene for abiotic stress tolerance. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.15-19 KEYWORDS: AGROBACTERIUM TUMEFACIENS. CAULIFLOWERS. BRASSICA OLERACEA BOTRYTIS. MANNITOL. OXIDOREDUCTASES. STRESS.

The bacterial mannitol-1-phosphodehydrogenase (mtlD) gene conferring abiotic stress resistance was introduced into cauliflower (Brassica oleracea var. botrytis) by Agrobacterium mediated transformation. Petiole and hypocotyl explants were transformed with Agrobacterium strain LBA 4404 (pCaMVMTLDS). The explants were selected on kanamycin containing medium in three selection cycles of two week duration each with low intensity of selection in first selection cycle followed by high intensity selection. After completion of three selection cycles, 9.6 and 10.6 per cent kanamycin resistant petiole and hypocotyl explants were recovered respectively. A total of 80 putative transgenic plants were regenerated from the selected explants. Thirty plants were PCR positive for both selectable marker nptII gene and mtlD gene with transformation frequency of 1.3 and 2.1 per cent from petiole and hypocotyls explants respectively.

117. Mall, A.K.; Narendra Deva University of Agriculture and Technology, Faizabad (India). Department of Genetics and Plant Breeding. Ram Bhajan; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Kumar, K.; Narendra Deva University of Agriculture and Technology, Faizabad (India). Department of Genetics and Plant Breeding. Verma, O.P.; Narendra Deva University of Agriculture and Technology, Faizabad (India). Department of Genetics and Plant Breeding. Combining ability analysis for some metric traits over environments in Indian-mustard (Brassica juncea L. Czern & Coss) . Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.20-25 KEYWORDS: COMBINING ABILITY. BRASSICA JUNCEA. YIELD COMPONENTS.

Combining ability analysis was done using 20 lines × 3 testers for yield and its components over two environments. Significant differences due to lines, testers and their interaction showed the importance of both additive and non-additive gene action with later being predominant. Kranti and PBR-253 were good general combiners for seed yield per plant, plant height, length of main raceme, siliquae per plant and seeds per siliqua under timely sown (E1). JGM15-2 and PBR-558 were high GCA parents for seed yield and other traits under late sown (E2). The crosses HUJM-0202×Narendra Rai, KLM-145×NDYR-32 and JMWR-946-3-13×Narendra Rai in E1, and CS-611-1-3-1×NDYR-32, PBR-253×Narendra Rai and RH-0202×NDYR-32 in E2 were the most desirable specific combinations for seed yield and other yield related traits.

118. Kumar, Anil; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Mani, S.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Gene action for grain yield, its components and quality traits in Basmati rice (Oryza sativa L.). Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.26-31 KEYWORDS: GENE EXPRESSION. YIELD COMPONENTS. RICE. ORYZA SATIVA.

The components of genetic variance for grain yield, important yield components and certain quality traits were studied in seven crosses among eight basmati parental lines. The character means over six generations were subjected to scaling test. In the presence of epistasis, six parameter model was used to detect epistasis. The genetic analysis revealed the importance of additive components (d) for plant height, number of grains/panicle, panicle length, 1000-grain weight and kenel elongation ratio; dominance (h) and epistatic components for grain yield / plant, 1000-grain weight, panicle length, number of grains/panicle in most of the crosses. Dominance effect was important for kernel L/B ratio. Among the digenic interactions additive × additive (i) and dominance × dominance (l) effects contributed more for most of the characters. Additive × dominance (j) gene effect was important for 1000-grain weight in the cross C1, C3, C4 and C7; for grain yield per plant in C5 and C7 and for plant height, number of grains per panicle, number of effective tillers per plant, panicle length in C3 and C5.In general, the crosses revealed duplicate type non- allelic interactions for grain yield/plant. All the crosses exhibited heterosis in F1and inbreeding depression in F2 generation.

119. Yadav, Narendra Singh; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Shukla, Arvind; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Molecular diversity in Jatropha curcas (L.) genotypes assessed by RAPD Markers. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.32-38 KEYWORDS: MOLECULAR GENETICS. JATROPHA CURCAS. RAPD. GENETIC VARIATION. GENETICS.

Jatropha curcas is a multipurpose shrub and is considered to have originated in Latin America but presently grown throughout the arid, semi-arid tropical and subtropical regions of the world. Jatropha is easy to establish grows relatively quickly and is hardy. Being drought tolerant, it can be grown in eroded areas. Jatropha is desirable as a source for biofuels given that its seeds produce up to 40 percent oil, and the species in general is highly resistant to drought and pests. Processed oil from crushed mature seeds can be used in existing standard diesel engines, while the residue can also be processed into biomass to power electricity plants. Despite these characteristics, the full potential of Jatropha is far from being realized. Very little information is available on genetic diversity among Jatropha curcas genotypes. So the major objective of the present study is to assess the genetic diversity among twenty genotypes of Jatropha curcas using RAPD markers. Twenty highly polymorphic RAPD primers were used in the present study. The twenty random primers showed a total of 158 reproducible bands. The individual primer produced bands in a range of four (LC-77, LC-84, and LC-96) to 22 (LC-89) bands with an average of 7.9 bands per primer. The polymorphism per centage was 100 percent for every primer. Five primers gave a total of sixteen unique bands. PIC values ranged from 0.09 for primer LC-77 and LC-84 to as high as 0.81 for primer LC-87, with an average of 0.43. The average expected gene diversity ranged from 0.20 for primer LC-89 to a maximum of 0.47 for primer LC-93 with an average of 0.36. The values of the similarity coefficients ranged from 3.3% between

genotype 2 and 4 to a maximum of 93.7% between genotype 7 and 8. The dendrogram showed clear distinction among twenty genotypes by dividing the genotypes into seven clusters at 75percent similarity.

120. Bhatt, Usha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Khanna, V.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Pollen tube study in relation to haploid production in wheat maize crosses. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.39-42 KEYWORDS: POLLEN TUBES. HAPLOIDY. WHEATS. MAIZE. ZEA MAYS. TRITICUM AESTIVUM. CROSSBREEDING.

In the wide crossing there are many factors that affect the success of fertilization. These include pre as well as post fertilization factors. In wheat x maize crosses similar barriers were also reported. Data were recorded for pollen tube abnormalities and embryo formation frequency for 29 wheat F1's. Pollen tube abnormality was one of the pre fertilization barriers. Pollen tube growth in wrong direction, bursting, swelling, twisting and coiling of pollen tubes was some of the most common abnormalities. A highly negative correlation coefficient was found between pollen tube growth and embryo formation frequency.

121. Kumar, J.; Indian Institute of Pulses Research, Kanpur (India). Pandey, Indra Deo; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. RAPD analysis using single seed extracted DNA for characterization of pigeon pea genotypes. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.43-46 KEYWORDS: RAPD. PIGEON PEAS. CAJANUS CAJAN. DNA. GENOTYPES. GENETIC MARKERS.

Present study describes a protocol for DNA extraction and purification from individual seed in pigeon pea which is advantageous to follow when genetic material and resources are limited. The DNA concentration was estimated 56 µg/ml.RAPD analysis was conducted for characterization of early and late maturing genotypes of pigeonpea. However, only primer 27 showed variation among genotypes out of 14 primers used. This indicates narrow genetic base of genotypes under study. Thus, present DNA extraction protocol appears readily applicable to sort out genetic contamination at molecular level by PCR at routine basis in seed testing laboratories.

122. Pandey, Suneeta; G.B. Pant University of Agriculture and Technology. Pantnagar (India). Department of Genetics and Plant Breeding. Pushpendra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Singh, B.V.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Singh, Kamendra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Kumar, Manoj; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Genetics and Plant Breeding. Variability and association analysis for yield and other traits in Soybean. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.47-50 KEYWORDS: GENETIC VARIATION. YIELD COMPONENTS. SOYBEANS. GLYCINE MAX. GENOTYPES.

A set of fifty nine individual plants derived from a cross i.e., Birsa soy-1/ JS-71-05 was used for studying variability and association analysis between eight quantitative characters.

The GCV, PCV were estimated as high in comparision to ECV, which indicated that variability was influenced by environment. High heritability was estimated for 100 seed weight (85.7%), germination per centage (84.0%), water absorption (82.2%) followed by dry matter weight per plant (81.2%) and it was moderate for seed yield per plant (75.6%) and pods per plant (75.0%), whereas, the lowest heritability was observed for plant height (63.8%). High value of expected genetic advance was observed for traits viz., germination per centage (46.30), water absorption (23.04), pods per plant (22.27) and dry matter weight per plant (15.19), whereas it was lowest for 100-seed weight per plant (2.46). Genotypic correlation coefficients were generally higher than phenotypic correlation coefficients. The study revealed that water absorption was positively and significantly correlated with germination per centage. Seed yield per plant was significantly and positively correlated with number of pods per plant and dry matter per plant.

123. Srivastava, Vartika; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Rai, P.N.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Kumar, Prabhat; G. B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Studies on variability in physico-chemical characters of different accessions of Jamun (Syzygium cumini Skeels). Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.139-142 KEYWORDS: CHEMICOPHYSICAL PROPERTIES. SYZYGIUM CUMINI. GENOTYPES.

124. Thomas, Jibu; Karunya University, Coimbatore (India). Kumar, Raj R.; UPASI Tea Research Foundation, Valparai (India). DNA loci based characterization of tea germplasm for screening accessions with quality traits. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.216-219 KEYWORDS: DNA FINGERPRINTING. GERMPLASM. RAPD.

125. Kushwah, Renu; Kerala Agricultural university, Thrissur (India). College of horticulture. Dept. of Plantation Crops and Spices. Nazeem, P.A.; Kerala Agricultural university, Thrissur (India). College of horticulture. Dept. of Plantation Crops and Spices. Manjula, S.; Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram (India). Keshavachandran, R.; Kerala Agricultural university, Thrissur (India). College of horticulture. Dept. of Plantation Crops and Spices. Jose, Sherin; Kerala Agricultural university, Thrissur (India). College of horticulture. Dept. of Plantation Crops and Spices. Differential gene expression in relation to drought tolerance in black pepper (Piper nigrum L.). Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.224-227 KEYWORDS: DROUGHT STRESS. PIPER NIGRUM.

F40 Plant Ecology

126. Ramalaxmi,; Central Plantation Crops Research Institute, Vittal (India).Regional Station. Naik, Suchith; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Balasimha, D.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Nayak, M.G.; Directorate of Cashew Research, Puttur (India). Photosynthetic characteristics in cashew accessions. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.210-212 KEYWORDS: CASHEWS. TRANSPIRATION.

F50 Plant Structure

127. Alam, Md. Khursheed; Patna University, Patna (India). Department of Botany. Ahmad, Naheed; Patna University, Patna (India). Department of Botany. A cytotaxonomic investigation of Desmodium Desv. species. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.86-88 KEYWORDS: CYTOTAXONOMY. DESMODIUM. ERECTNESS. MEIOSIS.

Karyomorphological and meiotic studies reflect differences in gene arrangement, segregation and recombination of gene as well as chromosome. These differences are cytotaxonomically important since they provide convenient parameter for establishing relationship among various species of a genus. It has also been effective in the delimitation of taxa. The present study is an endeavour to establish cytotaxonomic relationship among three selected Desmodium species of Patna, viz. Desmodium gangeticum L, Desmodium latifolium (L.) DC. and Desmodium triflorum L. by studying meiotic behaviour and recombination.

128. George, Priya; Central Plantation Crops Research Institute, Kasaragod (India). Gupta, Alka; Central Plantation Crops Research Institute, Kasaragod (India). Gopal, Murali; Central Plantation Crops Research Institute, Kasaragod (India). ChandraMohanan, R.; Central Plantation Crops Research Institute, Kasaragod (India). Thomas, Litty; Central Plantation Crops Research Institute, Kasaragod (India). Thomas, George V.; Central Plantation Crops Research Institute, Kasaragod (India). Antagonistic activity of coconut rhizospheric and endophytic Bacillus spp. against Ganoderma applanatum and Thielaviopsis paradoxa . Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.278-284 KEYWORDS: ANTIFUNGAL PROPERTIES. BACILLUS STEAROTHERMOPHILUS. COCONUTS.

A screening study was carried out to detect the antagonistic potential of Bacillus spp. against Ganoderma applanatum and Thielaviopsis paradoxa, fungal pathogens of coconut. A total of 327 heat resistant, endospore producing bacilli were isolated from the rhizospheric soil and roots of coconut growing in Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and Maharashtra. All the isolates were tested for antifungal activity against G. applanatum and T. paradoxa by dual cultural technique on nutrient agar medium. The zone of inhibition was measured and percentage of inhibition was calculated. More than 90 % of the rhizospheric and root endophytic isolates were found to effectively inhibit the mycelial growth of G. applanatum, with a maximum inhibition zone of 12 mm and percentage inhibition ranging from 44 to 91. About 86% of the isolates inhibited the mycelial growth of T. paradoxa, with a maximum inhibition zone of 14 mm and percentage inhibition ranging from 42 to 93. Further tests of potent antagonists revealed that more than one mode of mechanisms like production of chitinase, siderophores, HCN, antibiotics, ammonia, & 946-1,3-glucanase and salicylic acid may be involved in the antagonistic activities. The results of this study revealed 13 Bacillus spp. having potential for use as biocontrol agents against G. applanatum and T. paradoxa, fungal pathogens of coconut.

129. Kasturi Bai, K.V.; Central Plantation Crops Research Institute, Kasaragod (India). Padmanabhan, Sughatha; Central Plantation Crops Research Institute, Kasaragod (India). Muralikrishna, K.S.; Central Plantation Crops Research Institute, Kasaragod (India). John Sunoj, V.S.; Central Plantation Crops Research Institute, Kasaragod (India). Physio-chemical changes in coconut leaf at different maturity stages. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.319-321 KEYWORDS: PHOTOSYNTHESIS. ENZYMES. COCONUTS.

F61 Plant Physiology - Nutrition

130. Balasimha, D.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Ramalaxmi; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Naik, Suchith; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Nayak, M.G.; Directorate of Cashew Research, Puttur (India). Jeeva, S.; Regional Research Station, Vriddachalam (India). Narasimha Reddy, M.N.; Agricultural Research Station, Chinthamani(India). Jose, C.T.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Chlorophyll fluorescence, stomatal conductance and yield of cashew germplasm from three agro-climatic regions of South India. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.232-235 KEYWORDS: CASHEWS. YIELDS. CHLOROPHYLLS.

131. Yadukumar, N.; Directorate of Cashew Research, Puttur (India). Rejani, R.; Directorate of Cashew Research, Puttur (India). Rupa, T.R.; Directorate of Cashew Research, Puttur (India). Srividya, B.R.; Directorate of Cashew Research, Puttur (India). Optimal nutrient requirement and plant density for enhancing the cashew productivity. Journal of Plantation Crops (India). (April 2011) v.39(1) p.26-29 KEYWORDS: NUTRIENT AVAILABILITY.

An experiment was conducted to determine the optimal nutrient requirement of cashew under three different plant densities and to quantify the effect of different plant densities on the productivity of cashew. The experiment was laid out in a split plot design with cashew variety Ullal-3; under three plant densities viz., 200 (S1 - 10 mx5 m), 416 (S2 - 6m x 4m) and 500 (S3 - 5mx4m) plants /ha as main plot treatments and three fertilizer doses viz., 75 kg N, 25 kg each of P2 O5 and K2O (M1), 150 kg N, 50 kg each of P2 O5 and K2O (M2), 225 kg N, 75 kg each of P2O5 and K2O/ha (M3) as sub plot treatments with three replications. It was found that under high density planting system (S2 and S3), the soil moisture content at the base of the plant during February and March 2010 was higher as compared to normal density planting system (S1). The organic carbon content (OC%) was also higher in high density planting system plots (S2 and S3). The ground coverage and light interception by the canopy were also significantly higher under high density planting system (92-98 and 72-80 per cent, respectively) compared to normal density planting system (55-60 and 32- 42 per cent, respectively) during 2008. The higher cumulative nut yield of 7.0 t/ha and 6.3 t/ha was obtained in high plant density plots of 500 and 416 plants/ha, respectively. In normal density planting it was only 5.2 t/ha (for the first seven harvests). Fertilizer dose influenced the yield of cashew only upto first two harvests. The highest cumulative net profit of Rs. 1,67,002/ha (25% more than control) was obtained from the treatment of high density planting system (500 plants/ha) with lower fertilizer dose tested in this study and in normal density planting system with lower fertilizer dose, it was Rs. 1,34,012/ha.

F62 Plant Physiology – Growth and Development

132. Balasimha, D.; Central Plantation Crops Research Institute, Regional Station, Vittal (India). Towards understanding the physiology of cocoa (Theobroma cacao L.). Journal of Plantation Crops (India). (Apr 2011) v.39(1) KEYWORDS: THEOBROMA CACAO.

133. Awati, Mallikarjun G.; Regional Coffee Research Station, Thandigudi (India). D'souza, G.F.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station.

Renukaswamy, N.S.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Anand, C.G.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Venkataramanan, D.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kumar, M. Udaya; University of Agricultural Sciences, Bangalore (India). Jayarama; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Rootstock-scion grafting on physiological efficiency of arabica coffee seedlings. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.11-18 KEYWORDS: PHYSIOLOGICAL FUNCTIONS.

An experiment was conducted to find out the interaction effects of rootstock-scion graft combination on gas exchange and morpho- physiological traits in arabica coffee seedlings. The study revealed significantly (p=0.01) higher gas exchange parameter in grafts compared to self grafted seedlings. Among the rootstock-scion graft combinations, Sln.4 rootstock (high root type) grafted with S.4695 scion a high light intensity tolerant type and Sln.8 (low root type) rootstock with Sln.6 scion (high root type) showed a maximum net photosynthesis, stomatal conductance and transpiration rate than self grafts. The significant increase on leaf, stem and shoot biomass observed in graft combinations of Sln.4 rootstock with Sln.10 scion and reciprocal grafts; Sln.4 rootstock with S.4695, S.4595 and S.4575 scions and Sln.6 rootstock with S.4595 scion combinations. The other graft combinations i.e. Sln.4 rootstock with Sln.10 (high WUE type) scion and reciprocal grafts, Sln.4 as rootstock with S.4695, S.4575 scions and Sln.6 rootstock with S.4695 scion have enhanced the production of root biomass, root length, primary and secondary roots and root to shoot ratio compared to self grafted seedlings. Similarly, Sln.4 rootstock with Sln.10, S.4595 scions and Sln.6 rootstock with S.4595, S.4695 scions improved the total dry matter production and cumulative water transpiration. Whereas, maximum water use-efficiency was recorded in graft combinations compared to self grafts. Hence, physiologically efficient reciprocal rootstock-scion graft combinations i.e. Sln.4 (T) with Sln.10, Sln.8 with Sln.6 and high root types of Sln.4 (T) and Sln.6 respectively with S.4695 and S.4575 scions could be utilized in crop improvement programme of coffee.

134. Thomas, Litty; Central Plantation Crops Research Institute, Kasaragod (India). Gupta, Alka; Central Plantation Crops Research Institute, Kasaragod (India). Gopal, Murali; Central Plantation Crops Research Institute, Kasaragod (India). George, Priya; Central Plantation Crops Research Institute, Kasaragod (India). Thomas, George V.; Central Plantation Crops Research Institute, Kasaragod (India). Efficacy of rhizospheric Bacillus spp. for growth promotion in Theobroma cacao L. seedlings. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.19-25 KEYWORDS: BACILLUS.

Cocoa (Theobroma cacao L.) trees harbour a diverse microbial communities of epiphytic, rhizospheric and endophytic organisms, many possessing plant growth promoting abilities. Since plant growth promoting rhizobacteria (PGPR) can significantly promote plant health and sustain agriculture by a variety of mechanisms, their potential for use in cocoa crop can be exploited. PGPR based products with strains of Bacillus are more successful in the field due to the fact that they produce spores which offer them ability to tolerate wide range of biotic and abiotic stress. This paper highlights the screening of selected Bacillus spp., isolated from the rhizosphere of cocoa growing in different agro-climatic and soil types in Kerala, Karnataka, Tamil Nadu and Andhra Pradesh, on the growth parameters of cocoa seedlings when grown in polybags. Statistically significant increase (P=0.05) over the control was observed in the tested parameters such as total seedling length (up to 37%), total fresh

weight (up to 73%) and total dry weight (up to 56%) of cocoa seedlings when they were inoculated with Bacillus spp. The overall improvement in seedling vigour through a significant increase in various growth parameters indicated that the Bacillus strains (Bacillus sp. ASB3, ASB12, CSB8, CSB16 and CSB17) had positive and effective plant growth promoting ability on cocoa seedlings. In addition to its plant growth promotion abilities the potential PGPR Bacillus spp. (isolates CSB8, CSB16, CSB17 and ASB12) also showed high abiotic stress tolerance, growing at higher temperatures (50^0 C) and salt concentrations (10% NaCl). These PGPRs were identified according to Bergey s Manual of Determinative Bacteriology and confirmed by Biolog® GEN III microplate identification system. The results of this study points to the potential of rhizospheric Bacillus spp. to enhance growth and vigour of cocoa seedlings when grown in polybags.

135. Mishra, M.K.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Bhat, Asha M.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Suresh, N.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kumar, Satheesh S.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Padmajyothi, D.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Surya Prakash, N.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kumar, Anil; Regional Coffee Research Station, Thandigudi (India). Jayarama; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Molecular genetic analysis of arabica coffee hybrids using SRAP marker approach. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.41-47 KEYWORDS: PLANT GROWTH SUBSTANCES.

In Coffea arabica, the phenotypic as well as genetic variability has been found low due to narrow genetic base and self-fertile nature of the species. Because of high similarity in phenotypic appearance among majority of arabica collections, selection of parental lines for inter-varietal hybridization and identification of resultant hybrids at an early stage of plant growth is difficult. Application of DNA markers provides a promising alternative for quick and reliable assessment of hybrid genotype. Sequence-related amplified polymorphism (SRAP) is a new molecular marker based on PCR technology. In this study, we evaluated the effectiveness of SRAP for molecular genetic analysis of selected arabica hybrids (F1) and their parents. Forty arabica hybrid progenies belong to four crosses were analyzed using 27 highly polymorphic SRAP markers. These 27 primer pairs generated seven different types of marker profiles, which are useful for discriminating the parents and hybrids. The number of bands amplified per primer pair ranged from 5.56 to 7.81 with average number of 6.42 bands. The polymorphic bands varied from 28.07 to 44.57% among different hybrids. The percent bands shared between hybrids and their parents ranged from 80.0 to 91.87%. Percentage of hybrid specific fragments obtained in various hybrid combinations ranged from 2.70 to 4.49% and ascribed to the consequence of recombination. Analysis of the SRAP marker profiles revealed that two hybrid progenies are closer to maternal parent, and other two are closer to paternal parent in banding pattern. The results obtained in present study revealed the effectiveness of SRAP technique in cultivar identification and hybrid analysis in coffee.

136. Murugesan, P.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Haseela, H.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Shareef, M.V.M.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station.

Gopakumar, S.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station. Fruit and seed development in Elaeis oleifera (HBK) Cortes under tropical climate of Kerala. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.73-77 KEYWORDS: FRUIT. TROPICAL CLIMATE. GERMINATION.

American oil palm (Eleais oleifera) is considered as promising genetic resource for breeding for dwarf palm which facilitates easy harvest. It is generally backcrossed to cultivated species of African oil palm (Elaeis guineensis) to obtain dwarf hybrids. During fruit development substantial weight increase was observed in case of fertile fruits, whereas, parthenocarpy fruits re-corded no appreciable weight. However, changes in fruit components were more erratic during 46 -110 Days after Anthesis (DAA) than matured phase (124 to 180 DAA) due to inherent characteristics of oleifera. Mass maturity (seed filling) occurred at about 148-186 DAA at which time seed moisture content declined gradually from 87.65 to 19.69%. Oil formation in the mesocarp initiated (13.69%) approximately at 92DAA and peaked (67.7%) at 186 DAA. The entire seed development period from immature to the ripe fruit took about 186 days under tropical climate of Kerala. Onset of germination of 16.7% was obtained at 136DAA and highest germination (90%) reported at 186 DAA followed by 180 DAA (81.3%).

137. Apshara, S. Elain; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Nair, R.V.; Central Plantation Crops Research Institute, Kasaragod (India). Genetic analysis in Cocoa (Theobroma cacao L.) collections obtained from Nigeria. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.153-156 KEYWORDS: COCOS.

138. Gajbhiye, R.C.; Regional Forest Research Station, Vengurle (India). Gawankar, M.S.; Regional Forest Research Station, Vengurle (India). Arulraj, S.; Central Plantation Crops Research Institute, Kasaragod (India). Palms Cell. Patil, S.L.; Central Plantation Crops Research Institute, Kasaragod (India). Evaluation of drought tolerant oil palm genotypes for their performance in Konkan region of Maharashtra. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.161-163 KEYWORDS: DROUGHT.

139. Basavaraju, T.B.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Palanna, K.B.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Lavanya, T.N.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Prashanth, M.; Horticulture Research Station, Arsikere (India). AICRP on Palms. Arulraj, S.; Central Plantation Crops Research Institute, Ksasaragod (India). AICRP on Palms. Growth and yield performance of coconut hybrids in maidan tract of Karnataka. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.171-173 KEYWORDS: HYBRIDS. COPRA.

140. Balasimha, D.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Biomass productivity, carbon stocks and carbon sequestration of cocoa in relation to planting density and canopy regimes. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.174-176 KEYWORDS: COCOS. MIXED CROPPING.

F63 Plant Physiology Reproduction

141. Mathew, Thomas M; Coconut Developement Board, Kochi (India). CDB registers elite tall and dwarf mother palms for seedlings production. Indian Coconut Journal (India). (Sep 2011) v.74(05) p.18-20 KEYWORDS: DWARFS. MOTHER PLANTS.

142. Thomas, Regi J.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Shareefa, M; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Jacob, P.M.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Hybrids and hybridization techniques in coconut. Indian Coconut Journal (India). (Sep 2011) v.74(05) p.25-28 KEYWORDS: HYBRIDIZATION. COCONUTS.

143. Sundararaju, D.; Directorate of Cashew Research, Puttur (India). Studies on extent of pollination and fruit set in cashew. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.157-160 KEYWORDS: POLLINATION. CASHEWS.

H01 Protection of Plants – General Aspects

144. Bhat, Ravi; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Krishnakumar, V.; Central Plantation Crops Research Institute, Vittal (India). Regional Station. Influence of planting material and nutrients on herbage and oil yield of patchouli grown under coconut. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.57-61 KEYWORDS: PRODUCTION. COCONUTS.

A study was conducted at two locations to know the influence of planting materials and nutrient management practices on production of patchouli under coconut in 2004-2005. Influence of graded levels of nutrients (40:20:20, 60:30:30, 80:40:40 and 100:50:50 kg N:P:K ha-1 crop-1) and vermicompost were studied on rooted cuttings and tissue cultured plants at Central Plantation Crops Research Institute, Research Centre, Kidu. Number of main branches, which is the main yield contributing attribute, was significantly influenced by nutrient levels. Dry herbage yield was not significantly influenced due to type of planting material indicating the similar performance of both rooted cuttings and tissue culture plants as intercrop in coconut. The yield of patchouli among different nutrient levels varied from 1092 to 1544 kg ha-1 and was significantly different. Significantly higher herbage yield of 1544 kg ha-1 was observed with 60:30:30 kg NPK ha-1. This suggests that 60:30:30 kg NPK is optimum for patchouli when intercropped in coconut plantation. Planting materials and nutrient levels did not show any significant impact on oil content. In general, the oil content varied between 0.34 to 0.56%. At Central Plantation Crops Research Institute, Regional Station, Vittal, patchouli was grown under coconut with organic farming approach. Different organic sources viz., farmyard manure, vermicompost, neem cake, composted coir pith and green leaf manure (gliricidia) were applied in different combinations. The results revealed that the Composted Coir Pith (CCP) + green manure (gliricidia) treatment recorded significantly higher plant height at 45 DAP (37.6 cm) over other treatments. Combined application of composted coir pith and green leaf manure produced significantly higher herbage yield (2098 kg ha-1) followed by combination of vermicompost, composted coir pith and green leaf manure (2043 kg ha-1). Oil content among the treatments varied from 1.09% to 2.3% with combined application of vermicompost + CCP+ green manure resulting in higher oil content (2.3%) and oil yield (47.1 kg/ha).

145. Thomas, Regi J.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Shareefa, M; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Jacob, P.M.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Nair, R.V.; Central Plantation Crops Research Institute, Kasaragod (India). Strategy for planting material production in coconut. Indian Coconut Journal (India). (Jun & Jul 2011) v.74(2 & 3) p.36-40 KEYWORDS: PRODUCTION.

H10 Pests of Plants

146. Karnatak, Ajeet Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Karnatak, Dinesh Chandra; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Impact of pesticides on bacteria and fungi in rice ecosystem. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.210-214 KEYWORDS: PESTICIDES. ECOSYSTEMS. BACTERIA. FUNGI. RICE. ORYZA SATIVA.

The experiment was conducted on mollisol soil of Uttarakhand during 2001 and 2002 to investigate the effect of pesticides on bacteria and fungi in rice ecosystem with ten treatments - Phorate (P), Quinalphos (Q), Butachlor (B), (P+Q), (B+Q), (P+B), (P+B+Q), Control, Cartap hydrochloride and Dithane M-45. The bacterial and fungal population in soil increased with crop age in all treatments during both years. However, maximum increase was observed in control (no pesticide) and minimum in (P+B+Q) treatment. The use of combinations of pesticides in rice ecosystem imposed hazardous impact on population of bacterial and fungal population in soil.

147. Sharma, Kuldeep; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Kumar, Suneel; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Khan, M.A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Larvicidal activity of deltamethrin and dichlorvos against Corcyra cephalonica. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.131-132 KEYWORDS: DELTAMETHRIN. INSECTICIDES. DICHLORVOS. CORCYRA CEPHALONICA. PEST CONTROL.

148. Ahmad, Tariq; University of Kashmir, Srinagar (India). P.G. Department of Zoology. Nabi, Shabnum; Aligarh Muslim University (India). Department of Zoology. A preliminary observation on cannibalistic behaviour in Choroedocus illustris Walker (Orthoptera: Acrididae). Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.133-134 KEYWORDS: FEEDING HABITS. ACRIDIDAE. PEST CONTROL.

149. Subaharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Kumar, N. Ravi; Central Plantation Crops Research Institute, Kasaragod (India). Prasad, A.R.; Indian Institute of Chemical Technology, Hyderabad (India). Electrohysiological and behavioral response of Goniozus nephantidis Muesbeck, to plant and host volatiles. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.78-85 KEYWORDS: GONIOZUS. OLFACTORY ORGANS.

Experience of parasitoids with host and host related products have effects on their behavior. Learning can be induced by conditioning parasitoids at various stages i.e. pre imaginal or imaginal (after eclosion). Here we studied the volatiles from damaged,

undamaged coconut leaflets and Opisina arenosella larval frass that cause electrphysiological and behavioural response in the bethylid parasitoid Goniozus nephantidis. The possibility of using the host frass for conditioning the parasitoids was explored. The damaged coconut leaflets released cyclopentanone, butanol, and alpha pinene and these compounds were absent in undamaged leaflets. Z-3 hexenol, a green leaf volatile was trapped form both damaged and undamaged plants. Alpha pinene released form undamaged leaflets caused the highest electroantennogram (EAG) peak amplitude (0.330mV) in female antennae. This was followed by cyclopentanone (0.30mV), hexanone (0.29mV) and hexanal (0.29mV) which were all at par. G. nephantidis reared on Corcyra cephalonica conditioned with the larval frass of O. arenosellla when provided a choice preferred to parasitize O. arenosella as compared to C. cephalonica. Conditioned parasitoids when released in the field caused 59 per cent reduction in larval population per leaflet as compared to 29 per cent reduction by unconditioned parasitoids two months after release. Conditioning of G. nephantidis with odors of O. arenosella will aid to enhance the host searching ability of the parasitoids that were reared on C. cephalonica.

150. Varadarasan, S.; Indian Cardamom Research Institute, Myladumpara (India). Hafitha, N.M.; Indian Cardamom Research Institute, Myladumpara (India). Sithara, L.; Indian Cardamom Research Institute, Myladumpara (India). Balamurugan, R.; Indian Cardamom Research Institute, Myladumpara (India). Chandrasekar, S.S.; Indian Cardamom Research Institute, Myladumpara (India). Ansar Ali, M.A.; Indian Cardamom Research Institute, Myladumpara (India). Thomas, J.; Indian Cardamom Research Institute, Myladumpara (India). Entomopathogenic nematodes- science, technology and field outreach for biological control of cardamom root grub. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.86-91 KEYWORDS: ROOTS.

Small cardamom (Elettaria cardamomum Maton) is cultivated under forest ecosystem. The soil habitat, which holds moisture even in summer months, is an ideal niche for entomopathogenic nematodes (EPN) to survive, sustain and multiply on insect larvae. Local isolate of EPN collected from cardamom niche as well as exotic strain from the Project Directorate of Biological Control, Bangalore were bioassayed on cardamom root grub (a major pest damaging the root system). Based on mortality, progeny production and LC50 studies, a local strain, Heterorhabditis indica (ICRI EPN-18) was found to be highly virulent. The EPN strain was multiplied in Galleria larvae and field experiments were conducted with EPN on root grub in comparison with stand- ard (insecticide treatment) and absolute control resulting with significant control of root grub with EPN. Trials in farmers' plots indicated that root grub reduction ranged from 71.43 to 93.38% in EPN treated plot whereas there was increase or reduction of grub from about 6.69 to 18.39% in control plots. The EPN application methods viz., (a) EPN infected cadaver to be implanted at plant base 4 cadavers/plant (b) talc formulation to be mixed with compost and applied at plat base and (c) liquid suspension to be applied at plant base were also standardized. Among the formulations, cadaver application registered higher percentage of grub reduction in more number of fields. To outreach the technology among farmers, demonstration trials were conducted in farmers plot with EPN in comparison with standard check and absolute control with root grub reduction ranging from 72 to 99.6% in EPN treated plot.

151. John, Jacob; Kerala Agricultural University, Karamana (India). Joy, M.; College of Agriculture, Vellayani (India). Sarada, S.; College of Agriculture, Vellayani (India). Sinoby, V.;

Kerala Agricultural University, Karamana(India). Saritha, N.S.; Kerala Agricultural University, Karamana(India). Seasonal and system wise variation in disease and insect pest incidence in plantation crops of Wayanad district. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.105-109 KEYWORDS: COCONUTS.

A study was undertaken in the plantation crop based cropping system plots of Wayanad district to assess disease and pest incidence during different seasons in major crops and the variations in incidence of disease and pests between various cropping systems. In coconut, grey blight was extremely high during all seasons. Eriophyid mite attack was highest during south west (SW) monsoon (80%). Arecanut palms were mainly infected by Colletotrichum leaf spot, grey blight, inflorescence blight, button shedding and leaf rot during all seasons. Spindle bug infestation was highest during north east (NE) monsoon season (46.6%). In pepper, foot rot, yellow mottle, fungal pollu and marginal thrips was noticed in all seasons. In coffee, severe incidence of Colletotrichum leaf spot was noticed during summer (65.1%). Cardamom plants were mainly affected by leaf rot, leaf blotch and shoot borer during all the three seasons. In tea, the incidence of grey blight and stem borer attack was highest during summer. Study of seasonal variation in disease/ insect pest incidence between cropping systems showed that in arecanut, spindle bug attack was relatively greater when intercropped with nutmeg and tea during summer, with banana and nutmeg during SW monsoon and with coconut during NE monsoon. Incidence of foot rot was more in pepper grown along with tea during all seasons. During the two monsoon seasons, blister blight of tea was more in tea with pepper as intercrop and sooty mould was higher in tea intercropped with arecanut.

152. Sreekumar, K.M.; College of Agriculture, Padnekkad (India). Vasavan, N.; College of Agriculture, Padnekkad (India). Madhu, S; College of Agriculture, Padnekkad (India). Sijila, J.; College of Agriculture, Padnekkad (India). Sreedharan, M.P.; College of Agriculture, Padnekkad (India). Sreelekha, S.; College of Agriculture, Padnekkad (India). Cheriyan, Tom; College of Agriculture, Padnekkad (India). Managing tea mosquito bug (Helopeltis antonii Sign.) in cashew by augumenting red ants Oecophylla smaragdina (F.). Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.110-113 KEYWORDS: CASHEWS. PEST CONTROL.

An experiment was undertaken to manage tea mosquito bug (Helopeltis antonii) in cashew through augumentative use of red ants (Oecophylla smaragdina). Fifty per cent of the 190 plants in an orchard were colonized with red ants. Pest population, extent of damage and yield parameters were recorded for three years for both treated and untreated plants, coinciding with flushing, flowering and fruiting phases of the crop. Bug population was significantly lower in plants colonized by red ants. The mean population values varied from 1.61 to 9.76 for untreated plants and 0 to 0.07 for treated plants. The extent of damage in untreated plants varied from 20.45 to 92.9 per cent, whereas the same was a negligible 0.02 to 0.009 per cent in treated plants. The mean number of immature nuts was significantly higher in treated plants as compared to untreated plants. The average yield recorded from red ant free trees varied from 0.39 kg to 3.85 kg per tree while that of plants colonized by red ants were significantly higher at 5.01 to 15.75 kg. Further, production period was also extended by two months in the latter, compared to untreated plants. Thus, the net effect of colonization by ants was an increase in yield by 400 per cent by the third year of the study. The cost benefit ratio worked out indicates that the red ant technology is economically more viable than chemical pesticides.

153. Babu, A.; UPASI Tea Research Foundation, Valparai (India). Vasantha Kumar, D.; UPASI Tea Research Foundation, Valparai (India). Rahman, Jasin V.K.; UPASI Tea Research Foundation, Valparai (India). Kumar, Roobak A.; UPASI Tea Research Foundation, Valparai (India). Sundaravadivelan, C.; UPASI Tea Research Foundation, Valparai (India). Potential of Mallada boninensis Okamoto (Neuroptera: Chrysophidae), as a biocontrol agent of Oligonychus coffeae Nietner (Acarina: Tetranychidae) infesting tea. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.193-195 KEYWORDS: BIOLOGICAL CONTROL. TEA.

154. Soman, Sneha; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Mohan, Chandrika; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Compatibility of Metarhizium anisopliae (Metsch.) Sorokin with some chemical and botanical pesticides used in coconut pest management. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.196-200 KEYWORDS: PEST CONTROL. COCONUTS.

155. Rasmi, A.R.; Govt. Victoria College, Palakkad (India). Iyer, Rohini; Central Plantation Crops Research Institute, Kasaragod (India). Survival of inoculum and initiation of infection in coconut nursery by Phytophthora palmivora Butl. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.213-215 KEYWORDS: COCONUTS.

156. Subramaniam, Sankara Rama M.; UPASI Tea Research Foundation, Valparai (India). Babu, A.; UPASI Tea Research Foundation, Valparai (India). Kumar, Roobak A.; UPASI Tea Research Foundation, Valparai (India). Kumar, D. Vasantha; UPASI Tea Research Foundation, Valparai (India). Utilization of an entomopathogenic fungus, Lecanicillium lecanii (Zimmermann) and neem kernel aqueous extract for the management of Scirtothrips bispinosus (Bagnall) infesting tea. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.220-223 KEYWORDS: MORTALITY.

157. Roobak Kumar, A.; UPASI Tea Research Foundation, Valparai (India). Rahman, Vattakandy Jasin; UPASI Tea Research Foundation, Valparai (India). Vasantha Kumar, D.; UPASI Tea Research Foundation, Valparai (India). Babu, A.; UPASI Tea Research Foundation, Valparai (India). Subramaniam, M. Sankara Rama; UPASI Tea Research Foundation, Valparai (India). Utilization of the bacterium, Pseudomonas putida as a potential biocontrol agent against red spider mite, Oligonychus coffeae,(Acari: Tetranychidae) infesting tea. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.236-238 KEYWORDS: CHITINASE. ENTOMOGENOUS BACTERIA. PSEUDOMONAS PUTIDA.

158. Ponmurugan, P.; K.S. Rangasamy College of Technology, Tiruchengode (India). Elango, V.Marimuthu, S.; Parry Agro Industries, Valparai (India). R & D Centre. Chaudhuri, T.C.; National Tea Research Foundation, Kolkata (India). Saravanan, D.; K.S. Rangasamy College of Technology, Tiruchengode (India). Mythili Gnanamangai, B.; K.S. Rangasamy College of Technology, Tiruchengode (India). Manju Karunambika, K.; K.S. Rangasamy College of Technology, Tiruchengode (India). Evaluation of actinomycetes isolated from southern Indian tea plantations for the biological control of tea pathogens. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.239-243 KEYWORDS: ACTINOMYCOSIS. STREPTOMYCES.

159. Vidhya Pallavi , R.; UPASI Tea Research Foundation, Valparai (India). Nepolean, P.; UPASI Tea Research Foundation, Valparai (India). Balamurugan, A.; UPASI Tea Research Foundation, Valparai (India). Pradeepa, N.; UPASI Tea Research Foundation, Valparai (India). Kuberan, T.; UPASI Tea Research Foundation, Valparai (India). Jayanthi, R.; UPASI Tea Research Foundation, Valparai (India). Premkumar, R.; UPASI Tea Research Foundation, Valparai (India). In-vitro studies on antagonistic potential of biocontrol agents against tea pathogens, Hypoxylon sp. and Pestalotiopsis sp.. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.244-246 KEYWORDS: TEA.

160. Josephrajkumar, A; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Rajan, P; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Mohan, Chandrika; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Namboothiri, C.G.N; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Diversity and Management of scale insects infesting coconut. Indian Coconut Journal (India). (Jan 2011) v. 73(9) p. 25-29 KEYWORDS: PEST CONTROL. MANAGEMENT.

161. Nair, C.P.R.; Central Plantation Crops Research Institute, Kayangulam (India). Rajan, P.; Central Plantation Crops Research Institute, Kayangulam (India). Namboothiri, C.G.N.; Central Plantation Crops Research Institute, Kayangulam (India). Adoption of integrated pest management strategies for sustainable production in coconut. Indian Coconut Journal (India). (Apr 2011) v. 73(12) p. 11-17 KEYWORDS: PEST CONTROL. MANAGEMENT.

H20 Plant Diseases

162. Tewari, Rashmi; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Vishunavat, K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Detection of Alternaria solani causing early blight of tomato and its impact on seed health. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.251-253 KEYWORDS: ALTERNARIA SOLANI. BLIGHT. TOMATOES. QUALITY. SEED. FUNGAL DISEASES.

Productivity of tomato is reduced due to early blight which causes both qualitative and quantitative losses. Infected seeds transmit the disease to seedlings. Detection of the pathogen with standard blotter method revealed 7.6 and 4.6 per cent recovery of Alternaria solani in untreated and pretreated tomato seeds respectively. Per cent germination of seedling was reduced in the infected seeds. Seed rot (96.0 per cent) and seedling infection (15.3 per cent) in infected seeds was higher than healthy seeds. Viability of the infected seeds was 83.0 per cent, which was 4.0 per cent in healthy seeds. Non significant reduction in seed weight, seed volume and density was recorded in infected than the healthy seeds.

163. Ansari, M.W.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Physiology. Nailwal, T.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Physiology. Bains, G.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Physiology. Shukla, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Physiology. Singh, U.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Effect of ethrel on

germination of spores of Fusarium sp. from Mangifera indica L. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.275-278 KEYWORDS: ETHEPHON. GERMINATION. SPORES. FUSARIUM. MANGIFERA INDICA. MANGOES. FUNGAL DISEASES.

Mango malformation is an economically important disease, which causes gross deformations of vegetative and floral tissues in Mangifera indica L. Fungi, mites, viruses, physiological factors, malformins and mangiferins are its reported causes. Recently, a role for stress ethylene has been implicated in mango malformation. Ethrel was found to stimulate the germination of spores of isolates of Fusarium sp. from mango cultivars at concentration from 5 ppm to 100 ppm. However its higher concentration was toxic for spore germination. These findings are discussed in relation to higher population of Fusarium sp. in diseased tissues, could be due to stress ethylene, generating in response to various stresses.

164. Neetu Rani; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Pradeep Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Tewari, Rashmi; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Efficacy of antibiotics and plant extracts against Pseudomonas savastanoi pv. glycinea the incitant of bacterial blight of soybean. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.299-301 KEYWORDS: ANTIBIOTICS. PLANT EXTRACTS. PSEUDOMONAS. BACTERIOSES. SOYBEANS. GLYCINE MAX. MEDICINAL PROPERTIES.

165. Mishra, Kamlesh Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Molecular Biology and Genetic Engineering. Singh, U.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Pathology. Singh, Munna; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Plant Physiology. Finger printing of Trichoderma isolates for their antagonistic behavior against Rhizoctonia solani. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.302-304 KEYWORDS: TRICHODERMA. ISOLATION. RHIZOCTONIA SOLANI. ANTAGONISM. FUNGAL DISEASES. BIOLOGICAL CONTROL.

166. Pandey, Renu; G.B. Pant University of Agriculture and Technlogy Pantnagar (India). Department of Entomology. Kanaujia, K.R.; G.B. Pant University of Agriculture and Technlogy Pantnagar (India). Department of Entomology. Effect of fungicides on growth and viability of entomogenous fungi under invitro conditions. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.161-165 KEYWORDS: FUNGICIDES. FUNGAL DISEASES. VIABILITY. ENTOMOGENOUS FUNGI. IN VITRO. BEAUVERIA BASSIANA. METARHIZIUM ANISOPLIAE.

The invitro compatibility of entomopathogenic fungi, Beauveria bassiana and Metarhizium anisopliae with four different fungicides was evaluated. The active ingredients with five different concentrations were selected to test their influence on mycelial growth and spore germination of entomogenous fungi. The formulation tested affect conidial germination and vegetative growth of the fungus in different levels. All the fungicides were detrimental to growth and spore viability of entomogenous fungi, B. bassiana and M. anisopliae. Lower doses were relatively safer to the fungus as compared to higher doses of fungicides. Among all fungicides tested carbendazim was completely inhibitory in its action at all the concentrations and caused 100 per cent growth inhibition in both the entomogenous fungus tested. While captan proved relatively safer for the entomogenous

fungi, with fairly good amount of spore germination. Compatible formulation could be used simultaneously with this entomogenous fungus in integrated pest management programme.

167. Ambilikutty Amma, P.; Central Plantation Crops Research Institute, Kasaragod (India). Chandra Mohanan,R.; Central Plantation Crops Research Institute, Kasaragod (India). Cocoa sweating, a promising culture medium for mass production of fungal bioagents. Journal of Plantation Crops (India). (Apr 2011) v.39(1)p.92-98 KEYWORDS: COCOA BEANS.

Cocoa sweating collected on the first day of fermentation of beans was used for the preparation of culture media. When cocoa sweating as collected from the fermentary was used as liquid medium to grow Trichoderma harzianum and Metarhizium anisopliae, there was no growth. Therefore, growth and sporulation of both the fungi in different dilutions of cocoa sweating were compared with that in potato dextrose broth (PDB) and potato jaggery broth (PJB). Growth and sporulation of both the fungi were the highest in cocoa sweating (CS) diluted with tap water (TW) in the proportion CS:TW1:4 (CS1:4). Both the biocontrol agents did not exhibit any difference in growth and sporulation in CS 1:4 and in CS1:4 supplemented with 15g dextrose and pH adjusted to 6.5. Growth and sporulation of both the fungi in CS1:4, PDB and PJB increased with number of days of incubation and was the highest on 20th day after inoculation. When 800 ml CS1:4 was used to grow the biocontrol agents and to prepare talc formulations using 2kg talc powder, the moisture content was 8% after 72h of drying. Shelf life of talc formulations of both the biocontrol agents could be maintained for 5 months with very high colony forming units (CFUs). The CFUs/g of talc formulations of both the fungi stored for 6 months were less than that in the 5th month.

168. Maheswrappa, H.P.; Central Plantation Crops Research Institute, Kasaragod (India). Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India). Krishnakumar, V.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Shanavas, M.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Economic evaluation of high density multispecies cropping system in root (wilt) disease affected coconut (Cocos nucifera) area in Kerala. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.125-130 KEYWORDS: COCONUTS.

Root (wilt) disease, which is debilitative in nature, is one of the major constraints affecting coconut productivity in Kerala. Adoption of integrated management practices especially effective utilization of inter space in the coconut garden by inclusion of various crops shall constitute an ideal approach to improve the health and productivity of coconut palms. An experiment was undertaken at the Regional Station of Central Plantation Crops Research Institute, Kayamkulam, Kerala from 2004 to 2008 to evaluate the economics of high density multispecies cropping system (HDMSCS) model with different annual and perennial crops in an existing 39 year old West Coconut Tall (Cocos nucifera) garden affected by root (wilt) disease. Various crops such as elephant foot yam, pineapple, banana, black pepper and nutmeg were raised as component crops with coconut in the HDMSCS. The overall coconut yield under the system improved by around 17% during the fourth year of experiment when compared to the initial yield of 53 nuts/palm due to the management practices including recycling of organic biomass produced through vermicomposting and basin raising and incorporation of green manure crop. In the total cost of cultivation incurred, cost of labour was the highest, ranging from 50 to 75% during 2007-08 and 2005-06, respectively. The net return varied from Rs.15,064 to Rs.25,687 during 2005-06 and 2006-07, respectively. In the absolute monetary terms, the contribution of inter/mixed

crops in the HDMSCS varied from 30% (2005-06) to 51% (2006-06). Analysis of coconut equivalent yield showed that the overall contribution of inter/mixed crops was about 40%, indicating the beneficial effects of the cropping system in coconut gardens, especially in areas where root(wilt) disease is a problem causing reduction in farm family income. The economic advantage of HDMSCS over mono cropping was 61% with a BC ratio of 1.59 indicating that the coconut based high density cropping system is economically viable in root (wilt) disease affected areas provided the disease incidence is well managed by adopting integrated practices and other production and price related risks are at normal level. Analysis of root (wilt) disease incidence from the experimental field indicated significant decrease in the disease incidence due to adoption of HDMDCS in disease affected gardens.

169. Daivasikamani, S.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Rajanaika,; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kumar, Vinod P.K.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Bhat, Sudhakar S.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Jayarama; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Influence of weather parameters on leaf rust disease incidence of arabica coffee cv. S.795 . Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.190-192 KEYWORDS: LEAVES.

170. Rajappan, K.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Ramanathan, A.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Vaithilingam, R.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Early diagnosis of Ganoderma infection in indicator plants through ELISA and visual observation. Journal of Plantation Crops (India). (Aug 2011) v.39(2)p.330-331 KEYWORDS: COCONUTS. ELISA. INDICATOR PLANTS.

171. Bhuvaneswari, V.; Horticulture Research Station, Pandirimamidi (India). Venkata Ramana, K.T.; Horticulture Research Station, Pandirimamidi (India). Bhagavan, B.V.K.; Horticulture Research Station, Pandirimamidi (India). Naga Lakshmi, R.; Horticulture Research Station, Pandirimamidi (India). Diseases of Palmyrah in Andhra Pradesh - A preliminary report. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.332-336 KEYWORDS: SPOTS.

172. Srinivasan, N.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Bharathi, R.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Issak, Shanty; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Field management of coconut leaf rot disease with biological control agents, their bioformulation and viability in organics. Journal of Plantation Crops (India). (April 2011) v.39(1)p.99-104 KEYWORDS: PEST CONTROL.

Leaf rot disease is an integral part of root (wilt) disease of coconut and hence its control a great importance. Potential of biological control agents against leaf rot pathogens have been established. Field performance of talc-based B. subtilis and P. fluorescens against leaf rot (individually and in consortium mode), growth of bioagents in coconut water-based media for enriching bioformulations and viability of the bioagents in organic carriers based

formulations were evaluated. A field experiment conducted with treatments of B. subtilis, P. fluorescens, B. subtilis + P. fluorescens and Phytosanitation + B. subtilis + P. fluorescens in comparison with control showed a decline of disease index in newly emerged leaves of treated palms (higher disease ameliorative effect through consortium of B. subtilis and P. fluorescens). Multiplication of bacterial (P. fluorescens) and fungal (Trichoderma viride) bioagents could be achieved in coconut water-based media-moderate-good growth of P. fluorescens in coconut water (pH adjusted to 7.0), coconut water amended with peptone at 1% or jaggery at 5% or 10% levels comparable with its growth in King s B broth; moderate-good mycelial yield of T. viride in coconut water-based media with or without jaggery amendment comparable to its growth in potato dextrose broth. The bacterial and fungal biocontrol agents as grown in coconut water-based media could be processed into talc-based bioformulations (quality comparable with such products evolved using conventional media). The talc-based formulations admixed with organics viz., neem cake, vermicompost and coir pith-(1: 1w/w) that were individually packed also assured reasonable period shelf-life (six months) of bioagents, compared well to corresponding other media. Thus mass production of popular biological control agents in coconut water based medium followed by their bioformulations through fortifications with popular organics has been successfully evolved.

H60 Weeds and Weed Control

173. Singh, Manish Kumar; T.D. P.G. College, Jaunpur (India). Department of Agronomy. Singh, A.K.; T.D. P.G. College, Jaunpur (India). Department of Agronomy. Singh, T.N.; T.D. P.G. College, Jaunpur (India). Department of Agronomy. Anil Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Bio-efficacy of various herbicides against mixed weed flora in wheat. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.196-198 KEYWORDS: HERBICIDES. WHEATS. BIOLOGICAL CONTROL. WEED CONTROL. ISOPROTURON. PENDIMETHALIN. METRIBUZIN.

A field experiment was conducted during winter (rabi) season of 2003-04 and 2004-05 at Agronomy Research Farm to find out an effective herbicide to control mixed weed flora of wheat crop. Complete control of A.arvensis and P.minor was noticed under sulfosulfuron treatments (25 and 37 g/ha) where as density of P.hysterophorus and total weed were drastically reduced which reflected into lower weed dry weight and higher weed control efficiency. Sulfosulfuron at 37g/ha produced maximum grain yield among different herbicides and remain at par with its lower dose (25g/ha), both rates of pendimethalin (1.00 and 1.25 kg/ha) and weed-free.

174. Singh, Dheer; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Joshi, Y.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Singh, Virpal; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Sachan, H.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Chemical weed management in Berseem (Trifolium alexandrium L.). Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.5-7 KEYWORDS: CHEMICAL CONTROL. WEED CONTROL. TRIFOLIUM ALEXANDRINUM. HERBICIDES.

Field experiment with eight (8) treatments to control weeds in berseem was conducted in two consecutive years during 2006-07 and 2007-08 in three replications. Pre-emergence application of butachlor 1.0 or 2.0 kg/ha or alachlor 2.0 kg/ha were found to be effective in controlling weeds in berseem, resulting in higher fodder yield. Highest fodder yield was recorded from butachlor applied 2.0 kg/ha. However, dry matter of weeds at 45 DAS stage was lower with alachlor applied 2.0 kg/ha. Weed control efficiency was highest (83.1%) with alachlor applied 2.0 kg/ha and weed index was lowest with application of butachlor 2.0 kg/ha. The fodder yield was reduced by 52.5% due to uncontrolled weeds in weedy check. Coronopus dedymus was the major non-grassy weed in the berseem crop.

J10 Handling, Transport, Storage and Protecion of Agricultural Products

175. Singh, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Process and Food Engineering. Sahgal, M.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Process and Food Engineering. Jain, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Microbiology. Agricultural waste utilization through value addition of apple pomace . Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.226-229 KEYWORDS: WASTE MANAGEMENT. AGRICULTURAL WASTES. VALUE ADDED. APPLES. BIOFUELS. FOOD INDUSTRY. ETHANOL.

Processing waste utilization is the necessity and a challenge to the food industry and is a priority to make the units economically viable, through the recovery of value added byproducts. Since apple pomace poses a greater problem for its disposal, there is a strong need to have an integrated approach for utilization of apple pomace. Production of ethanol from apple pomace is one of the attractive options due to its supply at cheap price, minimum land requirements and independent of weather conditions during fermentation. Keeping in view the above facts, a study was conducted to produce ethanol from fermented apple pomace under controlled conditions. Experiments for natural fermentation of apple pomace with initial sugar variables, pH levels and fermentation time were carried out and based on the results obtained from natural fermentation, experiments for second phase i.e. inoculated fermentation with variables as amylase treatment (treated), pH (4.0), yeast strains (Y2, Y5 and Y12) and fermentation time (0- 84 h) were carried out. Study revealed that initial pH and fermenting time both affected the process of ethanol production, in both the conditions but effect of initial pH was more significant in comparison to fermenting time.

176. Kalavathi, S.; Central Plantation Crops Research Institute, Kayangulam (India). Research Station. Anithakumari, P.; Central Plantation Crops Research Institute, Kayangulam (India). Research Station. Evaluation and refinement of community approaches in coconut technology transfer. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.141-147 KEYWORDS: COMMUNITY DEVELOPMENT. SUSTAINABILITY.

Evaluation on the performance and sustenance of coconut clusters revealed better group characteristics and capacity development in the case of clusters facilitated by Central Plantation Crops Research Institute (CPCRI) and Coconut Development Board (CDB) and their performance also were rated as good against the objectives set. Even though the performance of the rubber producers' group was the highest among all, the present status of the coconut groups facilitated by CPCRI and CDB are highly encouraging in terms of their

performance, increased knowledge, skills, improved behavioural changes and their strong and responsible leadership, being in the early period of development. Further, the coconut groups have several limitations like unorganized markets, inadequate government support limited to project periods and lack of a permanent establishment and infrastructural facilities for storage and processing, unlike the well established commodity clusters. Based on the inferences drawn, an integrated model coconut cluster at the panchayat level by linking the ward level coconut clusters through a common support centre with continued government support for input use and marketing for effective functioning and sustenance is suggested.

K01 Forestry – General Aspects

177. Mishra, Yagya Dev; Krishi Vigyan Kendra, Jakhdhar, Rudraprayag (India). Bhardwaj, Neelam; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agricultural Communication. Communication interventions in Joint Forest Management (JFM). Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.168-172 KEYWORDS: FOREST MANAGEMENT. COMMUNICATION. COMMUNITY FORESTRY.

Communication attains a centre stage in all interactive processes like JFM where people discuss, resolve, decide, communicate, plan, lead, and execute the development issues collectively. The process involves constant deliberation and consultation, information sharing, frequent meetings, collective decision-making and suitable modifications with the feedback. In view of its strategic role in JFM process, it becomes imperative to design a process friendly communication strategy and interventions for successful implementation of the programme. Keeping the importance of communication in view, the present study was conceptualized to find out the major communication interventions and strategies used by forest department and members of VFCs to motivate beneficiaries for popular participation in JFM. The study was carried out in two JFM villages of Kumaun region of Uttarakhand. The findings of the study reveal that most of the respondents came to know about JFM from friends/relatives and neighbourers followed by village Pradhan and forest officials. Agenda through village watchman, personal contact by Pradhan and forest officials were major approaches followed by VFC members and forest department to popularize the JFM in study villages. Most of the respondents consulted friends/relatives and neighbours for further details about JFM. Other sources consulted by beneficiaries for getting information on JFM were fellow villagers, Pradhan and forest officials. Forest officials were proved as most credible sources of information regarding JFM, followed by friends and relatives.

K70 Forest Injuries and Protection

178. Suneel Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Arvind Kumar; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Khan, M.A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Entomology. Evaluation of different species of Trichogramma against eggs of Poplar defoliator, Clostera fulgurita Walker. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.291-292 KEYWORDS: TRICHOGRAMMA. POPULUS. DEFOLIATION. EGGS. NATURAL ENEMIES. FOREST PESTS. BIOLOGICAL CONTROL.

N20 Agricultural Nachinery and Equipment

179. Lohani, U.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Processing and Food Engineering. Pandey, J.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Processing and Food Engineering. Effect of degree of polish on cooking qualities of barnyard millet. Pantnagar Journal of Research (India). (Jul-Dec 2008) v.6(2) p.281-285 KEYWORDS: POLISHING. COOKING. ECHINOCHLOA FRUMENTACEA. HYDRATION. WATER UPTAKE.

Dehusked barnyard millet grain is cooked like rice to make jhangora bhath, chencheda, kheer in all Kumaoni and Garhwali households. Experiments were conducted to study the cooking qualities of barnyard millet (VL-172) at four moisture levels (8, 10, 12 and 14%, db). The hydration capacity (0.37-0.53 mg/kernel) and swelling capacity (0.30-0.44 µl/kernel) of milled barnyard millet increased linearly, while the cooking time of millet decreased with the increase in milling time at each experimental moisture levels. The hydration capacity increased by 0.0819, 0.0814, 0.0871 and 0.0924 g/g kernel whereas swelling capacity enhanced by 0.1178, 0.1148, 0.1205 and 0.1330 µl/kernel from 0 to 20% degree of polish at 8, 10, 12 and 14 per cent moisture levels respectively. The cooking time of milled barnyard millet decreased from 8 to 5 min at 8 and 10 per cent moisture levels and from 7 to 5 min at 12 and 14 percent moisture levels respectively with the increase in degree of polish.

180. Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India). Mathew, A.C.; Central Plantation Crops Research Institute, Kasaragod (India). Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Subramanian, P.; Central Plantation Crops Research Institute, Kasaragod (India). Singh, Vidhan T.; Central Plantation Crops Research Institute, Kasaragod (India). Madhavan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Coconut climbing methods and devices: A participatory analysis of constraints and strategies. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.148-152 KEYWORDS: CLIMBERS. ECONOMIC ANALYSIS.

Socio-economic characteristics, extent of knowledge about integrated management of selected pest and diseases of coconut and technical efficiency of mechanical climbing devices were analysed in a study conducted among 87 coconut climbers in Kasaragod District. Matrix scoring, one of the Participatory Rural Appraisal tools, was employed to elicit data for the participatory assess- ment of the climbing devices. Among the climbers 22 per cent were illiterate, 57 per cent had primary school level of education, eight per cent were landless and 64 per cent were having only 10 to 50 cents of land holding. Only 14 per cent of the climbers used mechanical devices for climbing coconut palms. Seventy four per cent of the climbers attended to plant protection measures, mainly control measures for bud rot disease and rhinoceros beetle, apart form harvesting and crown cleaning. Except one climber, none of them had attended any training on PP measures in coconut. Majority of the climbers did not possess the required level of knowledge about the control measures recommended against bud rot disease and rhinoceros beetle infestation. The average time taken to set the device on the tree was more for the Chemberi Joseph model of climbing device but it took less time for climbing up the tree. CPCRI model was assessed better on the dimension of safety for the climber and simplicity in the design of the device. Chemberi Joseph model was assessed better on the dimensions of less drudgery involved in climbing, suitability for using under all weather situations and cost of the device.

181. Balasubramanian, D.; Directorate of Cashew Research, Puttur (India). Sandeep, T.N.; Directorate of Cashew Research, Puttur (India). Thin layer drying characteristics of in-shell cashewnuts using convective dryer. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.252-255 KEYWORDS: DRYING. MOISTURE CONTENT.

182. Vidhan Singh, T.; Central Plantation Crops Research Institute, Kasaragod (India). Design and development of manually operated coconut splitting device. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.256-259 KEYWORDS: COCONUTS.

P01 Nature Conservation and Land Resources

183. Verma, Vijai; Lucknow University (India). Department of Botany. Sharma, Y.K.; Lucknow University (India). Department of Botany. Status of ambient air quality in residential and commercial areas of Lucknow. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.81-85 KEYWORDS: ENVIRONMENTAL FACTORS. URBAN AREAS. URBAN ENVIRONMENT. AIR POLLUTION. POLLUTION CONTROL.

Status of ambient air quality at seven road transactions in commercial areas and four in residential areas of Lucknow (Uttar Pradesh), India was studied during 2002 to 2007. Four pollution parameters viz. Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), SO2 and NOx were studied. Concentration of SPM and RSPM exceeded the prescribed standards in commercial areas as well as residential areas whereas concentrations of SO2 and NOx levels were within standard limits in both the areas. Based on Air Quality Index (AQI), commercial areas- Charbagh (156.54), Hussainganj (153.34), Hazaratganj (151.77) were severely polluted whereas Vikasnagar (106.18) and Gomtinagar (111.73) with low AQI were safest residential areas but fell in highly polluted category.

184. Shalini, D.; UPASI Tea Research Foundation, Valparai (India). Raj Kumar, R.; UPASI Tea Research Foundation, Valparai (India). Quality related substrates and enzyme in tea as influenced by weather parameters. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.272-277 KEYWORDS: PREDNISOLONE. QUALITY CONTROLS.

Recent threat on global warming and change in climate are not only the topic related with agricultural and biomass productivity; but on the basis of quality consciousness consumers demand, agriculturalists are indebted to offer due importance to the quality of the agricultural commodities. Quality attributes depends mainly upon the biochemical constituents. How far climatic changes influence the quality attributes of tea are unknown. In the pilot scale study, polyphenols, catechins and their oxidative enzyme are considered and variations in their ratios with respect to prevailing climatic conditions of the Anamallais are attempted. Crop shoots were collected at monthly intervals and subjected to determination of polyphenols, catechins and polyphenol oxidase assay. Weather data collected at UPASI meteorological observatory were used for correlation and factor analysis. Irrespective of the clones, cultivars registered higher quantum of polyphenols followed by Assam cultivar. Clones studied within the taxonomic group also significantly varied among them, irrespective of the sampling time. As the catechins are polyphenol derivates, the same trend was observed with total catechin content. Among the clones, SA-6 registered least amount of polyphenols and catechins when compared to other clones. Ratio of catechin to polyphenol exhibited different trend; Cambod cultivars registered higher values

in catechin, polyphenol ratio followed by China and Assam cultivars. Polyphenol oxidase activity was significantly varied among the jats and the clones within the taxa. Microclimatic variables played an important role in accumulation of predominant quality constituents, polyphenols or catechins and the enzyme, poly phenol oxidase. Sunshine hours positively related with the above said biochemicals while rainfall has negative influence on the biochemical constituents. Maximum temperature had positive and significant correlation with quality constituents whereas, minimum temperature registered negative impact on their production. Relative humidity recorded at 8.00 am and 2.30 pm exerted negative influence on polyphenols, catechins and PPO activity. Multiple regression models derived based on the climatic variables are presented and discussed in detail.

P11 Drainage

185. Singh, P.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Irrigation and Drainage Engineering. Singh, S.K.; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences. Singh, Narendra; Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (India). Lal, R.L.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Horticulture. Plant tissue testing as a guide for diagnosing nutrient disorders in the litchi growing orchards of Uttarakhand. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.222-225 KEYWORDS: TISSUE ANALYSIS. PLANT TISSUES. DISORDERS. NUTRIENT DEFICIENCIES. LITCHI CHINENSIS. LEAVES.

Leaf analysis has been successfully used as a guide in diagnosing nutritional problem and as a basis for fertilizer recommendation in fruit tree in many countries. However, little information is available on leaf nutrient standard for litchi which is a native of china. An alternative approach to the traditional method of developing leaf nutrient standards is to survey high productive orchard and assume that nutrients concentration in these orchards are optimal. This technique was used to establish tentative leaf nutrients concentration standard for litchi in Uttarakhand. Nitrogen status in leaf sample was lowest (1.19%) in Pithoragard belt, whereas phosphorus content was particularly low in Dehradun (0.16%) and Pithoragarh (0.13%) litchi belt. As regards to potassium content, it was also very low in Dehradun (0.67%), Pithoragarh (0.67%) and Haridwar (0.95%). Very low sulphur content in litchi orchard of Pithoragarh area seems to be a major concern. As regards to micronutrients concentration, Zn content was combatively lower in Ramnagar (17ppm) and Kichha (18ppm) area while Cu status seems to cause problem in near future. Iron was sufficient in the entire orchard while Mn status was comparatively lower in Ramnagar and Kichha area. Poor nutritional status of leaves in Litchi orchards primarily in hill areas seems to be a cause of concern and warrant proper nutrient management strategy. A tentative leaf nutrients standard proposed for litchi orchard of Uttarakhand is 1.78%, 0.25%, 2.68%, 0.16%, 26ppm, 13ppm, 179ppm and 13ppm for N, P, K, S, Zn, Cu, Fe and Mn respectably.

P33 Soil Chemistry and Physics

186. Savita, U.S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Chandra Shekhar; Gochar Mahavidhayalya Rampur Maniharan, Saharanpur (India). Department of Agricultural Chemistry and Soil Science. Effect of period of waterlogging on the yield and nutrient uptake by maize (Zea mays L.). Pantnagar Journal

of Research (India). (Jul-Dec 2008) v.6(2) p.261-265 KEYWORDS: WATERLOGGING. NUTRIENT UPTAKE. MAIZE. ZEA MAYS. WATER TOLERANCE.

Effect of waterlogging durations on uptake of macro and micronutrients by maize was evaluated during kharif 2004 and 2005 season. The treatments consisted four durations of waterlogging (0, 3, 7 and 10 days) and four varieties (Tarun, Pragati, Gaurav and Navin). The waterlogging treatments was given at knee-high stage by keeping ±5 cm continuous submergence for different durations under field conditions. Waterlogging significantly reduced the maize yields as well as its nutrient compositions, consequently reducing the uptake of N, P, K, Fe, Mn and Zn by the crop.

P34 Soil Biology

187. Thampan, P. K.; Peekay Tree Crops Development Foundation, Kochi (India). Biodiversity of the soil life in support of coconut production at optimum levels. Indian Coconut Journal (India). (Apr 2011) v.73(12) p.18-23 KEYWORDS: SOIL. BIODIVERSITY.

P35 Soil Fertility

188. Singh, D.K.; Horticulture Research and Extension Centre, Dehradun (India). Singh, G.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Srivastava, A.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Chemistry. Sand, N.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Chemistry. Harvest time residue of isoproturon in soil, wheat grain and straw. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.125-127 KEYWORDS: HARVESTING DATE. HERBICIDES. ISOPROTURON. SOIL MANAGEMENT. WHEATS. WHEAT STRAW. WEED CONTROL. MAXIMUM RESIDUE LIMITS.

189. Borkotoki, Bikram; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Agnihotri, A.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Effect of bentonite clay and moisture regimes on nitrogen mineralization from different organic amendments in mollisols of Tarai region of Uttarakhand. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.69-75 KEYWORDS: BENTONITE. MOISTURE CONTENT. MINERALIZATION. NITROGEN CYCLE. ORGANIC AGRICULTURE. ORGANIC AMENDMENTS. FARMYARD MANURE.

A study was conducted to relate the effect of bentonite clay and moisture regimes on nitrogen mineralization in Mollisols of Tarai region of Uttarakhand with eight treatments viz. control (soil), nitrogen , wheat straw, FYM , wheat straw + nitrogen , FYM + nitrogen, rice straw and rice straw+ nitrogen. Rice and wheat straw were applied 6 t ha-1, while FYM was applied 10 t ha-1. Nitrogen 20 kg ha-1 was used as starter dose. Treatments were incubated at 300 centigrade in a BOD incubator for 90 days in triplicate using two bentonite (0% and 10%) levels and two moisture (field capacity and saturation) regimes. On 90th day, the highest cumulative mineralized nitrogen was found in case of nitrogen treated soil ie.133.6 ,113.3 mg kg -1at field capacity with 0 and 10% bentonite levels, respectively ; and 57.1, 49.5 mg kg -1at saturation with 0 and 10% bentonite levels, respectively. The lowest mineralization was recorded in wheat straw ie. 45.3, 40.1 mg kg-1 at field capacity with 0 and 10 % bentonite respectively; and 19.7,17.3 kg -1at saturation with 0 and 10% bentonite

levels, respectively. Both bentonite and moisture regimes significantly altered nitrogen mineralization at each date of observation. By the end of incubation (90th day), reduction of mineralization by 10 % bentonite and saturated moisture regime was found to be 13.2 and 60.5 per cent, respectively.

190. Agarwal, Mina; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Nand Ram; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Shri Ram; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Soil Science. Long-term effect of inorganic fertilizers and manure on physical and chemical properties of soil after 35 years of continuous cropping of rice-wheat. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.76-80 KEYWORDS: INORGANIC FERTILIZERS. ORGANIC FERTILIZERS. SOIL CHEMICOPHYSICAL PROPERTIES. RICE. ORYZA SATIVA. WHEATS. TRITICUM AESTIVUM. CONTINUOUS CROPPING. CROPPING SYSTEMS.

An ongoing field experiment was conducted at Long-term fertility experiment, Pantnagar, to study the effect of inorganic fertilizer and manure on physical and chemical properties of soil of seven treatments viz. 100% NPK, 100% NPK+Zn, 100% NP+Zn, 100% N+Zn, 100% NPK+FYM, 100% NPK-S+Zn and Control, four replications of each treatment. Farmyard manure is applied at the rate of 15 t/ha. Soil bulk density, hydraulic conductivity, penetration resistance, pH, electrical conductivity, organic carbon and available macronutrients were determined. In general among all the treatments 100% NPK+FYM showed better result and control gave poorest result.

Q01 Food Science and Technology

191. Ramaswamy, Lalitha; PSG College of Arts and Science, Coimbatore (India). Dept. of Nutrition and Dietetics. Sivagami, A.R.; PSG College of Arts and Science, Coimbatore (India). Dept. of Nutrition and Dietetics. Standardisation of South Indian Breakfast Foods with Ccoonut flour. Indian Coconut Journal (India). (May 2011) v.74(01) p.15-22 KEYWORDS: FOOD COMPOSITION. BREAKFAST CEREALS.

Q02 Food Processing and Preservation

192. Lohani, U.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Processing and Food Engineering. Pandey, J.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Post Harvest Processing and Food Engineering. Effect of moisture content on physical properties of barnyard millet. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.148-154 KEYWORDS: MOISTURE CONTENT. CHEMICOPHYSICAL PROPERTIES. ECHINOCHLOA FRUMENTACEA. POSTHARVEST TECHNOLOGY.

The experiments were conducted to study the physical properties of barnyard millet (VL-172) at four moisture levels (8, 10, 12 and 14%, db). The size characteristics, i.e., length, width, thickness, length-width ratio, width-thickness ratio, grain mean diameter and spherecity varied from 2.43-2.57 mm, 1.94-2.01 mm, 1.26-1.30 mm, 1.26-1.28,1.54-1.56, 1.81-1.89 mm and 0.73-0.74 among different experimental moisture level. The gravimetric properties, i.e. 1000-kernel weight (3.48-3.73 g), 1000-kernel volume (3.00-3.27 ml), bulk density (0.7489-0.7828 g/ml), true density (1.2134-1.2639 g/ml), porosity (0.3249-0.4074),

angle of repose (19.19-22.71°), coefficient of friction (0.2339-0.2561) and hardness (3.2-4.3 kgf) were correlated with moisture content through regression analysis. At each moisture level, low values of correlation coefficients between grain dimensions indicates that the grain dimensions were independent of each other and hence, no suitable model for describing the relationship between grain dimensions could be developed. The porosity depended on the grain size and shape. The thousand-kernel weight and volume were highly positively and negatively correlated with grain dimensions respectively. Bulk density was positively correlated whereas true density was negatively correlated with thousand-kernel weight of the grain.

193. Gupta, Devesh; J.V. College, Baraut (India). Department of Dairy Science and Technology. Study on chhana whey as flavoured drinks and effect of storage on its quality. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.216-218 KEYWORDS: WHEY. FLAVOURING. KEEPING QUALITY. MILK PRODUCTS.

An experiment was undertaken to explore the possibility of utilization of whey for the preparation of flavoured whey drinks. The whey drinks were prepared from cow milk chhana whey, buffalo milk chhana whey and mixed milk chhana whey by adding different flavour (orange, mango ripe and pine apple) and colour (orange, red and yellow). It was concluded that, whey drink prepared from buffalo milk chhana whey coagulated by 4% lemon juice or 0.3% and 0.4% citric acid was the best quality with pineapple flavour. The storage study showed that the citric acid whey drink remained good instead of lemon juice whey drink.

194. Gupta, Har Charan Lal; J.V. (P.G.) College, Baraut (India). Department of Dairy Science and Technology. Gupta, Devesh; J.V. (P.G.) College, Baraut (India). Department of Dairy Science and Technology. Compositional change in crossbred and local cow milk as affected by formalin preservative. Pantnagar Journal of Research (India). (Jul-Dec 2010) v.8(2) p.219-221 KEYWORDS: DAIRY INDUSTRY. COW MILK. FORMALDEHYDE. PRESERVATIVES. PRESERVATION. CROSSBREDS. CHEMICAL COMPOSITION.

An experiment was conducted to study the compositional changes in milk samples as influenced by the addition of 0.3% and 0.5% of formalin preservative in cross bred and local cow milk samples. Addition of formalin increases the acidity, while casein % decreases in both type of milk. The extent of decrease during storage was practically the same in 0.3% and 0.5% formalin samples. No significant difference was recorded in lactose, total solids, fat and specific gravity by addition of formalin in fresh and during storage upto 48 hours. 0.3% and 0.5% formalin is best for preservation of milk samples for chemical examination only.

195. Gupta, Devesh; J.V. College, Baraut (India). Department of Dairy Science and Technology. Effect of coagulants on the yield and quality parameters of chhana whey prepared from different types of milk. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.101-104 KEYWORDS: COAGULATION. MILK PRODUCTS. WHEY. FOODS. QUALITY. FOOD INDUSTRY. FOOD TECHNOLOGY.

The experiment was conducted to study the suitability of different types of milk and coagulant for chhana whey. 10 samples of milk were taken from cow milk, buffalo milk and mixed milk. Chhana whey was obtained by adding citric acid (0.2, 0.3 and 0.4%) and lemon

juice (2.0, 3.0 and 4.0%). It was concluded that cow milk (4.5% fat) chhana whey coagulated by 0.2% and 0.3% citric acid was best for yield and quality parameters.

S01 Human Nutrition – General Aspects

196. Nagaraja, K.V.; Directorate of Cashew Research, Puttur (India). Antioxidant activity in proteolytic enzyme digests of cashew (Anacardium occidentale L.) byproducts. Journal of Plantation Crops (India). (Aug 2011) v.39(2) p.265-271 KEYWORDS: ANTIOXIDANTS. CASHEWS.

Abstract Membrane filtration of proteolytic enzyme digests and NaOH extracts of solvent extracted flours of cashew by-products resulted in reduction in antioxidant activities. Gel filtration of proteolytic enzyme digests of solvent extracted flours of cashew processing by- products on Sephadex G 25 revealed the presence of two peaks one immediately after the void volume and another later during elution. Reducing power, arginine and proteins content reduced in enzyme digests and alkali extracts after gel filtration and membrane filtration.

197. Hariyappa, N.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. D'Souza,, Maria Violet; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Prasanna, S.M.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Manjunatha, A.N.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Kumaraswamy, B.H.; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Jayarama; Central Coffee Research Institute, Chickmagalur (India). Coffee Research Station. Composite leaf litter decomposition and nutrient dynamics in coffee. Journal of Plantation Crops (India). (Apr 2011) v.39(1) p.184-186 KEYWORDS: COFFEE.

U10 Mathematical and Statistical Methods

198. Bhardwaj, S.B.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Directorate of Experiment Station. Singh, S.P.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Directorate of Experiment Station. Sharma, G.C.; Project Directorate of Cropping Systems Research, Modipuram (India). An analysis of birth intervals by considering hazard rates. Pantnagar Journal of Research (India). (Jan-Jun 2008) v.6(1) p.176-180 KEYWORDS: FAMILY PLANNING. POPULATION GROWTH. STATISTICAL METHODS.

Many authors have studied the probability models in fertility particularly in birth intervals and parity specific fertility rates involving stochastic processes and renewal theory during the recent years. Such studies have played important roles in fertility analysis. In the proposed study, an attempt has been made to look into the phenomenon of parity progression from reliability or survival point of view based on the models for hazard rates obtained by Pachal (1992), wherein it has been assumed that fertility rates decline uniformly by parity. The hazard rates decline gradually with advancement in parity. Distribution of women in the first parity with respect to the time of birth and hazard rate of births for first parity has been obtained from a cohort of 313 females. Lateron a comparative analysis between observed mean and standard deviation to the expected mean and standard deviation of the time interval also has been done.

U40 Surveying Methods

199. Gupta, Akanksha; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Pal, M.S.. G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Sharma, H.C.. G.B. Pant University of Agriculture and Technology, Pantnagar (India). Department of Agronomy. Temporal land use pattern in Maniyar watershed of Uttarakhand using GIS and remote sensing. Pantnagar Journal of Research (India). (Jan-Jun 2010) v.8(1) p.11-14 KEYWORDS: LAND USE. WATERSHED MANAGEMENT. WATERSHEDS. GEOGRAPHICAL INFORMATION SYSTEMS. REMOTE SENSING.

A study was carried out to study the land use pattern in Maniyar Watershed, located between 78022 to 78028 E longitude and 30020 to 30025N latitude, varying from 600 to 2400m above mean sea level (amsl) and covering an area of 5519 ha (55.19 km2). Results indicated that agricultural area had reduced from 62 per cent to 30 per cent from 1960 to 2002, while forest area increased marginally from 25 to 26 per cent of the total watershed area but barren land increased drastically from 13 to 27 per cent during the same period of 42 years. Therefore, conclusion is drawn that agricultural land is shifting very fast into unproductive lands and need corrective measures to protect natural resources of the watershed for its sustainable development.

LIST OF CONTRIBUTORS

1. Indian Agricultural Research Institute
   Pusa, New Delhi – 110 012

2. National Research Centre for Sorghum
   Hyderabad-500030,
   Andhra Pradesh

3. Directorate of Rapeseed Mustard
   Sewar, Bharatpur-321303,
   Rajasthan

4. Vevekanand Parvatiya Krishi Anusandhan Sansthan
   Almora-263601, Uttarakhand

5. Directorate of Wheat Research
   P.B.No.158, Aggarsain Marg,
   Karnal-132001, Haryana

6. National Research Centre for Soybean
   Khandwa Road, Indore-452017,
   Madhya Pradesh

7. Indian Grassland & Fodder Research Institute
   Jhansi-284 003, Uttar Pradesh

8. Indian Institute of Sugarcane Research
   Lucknow-226 002, Uttar Pradesh

9. Indian Veterinary Research Institute
   Izatnagar-243122, Uttar Pradesh

10. Indian Agricultural Statistics Research Institute
    Library Avenue, Pusa,
    New Delhi-110012

11. National Centre for Agricultural Economics & Policy Research
    Library Avenue, Pusa,
    New Delhi-11012

12. Central Institute for Research on Buffaloes
    Sirsa Road, Hisar-125001, Haryana

13. National Research Centre for Equines
    Hisar-125001, Haryana

14. Central Inland Fisheries Research Institute
    Barrackpore-700120, West Bengal

15. National Institute of Research on Jute & Allied Fibre Technology
    12, Regent Park, Kolkata-700040,
    West Bengal

16. Directorate of Oilseeds Research
    Hyderabad-500 030, Andhra Pradesh

17. Central Potato Research Institute
    Shimla-171 001, Himachal Pradesh

18. Central Tobacco Research Institute
    Bhaskar Nagar, Rajamundry-533105, Andhra Pradesh

19. Central Plantation Crops Research Institute
    Kasargod-671124, Kerala

20. National Bureau of Animal Genetic Resource
    P.B. No.129, Karnal-132 001,
    Haryana

21. Central Research Institute for Jute & Allied Fibres
    Nilganj, Barrackpore-700120, West Bengal

22. Central Research Institute for Dryland Agriculture
Hyderabad-500 059,
Andhra Pradesh

23. Central Avian Research Institute
Izatnagar-243 122, Uttar Pradesh

24. Directorate of Experiment Station
G.B. Pant Univ. of Agri. & Technology
Pantnagar – 263 145, Distt. Udham Singh Nagar, Uttarakhand

25. Indian Agricultural Statistical Reserch Institute
Librarary Avenu, Pusa, New Delhi

26. Central Institute of Brackishwater Aquaculture
75, Santhome High Road,
Raja Annamalaipuram,
Chennai-600028, Tamilnadu

27. Central Institute of Fisheries Education
Panch Marg, off yari Road, Andheri (West),
Mumbai-400061, Maharashtra

28. Central Institute for Research on Goats
Makhdoom, Mathura-281122,
Uttar Pradesh

29. Crop Protection Research Centre (CPRC)
St. Xavier's College, Tirunelveli, Tamilnadu

30. Central Soil Salinity Research Institute
Karnal 132001, Haryana

31. Central Tuber Crops Research Institute
Sreekariyam, Thiruvananthapuram -695017, Kerala

32. National Bureau of Animal Genetic Resources
G.T. Road Bye-Pass, P.B.No.129,
Near Basant Vihar,
Karnal-132001, Haryana

33. National Bureau of Plant Genetic Resources
Pusa Campus, New Delhi 110012

34. National Centre for Integrated Pest Management
LBS Building, Pusa Campus,
New Delhi-110012

35. National Dairy Research Institute
Karnal-132001, Haryana

36. National Research Centre on Camel
Post Bag No.07, Jorbeer,
Bikaner-334001, Rajasthan

37. Directorate of Groundnut Research
Ivenagar Road P.B.No.5,
Junagadh-362001, Gujarat

38. National Research Centre for Citrus
Nagpur, Maharashtra

39. National Research Centre on Mithun
Jharnapani, P.O. Medziphema-797106

40. ICAR H.Q. Library

41. Directorate of Knowledge Management in Agriculture (DKMA)
ICAR, KAB-I, Pusa Campus, New Delhi-110012

42. Indian Institute of Pulses Research (IIPR)
Kalyanpur, Kanpur-208024
(U.P.)

43. Central Rice Research Institute
Cuttack-753006 (Odisha)

44. Society for Plant Protection Sciences
Div. of Nematology, LBS Centre,
IARI, Pusa Campus,
New Delhi-110012

45. Soil Conservation Society of India
National Societies Block A/G-4
NASC Complex, DP Shastri Marg
Pusa, New Delhi-110012

How to obtain the full text of documents

1. Recommendations to scientists

- First determine whether your local library or another library in your area can provide you with a copy of the document you want.
- Most authors keep small stocks of reprints of their own publications, and they are usually prepared to respond to a polite request from a fellow scientist.
- In addition many of the NARD Input Centers have a document delivery service. Your librarian may write and request a photocopy for which you may often be charged the photocopy and mailing cost.
- If your librarian is unable to find the document you want, you could send us the document delivery coupon which is included in each copy of this journal. This coupon enables you to ask the NARD Headquarter to supply one or two items for your personal interest. We make no charge for this limited service, but the coupons should be used only as a last resort.
- Because of copy right regulations, photocopies of entire publications (e.g. complete books) cannot be provided.

2. Recommendations to librarians

- Become a NARD member early and get your work visible to others.
- Establish good working relationships with other librarians and be as helpful as possible in providing document delivery services from the collection you hold.
- Make your managers aware of the importance of having your own collection effectively organized, with back copies available for document delivery with access to a photocopy machine and some funds to provide requested copies of your documents.
- Contact the NARD Headquarter to make sure that relevant publications of your institution are entered/indexed in NARD.

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DKMA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year ____________ Entry Number _____ Author ___________________________

Title ____

Source ____

Year of Publication of the source/journal __________ Pages ____________________________

Write your name/address on the reverse of this coupon

✂ -

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DKMA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _________ Entry Number ________ Author ___________________________

Title ____

Source ____

Year of Publication of the source/journal __________ Pages ____________________________

Write your name/address on the reverse of this coupon

✂ -

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DKMA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____________ Entry Number ____ Author ___________________________

Title ____

Source ____

Year of Publication of the source/journal ______________ Pages ________________________

Write your name/address on the reverse of this coupon

My name and institutional address are:

____

____

____

____

____

____

____

Date: ________________________ **Signature:** ________________________

✂ -

My name and institutional address are:

____

____

____

____

____

____

____

Date: ________________________ **Signature:** ________________________

✂ -

My name and institutional address are:

____

____

____

____

____

____

____

Date: ________________________ **Signature:** ________________________