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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

001. Joseph, Rajkumar A.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Mohan, Chandrika; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Jacob, P.M.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Re-invasion and bio-suppression of spiralling whitefly, Aleurodicus dispersus Russel on coconut in Minicoy Island. Indian Coconut Journal (India). (Jun 2010) v.73(2) p.20-23 KEYWORDS: ALEURODICUS DISPERSUS. BIOLOGICAL CONTROL.

002. Singh, H.P.; Indian Council of Agricultural Research, New Delhi (India). Dynamics and co-kinetics of coconut research and development in India. Indian Coconut Journal (India). Dec 2010) v. 73(8) p. 2-11 KEYWORDS: COCONUTS. RESEARCH.

C30 Documentation And Information

003. Ravanan, C.; VIT University, Vellore (India). Balasubramanian, P.; Manonmaniam Sundaranar University, Tiruneveli (India). Raghavan, S.; National Institute of Technology, Tiruchirappalli (India). Scientometric analysis of coconut Literature : a global perspective. Indian Coconut Journal (India). (Nov 2010) v. 73(7) p. 22-26 KEYWORDS: COCONUTS. MILK.

The botanical name of the coconut is *Cocos nucifera*. The tree is considered the most useful tree in the tropics. Coconut is highly nutritious and rich in fibre, vitamins, and minerals. This fruit is classified as a functional food. This study is focused on the growth pattern and overall trend and output on coconut literature during the period from 1995 to 2009, as per the data collected from sCOPus databases based on several parameters like annual average growth rate, global publication ranks, top published institutes, authors etc.

004. Nayar, N.M.; University of Kerala, Thiruvananthapuram (India). Dept. of Botany. Breeding Plantation Tree Crops. Temperate Species. Journal of Plantation Crops (India). (Dec 2010) v. 38(3) p. 235-236KEYWORDS: PLANTATIONS.

E10 Agricultural Economics And Policies

005. Mathew, M. Thomas; Coconut Development Board, Kochi (India). Baby P.O.; Coconut Development Board, Kochi (India). Global Coconut Industry in 2009- a glimpse of the darker side. Indian Coconut Journal (India). (Feb 2010) vol. 72(10) p. 2-6 KEYWORDS: COCONUTS. EXPORTS.

006. Babu, K. Satheesh; Kerala Agricultural University, Vellayanikkara (India). Agricultural Market Intelligence cell. Coconut season starts with prices firming upon account of low initial arrivals. Indian Coconut Journal (India). (Feb 2010) v. 72(10) p. 21, 30 KEYWORDS: COCONUTS. SEASONS. PRICES.

007. John, Sona; Coconut Development Board, Kochi (India). Carving curios out of coconut. Indian Coconut Journal (India). (Feb 2010) v.72(10) p. 22-23 KEYWORDS: HANDICRAFTS. MODELS.

008. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Coconut-based agroforestry for productive and protective benefits. Indian Coconut Journal (India). (Jun 2010) v 73(2) p.2-6 KEYWORDS: AGROFORESTRY. EXTENSION ACTIVITIES.

009. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Gopalakrisnan, Remany.; Coconut Developement Board, Kochi (India). Farmer

participatory study crucial for evolving appropriate R& D policy in coconut sector. Indian Coconut Journal (India). (Jul 2010) v.73(3) p.2-6 KEYWORDS: FARMERS. PARTICIPATION. CULTURAL METHODS.

010. Mathew, Thomas M.; Coconut Developement Board, Kochi (India). Promoting bio-diversity and byproduct utilization in coconut for inclusive and sustainable growth. Indian Coconut Journal (India). (Oct 2010) v. 73(6) p. 7-11 KEYWORDS: SUSTAINABILITY. CULTIVATION.

011. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Swapna, Mary. Community Initiative Triggers group action in the coconut sector. Indian Coconut Journal (India). (Oct 2010) v.73(6) p.12-16 KEYWORDS: RURAL AREAS. COMMUNITY DEVELOPMENT.

012. Ramanathan A.V.; Coconut Developement Board, Kochi (India). Vintage oil needs a driver. Indian Coconut Journal (India). (Oct 2010) v. 73(6) p. 22-24 KEYWORDS: OILS.

013. Krishnakumar, V.; Central Plantation Crops Research Institute, Kayangulam (India).Regional Station. Restructuring coconut based homestead farms for sustained productivity. Indian Coconut Journal (India). (Dec 2010) v.73(8) p.15-19 KEYWORDS: PRODUCTIVITY.

014. Verma, Parmod; CSK-Himachal Pradesh Agricultural University, Palampur (India). Economic analysis of Himachal tea industry- A study of Co-operative factories and tea planters. Journal of Plantation Crops (India). (Dec 2010) v. 38(3) p. 194-200 KEYWORDS: TEA.

An analysis of the present status, profitability of tea cultivation, manufacturing and the problems faced by the growers and manufacturers in Himachal Pradesh is made in the study. Both secondary and primary data were collected. Various cost and income concepts were used to find out the cost of cultivation and profitability of tea farming. The results revealed that there was decrease of about 40 % both in production and productivity over the years from 1990-2008. The total income from tea industry also showed a decreasing trend. For tea co-operatives, the net returns over total cost were Rs 760/q whereas net returns over variable cost came out to be Rs 2980/q whereas in case of tea growers, the net returns per ha from the farm were found to be Rs 6,056/ ha over total cost and Rs.14,127/ ha over variable cost which clearly showed that the manufacturing and growing of tea is beneficial. The break even quantity for tea growers came out to be 2,018 kg/ ha whereas, for tea factories it was 3,61,944 kg/ year. High labour charges, availability of labour and lack of knowledge about credit availability were the main constraints of tea growers whereas for tea co-operatives these were distant marketing, non-remunerative prices, lack of promotional campaign, inadequate funds and high production costs. The study suggests that there is need to improve the productivity and manufacturing technology to enhance the economic status of the Himachal Tea Industry.

E11 Land Economics and Policies

015. Sarkar, D.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Chaturvedi, A.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Mahapatra, S.K.; National Bureau of Soil Survey and Land Use Planning, New Delhi (India). New vistas in perspective of land use planning. Journal of the Indian Society of Soil Science (India). (Dec 2009) v. 57(4) p. 587-600 KEYWORDS: LAND USE. PLANNING.

E14 Development Economics And Policies

016. Mathew, Thomas M.; Coconut Development Board, Kochi (India). Promoting bio-diversity and byproduct utilization in coconut for inclusive sustainable growth. Indian Coconut Journal (India). (Nov 2010) v.73(7) p. 12-21 KEYWORDS: BYPRODUCTS. BIODIVERSITY.

E16 Production Economics

017. Guledgudda, S.S.; UAS, Dharwad (India). Dept. of Agril. Economics. Cost of production and financial feasibility of investment in cashew plantations in coastal and north western Karnataka. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.211-218 KEYWORDS: PRODUCTION COSTS.

The study was conducted with a view to compute the cost of production taking into consideration the annualized establishment cost and cost of cultivation. The study was conducted during 2004-05 in Belgaum and Dakshina Kannada districts of Karnataka state and covered 120 sample respondents. The establishment cost of cashew orchard (up to four years) were worked out to be Rs.41,999, and Rs.43,330 in case of small and large farms, respectively in Dakshina Kannada district while in Belgaum district, Rs.38,288 and Rs.39,311 in case of small and large farms, respectively. The cost of production and net income were estimated to be high in Dakshina Kannada district as compared to Belgaum district. The capital productivity analysis showed favorable figures for net present value, internal rate of return and benefit-cost ratio in Belgaum district as compared to Dakshina Kannada district. The overall internal rate of return was worked to be 16 to 17 % as against an opportunity cost of 9.5 %. Hence, investment in cashew plantations was found to be economically and financially sound in the state. Hence, the farmers are encouraged to take up the cultivation of this crop in large areas of wasteland/marginal land. Further, it implies to create an awareness to adopt improved varieties of cashew in non-traditional (Belgaum district) and traditional areas (Dakshina Kannada district), which not only reduce the cost of cultivation but also to increase the net income among the different categories of farmers.

E21 Agro-industry

018. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). HIgh value fruit trees in coconut based mixed cropping system. Indian Coconut Journal (India). (Sep 2010) v.73(5) p.9-13 KEYWORDS: CROPPING SYSTEMS. MACADAMIA TERNIFOLIA.

019. Shylaja, M.R.; Kerala Agricultural university, Thrissur (India). College of Horticulture. Dept. of Plantation Crops and Spices. Nybe, E.V.; Kerala Agricultural university, Thrissur (India). College of Horticulture. Dept. of Plantation Crops and Spices. Productivity improvement in coconut : role of right varieties and selection of quality planting materials. Indian Coconut Journal (India). (Sep 2010) v. 73(5) p. 21-23 KEYWORDS: PRODUCTIVITY.

E70 Trade, Marketing And Distribution

020. Patrick, Martin; Maharajas College, Eranakulam, Kerala (India). Dept. of Economics. Market for tender coconut water in Kerala. Indian Coconut Journal (India). (Jan 2010) v.72(9) p.6-10 KEYWORDS: PESTICIDES.

F01 Crop Husbandry

021. Sharma, Ashwani Kumar; Central Potato Research Institute, Shimla (India). Venkatasalam, E.P.; Central Potato Research Institute, Shimla (India). Singh, R.K.; C.C.R. (P.G.) College, Muzaffarnagar (India). Singh, Sarjeet; Central Potato Research Institute, Shimla (India). Effect of variety and planting method of micro-plants on Potato

mini tuber production during off-season in North-Western Himalayas. Potato Journal (India). (Jun 2010) v.37(1-2) p.28-32 KEYWORDS: PLANTING. TUBERS. SEED POTATOES.

Keeping in view the huge requirement of quality seed-potatoes an attempt was made to explore the possibility of growing potato mini tubers using micro-plants during the off-season (mid August–December) in high hills of north-west India. Four-week old micro-plants of two potato cultivars of hills, viz. Kufri Himalini and Kufri Giriraj were planted in two different methods of planting i.e. flat bed and furrow systems. Both the varieties produced mini-tubers successfully with significant differences in the number of mini tubers per unit area. Mini tuber production potentiality was not affected significantly with the method of planting of micro-plants. Numbers of mini tubers were significantly more in Kufri Himalini (312/m2) than Kufri Giriraj (230/m2) and the respective yields were 3.25 and 2.79 kg/m2.

022. Siddagangaiah; University of Agricultural Science. Bangalore (India). Agricultural Research Station. Raveesha, K.A.; University of Mysore, Karnataka (India). Department of Studies in Botany, Agricultural Microbiology Lab. Kumar, T. Vasanth; Green Lifescience Technologies Private Limited, Karnataka (India). Effect of foliar application of Phyton-T, a seaweed extract on growth and yield of Potato. Potato Journal (India). (Jun 2010) v.37(1-2) p.44-47 KEYWORDS: FOLIAR APPLICATION. SARGASSUM. GROWTH. YIELDS. SOLANUM TUBEROSUM.

The effect of Phyton-T, a seaweed extract was studied on growth and yield of potato var. Kufri Jyoti for two years during kharif seasons of 2007 & 2008 at ARS, Madenur, Hassan. Growth parameters like number of stems, number of leaves, plant height, leaf length and breadth, leaf area and yield parameters; number and weight of marketable and non-marketable size tuber yield and percentage increase in yield over control were recorded. Foliar application of Phyton-T, three rounds on 25th, 35th and 45th day after planting at the concentrations of 0.5, 0.4 and 0.3 along with 0.3 mancozeb resulted in more vegetative growth - number of stems, number of leaves, plant height, leaf area and yield parameters - total tuber yield and increase in yield (39.21). Higher yield (231.93 & 203.76 q/ha) was observed in Phyton-T treatments at 0.5 and 0.4 along with mancozeb 0.3. To get better growth, biomass and yield, foliar spray of Phyton-T at 0.4 concentration along with mancozeb 0.3 in three rounds on 25th, 35th and 45th day after planting was found superior.

023. Singh, Mahendra; Indian Agricultural Research Institute, New Delhi (India). Division of Agricultural Economics. Projection of potato export from India: a markov chain approach. Potato Journal (India). (Jue 2010) v.37(1-2) p.48-55 KEYWORDS: FORECASTING. EXPORTS. POTATOES. INDIA. PRODUCTION.

The paper analyses the trends in area, production and yield of potato during 1950–51 to 2006–07 in India. The growth in value of output from potato and its comparison with fruits and vegetables and total value of output from agriculture was estimated during 1999–2000 to 2005–06 in major potato growing states in India. Apart from this the export of fresh or chilled potatoes in reliable markets and structural changes in composition of various products of potato were also predicted till the end of XIth Five Year Plan by using Markov Chain approach. The study observed that the annual compound growth in area, production and yield was lowest in post-WTO period (1997–2006) in comparison to any sub-period or entire period of the study. The analysis of the export composition of potato products reveals that the share of potatoes, fresh or chilled, and potatoes other than seed potatoes, fresh/chilled, declined while share of flakes, granules and pellets of potatoes had increased substantially during 2003–07. Nepal, Sri Lanka, Mauritius, Malaysia, Singapore and United Arab Emirates are projected as reliable markets for potato products till the end of XIth Five Year Plan. The study suggests that to strengthen potato production ensure positive growth in yield and to

sustain in world markets in exports of potato products there is a need to focus on reliable markets and demand driven products, bring about changes in research priorities and strengthen the linkages among researchers, extension personnel and policy planners.

024. Pandit, Arun; Central Rice Research Institute, Orissa (India). Anil Kumar; Central Potato Research Institute, Shimla (India). Rana, Rajesh K.; Central Potato Research Institute, Shimla (India). Pandey, N.K.; Central Potato Research Institute, Shimla (India). Kumar, N.R.; Central Institute of Fisheries Education, Maharashtra (India). A study on socio-economic profile of Potato farmers: comparison of irrigated and rainfed conditions in Himachal Pradesh. Potato Journal (India). (Jun 2010) v.37(1-2) p.56-63 KEYWORDS: POTATOES. IRRIGATED FARMING. RAINFED FARMING. HIMACHAL PRADESH.

The present study was conducted in Kangra (irrigated) and Mandi (rain-fed) districts of Himachal Pradesh during 2005–06. The study revealed that the farmers of irrigated area allocated higher proportion of cultivated land to potato, they had more non-farm income and grew mainly Kufri Jyoti variety of potato. On the other hand, in addition to K. Jyoti, farmers of rain-fed area grew other varieties as well. In adoption of potato technologies the farmers of rain-fed area lagged behind their counterparts of irrigated area. The study also found that the adoption of technologies was an important contributor of enhancing potato yield. It was evident from the regression analysis that one percent increase in adoption of potato production technologies would increase potato yield by 0.96 and 0.88 n irrigated and rain-fed areas, respectively. The major constraints faced by potato farmers of both irrigated and rain-fed regions were lack of sufficient quantity of healthy seed, lack of late blight forecast mechanism, low efficiency of mancozeb against late blight, etc. Farmers should be made aware about the usefulness of potato technologies like new varieties such as K. Himalini, etc which possess higher degree of late blight resistance. The scheme of contract farming needs to be supervised by the state government or panchayat. Moreover, government may declare Mandi as seed potato zone; and Kangra as processing quality potato zone and develop proper market infrastructure to upgrade the socio-economic condition of the potato farmers.

025. Arora, R.K.; Central Potato Research Station, Jalandhar (India). Singh, R.K.; Indian Institute of Sugarcane Research. Krishi Vigyan Kendra. Gulati, S.; Central Potato Research Station, Jalandhar (India). Managing loss from ground frost – a major constraint to Potato production in North-Western plains. Potato Journal (India). (Jun 2010) v.37(1-2) p.73-74 KEYWORDS: FROST. LOSSES. CROP LOSSES. PRODUCTIVITY.

F04 Fertilizing

026. Deo, C.; Rajasthan Agricultural University, Jaipur (India). Dept. of Soil Science and Agricultural Chemistry). Khaldelwal, R.B.; Rajasthan Agricultural University, Jaipur (India). Dept. of Soil Science and Agricultural Chemistry. Effect of P and S nutrition on yield and quality of chickpea (Cicer arietinum L.). Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.352-356 KEYWORDS: SANDY SOILS. YIELDS. QUALITY. CICER ARIETINUM. SULPHUR. PHOSPHORUS.

Phosphorus-sulphur interaction was studied in a field experiment at Agricultural Research Station, Durgapura, Jaipur on a loamy sand soil (Typic Ustipsamment) deficient in S and medium in P-with chickpea (Cicer arietinum L.) as a test crop. The treatments consisted of three levels of S (0, 15 and 30 kg ha-1) and four levels of P (0, 20, 40 and 60 kg P205 ha-1) applied through gypsum and triple superphosphate, respectively. Results indicated that grain and straw yield; content of N, P and S; and uptake of P and S increased with increase in rate of application of P and S individually as well as in various combinations. Applied S and P increased the number of nodules plant-1 and protein content in grain. Available P in soil increased with increasing levels of

phosphorus. Similarly available S in the soil increased with increasing levels of sulphur. The synergistic effect of phosphorus and sulphur was observed on yield, number of nodules plant-1, protein content and uptake of S and P.

027. Jessy, M.D.; Rubber Research Institute of India, Kottayam (India). Joseph, Kochuthresiamma; Rubber Research Institute of India, Kottayam (India). Mathew, Jacob; Rubber Research Institute of India, Kottayam (India). Prathapan, K; Rubber Research Institute of India, Kottayam (India). Mathew, M.; Rubber Research Institute of India, Kottayam (India). Nair, Usha; Rubber Research Institute of India, Kottayam (India). Effect of biofertilizers on soil microbial population and growth of young rubber (Hevea brasiliensis) plants. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.223-227 KEYWORDS: BIOFERTILIZERS.

028. Basavaraju, T.B.; AICRP on Palms Horticulture Research Station, Arsikere (India). Hanumanthappa, M.; AICRP on Palms Horticulture Research Station, Arsikere (India). Lavanya, T.N.; AICRP on Palms Horticulture Research Station, Arsikere (India). Effect of graded levels of NPK on the roductivity of hybrid coconut in maidan tract of Karnataka. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.228-230 KEYWORDS: FERTILIZERS.

F06 Irrigation

029. Patel, Neelam; Indian Agricultural Research Institute, New Delhi (India). Water Technology Centre. Rajput,T.B.S.; Indian Agricultural Research Institute, New Delhi (India). Water Technology Centre. Use of simulation modeling for enhancing potato production using
subsurface drip. Potato Journal (India). (Jue 2010) v.37(1-2) p.21-27 KEYWORDS: SUBSURFACE IRRIGATION. POTATOES. SANDY SOILS.

Subsurface drip irrigation (SDI) is the most advanced method of irrigation, which enables the application of small amounts of water and nutrients to the soil through the drippers placed below the soil surface. Variations of soil structure, texture, and crop's root development pattern preclude the possibility of framing general recommendations for installation depths of SDI system. The specific objective of this study was to assess the effect of depth of placement of drip tape on crop yield and application of Hydrus-2D model for the simulation of soil water. An experiment was conducted on potato (var. Kufri Anand) during October to February for 3 years (2002–03, 2003–04 and 2004–05) to study the effect of depth of placement of drip tape at five depths namely, surface (0), 5, 10, 15 and 20 cm. Distribution of soil water under field experiment and in model simulation at different growth stages agreed closely and the differences were statistically insignificant. Hydrus-2D model helped in designing the subsurface drip system for efficient use of water with minimum drainage in potato crop. Maximum yield was obtained by applying 23.6 cm of irrigation water and by placing the drip tape at 10 cm depth in the sandy loam soil of the experimental site.

030. Patel, C.K.; S.D. Agricultural University, Gujarat (India). Potato Research Station. Chaudhari, P.P.; S.D. Agricultural University, Gujarat (India). Directorate of Research. Patel, R.N.; S.D.A.U., Gujarat (India). Main Spices Research Station, Patel, N.H.; S.D. Agricultural University, Gujarat (India). Potato Research Station. Effect of plant geometry on tuber yield of Potato under drip irrigation in North Gujarat. Potato Journal (India). (Jun 2010) v.37(1-2) p.64-67 KEYWORDS: TUBERS. YIELDS. POTATOES. TRICKLE IRRIGATION.

F07 Soil Cultivation

031. Jain, V.; Indian Agricultural Research Institute, New Delhi (India). Div. of Plant Physiology). Khetrapal, S.; Indian Agricultural Research Institute, New Delhi (India). Div.

of Plant Physiology). Aravind, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Plant Physiology). Saikia, S.P.; North East Institute of Science and Technology, Jorhat (India). Div. of Medicinal Aromatic and Economic Plants). Enhanced levels of soil nitrogen and endogenous phytohormones in maize (Zea mays L.) inoculated with Azospirillum brasilense. Indian Journal of Plant Physiology (India). (Apr-Jun 2010) v.15(2) p.198-201 KEYWORDS: BIOFERTILIZERS. NITROGEN. SOIL. ZEA MAYS. AZOSPIRILLUM BRASILENSE. GIBBERELLIC ACID.

The para-nodulated maize plants grown in soil supplemented with Azospirillum thrice during the growth period performed better than the control plants. The para-nodules were formed along primary roots in the presence of 2,4-dichlorophenoxyacetic acid (2,4-D) and Azospirillum. The content of the endogenous hormones viz. indole acetic acid (IAA) and gibberellic acid (GA) was enhanced in para-nodulated maize plants cultivar Kiran. However, the level of. abscisic acid (ABA) declined. The dry weight and leaf area of the para-nodulated plants increased as compared to the control plants. The ammonia concentration (56% more) and nutrients were higher in the para-nodulated plants as compared to the control plants. The soil nitrate and ammonical N levels were higher in the pots with treated plants and inoculated with Azospirillum as compared to their levels in control pots. Bacterial phytohormone synthesis seems to be responsible for the Azospirillum mediated plant growth promotion.

F08 Cropping Patterns And Systems

032. Rautaray,S.K.; Regional Rainfed Lowland Rice Research Station, Assam (India). Benefits of mulching with dried water hyacinth or paddy straw. Potato Journal (India). (Jue 2010) v.37(1-2) p.32-36 KEYWORDS: MULCHING. EICHHORNIA CRASSIPES. EICHHORNIA. RICE. STRAW. SOLANUM TUBEROSUM.

Three field experiments were conducted at Regional Rainfed Lowland Rice Research Station, Gerua, Kamrup, Assam, India to study the effects of mulching on potato (Solanum tuberosum) in a rainfed rice-potato cropping system. Experiment 1 was conducted during three seasons (1999–2000, 2000–2001 and 2001–2002) to examine the effect of mulching on yield and economics of winter crops grown after rice and to identify suitable rice based cropping sequences with high productivity and profitability. Rice as preceding crop was followed by common winter crops, viz., potato, tomato, pea for green pods, lentil, gram, toria and coriander. Among the subsequent crops, potato gave the highest yield of 13.9 t ha-1 followed by tomato (12.3 t ha-1) under mulching with paddy straw. The rate of increase in yield due to mulching was highest for tomato (29) followed by potato (21). Results of Experiment 2 conducted during two seasons revealed that mulching with dried water hyacinth improved tuber yield of potato by 3.02 t ha-1 from 11.36 t ha-1 under no mulching. The proportion of larger sized tuber yield was higher (60) under mulching as compared to no-mulching control (51). Results of experiment 3 (2004-005 and 2005–2006) revealed that response of potato to mulching depends on the variety used. In 2005–06, the yield levels were very low (0.5 t ha-1 under no-mulching and 2.3 t ha-1 under mulching) due to the incidence of bacterial wilt followed by late blight. Incidences of the two diseases were less severe under mulching. Results indicate that use of tolerant variety Kufri Megha and adoption of mulching may reduce wilt and blight incidence and increase tuber yield.

033. Patel, C.K.; S.D. Agricultural University, Gujarat (India). Potato Research Station. Chaudhari, P.P.; S.D. Agricultural University, Gujarat (India). Directorate of Research. Patel, R.N.; S.D.A.U., Gujarat (India). Main Spices Research Station. Patel, N.H.; S.D. Agricultural University, Gujarat (India). Potato Research Station. Integrated nutrients management in Potato based cropping systems in North Gujarat. Potato Journal (India). (Jun 2010) v.37(1-2) p.68-70 KEYWORDS: CROPPING SYSTEMS. POTATOES. GUJARAT. ORGANIC FERTILIZERS.

034. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Gopalakrisnan, Remany; Coconut Developement Board, Kochi (India). Nitrogen fixing trees in coconut based mixed cropping system. Indian Coconut Journal (India). (Aug 2010) v.73(4) p.2-6 KEYWORDS: NITROGEN FIXATION. TREES. MIXED CROPPING. GLIRICIDIA. ERYTHRINA. SESBANIA GRANDIFLORA. LEUCAENA LEUCOCEPHALA. CAJANUS CAJAN. CASUARINA EQUISETIFOLIA.

035. Peter, P.I.; World Noni Research Foundations, Chenni (India). Singh, Kirti; World Noni Research Foundations, Chenni (India). Peter, K.V.; World Noni Research Foundations, Chenni (India). Marimuthu, T.; World Noni Research Foundations, Chenni (India). Noni-A future intercrop of coconut. Indian Coconut Journal (India). (Oct 2010) v.73(6) p.4-6 KEYWORDS: INTERCROPPING.

Noni is a tropical fruit of the tree Morinda citrifolia L, popularly known as the Indian Mulberry. Morinda, the genus name for the tree is derived from two Latin words morus (mulberry) and indicus (Indian). The species name citrifolia indicates resemblance of the plant foliage to that of citrus species. The botanical name itself is a powerful evidence to show that Morinda citrifolia L. originated in India. Noni plant known in Sanskrit as Ach is attributed with special properties by ancient physicians. This fruit has a rich history in India, where it is used for centuries in the Ayurveda and Siddha systems of Indian medicine in addition to tribal folk medicines. Noni contains 160+ nutraceuticals, cancer inhibiting compounds, essential vitamins, minerals, antioxidants, alkaloids, amino acids and health enhancing attributes which are antibacterial, anti-inflammatory, analgesic and anti-congestive.

036. Thampan, P.K.; Peekay Tree Crops Development Foundation, Kochi (India). Pillai, R.V.; Coconut based cropping for socio economic benefits. Indian Coconut Journal (India). (Dec 2010) v.73(8) p.20-24 KEYWORDS: CROPPING SYSTEMS.

037. Singh, B.; Punjab Agricultural University, Ludhiana (India). Dept. of Forestry and Natural Resources. Return and release of nutrients from poplar litterfall in an agroforestry system under subtropical condition. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.214-218 KEYWORDS: NUTRIENTS. AGROFORESTRY. POPULUS. TROPICAL SOILS.

038. Singh, J.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils). Rani, N.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils). Sidhu, B.S.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils). Beri, V.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils). Effect of phosphocompost on rice-wheat system in a non-calcareous typic haplustept. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.338-344 KEYWORDS: PHOSPHORUS. WHEATS. RICE. ORGANIC COMPOUNDS. CROPPING SYSTEMS.

Utilization of rock phosphate through phosphocompost in rice-wheat system was investigated in a field experiment. Application of phosphorus (P) in the form of phosphocompost and inorganic fertilizers at various doses was repeated for five rice-wheat cycles on a coarse loam noncalcarous Typic Haplustept. Higher grain yield (7.41 t ha-1) of rice was obtained in the treatment receiving half of the recommended level of inorganic P in combination with 2 tonnes (t) of phosphocompost ha-1 (N120 P13 V2), Maximum wheat grain yield of 5.41 t ha-1 was obtained in treatment receiving recommended dose of fertilizers along with 2 t phosphocompost ha-1 (N120 P26 V2)' The relative yield of rice and wheat was 110 and 104;, respectively in the treatment receiving 2 t ha-1 of phosphocompost to each rice and wheat along with inorganic fertilizers (N 120 P26 V2)' The addition of 2 tonnes of phosphocompost each to rice and wheat saved 13 kg P205 ha-1 in wheat and 60 kg N ha-1 in rice. Each cycle of rice-wheat removed 20.2 kg and 42 kg P ha-1 (average of five crop cycles) in control and N120 P26 V2 treatments, respectively. Each tonne of rice and wheat grain removed 3.19

to 3.25 and 3.36 to 3.50 kg P, respectively. Phosphorus uptake, recovery efficiency, physiological efficiency, agronomic efficiency and recovery of P from compost were higher in rice than in wheat. The Olsen-P and other fractions of P in the soil increased over control in treatments where phosphocompost was added. Olsen-P determined after five cycles correlated positively with total P addition (r = 0.867***) and different fractions i.e. saloid-P (r= 0.970***), Fe-B(r = 0.937***), AI-P (r = 0.964***) and Ca-P (r=0.702*). Activity of the alkaline phosphatase enzyme increased with phosphocompost incorporation.

039. Bedi, P.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science). Dubey, Y.P.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science). Datt, N.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science). Microbial properties under rice-wheat cropping sequence in an acid alfisol. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.373-377 KEYWORDS: MICROBIAL PROPERTIES. RICE. WHEATS. ACID SOILS. CHEMICOPHYSICAL PROPERTIES.

040. Manjunath, B.L.; ICAR Research Complex for Goa (India). Ramesh, R.; ICAR Research Complex for Goa (India). Korikanthimath, V.S.; ICAR Research Complex for Goa (India). Feasibility of ramie intercropping in coconut. Journal of Plantation Crops (India). (Dec 2010) v. 38(3) p. 207-210 KEYWORDS: INTERCROPPING.

Field experiments were conducted at ICAR Research Complex for Goa for three years during 2005 to 2008 to study the feasibility of growing ramie (Boehmeria nivea (L.) Gaud) as intercrop in coconut. Three treatments that included comparison of sole ramie grown under open conditions, sole coconut and coconut + ramie intercropping system were studied in a Randomized Block Design with six replications. Although sole ramie grown under open conditions recorded significantly higher green (7,843 kg/ha/harvest) and fibre yield (243 kg/ha/harvest) over intercropping with coconut (6,747 kg/ha/harvest and 210 kg/ha/harvest, respectively), the per unit productivity of green yield was still higher under intercropped situations (0.90 kg/m2/harvest) over sole cropping (0.78 kg/m2/harvest) indicating the potential of ramie for intercropping in coconut. An improvement in coconut productivity was observed during the experimental period over the pre-experimental period with an additional 11 nuts/palm/year indicating that the ramie intercropping has a positive influence on coconut yield. It was found that sole cropping of coconut is not much remunerative (Rs.14,830/ha net returns) while pure cropping of ramie could lead to a net return of Rs. 57,120/ha/year. However, intercropping of ramie in the interspaces of coconut could fetch a total net return of Rs.81,607/ha, showing the prospects for intercropping of ramie in coconut in the agro-climatic condition of Goa.

F30 Plant Genetics And Breeding

041. Pandey, Suman Kumar; Central Potato Research Institute, Shimla (India). Cell and Molecular Biology Laboratory. Division of Crop Improvement. Sarkar, Debabrata; Central Potato Research Institute, Shimla (India). Cell and Molecular Biology Laboratory. Division of Crop Improvement. Sharma, Sushruti; Central Potato Research Institute, Shimla (India). Cell and Molecular Biology Laboratory. Division of Crop Improvement. Chandel, Poonam; Central Potato Research Institute, Shimla (India). Cell and Molecular Biology Laboratory. Division of Crop Improvement. Integration of somatic fusion into Potato breeding: Problems and perspectives. Potato Journal (India). (Jun 2010) v.37(1-2) p.9-20 KEYWORDS: INTEGRATION. SOMATIC HYBRIDIZATION. POTATOES. SOLANUM TUBEROSUM.

The tetraploid potatoes (Solanum tuberosum L.), with tetrasomic inheritance, asexual mode of propagation, a heavy load of deleterious recessive alleles and varying levels of

sexual and EBN (endosperm balance number) incompatibilities are difficult to negotiate at the genome level. Somatic hybridization through targeted protoplast fusion between two dihaploids of tetraploid potatoes, or between a dihaploid and a wild diploid Solanum species across sexual/EBN barriers, or between two monoploids of diploid/dihaploid potatoes offers great opportunities for targeted whole genome manipulation vis-a-vis complementation. Although dihaploid breeding and protoplast fusion technologies are successfully integrated into European potato breeding programs through an effective interface between public research institutes and commercial potato breeding companies, these innovative strategies are yet to be functionally integrated into the breeding programs of most of the developing countries. This article analyzes the potential of somatic fusion for augmenting potato improvement, reviews the progress made and identifies the problems to integrate these techniques into a potato breeding program.

042. Ramesh, G.; Lalbagh, Bangalore (India). Dept. of Horticulture. Shivanna, M.B.; Kuvempu University, Janansahyadri, Shankaraghatta (India). Dept. of Applied Botany. Perfomance of Kalmegh (Andrographis paniculata Nees.) as intercrop in coconut garden. Indian Coconut Journal (India). (Apr 2010) v.72(12) p.7-10 KEYWORDS: ACANTHACEAE. INTERCROPPING.

043. Medthi, G.; Assam Agricultural University, Guwahati (India). Horticultural Research Station. Nath, J.C. Saud, B.K. Deka, K.K. Chowdhary, D. Arulraj, S.; Central Plantation Crops Research Institute, Kasaragod (India). Kahikuchi coconut hybrid-1, A newly developed coconut hybrid for north east region. Indian Coconut Journal (India). (Aug 2010) v.73(4) p. 19-20 KEYWORDS: HYBRIDS.

044. Rao, V.R.; Biodiversity International, Rome (Italy). Honorary Research Fellow). In situ/on-farm conservation of crop biodiversity. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v.69(4) p.284-293 KEYWORDS: PLANT GENETIC RESOURCES. ADAPTATION. GERMPLASM. FARMS. BIODIVERSITY. CROPS. CLIMATIC CHANGE. STORAGE.

Agrobiodiversity conservation should be the basic component of any national agricultural improvement programme. Programmes that manage agricultural genetic resources need to reconsider their strategies. Conservation based on genebanks (ex situ conservation) must be broadened and be integrated with on-farm! in situ conservation to be able to conserve much large species and genetic diversity than would otherwise be possible. In situ conservation of agricultural biodiversity (crop and related species diversity) must be made an integral part of agricultural development and supplemented by ex situ conservation. It is obvious that the public sector will have to take the lead in implementing such a comprehensive approach, in which the private sector has an important supportive role. National and intergovernmental laws and regulations will have to provide the necessary legal framework. Civil society organizations (CSOs) as well as the private sector are becoming increasingly important in filling this framework with development reality on the ground. There is a great need for us to adapt to changing conditions accepting realities of climate change, which is a complex task and requires much research as much is unknown. We are in early stages of understanding the changing rules of the game, but I believe there is sufficient experience and diverse resources available to deal with the situation on short term basis, but for long term solutions further research is needed. Complacency should be out and we need to be strategic and need to involve several stakeholders and plan early and systematically. Some amount of crystal gazing and innovation (that may or may not seem right, right now). That means we need to be flexible and be able to change fast when situation demands.

045. Singh, A.K.; House No. 2924, Sector 23, Gurgaon (India). Role of core collection and pre-breeding in management and use of genetic resources for designing crops under changing climate. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009)

v.69(4) p.294-299 KEYWORDS: BREEDING METHODS. MANAGEMENT. GENETIC RESOURCES. CLIMATIC CHANGE. CROPS.

The success to designing new cultivars, adapted to the changed climate primarily depends on the information regarding the genetic variability available within the taxonomic gene pool of cultivated species. This needs quantification of genetic variability within manageable set of collections and information about the phylogenetic relationships between distant sources of genetic variability and the cultivated species to enable introgression of desirable gene(s) into cultivated gene pool in a usable from. The core collection approach and gene pool grouping followed by pre-breeding can play an effective role in providing access to wide range of genetic resources, bringing their desirable gene(s) into cultivated species to meet the challenges of climatic changed. The present article discusses the possible application of these approaches along with concerns and future perspective.

046. Sharma, B.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Towards season-free agriculture. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v.69(4) p.300-304 KEYWORDS: GENES. AGRICULTURE. SEASONS. CULTIVATION. CROPS. GENETIC TRANSFORMATION. DROUGHT RESISTANCE.

Applied molecular genetics, popularly known as biotechnology, has opened opportunities beyond imagination. It is likely to revolutionize the science of plant breeding in not too distant future. With the possibility of transferring genes across the biological world, it has become possible to create new plant genotypes carrying traits not only unique to closer or distant taxa, but even those from animal and microbial kingdoms. A thorough churning of cropping patterns should be possible by creating new varieties adaptable to unconventional environments. Two major environmental factors determine the acceptability of any crop or different varieties of a particular crop. These are temperature and photoperiod. Genotypes that are neutral (insensitive) to day length and simultaneously tolerant to high as well as low temperatures could be cultivated in any part of the year, especially in tropical and subtropical regions of the globe. Efforts will also be needed to make such varieties tolerant/ resistant/immune to the various biotic (e.g. pests and diseases) and abiotic (drought, salinity etc.) factors which perpetually inflict crops, leading to huge economic losses. All the above properties are under genetic control. Genes controlling these traits, one way or the other, can be harvested from close and distant taxa and used in genetic transformation. Genes for opposite properties, e.g. simultaneous tolerance to high as well as low temperatures, can be pyramidied in a single genotype, and their cultivation will not be season bound. Consequences of such an eventuality will have tremendous impact on world agriculture, ultimately leading to solving the food problem of ballooning populations in the poorest countries.

047. Prabhu, K.V.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, A.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Basavaraj, S.H.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Cherukuri, D.P.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Charpe, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Gopalakrishnan, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Gupta, S.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Joseph, M.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Koul, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Mohapatra, T.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Pallavi, J.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Samsampour, D.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, V.K.; Indian Agricultural

Research Institute, New Delhi (India). Div. of Genetics). Singh, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, V.P.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Marker assisted selection for biotic stress resistance in wheat and rice. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v.69(4) p.305-314 KEYWORDS: RICE. WHEATS. SELECTION. STRESS. MOLECULAR GENETICS.

Use of molecular markers has emerged as a powerful and efficient approach to complement traditional plant breeding for improving crops. An array of molecular markers are now available that include RFLP that is based on Southern blot hybridization and, RAPD, ISSR, SSR and STS are based on polymerase chain reaction. The AFLP and CAPS markers are the other PCR based markers involving pre and post amplification restriction digestion, respectively. The most recent marker system is single nucleotide polymorphism (SNP) that utilizes the vast DNA sequence resources available in different crop species. Each of these markers has its own strengths and limitations. Markers are being used in several different aspects of crop improvement including estimation of genetic diversity, construction of high density genome maps, mapping and tagging of genes, map-based isolation of genes and marker assisted selection (MAS). MAS is carried out for transferring target gene(s) from one genetic background to another using tightly linked markers (foreground selection). MAS is also carried out to quickly recover recurrent parent genome in backcross breeding using a large number of either random or mapped markers having whole genome coverage (background selection). Hence, MAS requires markers tightly-linked to the genes for the target traits as well as high-density genome maps in crops of interest. This condition is not fulfilled in all crops and traits. The Division of Genetics, IARI has taken a lead in this approach in breeding for rust resistance in wheat, blight and blast resistance in rice. MAS has been effectively employed in pyramiding identified genes involving short breeding cycles through background and foreground selection thereby adding resistance to established cultivars of each crop.

048. Pal, D.K.; National Bureau of Soil Suvey and Land Use Planning (ICAR), Nagpur (India). Mandal, D.K.; National Bureau of Soil Suvey and Land Use Planning (ICAR), Nagpur (India). Bhattacharyya, T.; National Bureau of Soil Suvey and Land Use Planning (ICAR), Nagpur (India). Mandal, C.; National Bureau of Soil Suvey and Land Use Planning (ICAR), Nagpur (India). Sarkar, D.; National Bureau of Soil Suvey and Land Use Planning (ICAR), Nagpur (India). Revisiting the agro-ecological zones for crop evaluation. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v. 69(4) p. 315-318 KEYWORDS: CROPS. EVALUATION. ALTERNATIVE AGRICULTURE.

Food and nutritional security on sustainable basis are the major challenges of the 2151 Century. The domestic production needs to be increased % for cereals and pulses and 0.6% per annum for oilseed to meet the projected demand by the year 2030. The speed of the expansion of irrigation potential of 140 m ha is very tardy at present. Irrigation has been possible in only 83 m ha up to 2005-06. Improving the efficiency of water under rainfed situation holds a promise to increase the productivity. Frontline demonstration results showed a large gap between farmers' yield and achievable yield. This gap can be filled considerably by adopting a sustainable management approach of natural resources. It requires knowledge of sound agronomic principles, broader understanding of constraints and interaction of biotic and abiotic stresses in developing crop genetic bases for diversifying production while ensuring the efficiency of resource use. Under rainfed conditions, the yield of deep-rooted crops in cracking clay soils (Vertisols) depends primarily on the amount of rain entered and stored at depth in soil profile, and the extent to which this soil water is released during the crop growth. Recent research results obtained at NBSS&LUP [16, 17, 19] indicate that both retention and release of soil water are governed by the nature and content of clay minerals, and also by the nature of exchangeable cations. In arid and semi-arid environment the subsoils become sodic due to accelerated rate of formation and accumulation of pedogenic

CaC03. This process impairs the sHC. Therefore, it has become imperative to revise the AESR boundaries incorporating revised LGP estimates based on soil properties. AESR map is a useful tool to plan the crop suitability based on length of growing period. The revision of LGP estimates involving the influence of drainage related soil properties might provide a better insight into the AESRs. It might also involve revising AESR boundaries to bring the latest soil, climate information generated during the last 20 years.

049. Singh, R.K.; NEOFORD, Lucknow (India). Singh, H.N.; Indian Rice Research Institute, Cuttack (India). Singh, V.N .; Narendra Dev University of Agriculture and Technology, Faizabad (India). Singh, A.; NEOFORD, Lucknow (India). Singh, S.; Indian Agricultural Research Institute, New Delhi (India). Singh, N.; NEOFORD, Lucknow (India). Singh, A.; Narendra Dev University of Agriculture and Technology, Faizabad (India). Helping farmers adapt to climate change: the NEFORD way. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.319-324. KEYWORDS: FIELDS. FARMERS. TECHNOLOGY. CLIMATIC CHANGE. ADAPTATION. PILOT FARMS.

Significant increases in food production in the 20th century have contributed to the improvement of many farmers' livelihood and their economic growth. However, the gains have come with disproportionate environmental, cultural, health and social costs. The agriculture in the 21 5t century will have to address crucial challenges including climate change, by maintaining and enhancing environmental, cultural services and safeguarding nutritional quality, diversity of food and farming systems. Often the problems in agriculture are not solely caused by a lack or failure of science & technology, but instead derive from social, economic or legal framework. It is therefore critical to define first, what problems are best solved by changing social, economic or legal frameworks and second, those which are best solved by using technology. Further, the green revolution era model of transfer of technology is no more valid, particularly, when it comes to complex issues such as natural resource and climate change. Instead, innovative institutional arrangements are essential to successful design and adoption of ecologically and socially suitable agricultural systems. The roles of NGOs should be seen in this context. The advantage of NGOs lies in their independence status, freedom of raising voice of the poor and involvement at the grass-root level. Nand Educational Foundation for Rural Development (NEFORD) is one such NGO committed to transforming quality of live for the rural poor and under-privileged. It is dedicated to achieve sustainable economic development and preserve environment with the focus on marginal communities. NEFORD is leading an initiative called PARIS (Poverty Alleviation through Rice Innovation Systems) to improve food security (increase yields and reduce input cost), enhance flexibility in response to monsoon and climate change and maintain profitability in the market economy. PARIS aims to build partnership for Rice Innovation Platform and Communication Systems to improve information flow to farmers and feedback and facilitate communication throughout the information supply chain. The project uses ICT to improve access to information on market, cropping choices, weather forecasts and technology options, for which an Information Hub has been developed via the internet and village computer centres, to facilitate information flow between farmers and project partners. The program is about taking Research Into Use (RIU). We know a lot about the potential uses of different technologies, but what we don't know is where it is fit for purpose. To understand this, we are trying to bring together (a) knowledge of how a technology works, (b) appreciation of different agro-ecological conditions, in which it might be the best applied and (c) knowledge of socio-economic domain, in which it could be used. Matching the bio-physical and socio-economic characterizations with the technology profiles (options) enables us to test the usefulness of intervention. The paper highlights the concept of Rice Innovation Systems and describes the functional mechanism and provides examples from the fields on technologies for adaptation to climate change, the nature of trainings to improve farmers' skills and knowledge and innovative approaches for accelerating the pace of technology adoption to reach out larger number of people in a shortest possible time.

050. Dadlani, M.; Indian Agricultural Research Institute, New Delhi (India). Div. of Seed Science and Technology). Chakrabarty, S.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Seed Science and Technology). Basu, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Seed Science and Technology). Impact of climate change and IP regime on the production and availability of quality seed. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v. 69(4) p. 325-330 KEYWORDS: SEEDS. YIELDS. TEMPERATURE. PRODUCTION. CLIMATIC CHANGE. QUALITY.

Timely availability of high quality seeds of improved varieties, suitable to perform well in different' growing environment, is a key component of agricultural production system. Hence, an effective seed production plan not only, needs to take into account the overall commercial value of crop varieties, but also their potential to perform satisfactorily in respective agro-climatic regions, both under optimum and sub optimum conditions. In the present scenario of changing and fluctuating climate, this means that the seed plan should meet the demand of improved varieties having high commercial value and also be prepared to fulfill the contingent demands in fluctuating unfavorable weather conditions. In India, drought and flood are of common occurrence in some part of the country or other. In the recent years, the rise in temperatures, particularly at flowering and grain filling stages, have also been experienced frequently. Intensive cropping schedules, growing industrialization and poor. soil management practices are affecting the soil status. Focussed and extensive crop improvement programmes, particularly in the post-New Seed Policy, 1988 period, resulted in a greater choice to the farmers with respect to new varieties and hybrids' availability. This, on one hand increased the profitability of the farmers, and on the other hand, also helped in increasing the Seed Replacement Rate (SRR), which is still much lower than the desired levels in different crops. The SRR has shown significant rise in the crops where suitable hybrids have been introduced, but in OPVs, specially in high volume, low profit crops, which are crucial for national food security, viz., cereals and pulses, more is desired. The seed production programmes must, at all times, ensure availability of seeds of such varieties, which can be taken up in the event of uncertain weather constraints. For instance, when a timely sown crop fai Is due to early moisture stress situation, the farmer may go for resowing with a late sown, short duration variety or if the crop fails due to unfavourable weather in one season, the farmer may go for a substitute second crop, provided seeds of suitable varieties are available and the farmers are well informed and guided. The second aspect of seed production in the changing climate concerns the yield and quality of the seed produced under unfavourable weather conditions. Of various climatic factors, it has been observed that high temperature and moisture stress to the seed crop not only reduces the seed yield, but also affects the seed quality and performance of the resultant crop. In general, delayed maturity, caused by one or more environmental factors, reduces seed quality to a significant level. However, elevated CO2 levels do not adversely affect the seed quality or yield. Given the assumption, that in post-PPV&FR regime the focus of the private sector would be to develop hybrids I varieties for favourable growing environments, developing varieties for unfavourable I uncertain environments and making available seeds of the same, following an advanced and timely planning will be the primary objectives of the public sector research and seed production organisations. To encourage this, a policy to provide certain incentives for the latter may be considered.

051. Dass, S.; Indian Agricultural Research Institute, New Delhi (India). Directorate of Maize Res.). Kaul, J.; Indian Agricultural Research Institute, New Delhi (India). Directorate of Maize Res.). Manivannan; Indian Agricultural Research Institute, New Delhi (India). Directorate of Maize Res.). Singode, A.; Indian Agricultural Research Institute, New Delhi (India). Directorate of Maize Res.). Chikkappa, G.K.; Indian Agricultural Research Institute, New Delhi (India). Directorate of Maize Res.). Single cross hybrid maize-a viable solution in the changing climate scenario. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.331-334 KEYWORDS: HYBRIDS. SEED PRODUCTION. MAIZE. ZEA MAYS.

Maize is one of the viable solutions for addressing changing climate. Being C4, maize can fix maximum CO2 compared to other crop species. The slight rise in temperature would not affect the maize production. Over the years, maize has witnessed a phenomenal growth with respect to area, production and productivity in the country. This is attributed to the cultivation of high yielding stress free Single Cross hybrids. Single Cross Hybrid technology offers an easy, viable and economical option to the farmers. Maize is a potential crop for diversification of cropping system. In context of peri-urban agriculture, specialty corn viz., baby corn and sweet corn hold great promise for ensuring livelihood security. The single cross hybrids of Quality Protein Maize enriched with tryptophan and lysine provide a nutritious feed to poultry, cattle and for. poor people particularly for those who consume maize as staple food thereby providing food and nutritional security. Maize has also great potential for high growth of seed sector and export.

052. Gadag, R.N.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Aski, M.S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Kumar, S; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Kumari, J.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Specialty corn hybrids- new strategy and perspective of maize in climate change. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.335-343 KEYWORDS: CLIMATIC CHANGE. MAIZE. HYBRIDS.

Specialty corns attract particular attention on account of steady increase in demand and production over the recent years in India as well as their utility in adjusting to drought conditions. To address major limitation of low productivity, initiatives were made towards developing single cross hybrids in baby corn, sweet corn and pop corn. Respective quality parameters relating to tender ear characteristics (baby corn) biochemical components relating to sweetness (sweet corn) as well as popping parameters (pop corn) were considered. Diverse maize genotypes were identified for baby corn purpose and new experimental hybrids ,in baby corn were developed. In respect of sweet corn, elite hybrids superior to the checks (Madhuri and Priya) in terms of productivity and quality were identified. Elite hybrids in pop corn were identified meeting the requirement of quality and productivity in comparison to respective checks. This initiative is expected to give much needed impetus at realizing the potentiality of specialty corns in general and for adapting to adverse effects of climate change in particular. Further, by using elite hybrids of all specialty corns (including QPM) as well normal field corns together, a multiple range of options and products can be contemplated with potential benefits to farmers. Such strategy and plan for using diverse maize types for ensuring continuous and wide range of harvesting duration is indicated.

053. Dubey, L.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Prasanna, B.M.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Ramesh, B.; Chaudhary Charan Singh Meerut University, Meerut (India). Analysis of drought tolerant and susceptible maize genotypes using SSR markers tagging candidate genes and consensus QTLS for drought tolerance. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.344-351. KEYWORDS: MAIZE. GENOTYPES. GENES. DROUGHT RESISTANCE.

Drought stress, particularly at flowering stage, has been identified as the most important factor limiting maize production and productivity in India. In this study, a set of 24 tropical maize lines with differential responses to drought stress, including 16 lines from CIMMVT (Mexico) and eight lines from India, were characterized using 37 polymorphic microsatellite/SSR markers, including 29 SSRs tagging specific candidate genes involved in drought stress tolerance in maize. These genes, distributed on nine of the ten maize chromosomes, also co localized with 17 'consensus QTLs' for various morpho-physiological traits associated with drought tolerance at flowering stage. The analysis using these 37 candidate gene-specific and drought 'anchor' markers tagging consensus QTLs led to unambiguous differentiation of the genotypes as well as assessment of genetic diversity in these important genetic resources. A total of 119 SSR

alleles with a mean of 3.22 alleles per locus were identified. Polymorphism Information Content (PIC) of the 37 SSR loci ranged from 0.09 (umc1627) to 0.78 (umc1056 and bnlg1866), with a mean PIC of 0.56. The study resulted in identification of eleven highly informative markers with PIC values -0.65, as well as five unique SSR alleles in DTPW-C9-F55-2-3, DTPW-C9-F115-1-4, DTPV-C9-F142-1-2, K64R and CML537. Pair-wise genetic similarity (GS) values, estimated using Jaccard's coefficient, ranged between 0.14 (HKI1025¬K64R; HKI1025-CML247) and 0.74 (HKI-335-HKI-209), with a mean GS of 0.31, indicating high leve1 of genetic divergence among the genotypes selected for the study. Cluster analysis revealed clear genetic differentiation of the DTP (drought tolerant population) lines developed at CIMMYT (Mexico) from those developed and identified in India (e.g. CM140). Principal Component Analysis (PCA) aided in further elucidation of the genetic relationships as well as differentiation of genotypes largely based on their phenotypic responses to drought stress. The analysis also led to identification of specific, highly informative SSR markers, namely dupssr12 (bin 1.08), umc1042 (bin 2.07), bnlg1866 (bin 1.03), umc1056 (bin 5.03), dup13 (bin 7.04), umc1069 (bin 8.08), umc1962 (bin 10.03), bnlg1028 (bin 10.06) and umc1344 (bin 10.07), which significantly contributed to the differentiation of the drought tolerant and susceptible genotypes analysed in the study. These SSR markers could be further validated and potentially deployed in molecular marker-assisted breeding for drought tolerance in maize.

054. Satyavathi, C.T.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Begum, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, B.B.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Unnikrishnan, K.V.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics)Bhardwaj, C.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Analysis of diversity among cytoplasmic male sterile sources and their utilization in developing F1 hybrids in Pearl millet [Pennisetum glaucum (R.) Br.]. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v. 69(4) p. 352-360 KEYWORDS: CYTOPLASMIC MALE STERILITY. PENNISETUM GLAUCUM. HYBRIDS. HETEROSIS BREEDING. MALE INFERTILITY.

The present study aims at analysis of diversity among parental lines of different cytoplasmic sources and their utilization in developing F, hybrids. Seven male sterile cytoplasmic lines belonging to A, - 3; A4 - 2 and As - 2 were crossed with three elite restorers. The cluster analysis done with molecular data obtained from genomic DNA using SSR markers grouped the parental lines belonging to A, cytoplasm into one cluster, A4 into one and As into the other. The assessment of the performance of the F, hybrids was done through standard heterosis, heterobeltiosis and economic heterosis. The study clearly indicated that all the seven cytoplasmic male sterile lines coming from different cytoplasmic sources are capable of producing new superior hybrids. Physiological characters like chlorophyll, relative carotenoids and root length density have also been studied (to assess the performance of parents and F1 hybrids. Higher economic heterosis was observed for yield in A, cytoplasm compared to A4 and As cytoplasms. Desirable effects of earliness and maturity can be obtained using A4 cytoplasm while desirable heterosis could be obtained for plant height, spike girth, number of nodes, chlorophyll content, relative carotenoids and 1000 grain weight from A5 cytoplasm.

055. Kalia, V.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Sood, V.K.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Chaudhary, H.K.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Bhandari, J.C.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Sood, A.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Mittal, R.K.; Chaudhary Swaran Kumar

Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Molecular Cytogenetics and Tissue Culture Lab.). Morphological and RAPD markers-mediated assessment of genetic diversity amongst various
Trifolium species and indentification of potential ideotypes for genetic upgradation of berseem under changed climate in mid-hills of north-west Himalayas. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.361-366 KEYWORDS: RAPD. TRIFOLIUM ALEXANDRINUM. GENETIC RESOURCES. HIMALAYAN REGION.

Genetic diversity among 25 genotypes belonging to nine species of genus Trifolium was evaluated on the basis of agro-morphological traits using Mahalanobis 02 statistic and RAPO markers with the objective of identifying the species showing affinity with berseem in order to enhance its genetic base for its genetic upgradation. Mean values revealed superiority of SH 48 (shaftal), Warean, Bundel berseem 2, Bundel berseem 3, Saidi and Fahli (berseem), PRC 3 (red clover), EC 401713 (constantinopole clover) and Palampur (arrowleaf clover) for various fodder traits. D2 statistic grouped the 25 genotypes into four clusters. In contrast, RAPO analysis grouped the genotypes into three clusters and further sub-clusters corresponding to different species. Both 02 statistic and RAPO analysis revealed low genetic diversity among white clover and berseem genotypes whereas, red clover genotypes were found more divergent. T. apertum and T. constantinopolitanum exhibited more affinity towards berseem than any other species.

056. Talukdar, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Verma, K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Gowda, D.S.S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Lal, S.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Sapra, R.L.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, K.P.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singth, R.; Indian Agricultural Research Institute, New Delhi (India). National Phytotron Facility). Sinha, P.; Indian Agricultural Research Institute, New Delhi (India). Div. of Plant Pathology). Molecular breeding for charcoal rot resistance in soybean I. Screening and mapping population development. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) .v.69(4) p.367-370 KEYWORDS: CHARCOAL. GLYCINE MAX. MACROPHOMINA PHASEOLINA. GENETIC MARKERS.

Charcoal rot caused by Macrophomina phaseolina is a major yield reducing disease in the soybean growing countries across the world. Its effect is more pronounced In crops under stress, biotic or abiotic. Changing global climatic conditions particularly occurrence of frequent drought or drought-like situations are making' soybean more vulnerable to this disease. Improper screening methods rendered conventional breeding approaches unproductive. Identification of molecular marker(s) linked to the charcoal rot resistance gene would greatly facilitate screening and thus accelerate the development of new cultivars. A core set of 100 diverse genotypes were subjected to screening for resistance under paper towel methods. No genotypes were immune; 7 germplasm lines appeared to be resistant. F1 hybrids were produced by crossing resistant and highly susceptible genotypes. Parental polymorphism and purity of the F, hybrids was established using SSR markers. Advancement has been made to develop mapping population to map QTL for charcoal rot resistance in soybean.

057. Malavizhi, D.; Tamil Nadu Agricultural Research Institute, Coimbatore (India). Dept. of Rice. Centre for Plant Breeding and Genetics). Thiyagarajan, K.; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Crop Physiology). Vijayalalakshmi, C.; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Crop Physiology). Manonmani, S.; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Crop Physiology). Exploration of heterosis for yield and morpho physiological traits in hybrid rice (Oryza sativa L.) : A comparative study under flooded and aerobic conditions. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.371-382. KEYWORDS: HETEROSIS. YIELDS. FLOODED LAND. ORYZA SATIVA. PHYSIOLOGICAL FUNCTIONS. AEROBIOSIS.

The global water crisis threatens the sustainability of irrigated rice production in all the rice producing countries. Development of rice hybrids with high yield potential for aerobic conditions would be one of the exciting research to overcome the existing water crisis. Present investigation was carried out to identify the best combining parents and hybrids suitable for aerobic cultivation based on their physiological and yield contributing traits. One hundred and twenty hybi1ds along with four lines, 30 testers and two check hybrids viz., ADTRH 1 and CORH 2, were raised in randomized block design in three replications under aerobic and flooded conditions. Data were recorded at vegetative (55-60 days), 'panicle initiation (75-80 days), flowering and maturity stage for physiological and quantitative traits for all the parents and hybrids included in the study. The hybrid COMS 14A x IR55838-B2-2-3-2-3 and COMS 14A x IR 36 showed superiority for number of productive tillers, panicle length, number of filled grains, spikelet fertility, total dry matter production and harvest, index; the hybrid IR 68888 A x IR 72875-94-3-3-2 for number of productive tillers, spikelet fertility, relative water content, root dry weight, harvest index, root shoot ratio and IR 68897 A x IR 36 for number of productive tillers, panicle length, spikelet fertility, total dry matter production and harvest index. These four hybrids can be best utilized commercially for both flooded and water limited conditions. The parental lines involved in the above hybrids also had high per se performance for grain yield under aerobic condition. In general, higher yield was obtained in most of the hybrids under flooded condition. A few hybrids had equal performance under both conditions. The female parents IR 68888A and COMS 14A and the male parents IR55838-B2-2-3-2-3, IR 36, WGL 14 and WGL 32100 best suited for irrigated conditions also had good performance for most of the yield contributing traits and physiological parameters under aerobic condition. The hybrids developed from these parental lines were found superior for most of the yield and physiological traits under aerobic condition. Therefore these parental lines could serve as basic materials for developing high, yielding hybrids suitable for water limited conditions.

058. Joshi, D.C.; Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Genetics and Plant Breeding). Shrotria, P.K.; Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Genetics and Plant Breeding). Singh, R.; Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Genetics and Plant Breeding). Chawla, H.S.; Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Genetics and Plant Breeding). Morphological characterization of forage sorghum [Sorghum bicolor (L.) Moench] varieties for DUS testing. Indian Journal of Genetics and Plant Breeding (India). (Nov 2009) v. 69(4) p. 383-393 KEYWORDS: SORGHUM. FORAGE. VARIETIES.

Twenty six varieties of forage sorghum [Sorghum bicolor (L.) Moench] which included 20 released and notified 6 indigenous local varieties were characterized using 40 morphological descriptors adopted from the DUS guidelines of PPV&FR Authority and ICAR and subsequently examined for their Distinctiveness, Uniformity and Stability. Among the 26 visually assessed characters 2 characters were monomorphic, 10 characters were dimorphic and 14 characters were polymorphic indicating their potential for varietal characterization and distinctiveness. No intra-varietal variation was observed for any of the visual characteristics and expression of characters in different varieties remained same for the two consecutive years confirming the uniformity and stability of the varieties. Combined Over Years Distinctiveness (COY-D) analysis was made on 14 measurable DUS descriptors which revealed distinctiveness for all the 26 varieties. COY-D analysis supported with MJRA analysis revealed that the slope of the MJRA curve and regression probability were too negligible which indicated that all the considered characteristics were independent and their interactions with environment as well as with themselves were negligible in both the years. This indicates the distinctiveness of all the candidate varieties. Combined Over Years Uniformity (COY-U) analysis revealed that all the released and notified varieties were more or less uniform for the 14 measurable characters. However, three local varieties viz., Rampur local, Gwalior local and Rajasthan local were not uniform for 7, 6 and 4 measurable characters respectively emphasizing

the need for their further purification to attain a considerable level of homogeneity in their heterogeneous blend. The present experimental material possessed relatively low magnitude of differences between PCV and GCV, high heritability coupled with high to moderate genetic advance for most of the measurable descriptors, thus emphasizing their consistency and stability over the years and their utility in varietal characterization. On the basis of grouping characteristics unique morphological profiles could be established for 9 varieties. When all the 33 morphological descriptors of PPV&FR Authority and 7 morphological descriptors of ICAR were studied distinctiveness could be obtained for two more varieties viz., UPFS 38 and SSG 59-3. Thus out of a total of twenty six varieties unique morphological profiles could be obtained for 11 varieties. However, the rest of 15 varieties remained .in groups of two or three varieties. Thus the morphological DUS descriptors could establish distinctiveness of some varieties but varieties showing overlapping of the expression for these characters could not be discriminated hence some other markers! descriptors could be thought for complementing the morphological DUS descriptors.

059. Yadav, S.K.; SKN College of Agriculture, Jobner (India). Dept. of Plant Breeding and Genetics). Raje, R.S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Maloo, S.R.; Rajasthan College of Agriculture, Udaipur (India). Dept. of Plant Breeding and Genetics). Identification of high yielding, salt tolerant and stable genotypes of bread wheat (Triticum aestivum L.). Indian Journal of Genetics and Plant Breeding (India). (Nov 2009). v.69(4) p.394-399 KEYWORDS: TRITICUM AESTIVUM. YIELDS. GENOTYPES. SALT TOLERANCE. SOFT WHEAT.

In the present investigation eighteen genotypes of wheat were evaluated under normal and saline soil environments over two years in rabi seasons in R.B.D. with two replications to study the g x e interaction and to identify stab1e genotypes. Pooled analysis of variance indicated significant variance due to genotype and g x e interaction for all the characters. Variance due to g x e (lin.) was significant for plant height, spikelets per ear, grain yield per ear, 100o-grain weight and grain yield per plant. The variance due to g x e (lin.) was higher than variance due to pooled deviation for all the characters except days to flowering. Environmental indices were higher under normal as compared to saline environments for all
characters except for days to flowering. Out of eighteen genotypes, genotypes KRL 19, Job 673 and Kh 65 showed average response (b = 1) and were highly stable (52 di= 0). Out of these, the genotype KRL 19 had higher mean value than population mean, thus this genotype should be used in the hybridization programme. Genotypes Job 673 and Kh 65 should be used in hybridization programme and should be crossed with high yielding genotypes such as Raj 3077 to develop high yielding and stable genotypes. Genotypes KRL 20 and Job 666 showed above average stability with mean equivalent to population mean. Thus, these were suitable for high saline conditions. These genotypes should be crossed with high yielding genotypes like Raj 3077 to develop high yielding genotypes suitable for highly saline soils.

060. Revathi, P.; Directorate of Rice Research, Hyderabad (India). Tomar, S.M.S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, N.K.; National Research Centre for Plant Biotechnology, New Delhi (India). Marker assisted gene pyramiding of leaf rust resistance genes Lr24, Lr28 along with stripe rust resistance gene Yr15 in wheat (Triticum aestivum L.). Indian Journal of Genetics and Plant Breeding (India). (Nov 2010). v.70(4) p.349-354 KEYWORDS: GENES. TRITICUM AESTIVUM. GENETIC MARKERS. PATHOGENICITY.

Two highly effective genes for leaf rust resistance viz., Lr24, Lt28 and a stripe rust resistance gene Yr15 were selected for pyramiding in the background of a susceptible but high yielding bread wheat variety HD2877. The screening against most virulent pathotypes of leaf rust 77-5 (121 R63-1) and stripe rust, 46S119 and 78S84 indicated that all the three genes confer a high degree of seedling and adult plant resistance. The use of molecular markers, namely, SCS13026o7, SCS421s7o and Xgwm273 validated the presence of resistance genes, Lr24 and Yr15 in Sunstar*6/C80-1/N763-2312 and

Lt28 in HW2033 both being donors. The application of molecular markers facilitated identification of individual plants in three-way cross (HD2877 x Sunstar*6/C80-1/N763-2312) x HW2033, BC1 -F1 and BC2 -F1 generations possessing the targeted genes. Finally eight plants were selected in BC2 -F2 generation carrying the desired resistance genes, Lr24, Lr28 and Yr15 in different combinations in the background of HD2877. The availability of combination of major rust resistance genes in desirable background would facilitate the strategic deployment of wheat varieties to achieve durable resistance.

061. Dubey, L.; Chaudhary Charan Singh University, Meerut (India). Prasanna, B.M.; International Maize and Wheat Improvement Center, Gigiri (Nairobi). Hossain, F.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Verma, D.K.; Indian Agricultural Research Institute, Pusa, Bihar (India). Regional Stn.). Ramesh, B.; Chaudhary Charan Singh University, Meerut (India). Phenotypic evaluation of a set of selected exotic maize inbred lines for drought stress tolerance. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010) v. 70(4) p. 355-362 KEYWORDS: DROUGHT RESISTANCE. MAIZE. DROUGHT STRESS. GRAIN. YIELDS.

Increased rainfall variability accentuated by climate change will have severe effects on production of maize which is grown predominantly as a rainfed crop in India. A set of 31 exotic inbred lines were analysed under both well-watered (controlled) and water-deficit stress (at flowering stage) conditions at the IARI Experimental Farm, New Delhi (during Kharif 2007), and IARI Regional Station, Pusa-Bihar (during Rabi 2007-08). Significant variation among the genotypes were observed for grain yield per plant, anthesis-silking interval (ASI), number of ears per plot, total n!-lmber of leaves per plant and leaf senescence, under both well-watered and drought-stressed conditions. Significant effects of locations/seasons and environments, besides location/season x genotype and environment x genotype interactions for most of the drought component traits were analysed. The study led to the identification of a few inbreds, such as DTPYC9-F46-1-2-1-2-B, CML341, CML340 and CMLP2 at Delhi, and CML340, LPSC7-F64-2¬6-2-2-B-B, LPSC7-F71-1-2-1-1-B-B, CMI360 and CML341 at Pusa (Bihar) as promising drought-tolerant genotypes. The study also established the negative association of ASI with ear per plot as well as with grain yield per plant under water stress conditions at both the locations. Leaf senescence was also found to be negatively correlated with ear per plot and grain yield per plant, thereby confirming the usefulness of lower ASI and leaf senescence as the potential secondary traits for breeding under drought stress conditions in rainfed maize.

062. Yadav, K.; Banaras Hindu University, Varanasi (India). School of Biotechnology). Singh, B.D.; University of Lucknow, Lucknow (India). Dept. of Biochemistry). Srivastava, C.P.; Banaras Hindu University, Varanasi (India). Dept. of Genetics and Plant Breeding). Chand, R.; Banaras Hindu University, Varanasi (India). Dept. of Mycology and Plant Pathology). Yadav, A.; V.B.S. Purvanchal University, Jaunpur (India). Dept. of Microbiology). Analysis of genetic divergence in pea (Pisum sativum L.) using quantitative traits and RAPD markers. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010) v.70(4) p.363-369 KEYWORDS: PISUM SATIVUM. RAPD. GENETIC MARKERS. PEAS. BIODIVERSITY.

Genetic diversity among 14 tall and 14 dwarf cultivars elite lines of pea (Pisum sativum L.) was assessed based on 10 quantitative traits and 72 RAPD primers. Dendrogram based on quantitative traits revealed six clusters. In principal component analysis (PCA), the first three PCs together accounted for 61.48% of the total variation, and the grouping was consistent with that of UPGMA method. RAPD-based dendrogram showed three major clusters; cluster II was further divided into three subclusters. The first three PCs of RAPD data accounted for 29.28% of the total variation, and the grouping pattern was similar to that obtained by UPGMA. The tall genotypes in both the types of clustering indicated a lower level of diversity compared to the dwarf ones. The correlation estimated by Mantel test between the quantitative trait and RAPD matrices was non-significant (r = -0.26) for reason of targetting different genomic regions by RAPD markers the morphological traits. Cophenetic correlations which reflect the

goodness of fit for a tree were 0.73 and 0.79 for quantitative traits based and RAPD based dendrogram, respectively.

063. Lohithaswa, H.C.; All India Coordinated Research Project on Forage Crops, Mandya (India). Desai, S.A.; University of Agricultural Sciences, Dharwad (India). All India Coordinated Wheat Improvement Project). Hanchinal, R.R.; University of Agricultural Sciences, Dharwad (India). All India Coordinated Wheat Improvement Project). Genotype x environment interaction for grain quality traits in emmer wheat (Triticum dicoccum (Schrank.) Schubl.). Indian Journal of Genetics and Plant Breeding (India). (Nov 2010). v.70(4) p.370-372 KEYWORDS: GENOTYPES. TRITICUM DICOCCUM. GRAIN FEED. GRAIN CROPS. STABILITY.

064. Revathi, P.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Singh, A.K.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Sundaram, R.M.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Senguttuvel, P.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Kemparaju, K.B.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Hariprasad, A.S.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Viraktamath, B.C.; Directorate of Rice Research, Hyderabad (India). Crop Improvement Section). Molecular screening for the presence of wide compability gene S5 neutral allele in the parental lines of hybrid rice. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010) v. 70(4) p. 373-375 KEYWORDS: TESTING. GENES. HYBRIDS. RICE.

065. Kuchanur, P.H.; University of Agricultural Sciences, Dharwad (India). Pattar, P.S.; University of Agricultural Sciences, Raichur (India). Balaganvi, S.B.; University of Agricultural Sciences, Dharwad (India). Murty, G.S.S.; Babha Atomic Research Centre, Mumbai (India). Gowda, M.V.C.; University of Agricultural Sciences, Raichur (India). Evaluation of rice (Oryza sativa L.) mutant derivatives for salt tolerance in saline vertisols of Tungabhadra command. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010) v.70(4) p.377-380 KEYWORDS: ORYZA SATIVA. MUTANTS. SALT TOLERANCE. VERTISOLS. SOIL TYPES.

066. Chandrashekar, M.K.; Zonal Agricultural Research Station, Mandya (India). Gowda, K.T.P.; Zonal Agricultural Research Station, Mandya (India). Lohithaswa, H.C.; Zonal Agricultural Research Station, Mandya (India). Genetic analysis of southern corn rust resistance (Puccinia polysora Underw.) in maize. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010). v.70(4) p.381-382 KEYWORDS: ZEA MAYS. MAIZE. PUCCINIA POLYSORA.

067. Sandhu, J.S.; Punjab Agricultural University, Ludhiana (India). Dept. of Plant Breeding and Genetics). Gupta, S.K.; ICRISAT, Patancheru (India). Singh, I.; Punjab Agricultural University, Ludhiana (India). Dept. of Plant Breeding and Genetics). Gill, B.S.; Punjab Agricultural University, Ludhiana (India). Dept. of Plant Breeding and Genetics). Bhardwaj, R.; Punjab Agricultural University, Ludhiana (India). Dept. of Plant Breeding and Genetics). Genetics of bushy growth habit and its implications in chickpea improvement. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010). v.70(4) p.383-385 KEYWORDS: GENETICS. CHICKPEAS. CICER ARIETINUM. GROWTH.

068. Kumari, L.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Ravikumar, R.L.; Agricultural College, Hassan (India). Dept. of Biotechnology). Satish, D.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Kumar, D.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Shinde, G.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Soregaon, C.D.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant

Breeding). Molecular analysis of segregation in F2 generation of inter-specific crosses in safflower. Indian Journal of Genetics and Plant Breeding (India). (Nov 2010) v 70(4) p.386-389 KEYWORDS: GENES. SAFFLOWER. SEGREGATION. GENOMES. POLYMORPHISM. BREEDING METHODS. GENETIC MARKERS.

069. Mallick, N.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Vinod; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Sharma, J.B.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Singh, B.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Tomar, S.M.S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Genetics). Genetics of stem rust resistance in common wheat genotypes WR95 and Selection T3336. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p. 109-113 KEYWORDS: GENETIC MARKERS. GENOTYPES. WHEATS. STEM EATING INSECTS.

Genetic stocks WR95 and Sel.T3336 were screened against most prevalent races of stem rust viz., 40A, 40-1 and 117-6 at seedling stage under controlled conditions. Both the genetic stocks, WR95 and Sel.T3336 were found resistant to all the three races. Genetic analysis revealed that WR95 carries a single recessive gene for rust resistance. An effort was made to locate the gene using monosomic series, however, the gene proved to be hemizygous ineffective in monosomic F1s. WR95 was also screened with validated molecular markers of the stem rust resistance genes 5,24, 5,25, 5r26, 5,31, 5r36, and 5,38. None of these genes could be detected in WR9S showing that the resistance gene present in WR95 is diverse from these genes. Sel T3336 showed segregation for one stem rust resistance gene against race 40-1. However, screening with molecular markers showed the presence of stem rust resistance genes 5r24 and 5r26 inSe1.T3336. The resistance identified in WR95 may prove very useful in breeding.

070. Lakshmana, D.L.; University of Agricultural Sciences, Dharwad (India). AICRPS). Biradar, B.D.; University of Agricultural Sciences, Bijapur (India). Regional Agricultural Research Stn.). Deshpande, S.K.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Salimath, P.M.; University of Agricultural Sciences, Bijapur (India). Dept. of Genetics and Plant Breeding). Fertility restoration studies involving three diverse cytoplasmic-nuclear male sterility systems in pearl millet. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 114-119 KEYWORDS: PENNISETUM GLAUCUM. MALES. SEED SET.

Pearl millet [Pennisetum glaucum (L.) R. Br.], hybrids grown widely in India are .all based on A1 CMS source. Though alternative sources of CMS were available and found to be highly stable, their utility is restricted due to non-availability of suitable restorers. The investigation on fertility restoration reaction of the various lines revealed that out of the 105 lines, 38 exhibited satisfactory (60 %) seed setting on A1, 63(50%) on A4 cytoplasm and 47 lines (44.76%) on As cytoplasm, acted as restorers. The frequency of restoration on A4 cytoplasm was quite high compared to A1 and As indicating the possibility of developing hybrids on A4source. Among the three sources. of male sterility the seed set percentage was highest on A1 (78.51) followed by A4 (76.10) and As (68.72) in kharif season. However, during summer only on A4 source the seed set per cent was 70%. The proportion of restorers exhibiting 80 % seed set was highest followed by As and A1 across kharlf and summer seasons. The mean seed set percentage (across the seasons) on A4 was highest (73.50 %) followed by on A1 (71.60%) and 66.60% on As.

071. Yadav, O.P.; Central Arid Zone Research Institute, Jodhpur (India). Evaluation of landraces and elite populations of pearl millet for their potential in genetic improvement for adaptation to drought prone environments. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p.120-124 KEYWORDS: BREEDING METHODS. ADAPTATION. DROUGHT RESISTANCE. PENNISETUM GLAUCUM.

Pearl millet growing regions in north-western India are characteristically drought-prone which emphasizes the importance of drought tolerance for pearl millet cultivars

targeted for these regions. This study was conducted to evaluate the potential of five each of land races and elite composites by evaluating their 25 crosses under drought conditions of arid zone for three years. Variation in landraces and elite composites accounted for more than 60% of variation in crosses for various traits. Both land races and elite composites possessed contrasting GCA effects showing their differential ability to produce crosses adapted to drought environments. While the landrace 220 had significant and positive effects for biomass and stover yield, the landrace 184 had significant negative effects for biomass, grain and stover yields. The land races 235 and 238 largely produced grain type materials. Elite composites, in general, had much lesser effects than landraces. The elite composite 923 had maximum positive effects for grain yield which was presumably due to its positive significant effects for harvest index and average effect for biomass. The composite HHVBC had highest desirable effects for stover yield and hence can be a potential source of improving stover yield in the genetic background of elite material. The results showed that there existed exploitable differences in landraces and elite composites which can be utilized in genetic improvement for adaptation to drought-prone environments.

072. Parameshwarappa, S.G.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Salimath, P.M.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Upadhaya, H.D.; ICRISAT, Patencheru, Hyderabad (India). Patil, S.S.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Kajjidoni, S.T.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Patil, B.C.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Characterization of drought tolerant accessions identified from the minicore of chickpea (Cicer arietinum L.). Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p.125-131 KEYWORDS: YIELDS. CICER ARIETINUM. HERITABILITY. GENETIC GAIN. DROUGHT RESISTANCE.

Terminal drought is one of the major causes of yield losses in chickpea (Cicer arietinum L.) and there is scope for recovery of major part of this loss through genetic improvement. The progress in breeding for drought tolerance is slow due to the quantitative and temporal variability of available moisture across years and the low genotypic variance in yield under drought. Deep and prolific root system is a high priority trait that can improve drought tolerance in chickpea. Ten accessions which were identified as drought tolerant based on drought susceptible index (DSI) and drought tolerant efficiency per cent (DTE 'Yo) were evaluated during rabi 2006-07 along with stanadred check Annigeri-1 and drought tolerant checks ICC 4958 and ICC 10448 under irrigated and rainfed condition for seed yield and root traits. Wide range of genetic variability, moderate to high heritability and high genetic advance for yield and its component traits was observed in drought tolerant accessions evaluated under moisture stress and irrigated situations during 2006-07. Among the drought tolerant genotypes evaluated, ICC 13124 showed maximum yield levels under irrigated (1220 kg/ha) as well as rainfed condition (990 kg/ha). The per cent reduction in yield was minimum (18.9 %) as compared to checks under moisture stress for this genotype. Observations on root length, root weight and root volume showed that ICC 13124 was equally good in respect of root traits which can be used in the breeding programme aimed at drought tolerance.

073. Tanveer, H.; Krishi Vigyan Kendra, Moradabad (India). Choudhury, P.R.; Indian Agricultural Research Institute, New Delhi (India). Div. of Agricultural Economics). Dixit, G.P.; Indian Institute of Pulses Research, Kanpur (India). Jha, G.K.; Directorate of Seed Research, Mau (India). Detection of molecular divergence and development of DNA fingerprints in fieldpea cultivars. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 132-139 KEYWORDS: DNA. PEAS. RAPD.

Studied the molecular divergence and develop DNA fingerprints in selected popular field pea cultivars from India. Those RAPD primers from the four sets (viz. OPP, OPSA, OPAQ and OPH) which showed at least 75 percent band polymorphism were selected for molecular diversity analysis. Twenty four primers generated a total of 256 amplified

fragments out of which 228 (89.06%) were polymorphic. On an average, 10.67 bands were amplified per primer. Cluster analysis based upon DNA amplification polymorphism using Jaccard's similarity coefficient and UPGMA could unveil substantial amount of polymorphism among the cultivars. Genotype specific bands were represented in a diagrammatic form and can be used as a reference fingerprint. The arithmetic mean heterozygosity (Hav) value and marker index (MI) was found to be 0.592 and 6.317, respectively, indicating the efficiency and usefulness of RAPD as a marker system.

074. Pattanashetti, S.K.; College of Agriculture, Bijapur (India). Dept. of Genetics and Plant Breeding). Gowda, M.V.C.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Mutational origin of genetic diversity in groundnut (Arachis hypogaea L.). Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 145-154 KEYWORDS: GENETIC VARIATION. GROUNDNUTS. RAPD. ARACHIS HYPOGAEA.

To investigate the mutational origin and nature of genetic diversity in groundnut, mutants derived from Dharwad Early Runner and others along with natural types, and intra and interspecific derivatives belonging to all the four botanical types were assessed for their morphological, biochemical and molecular diversity. Similarity among the natural and mutant categories suggests the key role of mutations in creating enormous diversity in terms of different subspecies and botanical types of groundnut. Behaviour of the Dharwad Early Runner derived mutants and several unusual features are indicative of the non-Mendelian turnover mechanisms. Multiple gene differences between the mutants and their parents, paternal inheritance and tissue-specific expression of glutamate oxloacetate transaminase isozyme, response of mutants to 5-azacytidine (a demethylating agent) and limited molecular diversity compared to enormousmorphological diversity suggests the possible involvement of epigenetic mechanisms in the differentiation of groundnut into different subspecies and botanical varieties.

075. Boranayaka, M.B.; University of Agricultural Sciences, Bengaluru (India). All India Coordinated Research Project on Millets). Ibrahim, S.M.; Agricultural College and Research Institute, Madurai (India). Dept. of Plant Breeding and Genetics). Ananda Kumar, C.R.; Agricultural College and Research Institute, Madurai (India). Dept. of Plant Breeding and Genetics). Rajavel, D.S.; Agricultural College and Research Institute, Madurai (India). Dept. of Agricultural Entomology). Induced macro-mutational spectrum and frequency in sesame (Sesamum indicum L.). Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 155-164 KEYWORDS: SESAMUM INDICUM. MUTANTS. PHYTOPHTHORA. FUNGI.

A mutation breeding study was carried out with sesame varieties viz, SVPR 1 and Cardeboriga using 5 doses each of gamma rays (10,20,30,40 and 50 krad) and ethyl methane sulphonate (0.8,1.0,1.2,1.4 and 1.6%). In general the spectrum of viable mutants included mutants with alteration in branching habit, plant height, phyllotaxy, nodal distance, flower character, nodal distance of the first capsule, capsule and seed characters with a total of 68 mutants in SVPR 1 and 32 mutants in Cardeboriga from gamma irradiated population and 83 mutants in SVPR 1 and 49 mutants in Cardeboriga from EMS treated population. Among the wide spectrum of viable mutants, economically important mutants such as mutants with determinate plant type, early flowering, more number of branches and capsules, altered phyllotaxy, main stem with shorter inter nodes, multicapsules per axil, multilocules, increased capsules etc., were isolated for further studies.

076. Pattanashetti, S.K.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Gowda, M.V.C.; University of Agricultural Sciences, Dharwad (India). Dept. of Genetics and Plant Breeding). Inheritance of necrotic mutants of groundnut (Arachis hypogaea L.). Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 165-171 KEYWORDS: ARACHIS HYPOGAEA. MUTANTS. GROUNDNUTS. INHERITANCE (ECONOMICS).

In groundnut, parent Dharwad Early Runner on treatment with ethyl methane sulphonate and 5-azacytidine (a demethylating agent) resulted in two independent lesion mimic mutants namely, Necrotic 1 and Necrotic 2 belonging to Spanish (var. vulgaris) and Valencia (var. fastigiata) type, respectively. Inheritance studies involving Non-necrotic 1, Non-necrotic 2 (Non-necrotic versions of Necrotic 1 and Necrotic 2) and parent Dharwad Early Runner as ovule parents and Necrotic 1 and Necrotic 2 as pollen parents indicated that necrosis phenotype is under the control of five genes. Though the two necrotic mutants were isolated independently and belongs to different botanical groups, they are essentially similar with respect to necrotic phenotype and genotype. But, Non-necrotic 1, Non-necrotic 2 and parent Dharwad Early Runner differ for their allelic constitution in two or three genes. Response to 5-azacytidine (a demethylating agent) suggested that Dharwad Early Runner is in hypermethylated state, necrotic mutants viz., Necrotic 1 and Necrotic 2 are in moderately-methylated state, while non-necrotic variants and Dharwad Early Runner like variants are in hypo methylated state. Results indicate the possible 'epigenetic' nature of these necrotic mutants.

077. Lavanya, D.L.; Sugarcane Breeding Institute, Coimbatore (India). Div. of Crop Improvement). Hemaprabha, G.; Sugarcane Breeding Institute, Coimbatore (India). Div. of Crop Improvement). Genetic diversity within sucrose rich parental pool of sugarcane and its application in sugarcane breeding through hybridization and selection . Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p.172-181 KEYWORDS: SUCROSE. GENETIC VARIATION. SUGARCANE. HYBRIDIZATION.

Genetic diversity in 82 high sucrose genotypes of sugarcane was estimated using 30 sugarcane specific 5TM5 primers. The overall 51 values using three diversity measures viz., Dice, Jaccard's and simple matching methods were 0.69, 0.54 and 0.74 respectively, indicating the existence of moderate diversity among the clones and the scope of improving sucrose content through breeding. The dendrogram analysis among the 82 sugarcane types showed that two pairs of clones (Co 200002 and Co 86005 and, Co 91017 and 89005) were identical. Though the clustering of clones reflected the pedigree relationship between the cultivars, deviations from this were observed and could be attributed to the high heterozygosity and polyploidy of the genus Saccharum that lead to gross differences in phenotype and genotype. The more diverse clones were Co 87009, Co 86002, Co 90006, Co 86014, Co 775, Co 87011 and Co 85037. Out of 3321 possible combinations, 443 combinations were genetically more similar (51=0.83) which might not provide incremental gains through hybridization, while 813 combinations (51= 0.69) were genetically more diverse and 2206 combinations showed moderate diversity (51=0.70-0.82). 5uch diverse clones and combinations have immediate application in breeding for improving efficiency and precision in sugarcane breeding. Based on diversity estimates, hybridization involving four genetically diverse, three genetically similar and three with intermediate similarities were affected and progeny performance correlated with genetic diversity. A strong correlation (-0.7265) between genetic diversity and cross performance and cross selection rate from crosses with high and medium diversity indicated the importance of diversity estimates in the choice of parents and to estimate genetically more similar crosses.

078. Sarkar, J.; Indian Agricultural Research Institute, New Delhi (India). Div. of Floriculture and Landscapping). Misra, R.L.; Indian Agricultural Research Institute, New Delhi (India). Div. of Floriculture and Landscapping). Bhat, K.V.; National Bureau of Plant Genetic Resources, New Delhi (India). National Research Centre for DNA Fingerprinting). Singh, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Fruits and Horticultural Technology). Singh, S.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Fruits and Horticultural Technology). Genetic diversity analysis in tuberose (Pollianthes tuberosa) genotypes through randomly amplified polymorphic DNA. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p.182-188 KEYWORDS: GENETIC VARIATION. DNA. GENOTYPES.

The present investigation was undertaken for characterizing tuberose genotypes using DNA marker technology. Twenty tuberose genotypes comprising of both single-

and double-petal types collected from different parts of India were selected for analysis. The DNA extraction and RAPD conditions were standardized. For RAPD analysis 20 ng DNA template, 2.5 mM MgCI2 and 1 U Taq DNA polymerase was found effective. Out of 80 random decamer primers tested, 17 were selected based on high level of polymorphism on the basis of primer resolving power and marker index, RAPD primers OPC-13 and OPD-12 were identified as efficient primers for diversity analysis of tuberose. A total of 157 RAPD bands were generated by the 17 random decamer primers. The selected primers proved effective for DNA profiling in addition to diversity analysis. Genotypes Guwahati Double and Swarnrekha showed good morphological similarity revealing high similarity coefficient (0.90) suggesting them to be very closely related. The RAPD analysis also confirmed their relatedness as they grouped in the same cluster. The suitability of this technique for genotyping and diversity analysis was also established. Genotypes, Vaibhav and Pune Single were found to have least pair-wise similarity although they had a greater morphological similarity with each other.

079. Pancholi, S.R.; S.K. Rajasthan Agriculture University, Jaipur (India). All India Coordinated Wheat and Barley Improvement Project, Agricultural Research Stn.). Sharma, S.N.; S.K. Rajasthan Agriculture University, Jaipur (India). All India Coordinated Wheat and Barley Improvement Project, Agricultural Research Stn.). Sharma, Y.; S.K. Rajasthan Agriculture University, Bikaner (India). Plant Biotechnology Centre). Maloo, S.R.; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Dept. of Genetics and Plant Breeding). Screening of bread wheat (Triticum aestivum L. em. Thell) genotypes under heat stress environment. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 189-193 KEYWORDS: HEAT STRESS. TRITICUM AESTIVUM. GENOTYPES. TESTING.

080. Pandey, R.L.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Dept. of Plant Breeding and Genetics). Satish, G.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Dept. of Plant Breeding and Genetics). Shrivastava, R.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Dept. of Plant Breeding and Genetics). Rastogi, N.K.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Dept. of Plant Breeding and Genetics). Molecular analysis of powdery mildew (Erysiphe polygoni DC) resistance in black gram (Vigna mungo L. Hepper). Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p.194-196 KEYWORDS: VIGNA MUNGO. ERYSIPHE POLYGONI. MOLECULAR GENETICS.

081. Singh, A.K.; Narendra Deva University of Agriculture and Technology, Faizabad (India). Dept. of Genetics and Plant Breeding) Mall, A.K.; Central Rice Research Institute, Cuttack (India). Crop Improvement Div.). Bhajan, R.; Narendra Deva University of Agriculture and Technology, Faizabad (India). Dept. of Genetics and Plant Breeding). Singh, O.N.; Central Rice Research Institute, Cuttack (India). Crop Improvement Div.). Environmental sensitivity of parents and their crosses for combining ability and rank correlation in Brassica rapa L. var. Yellow sarson. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 197-200 KEYWORDS: BRASSICA. COMBINING ABILITY. ENVIRONMENTAL TEMPERATURE.

082. Pradhan, K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). AICRP on Groundnut). Das, P.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). AICRP on Groundnut). Patra, R.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). AICRP on Groundnut). Genotype x environment interaction for pod yield and yield components of groundnut varieties in warm sub-humit climate and moderately acidic soil. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 201-203 KEYWORDS: GENOTYPES. ACID SOILS. YIELD COMPONENTS. GROUNDNUTS.

083. Sekhar, J.C.; Directorate of Maize Research, Hyderabad (India). Winter Nursery Center)Rakshit, S.; Directorate of Sorghum Research, Hyderabad (India)Kumar, P.;

Directorate of Maize Research, New Delhi (India)Venkatesh, S.; Directorate of Maize Research, Hyderabad (India). Winter Nursery Center)Sharma, R.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Entomology)Anuradha, M.; Maize Research Center, Hyderabad (India)Kumar, R.S.; Maize Research Center, Hyderabad (India)Dass, S.; Directorate of Maize Research, New Delhi (India). Improvement of resistance level in selected maize genotypes through cycles of selection against pink borer, Sesamia inferens Walker. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v. 70(2) p. 204-206 KEYWORDS: MAIZE. SESAMIA INFERENS. GENOTYPES. PESTICIDE RESISTANCE. ZEA MAYS.

F60 Plant Physiology And Biochemistry

084. Masthanareddy, B.G.; University of Agricultural Sciences, Dharwad (India). Agricultural Research Stn.). Hebbara, M.; University of Agricultural Sciences, Dharwad (India). Agricultural Stn.). Patil, V.C.; University of Agricultural Sciences, Dharwad (India). Agricultural Stn.). Patil, S.G.; University of Agricultural Sciences, Dharwad (India). Agricultural Stn.). Nitrogen use efficiency of transplanted rice as influenced by N, P and K levels. Journal of the Indian Society of Soil Science (India). (Sep 2009) 57(3) p. 345-351 KEYWORDS: NITROGEN. RICE. TRANSPLANTATION. PHOSPHORUS.

The effect of three levels each of N (150, 200 and 250 kg ha-1), P (33, 44 and 55 kg ha-1) and K (62, 83 104 kg ha-1) on grain yield and N-use efficiency in irrigated rice was studied at Agricultural Research Station, Gangavathi, Kamataka during kharif 2000 and summer 2001. Application of 250 kg N ha-1 recorded higher N uptake (150 and 151 kg ha-1 during kharifand summer 2001, respectively) than recommended 150 kg N ha-1 (122.8 and 112.8 kg N uptake ha-1, respectively during kharif and summer). Agronomic-N-use efficiency decreased at 250 kg N ha-1 (17.5 kg grain kg-l N) as compared to150 kg N ha-1 (21.6 kg grain kg-l N) in the summer, while in kharif it was higher at 200 kg N ha-1 than 150 kg N ha-1 but decreased with further increase in N rate. Application of P up to 55 kg ha-1 in kharif and up to 44 kg ha-1 in summer recorded higher N recovery (36.2 and 40.9% in kharif and summer, respectively) and agronomic efficiency (11.0 and 20.1kg grain kg-I, N respectively during kharif and summer). Potassium at different levels ranging from 62 to 104 kg ha-1 had no significant effect on N-use efficiency. Application of 200:44:62 and 250:44:62 kg N, P and K ha-1 in kharifand summer resulted in higher grain yields than recommended practice mainly by improving N uptake.

F62 Plant Physiology – Growth and Development

085. Tripathy, S.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). S.K. Sinha Molecular Lab.). Sardar, S.S.; Orissa University of Agriculture and Technology, Bhubaneswar (India). S.K. Sinha Molecular Lab.). Mishra, P.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). S.K. Sinha Molecular Lab.). Analysis of seed storage protein pattern: a method for studying genetic variation and diversity among vigna genotypes. Indian Journal of Genetics and Plant Breeding (India). (May 2010) v.70(2) p. 140-144 KEYWORDS: SEED STORAGE. PROTEINS. GENETIC VARIATION. VIGNA RADIATA. FINGERLINGS.

A method based in protein gel electrophoresis was employed in order to improve the analysis of genetic relationships among populations of Vigna. It has been used to estimate genetic divergence among 34 improved varieties, five local land races, one wild progenitor of mungbean (Vigna sub/obata) and a land race of urdbean.ln total, 20 polypeptide bands were resolved for seed storage proteins (albumin and globulin) by SDS-PAGE. The electrophoregrams revealed 11 and nine polypeptide bands for albumin and globulin respectively that have exhibited an array of polymorphism both in quality and quantity of bands. The varieties, C. No.3 and C. No. 36 had similar protein type for albumin and globulin seed protein fraction, but differed in thickness of bands. Mayurbhanj local (an urdbean local cultivar) and TCR 213 (a wild progenitor of

mungbean) had absence of a globulin band GL9 (27.5kd) and GL8 (30.2kd) respectively, but such bands were present in all other accessions leading to serve as molecular marker(s) for their identification. Mutants of mung bean differed in polypeptide bandin'g pattern as compared to their parents indicating the mutation of genes in multigene families for seed storage protein expression. Cluster analysis revealed high genetic diversity of Keonjhar local, Pant M-5, OUM 75-1 and Mayurbhanj local(urdbean) from rest of the genotypes. The results obtained support the idea that seed storage protein analysis can be successfully applied to phylogenetic analysis of Vigna genotypes.

F63 Plant Physiology - Reproduction

086. Chaitra, T.R.; Central Coffee Research Institute, CRS, Chickmagalur (India). Sreenath, H.L.; Central Coffee Research Institute, CRS, Chickmagalur (India). Induction of high frequency somatic embryogenesis and plant regeneration from cotyledonary leaf tissues of aseptic seedlings in arabica coffee (Coffea arabica L) cv. Cauvery. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.219-222 KEYWORDS: REPRODUCTION.

H10 Pests of Plants

087. Chandramani, P.; Agricultural College and Research Institute, Madurai (India). Rajendran, R.; KVK, Sikkal (India). Sivasubramanian, P.; TNAU, Coimbatore (India). Muthiah, C; Agricultural College and Research Institute, Madurai (India). Impact of biophysical factors as influenced by organic sources of nutrients on major pests of rice. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.1-5 KEYWORDS: TRICHOMES. NUTRIENTS. PESTS. RICE. PETIOLES. FARMYARD MANURE. BIOFERTILIZERS.

Biophysical factors such as epicuticular wax,trichome density and leaf sheath thickness were analysed in the leaf sheath and laminae of plants treated with organic sources of nutrients. The results revealed that wax content and trichome density increased in plants as the age of the plant advanced. The difference in epicuticular wax content was significant among treatments. At 45 DAT, the treatments viz., FYM, biofertilizers, lignite fly ash and neem cake as basal and in splits and FYM plus neem cake as basal and in splits recorded maximum trichome density of 49.33, 49.67, 49.67 and 48.34 / cm2 leaf respectively. The same trend was also noticed on 60 DAT. On 60 DAT, the combination of FYM, biofertilizers and neem cake as basal was significantly superior in having maximum wax content (23.67 mg/g) which was on par with the combination of FYM, biofertilizers, lignite fly ash and neem cake as basal (22.00 mg / g). Treatments showed significant difference in leaf sheath thickness on 60 DAT. But the difference was not significant on 30 DAT and it varied from 0.24 to 0.35 mg/mm2 and the leaf sheath thickness was maximum in the combination of FYM, biofertilizers, lignite fly ash and neem cake in splits which recorded 0.58 mg/ mm2.

088. Prabhakumary, C.; Cashew Export Promotion Council Laboratory, Kollam (India). Technical Division. Haseena, M.; Cashew Export Promotion Council Laboratory, Kollam (India).Technical Division. Abiotic factors and packing precipices on the infestation of cashew pests. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.6-10 KEYWORDS: TRIBOLIUM CASTANEUM. INFESTATION. CASHEWS. PESTS.

A detailed study was conducted to investigate the influence of modified atmosphere packaging in cashew processing unit on the infestation of Tribolium castaneum Herbst (Coleoptera:Tenebrionidae). Initial vacuum of 600/650mm Hg and final vacuum of 200 mm Hg filled with CO2 and N2 at 400/ 450mm Hg was used to evaluate their impact on the pest infestation at 0, 7, 35 and 45 days. Simultaneously observations like water activity, clumping, moisture content and levels of CO2 and N2 were evaluated. With in the week of experimentation the flexi packages showed high water activity. Clumping of cashew kernels was also observed and clumping was positively resulted with increase in initial vacuum. Reduction of CO2 content was closely related with higher water activity. In this study flushing 250mm of CO2 is suitable for kernels after borma. The results showed that the flushing 250mm of Co2 is not suitable for kernels after slight cooling

and also indicate that cashew kernel can effectively be disinfested with high CO2 application in flexible units.

089. Chatterjee, Hirak; Palli Siksha Bhavana, Visva-Bharati, Sriniketan (India). Department of Plant Protection. Influence of moisture on the toxicity of some biopesticides on Bombyx mori L. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.11-14 KEYWORDS: RELATIVE HUMIDITY. INSECTICIDES. BIOSAFETY. BOMBYX MORI. BOMBYX. BIOPESTICIDES.

Adverse effect of moisture on some microbial insecticides such as Halt (Bacillus thuriengiensis var kurstaki, B.t.k.- 55000 S.U./mg), Biolep (B.t.k.- 32000 I.U. /mg), Vertimec (product of Streptomyces avermitilis - Avermectin- 1.8% w/v) and Bassina (formulation of Beauvaria bassiana-1 x 107 spore / ml) were studied against third instar larvae of mulberry silkworm, Bombyx mori L. under four levels of relative humidity (30%, 60%, 80% and 90% R.H.) and constant temperature (20 0C ± 2 0C). The biocide avermectin at 1000 ppm caused 96.66% and 95.00% mortality after 72 h of treatment at 80% and 90% relative humidity respectively. Whereas, halt and biolep caused 95.00%, 90.00% and 81.66%, 80.00% mortality after 72 h at the two respective humidies level. Through fungal formulation of B. bassiana proved to be less harmful against B. mori at 30% and 60% R.H. it inflicted 40 – 43.33% mortality at higher moisture level (70% R.H.). Relative humidity was found to play a major role towards pathogenecity of all the tested microbials against B. mori. Increasing mortality was recorded with increase in days after treatment and maximum effect was noticed at 80% R.H. The overall effect followed the same trend for all the microbial insecticides, and the observed descending order was Avermectin Halt biolep B. bassiana at four levels of relative humidity, respectively.

090. Murugesan, N.; TNAU, Srivilliputtur (India). Cotton Research Station. Kavitha, A.; TNAU, Srivilliputtur (India). Cotton Research Station. Seed treatment with Pseudomonas fluorescens, plant products and synthetic insecticides against the leafhopper, Amrasca devastans (Distant) in cotton. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.22-25 KEYWORDS: SEED TREATMENT. PSEUDOMONAS FLUORESCENS. PSEUDOMONAS. PLANT PRODUCTS. AMRASCA DEVASTANS. AMRASCA. COTTON.

The present investigation was conducted to evaluate Pseudomonas fluorescens and neem oil alongwith eight synthetic insecticides such as, Acephate 75 SP, Pseudomonas fluorescens, carbosulfan 25 DS, carbosulfan 25 EC, dimethoate 30 EC, ethofenprox 10 EC, imidacloprid 17.8 SL, monocrotophos 36 SL, neem oil and phosalone 35 EC as seed treatments at 10 ml or gm per kg of seeds against Amrasca devastans in cotton. In the experiment conducted at the research farm, imidacloprid, monocrotophos and P. fluorescens were found to be effective in reducing the leafhopper population by more than 50 per cent. Imidacloprid was found to be the most effective treatment recording the least population of 0.8/3 leaves and was followed by monocrotophos (1.23/3 leaves) which was on par with P. fluorescens (1.42/3 leaves). All other treatments were unable to reduce the leafhopper population by less than 50 per cent. In another On Farm Trial (OFT) conducted at Thirupanikarisalkulam, leafhopper population appeared 10 DAS and increased steadily. All the seed treatments were able to reduce the leafhopper population. Imidacloprid was found to be the most effective one recording the least mean population of leafhoppers (0.53 /3 leaves). Imidacloprid and monocrotophos were able to reduce the leafhopper population by 72.54 and 59.59 per cent respectively. Other treatments viz., acephate, P. fluorescens, phosalone, ethofenprox, dimethoate, neem oil, carbosulfan EC and carbosulfan DS resulted in less than 50 per cent reduction in leafhopper population compared to untreated check. Laboratory studies have shown that imidacloprid, monocrotophos and P. fluorescens improved germination and increased shoot length. Whereas neem oil had adverse effect on shoot length.

091. Sharma, Anurag; Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni-Solan (India). College of Horticulture, Department of Entomology and Apiculture. Gupta, Rakesh; Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni-Solan (India).

College of Horticulture, Department of Entomology and Apiculture. Biological activity of some plant extracts against Pieris brassicae (Linn.). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.26-31 KEYWORDS: PLANT EXTRACTS. PIERIS BRASSICAE. ANTIFEEDANTS. TOXIC SUBSTANCES.

In the present study, aqueous extract of eight plants, namely Azadirachta indica A. Juss, Melia azedarach Linn., Lantana camara L. Moldenke., Cannabis sativa Linn., Nerium indicum Mill., Eucalyptus sp., Ricinus communis Linn. and Solanum nigrum Linn. were tested for antifeedant and toxic effects against Pieris brassicae (Linn.). The ethanol extract of four potential plants were further tested for their biological activity against the test insects. Aqueous extract of A. indica and M. azedarach repelled maximum number of larvae protected 94.0 per cent and 89.2 per cent cabbage foliage, respectively. Aqueous extract of M. azedarach, N. indicum and A. indica showed higher mortality of larvae (19.6, 19.6 and 18.5 respectively) while R. communis was the least toxic resulting in 8.9 per cent larval mortality. In case of ethanol extract, seed extract of M. azedarach protected 58.3 per cent cabbage foliage while Eucalyptus sp. protected minimum cabbage foliage. The maximum protection to the cabbage foliage was provided at 5 per cent of M. azedarach (88.3) and A. indica (82.5). Ethanol extract of A. indica exhibited statistically higher larval mortality of 50.0 per cent and N. indicum the lowest mortality of 3.2 per cent. In general, antifeedant and larval mortality was dose dependent.

092. Yankanchi, Shivanand R.; Shivaji University, Kolhapur (India). Department of ZoologyPatil, Sachinkumar R.; Shivaji University, Kolhapur (India). Department of Zoology. Field efficacy of plant extracts on larval populations of Plutella xylostella L. and Helicoverpa armigera Hub. and their impact on cabbage infestation. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.32-36 KEYWORDS: PLANT EXTRACTS. PLUTELLA XYLOSTELLA. PLUTELLA. HELICOVERPA ARMIGERA.

The field efficacy of four plant extracts such as Vitex negundo L. (Verbenaceae), Clerodendrum inerme (L.) Gaertn. (Verbenaceae),Lantana camara L. (Verbenaceae) and Eupatorium odoratum L. (Asteraceae) were evaluated against the diamondback moth, Plutella xylostella L. and the cotton bollworm, Helicoverpa armigera Hub. larvae on cultivated cabbage. Treatments with 1% V. negundo and C. inerme extracts significantly reduced P. xylostella larval density, and the percentage of infested plants, proving to be more effective than a standard insecticide Challenger 10EC (cypermethrin). Treatment with L. camara extract (1%) reduced the percentage of H. armigera infested plants and the intensity of cabbage damage. However, the plant extracts did not effectively reduce H. armigera larval density, and cabbage damage. Phytotoxic effects on cabbage plants were not observed in any extract treatment. Two plant extracts, V. negundo and C. inerme at 1% significantly reduced the P. xylostella larval density and proved more effective than Challenger. The intensity of cabbage damaged caused by P. xylostella was significantly lower in L. camara and C. inerme than control and Challenger.

093. Patil, D.S.; G.K.G College, Kolhapur (India). Department of BotanyChavan, N.S.; Shivaji University, Kolhapur (India). Department of Botany. Bioefficacy of some botanicals against the sugarcane woolly aphid, Ceratovacuna lanigera Zehnter. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.44-47 KEYWORDS: BOTANISTS. SUGARCANE. TOXIC SUBSTANCES.

Ceratovacuna lanigera Zehnter is a serious pest of sugarcane in many parts of India including Maharashtra and Karnataka. In the light of recent increased interest in developing plant based secondary chemistry into products suitable for integrated pest management, the objective of the present study was to investigate the impact of Acacia concianna, Acorus calamus, Momordica charantia, and Annona squamosa on Ceratovacuna lanigera Zehnter under in vitro and in vivo conditions. Among the tested plants, A. concianna was found to be
more effective than other plants. Two rounds of applications of four botanicals along with control were made and the incidence of aphid (Ceratovacuna lanigera Zehnter) on sugarcane was recorded. The results indicated that C.I. mortality was concentrations and exposure time dependent one. Among the four botanicals Acacia concianna was the most

toxic botanical under laboratory condition. Similar impact was also recorded under field condition too.

094. Renuga, F. Brisca; Holy Cross College, Nagercoil (India). Department of Advanced Zoology and Biotechnology.Sahayaraj, K.; St. Xavier's College, Palayamkottai (India). Crop Protection Research Centre, Department of Advanced Zoology and Biotechnology. Influence of botanicals in total head protein of Spodoptera litura (Fab.). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.52-55 KEYWORDS: SPODOPTERA LITURA. BOTANICAL INSECTICIDES. PEST CONTROL. AGERATUM CONYZOIDES. AGERATUM. ARTEMISIA VULGARIS. ARTEMISIA.

Both Ageratum conyzoides and Ageratum vulgaris have been used to manage pest throughout the world. Spodoptera litura (Fab.) (Lepidoptera: Noctuidae) is one of the pests of field crops and has been developed resistance against most of the modern classes of synthetic pesticides worldwide. S. litura third and fifth instar larvae treated topically with 0.1ìg of A. conyzoides and A. vulgaris were found to be significantly reduce total head protein after 24, 48 and 72 hours of treatment application over control. Similar trend was also observed when these plant extracts injected at 0.01 ìl/ insect. Furthermore both A. conyzoides and A. vulgaris have similar impact on S. litura third and fourth instar larvae. These two plants can be used as botanical insecticide in pest management programme.

095. Raghavendra, M.P.; University of Mysore, Mysore (India). DOS in Botany, Herbal Drug Technology Laboratory,S. Satish; Maharani; Science College for Women, Mysore (India). Post Graduate Department of Microbiology,Raveesha, K.A.; University of Mysore, Mysore (India). DOS in Botany, Herbal Drug Technology Laboratory. Alkaloid extracts of Prosopis juliflora (Sw.) DC. (Mimosaceae) against Alternaria alternata. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.56-59 KEYWORDS: PROSOPIS JULIFLORA. ALTERNARIA ALTERNATA. ALTERNARIA. FUNGICIDES. ALKALOIDS.

The antifungal activity of aqueous, petroleum ether, benzene, chloroform, methanol and ethanol extracts and alkaloid extract of Prosopis juliflora (Sw.) DC. leaves (Mimosaceae) was evaluated for antifungal activity by poisoned food technique against Alternaria alternata a causal organism of brown spot of tobacco. Aqueous extract recorded highly significant antifungal activity at 24 concentration. Among different solvent extracts tested, methanol and ethanol extract recorded highly significant antifungal activity. Methanol extract was further subjected to fractionation guided by antifungal activity leading to the isolation of alkaloid extract, which was also recorded highly significant antifungal activity against the test fungus and the minimum inhibitory activity was recorded at 1000 ppm. The antifungal activity of alkaloid extract was compared with synthetic fungicides viz., blitox, captan, dithane M-45 and thiram at their recommended dosage of 2000 ppm indicating that the alkaloid extract was highly effective even at the dosage lesser than the synthetic fungicides.

096. Murugesan, N.; Tamil Nandu Agricultural University, Srivilliputtur (India). Cotton Research Station, Murugesh, T.; Tamil Nadu Agricultural University, Srivilliputtur (India). Cotton Research Station,. Bioefficacy of some plant products against brinjal fruit borer, Leucinodes orbonalis Guenee (Lepidoptera : Pyrallidae). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.60-63 KEYWORDS: AUBERGINES. LEUCINODES ORBONALIS. LEUCINODES. PEST INSECTS. AZADIRACHTA INDICA. AZADIRACHTA. INTEGRATED PEST MANAGEMENT.

Ten plant products were evaluated against Leucinodes orbonalis. They were Azadirachta indica A. Juss. leaf extract 5.0, Calotropis gigantea. R. Br. leaf extract 5.0, Lantana camera Linn. leaf extract 5.0, neem cake extract 5.0, neem oil 2.0, Nimbecidine @2 ml/lit, Pongamia glabra Linn. leaf extract 5.0, Prosopis juliflora Linn. leaf extract 5.0, Vitex negundo L. leaf extract 5.0 and garlic (Allium sativum Linn.) extract 5.0. The standard check, carbaryl (Sevin 50 WP) 0.1 and an untreated check were included. The plant products, neem oil, Nimbecidine, neem cake extract and C. gigantea were able to reduce the shoot damage by more than 50 percent during Kharif; Consistent effect was

observed only for neem oil (57.29) and Nimbecidine (52.67) in Rabi crop. The plant products were moderately effective compared to the standard check, carbaryl. The plant products were moderately effective against fruit damage too. Among the plant products, neem oil was the best treatment both in Kharif (60.20) and Rabi (59.91) followed by Nimbecidine (57.42). Neem cake extract (51.97) and C. gigantean (51.34) were also quite effective in Kharif crop reducing fruit damage by more than 50 percent. Botanicals are moderate in their efficacy in reducing the fruit borer damage in brinjal.

097. Malarvannan, S.; M.S. Swaminathan Research Foundation, Chennai (India). Giridharan, R.; M.S. Swaminathan Research Foundation, Chennai (India). Sekar, S.; M.S. Swaminathan Research Foundation, Chennai (India)Prabavathy, V.R.; M.S. Swaminathan Research Foundation, Chennai (India). Nair, Sudha; M.S. Swaminathan Research Foundation, Chennai (India). Ovicidal activity of crude extracts of few traditional plants against Helicoverpa armigera (Hubner) (Noctuidae:Lepidoptera). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.64-71 KEYWORDS: PESTICIDAL PROPERTIES. HELICOVERPA ARMIGERA. HELICOVERPA. PLANT EXTRACTS.

Cipadessa baccifera Miq., Melia dubia (Cav.) (Meliaceae); Clausena dentata (Rutaceae) and Dodonaea angustifolia (Sapindaceae) are common medicinal plants found in Western Ghats and are used traditionally for various purposes. The petroleum ether, chloroform, hexane, acetone and water extracts of the leaves were investigated for their ovicidal property against Helicoverpa armigera (Hubner) (Lepidoptera : Noctuidae). The different extracts of the test plants differed significantly in their efficacy. Among the four plants tested for ovicidal activity, Clausena dentata reduced the egg hatchability and proved to be highly ovicidal compared to others. Among the age of eggs, it was clear that the early stage of the eggs namely 24 h old eggs, to be highly susceptible to all the treatments.

098. Kumari, Vinod; University of Rajasthan, Jaipur (India). Department of Zoology,Singh, N. P.; University of Rajasthan, Jaipur (India). Department of Zoology,. Spodoptera litura nuclear polyhedrosis virus (NPV-S) as a component in Integrated Pest Management (IPM) of Spodoptera litura (Fab.) on cabbage. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.84-86 KEYWORDS: SPODOPTERA LITURA. BIOPESTICIDES. ENDOSULFAN. CABBAGES.

Field tests were conducted to evaluate the effect of Spodoptera litura (Fab.) nuclear polyhedrosis virus (NPVS) alone and in combination with endosulfan and neemarin (neem seed kernel extract) against S. litura in cabbage. Treatment with NPV-S (500 LE/ha) + Endosulfan (625 ml/ha) was better in reducing the larval population and increasing yield than other treatments. However, considering cost benefit ratio (CBR), treatment with endosulfan (1250 ml/ha) alone was found to be the most beneficial as compared with other treatments.

099. Namasivayam, S. Karthick Raja; Sathyabama University, Chennai (India). Department of Biotechnology,Kumar, P. Vinoth; Sathyabama University, Chennai (India). Department of Biotechnology,. Influence of growth media on pathogenicity of Metarhizium anisopliae (Metsch) Sorokin against Chilo partellus (Swinhoe). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.92-93 KEYWORDS: METARHIZIUM ANISOPLIAE. CHILO PARTELLUS. CHILO. GROWING MEDIA.

The present study was undertaken to evaluate various liquid growth media viz sabouraud dextrose, sabouraud sucrose, sabouraud maltose supplemented with yeast extract, potato dextrose and coconut water derived coniospores and blastospores on sorghum stem borer Chilo partellus (Swinhoe)Among the media, the conidia harvested from sabouraud maltose yeast extract broth (SMYB),potato dextrose broth and coconut water were found to be pathogenic to all the larval instars of C. partellus. However, blastospores derived from none of the media caused mortality.

100. Chandramani, P.; Tamil Nadu Agricultural University, Madurai (India). Agricultural College and Research Institute,Rajendran, R.; Tamil Nadu Agricultural University,

Madurai (India). Agricultural College and Research Institute,Sivasubramanian, P.; Tamil Nadu Agricultural University, Madurai (India). Agricultural College and Research Institute,Muthiah, C.; Tamil Nadu Agricultural University, Madurai (India). Agricultural College and Research Institute. Management of hoppers in rice through host nutrition – A novel approach. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.99-106 KEYWORDS: INDUCED RESISTANCE. PEST INSECTS. RICE.

Experiments were carried in pot culture and field to analyse the effect of induced resistance on hopper pests of rice.The biological traits viz.,oviposition period ,adult emergence, growth index, adult longevity were studied based on standard procedures on plants imposed with treatments including neem cake, FYM , Azospirillum, phosphobacterium, silicate solublising bacteria and lignite fly ash. The combination of FYM, three biofertilizers, lignite fly ash and neem cake applied in splits significantly reduced the incidence GLH (59.13.), WBPH (63.12.) and BPH(74.545.) as compared to NPK applied as inorganic form. There has been a significant difference existed among treatments in oviposition period of BPH and WBPH and it ranged from 5.67 to 8.70 and 5.10 to 7.00 days respectively. The nymphal period was lengthened in the treatments viz., FYM, biofertilizers and neem cake as basal and in splits and FYM, biofertilizers, lignite fly ash and neem cake as basal and in splits and it was 15.01, 15.23, 15.87 and 15.92 days respectively as against 11.74 days in NPK applied plants. Longevity of BPH and WBPH varied from 5.00 to 7.15 and 3.70 to 6.15 days respectively. The presence of higher phenol (3.5 and 2.85 mg/ g in stem and leaf), tannin (5.65 and 4.50 mg/g in stem and leaf) and silica (6.20 and 6.46 mg/g in stem and leaf) in the effective treatments imparted induced resistance through antibiosis mechanism to rice pests which was evidently proved in the biological traits tested.

101. Prasad, N.V.V.S.D.; Regional Agricultural Research Station, Guntur (India). Rao, Mallikarjuna; Regional Agricultural Research Station, Guntur (India). Rao, N. Hariprasad; Regional Agricultural Research Station, Guntur (India). Performance of Bt cotton and non Bt cotton hybrids against pest complex under unprotected conditions. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.107-110 KEYWORDS: COTTON. HELICOVERPA ARMIGERA. PECTINOPHORA GOSSYPIELLA.

A field trial was conducted at Regional Agricultural Research Station, Lam, Guntur during 2002-03 to evaluate first generation Bt hybrids released in India for reaction to pest complex of cotton under unprotected conditions. The results revealed that transgenic Bt cotton does not afford any protection to sucking pests of cotton and their tolerance or resistance is mainly dependent on the morphological or genetic base. Helicoverpa armigera incidence was completely absent in RCH 144 Bt as no square damage was recorded followed by lower incidence in RCH 2 Bt(3.3) and RCH 20 Bt(5.95) whereas non Bt versions of RCH 2(7.53), RCH 20(11.95) and RCH 144(9.0) recorded higher damage and significantly differed from their respective Bt counter parts. Pink bollworm per cent green boll damage was also lowest in Bt cotton hybrids compared to their non Bt versions.

102. Mohan, Chandrika; Central Plantation Crops Research Institute, Kayangulam (India). Regional StationRajan, P.; Central Plantation Crops Research Institute, Kayangulam (India). Regional StationNair, C.P.R.; Central Plantation Crops Research Institute, Kayangulam (India). Regional StationThomas, Sunny; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Anithakumari, P.; Central Plantation Crops Research Institute, Kayangulam (India). Regional Station. Farmer friendly production technology of the green muscardine fungus for the management of rhinocerose beetle. Indian Coconut Journal (India). (Nov 2010) v.73(7) p. 27-30 KEYWORDS: FUNGI.

103. Rasmi, A.R.; Govt. Victoria College, Palakkad (India). Dept. of Botany.Iyer, Rohini; Central Plantation Crops Research Institute, Kasaragod (India). Characterization of Phytophthora palmivora isolates inciting bud rot and nut rot in coconut. Journal of Plantation Crops (India). (Dec 2010) v. 38(3) p. 188-193 KEYWORDS: COCONUTS.

Cultural and morphological characters of 35 isolates of the Phytophthora palmivora collected from rotting bud and nut of coconut were characterized. Basically the colonies were stellate or striate type. Rate of growth in carrot agar varied significantly among the isolates. Rate of growth was fast in Pp22 and Pp23 and slow in isolate Pp14. The sporangia of all the 35 isolates were found to be caducous and were shed with short, broad and occluded pedicel. All isolates of Phytophthora collected in the present study were found to be heterothallic and were of A2 mating type which produced oospores when paired with A1 isolates. Oospore formation in all isolates was noticed only after 15 days of pairing with an A1 isolate. From the above characteristics, all the 35 isolates were confirmed as Phytophthora palmivora Butl. Maximum growth of both bud rot and nut fall isolates of P. palmivora were observed at pH 6.5 (Mean dry weight, 62.36 mg). A temperature range of 25 and 270C supported maximum growth in both nut and bud rot isolates. Among organic Nitrogen sources, glutamine showed maximum dry weight of mycelium both in case of nut fall (58.27 mg) and bud rot isolates (57.00 mg) followed by those supplemented with L-sparagine.

104. Sugandi, Rohini; University of Agricultural Sciences, Dharwad (India). Department of Agril. Entomology. Mallapur, C.P.; University of Agricultural Sciences, Dharwad (India). Department of Agril. Entomology. Management of mirid bug, Creontiades biseratense (Distant) in Bt cotton. Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p.1-5 KEYWORDS: COTTON. GOSSYPIUM HIRSUTUM. TRANSGENIC PLANTS. PEST CONTROL. MIRIDAE. HETEROPTERA.

Among the different insecticides and bio-pesticides evaluated against the mirid bug in Bt cotton under field conditions, acephate 75WP 1.0 g/l was found to be the most effective chemical. The next best treatments included profenophos 50EC 2.0 ml/l, indoxacarb 14.5SC 0.5 ml/l, buprofezin 25SC 0.5 ml/l and fipronil 5SC 1.0 ml/l whereas, the biopesticides viz., Metarhizium anisopliae 1.0 g/l, Pochonia (Verticillium) lecanii 1.0 g/l and nimbecidine 3.0 ml/l were less effective in suppressing the mirid population. The highest seed cotton yield was obtained in acephate treated plots (12.11q/ha) followed by profenophos (14.17q/ha), indoxacarb (12.88q/ha) and buprofezin (12.49q/ha). However, the highest IBC ratio of 19.80:1.00 was recorded in acephate followed by M. anisopliae (16.95:1.00) and P. lecanii (15.33:1.00).

105. Tamoghna, Saha; University of Agricultural Sciences, Dharwad (India), Department of Agricultural Entomology. Patil, R.K.; University of Agricultural Sciences, Dharwad (India). Department of Agricultural Entomology. Basavana, K.; University of Agricultural Sciences, Dharwad (India). Department of Agricultural Entomology. Shekhrappa; University of Agricultural Sciences, Dharwad (India), Department of Agricultural Entomology. Nithya, C.; University of Agricultural Sciences, Dharwad (India), Department of Agricultural Entomology. Evaluation of insecticides against Apion amplum under laboratory and field conditions. Annals of Plant Protection Sciences (India). (Mar 2011) v.19(1) p.10-14 KEYWORDS: PEST INSECTS. MUNG BEANS. FIELD EXPERIMENTATION. EVALUATION. INSECTICIDES. VIGNA RADIATA. APION. APIONIDAE.

Among the insect pests, Apion amplum has gained major importance on greengram in recent years. Adults feed on the flower buds and also make brownish discoloration on tender pods known as egg laying punctures. Grubs feed on the seeds inside the pods. Evaluation of insecticides revealed that the application of fenvalerate 0.5 ml/l was found very effective by recording cent per cent mortality compared to other insecticides after 72 hrs of observation. This insecticide was found superior in reducing mean weevil numbers, pod and seed damage to green gram and recording higher yield over other insecticides evaluated under field conditions.

106. Neelima, S.; N.G. Ranga Agricultural University, Lam, Guntur (India). Regional Agricultural Research Station. Rao, G. M. V. Prasada; N.G. Ranga Agricultural University, Lam, Guntur (India). Regional Agricultural Research Station. Chalam, M.S.V.; N.G. Ranga Agricultural University, Lam, Guntur (India). Regional Agricultural Research

Station. Grace, A.D.G.; N.G. Ranga Agricultural University, Lam, Guntur (India). Regional Agricultural Research Station. Bio-efficacy of ecofriendly products against cotton leafhopper, Amrasca devastans (Dist.). Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p. 15-19 KEYWORDS: LEAF EATING INSECTS. COTTON. GOSSYPIUM. EVALUATION. VERTICILLIUM LECANII. METARHIZIUM ANISOPLIAE. AMRASCA DEVASTANS.

Field trial was conducted to evaluate the bio-efficacy of Pochonia (Verticillium) lecanii (9x109 cfu/g) 2500g/ha, Metarhizium anisopliae (9 x 109 cfu/g) 2500 g/ha, Beauveria bassiana (9 x 109 cfu/g) 2500 g/ha, Panchagavya 5%, cowdung–urine extract 10%, green chilli-garlic extract 10%, neem oil 5% and fipronil 5% SC 50 g a.i./ha against, Amrasca devastans. Among different treatments fipronil 5% SC 50g a.i/ha was effective in bringing down the population of leafhoppers up to 72.3% over control at 14 days after spraying. About 20% reduction of leafhopper population over control was observed with green-chilli garlic extract and neem oil. Per cent reduction in leafhopper population was less with bio-control agents viz., V. lecanii 2500 g/ha (11.0), M. anisopliae 2500 g/ha (12.3), B. bassiana 2500 g/ha 2500 g/ha (14.9). Other organic compounds like Panchagavya 5%, cow dung-urine extract 10% were ineffective in managing the leafhopper population on cotton.

107. Mandal ;P.; India Meteorological Department, New Alipore, Kolkata (India). Roy, K.; B.C.K.V., Nadia (India). AICRP on Plant Parasitic Nematodes.Saha, G.; B.C.K.V., Nadia (India). Department of Agril. Meteorology & Physics. Weather based prediction model of Scirpophaga incertulas (Walk.). Annals of Plant Protection Sciences (India). (Mar 2011) v.19(1) p.20-24 KEYWORDS: SCIRPOPHAGA INCERTULAS. FORECASTING. MODELS. STATISTICAL METHODS. WEATHER.

An attempt was made to develop a forewarning system for rice yellow stem borer, Scirpophaga incertulas infestation and outbreaks using pheromone traps containing (Z) 11-hexadecenal and (Z) 9-hexadecenal at 3:1. Field infestation of S. incertulas was evaluated based on % occurrence of dead hearts and white ears. Each weather variable was assigned weightage based on their relative importance to stem borer initiation and spread. The economic threshold level of stem borer can be determined in terms of % occurrence of dead hearts and white ears or pheromone trap catches of moth to decide the timing of insecticide application. Pheromone trap catches was used to forewarn regarding their outbreaks on which a linear regression equation was developed for predicting insect infestation in advance. Based on three years data, the catching of moth in trap was commenced as early as 32 standard week (2nd week of August) with its peak during 37 standard week while incidence of dead heart started at 34 standard week (4th week of August) and reached the peak at 38 standard week (3rd week of September). Accumulated growing degree days (AGDD) and accumulated helio thermal unit (AHTU) were ranged from 921.9–1203.1^{o}C & 1659.1–1967.8^{o}C and 5044.7–6539.9 & 8080.4–9180.8, respectively during initiation and peak period of moth catching. Damage by the was severe at a range of 1203.1–1967.8^{o}C AGDD and 6539.9–9180.8 AHTU.

108. Ali, Shamshad; N.D.U.A.T., Faizabad (India). Department of Entomology. Kumar, Rakesh; N.D.U.A.T., Faizabad (India). Department of Entomology. Kumar, Satendra; SVBPU&T, Meerut (India). Efficacy of bio-pesticides against Helicoverpa armigera, Hübner in Tomato. Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p. 29-32 KEYWORDS: HELICOVERPA ARMIGERA. LYCOPERSICON ESCULENTUM. TOMATOES. BIOPESTICIDES. EFFICIENCY. TESTING.

A field trial was conducted at three farmer's fields to study the role of bio-agents in management of tomato fruit borer. NPV with chick pea flour 1% + Jaggery 0.5% significantly reduced the larval population of Helicoverpa (93.1%), lowest fruit damage (6.9%) and higher yield (112.02 q/ha) was obtained over the control. In the treatment of NPV mixed with sandovit 0.2%, the population reduction (63.8%), lowest fruit damage (12.6%) and maximum fruit yield (118.21 q/ha) was obtained. Endosulfan 35 EC.07 was most effective for the reduction of population (79.6%), minimum fruit

damage (12.4%) and maximum fruit yield (176.4 q/ha) followed by ha NPV50 LE+0.035% endosulfan 35 EC.

109. Vishwa Nath; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. Sinha, S.R.; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. IPM in Okra through neonicotinoids, insecticides and their mixtures. Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p. 33-36 KEYWORDS: PEST CONTROL. INTEGRATED PEST MANAGEMENT. OKRAS. ABELMOSCHUS ESCULENTUS. AMRASCA BIGUTTULA. BEMISIA TABACI. EARIAS VITTELLA.

Field trial on okra cv. Arka Anamika was conducted with six treatments and a control. Two foliar sprays were conducted one was of neonicotinoids viz., thiamethoxam 5g a.i./ha in first four treatments while it was of acetamiprid 0g a.i./ha in other two treatments. In second spray, two dosages of each insecticide viz., triazophos (350 & 700g a.i./ha), deltamethrin (10 & 20g a.i./ha) and their registered mixtures, triazophos Deltamethrin (360 & 720g a.i./ha) were assessed against various insect pests of okra. Results revealed that neonicotinoids were very effective against leafhopper, Amrasca biguttula biguttula and whitefly, Bemisia tabaci in all treatments during first spray. All treatments were effective against leafhoppers and whiteflies during II spray except treatments with low dose of triazophos (350g a.i./ha) and deltamethrin (10g a.i./ha), which were not effective against whiteflies. As far as infestation due to shoot and fruit borer, Earias vittella was concerned, the damage in various treatments ranged from 2.4–14.2% compared to 27.3% in untreated check.

110. Kumar, Amit; N.D. Univ. of Agri. & Tech., Kumarganj, Faizabad (India). Department of Entomology. Lal, M.N.; N.D. Univ. of Agri. & Tech., Faizabad (India). Department of Entomology. Prasad, C.S.; S.V.P.U.A. & T, Meerut (India). Effect of treatments on yield and economics of Paddycultivation against yellow stem borer, Scirpophaga incertulas (Walker). Annals of Plant Protection Sciences (India). (Mar 2011) v.19(1) p. 37-40 KEYWORDS: PEST CONTROL. ORYZA SATIVA. SCIRPOPHAGA INCERTULAS. CROP YIELD. INSECTICIDES.

Based on effectiveness of treatments in reducing the incidence of Scirpophaga incertulas, Carbofuran, betacyfluthrin, chlorpyriphos and biolep were found most effective as these treatments registered comparatively low incidence of S. incertulas. The release of bio-agent, Trichogramma chilonis was also found effective in reducing the incidence of S. incertulas, which was observed to be superior over the treatments viz., nimbecidine, neemarin and halt. The maximum mean grain yield was obtained in plots treated with carbofuran (26.01 q/ha) followed by betacyfluthirn (24.24 q/ha) and chlorpyriphos (23.21 q/ha). The maximum return in terms of cost: benefit ratio was obtained from plots treated with betacyfluthrin followed by T. chilonis.

111. Singh, S.P.; Directorate of Rapeseed-Mustard Research, Bharatpur (India). Sachan, G.C.; G.B.P. Univ. of Agri. & Tech., Pantnagar (India). College of Agriculture. Department of Entomology. Singh, S.P.; N.C.I.P.M., New Delhi (India). Age specific survival/mortality and fertility life table studies of mustard sawfly Athalia proxima Klug. on crucifers. Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p.41-46 KEYWORDS: PEST CONTROL. BRASSICA CAMPESTRIS. ATHALIA. AGE. SURVIVAL. MORTALITY. FERTILITY. LIFE TABLES. BRASSICACEAE. BRASSICA. SPECIES.

The age specific survival/mortality and fertility of the female mustard sawfly, Athalia proxima was evaluated in laboratory on five crucifers namely, Brassica rapa var. toria, Brassica rapa var. yellow sarson, Brassica juncea, Raphanus sativus and Brassica napus. The survivorship (1x) of mustard sawfly declined gradually up to first 7 days on all five host plants due to egg mortality. Thereafter, 1x reduced sharply from 8 to 10 days on all test plants due to mortality among the early instars. Further, a gradual fall in 1x between 20 to 28, 21 to 29, 21 to 31, 20 to 29 and 23 to 34 days was recorded on various host plants i.e. B. rapa var. toria, B. rapa var. yellow sarson, B. juncea, R. sativus and B. napus, respectively, due to death of pupae. Later 1x reduced sharply on

39, 33, 38, 33 and 39 days on these plants, respectively, due to death of the adults. The potential fecundity was maximum on toria while minimum on B. napus. Net reproductive rate (Ro), intrinsic rate of increase, finite rate of increase and annual rate of increase (ARI) were found to be higher in case of B. rapa var. toria and lowest in B. napus.

112. Selvaraj, S.; T.N.A.U., Coimbatore (India). Centre for Plant Protection Studies. D., T.N.A.U., Coimbatore (India). Centre for Plant Protection Studies. Ramesh, V.; Pandit J.L.N. College of Agricultural and Research Institute, Karaikal (India). Department of Agril. Entomology. Population dynamics of leafhopper, Amrasca devastans Distant in Cotton and its relationship with weather parameters. Annals of Plant Protection Sciences (India). (Mar 2011) v. 19(1) p. 47-50 KEYWORDS: PEST CONTROL. GOSSYPIUM. GOSSYPIUM HIRSUTUM. AMRASCA DEVASTANS. POPULATION DYNAMICS. WEATHER.

Field trial was conducted to determine the effect of ecological factors on the incidence and development of leafhopper, Amrasca devastans at five different dates of sowing on three varieties of cotton. The pest population was started from third week of February on third weeks old crop and acquired its peak in second week of March on six weeks old crop. Maximum pest population (9.30/3 leaves) was build up at temperature ranged from 210 to 310 C, relative humidity ranges from 82 and 55%, zero rainfall, wind velocity 4.5 km/hr, total sunshine hours (9.00 hrs/week), evaporation (56.10 mm) and dewfall (1.491 mm). The highest incidence of leafhopper population was recorded in cv. MCU 7 followed by SPCH 22 and SVPR 3. Leafhopper population was build up showed a significant and positive correlation with morning and evening relative humidity and rainfall whereas, it was significant and negative association with minimum temperature, wind velocity and dewfall. The determination of effects of different weather factors on population of leafhoppers in cotton was essential for effective pest management.

H20 Plant Diseases

113. Bhat, M. Narayana; Central Potato Research Institute Campus, Meerut (India). Singh, B.P.; Central Potato Research Institute Campus, Meerut (India). Arora, R.K.; Central Potato Research Station, Ludhiana (India). Rai ;R.P.; Central Potato Research Station, Bihar (India). Garg, I.D.; Central Potato Research Institute, Shimla (India). Trehan, S.P.; Central Potato Research Station, Ludhiana (India). Assessment of crop losses in potato due to late blight disease during 2006–2007. Potato Journal (India). (Jue 2010) v.37(1-2) p.37-43 KEYWORDS: CROP LOSSES. POTATOES. BLIGHT. PHYTOPHTHORA INFESTANS. PHYTOPHTHORA.

Late blight caused by Phytophthora infestans attacked potato crop early in the season during 2006–07 in the states of Punjab, Haryana, Uttar Pradesh, Maharashtra, Bihar, West Bengal and Karnataka. Almost entire potato crop in the state of Punjab was affected to a varying extent whereas in other parts of the country, the disease was reported from specific regions. In Punjab, Hoshiapur district was most affected (36. loss) followed by Kapurthala (27% loss), Jalandhar and Patiala (24% loss each). The total cumulative loss in the state was 349,860 t. In the case of Haryana, overall decline in production by 8.8% was recorded resulting in crop loss of 40,260 t. In Uttar Pradesh, out of 18 districts, losses were highest in JP Nagar (56.1%) followed by Rampur (31.2%) and Bijnor (29.6%). The major potato producing districts comprising Kanpur Dehat, Kannauj and Farukhabad recorded minimal crop loss (upto 1.1%). The overall crop loss in the state was estimated at 3.91 lakh t. Rabi crop in Maharashtra state was most affected in the districts of Pune and Satara. Highest crop loss was recorded in variety Atlantic (68.3-72.3%) while minimal (5.1–9.3%) in Kufri Jyoti and Kufri Pukhraj. In Bihar, crop loss was highest in Katihar and Purnea (50% each) which was followed by West Champaran district (40%). Overall crop loss in the state was estimated at 4.95 lakh tons. In West Bengal, Howrah, Burdwan and Hooghly districts were worst affected (33.3% each) with overall loss of 28.04 lakh tons in the state. In Karnataka, Hasan (48.3%) was worst affected followed by Chikmagalore (44.3%) and Belgaum (25.3%) with overall loss of 2.82 lakh t. Cumulative loss in the country due to late blight was estimated at 43.91 lakh tons.

114. Bhat, M. Narayana ; Central Potato Research Institute Campus, Meerut (India). Singh, B.P.; Central Potato Research Institute Campus, Meerut (India). Singh, P.H.; Central Potato Research Institute, Shimla (India). Impact of using metalaxyl based fungicides against late blight of Potato. Potato Journal (India). (Jue 2010) v.37(1-2) p.71-72 KEYWORDS: METALAXYL. FUNGICIDES. BLIGHT. POTATOES.

115. Daivasikamani, S.; Central Coffee Research Institute, Chikmagalur (India). Coffee Research Station. Rajanaika; Kuvempu University, Shimoga (India). Department of Applied Botany. Effect of some abiotic factors on germination of urediospore of the coffee leaf rust fungus, Hemileia vastatrix (Berkeley & Broome). Journal of Biopesticides (India). (Jun 2009) v.2(1) p.15-17 KEYWORDS: TEMPERATURE. RELATIVE HUMIDITY. GERMINATION. HEMILEIA VASTATRIX. HEMILEIA. RUSTS.

The influence of abiotic factors viz., temperature and relative humidity on the germination of urediospore of Hemileia vastatrix Berkeley & Broome, the coffee leaf rust pathogen was assessed under in-vitro conditions. The laboratory study was carried out to find the percentage germination of urediospores at different temperatures of 18, 20, 22, 24 and 26^{o}C and at various relative humidity (RH) levels of 50, 60, 70, 80 and 90%. The results indicated that maximum germination of urediospore of the coffee rust fungus was observed at 24^{o}C (48.60%) and 70% relative humidity (40.80%). The percentage germination of urediospore was affected when the temperature was decreased to 18^{o}C (33.00%) and also increased to 26^{o}C (36.20%). Spore germination was reduced to 31.60% at 50% relative humidity and 26.40% at 90% relative humidity levels set for the experiment.

116. Reddy, C. Raja Gopal; Dravidian University, Kuppam (India). School of Herbal Studies & Naturo Sciences. Department of Biotechnology. Nirmala, R.S.; Dravidian University, Kuppam (India). School of Herbal Studies & Naturo Sciences. Department of Biotechnology. Ramanamma, C.H.; N.S.P.R. Govt. Degree College for Women, Hindupur (India). Efficacy of phytoextracts and oils of certain medicinal plants against Cercospora moricola Cooke., incitant of mulberry (Morus alba L.) leaf spot. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.77-83 KEYWORDS: MORUS. CERCOSPORA. PLANT OILS. DRUG PLANTS. SPOTS. PATHOGENICITY.

Certain phytoextracts and plant oils were treated in vitro for their antifungal efficacy against the growth of Cercospora moricola Cooke, the incitant of leaf spot of Mulberry (Morus alba L.). Highest mycelial growth inhibition (72.59%) was recorded in Eucalyptus globules with 10% concentration. The next best plant extracts are, Oscimum sanctum (49.08%), Phyllanthus emblica (46.75%), Aloe barbedensis (45.75%), Allium sativum L. (41.08%) and Azadirachta indica (35.25%). Plant oils viz., Madhuca indica oil (3%) Cymbopogon citratus oil (0.05%) and neem oil (3%) also inhibited the mycelial growth of the fungus with 75.73%, 73.22% and 24.44% respectively, when compared to control. All the tested phytoextracts showed more or less inhibitory effect on mycelial growth on dry weight basis. Growth inhibition ranged from 49.24% to 60.12%. Significantly, the highest inhibition was recorded in Eucalyptus globules (10%) with 60.12% followed by Aloe barbedensis (57.37%), Oscimum sanctum (56.40%), Phyllanthus emblica (54.26%), Allium sativum L.(51.68%) and Azadirachta indica (50.81%). In case of oils, neem oil (3%) showed highest per cent inhibition (40.44%), when compared to Madhuca indica oil (3%) with 40.23% and Cymbopogon citratus (0.05%) with 30.62%.

117. Daivasikamani, S.; Central Coffee Research Institute, Chikmagalur (India). Coffee Research Station. Rajanaika; Kuvempu University, Shimoga (India). Department of Applied Botany. Biological control of coffee leaf rust pathogen, Hemileia vastatrix Berkeley and Broome using Bacillus subtilis and Pseudomonas fluorescens. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.94-98 KEYWORDS: HEMILEIA VASTATRIX. ARABICA COFFEE. MICROBIAL PESTICIDES. RUSTS.

Bacterial antagonists isolated from coffee rhizosphere soils were evaluated at different concentrations alone and in combination against Hemileia vastatrix, the causal organism of leaf rust disease of coffee under *in vitro* and *in vivo* conditions. Under *in vitro* conditions, the rhizobacterium, Bacillus subtilis inhibited the growth of urediospores to an extent of 68.20% at a test dosage of 1x109 cfu ml^{-1} followed by Pseudomonas fluorescens to an extent of 64.50% at the same test dose. Combination of P. fluorescens and B. subtilis at 1x108 cfu ml^{-1} inhibited the growth of urediospores of the CLR pathogen to an extent of 61.46%. The natural inhibition of germination in the check treatment was 37.79%. Among fungicides used for comparison, the per cent inhibition over control was maximum in Bayleton (89.03%) followed by Bordeaux mixture (80.64%). Under *in vivo* conditions, during the period of season-I, maximum reduction in disease index was recorded in treatment with Bayleton (71.84%) followed by Bordeaux mixture (53.37%). Among the bioagents, B. subtilis recorded maximum disease reduction (42.98%) at a test dosage of 1x109 cfu ml^{-1} followed by P. fluorescens (33.65%) at the same test dose. P. fluorescens and B. subtilis in combination at 1x108 cfu ml^{-1} reduced the disease incidence to an extent of 26.45%. The season-II (post-monsoon period) has recorded less disease reduction compared to season-I (pre-monsoon period).

118. Vimala, R.; Tamilnadu Agricultural University, Srivilliputtur (India). Cotton Research Station. Suriachandraselvan, M.; Tamilnadu Agricultural University, Srivilliputtur (India). Cotton Research Station. Induced resistance in bhendi against powdery mildew by foliar application of salicylic acid. Journal of Biopesticides (India). (Jun 2009) v.2(1) p.111-114 KEYWORDS: SALICYLIC ACIDS. INDUCED RESISTANCE. MILDEWS. ERYSIPHE CICHORACEARUM. ERYSIPHE.

The effect of salicylic acid in inducing systemic resistance in bhendi against powdery mildew caused by Erysiphe cichoracearum DC was investigated by the application of salicylic acid (1mM) to induce production of defense related enzymes and chemicals in plants when it was applied as pre-inoculation, post-inoculation, salicylic acid alone, pathogen alone and water control. The results revealed that earlier and increased activities of phenyl alanine ammonia lyase, was observed in salicylic acid pretreated bhendi plants challenge inoculated with E. cichoracearum. Higher accumulation of phenolics was also noticed in plants pretreated with salicylic acid and able to enhance the resistance against invasion of E. cichoracearum in bhendi.

119. Rasmi, A.R.; Govt. Victoria College, Palakkad (india). Dept. of Botany.Iyer, Rohini; Central Plantation Crops Research Institute, Kasaragod (India). Bud rot disease of coconut: An overview. Indian Coconut Journal (India). (Feb 2010) v. 72(10) p. 7-13 KEYWORDS: COCONUTS. PLANT PATHOLOGY. PHYTOPHTHORA.

120. Rasmi, A.R.; Govt. Victoria College, Palakkad (india). Dept. of Botany.Iyer, Rohini; Central Plantation Crops Research Institute, Kasaragod (India). Ret. Head, Crop Protection. Investigations on the Bud rot disease of coconut caused by Phytophthora palmivora Butl. in Northern Kerala. Indian Coconut Journal (India). (Mar 2010) v. 72(11) p. 6-8 KEYWORDS: PHYTOPHTHORA PALMIVORA. ROTS.

121. Rasmi, A.R.; Govt. Victoria College, Palakkad (india). Dept. of Botany. Soumya, E. Nisha, K. A study on the stem bleeding disease of coconut in Palakkad district of Kerala. Indian Coconut Journal (India). (Nov 2010) v. 73(7) p. 31-35 KEYWORDS: COCONUTS. PLANT PATHOLOGY. PATHOGENS.

Stem bleeding incidence was high in Eruthempathi, Vadakarapathi, Kozizijampara, Nallepalli, Perumatti, Pattanclreri and Ozhalapathi areas of Palakkad district. On close observation, it was noticed that the number of palms with stem bleeding incidence was higher in the plots with waterlogged condition compared to other plots. Stem bleeding incidence was found to be high in palms below the age of 20 years. Percentage of palm mortality was high in the case of palms belonging to the age group of 15 20 years in all places surveyed. Disease index

calculated for quantifying the disease incidence showed that the attack is moderate with disease index between 2.39 and 8.01. The palms with more disease index showed low yield. Testing of the soil from stem bleeding affected gardens revealed that all the palms showing the stem bleeding incidence have high content of P and K. Most of the healthy and the stem bleeding affected palms in the disease prone areas have lot of growth cracks on the stem. The pathogen enters through these growth cracks or wounds. The growth cracks may develop after sudden heavy manuring, thrash burning at the: base of the palm or injury made during tractor ploughing etc. cause damage to the palms paving way for infection. Isolation of the causal organism from stem bleeding samples yielded 11 Thielaviopsis paradoxa isolates. Conidia of these isolates were hyaline, cylindrical, apex and base truncate, and thin walled, 7.73 - 5.07 x 3.02 - 4.22 pm formed enterogenously. Chlamydosprores thick walled, brown in chain of4-6, remained intact for long time and resembled as multiseptate conidia and ranged from 12.64-7.61x5.6-3.2 p.m.

122. Rasmi, A.R.; Central Plantation Crops Research Institute, Kasaragod (India). Crop Protection. Iyer, Rohini; Central Plantation Crops Research Institute, Kasaragod (India). Crop Protection. Effect of plant extracts on Phytophthora almivora causing bud rot disease of coconut. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.231-234 KEYWORDS: DISEASE CONTROL.

J10 Handling, Transport, Storage and Protecion of Agricultural Products

123. Prasanth Kumar, P.K.; Central Food Technological Research Institute, Mysore (India). Department of Lipid Science and Traditional Foods. Bhatnagar, A.S.; Central Food Technological Research Institute, Mysore (India). Department of Lipid Science and Traditional Foods. Indira, T.N.; Central Food Technological Research Institute, Mysore (India). Dept. of Protein Chemistry and Technology. Indiramma, A.R.; Central Food Technological Research Institute, Mysore (India). Dept. of Food Packaging Technology. Gopala Krishna, A.G.; Central Food Technological Research Institute, Mysore (India). Department of Lipid Science and Traditional Foods. Storage stability of packed coconut oil blends with other vegetable oils. Indian Coconut Journal (India). (Jun 2010) v.73(2) p.7- 14 KEYWORDS: COCONUT OIL. PLANT OILS. STORAGE.

Evaluation of storage stability of packed coconut oil blends with other vegetable oils with regard to packaging material, storage period, and storage condition was conducted. The blends of coconut oil (CNO) were prepared with sunflower oil, rice bran oil, safflower oil, groundnut oil, sesame oil and palm oil. The blends were packed in pouches of two different packing materials (nylon based and foil laminate) and stored at two different temperatures and relative humidity conditions (27°C/65%RH and 38°C/90%RH) for 120 days. Colour, peroxide value (PV), free fatty acid value (FFA) and moisture content of the blends were analyzed at regular intervals to monitor bleaching of colour, oxidation,' hydrolysis and moisture pick-Up during storage. Initial values of CNO blends for colour (2.3-16.6 Lovibond units), PV(1.03-2.98 meqO/Kg), FFA (0.08-2.1%) and moisture content (0.016-0.039%) changed during storage. The study showed that the blends packed in nylon based co-extruded film and stored at 27°C/65%RH and 38°C/90%RH recorded higher PV (32.1 and 117.9 meqO/Kg), FFA (1.56 and 1.85%) and moisture content (0.071-0.186%) respectively, than the blends packed in foil laminated packing material. The foil laminated packing material provided greater protection to the CNO blends stored at 27°C/65% RH and 38°C/90% RH against oxidation (4.33 and 6.03 meqO/Kg), hydrolysis (1.53 and 1.51%) and moisture pick-up (0.034 and 0.037%) respectively. Oxidation, hydrolysis and moisture pick-up was more rapid for the packed blends stored at 38°C/90%RH. The observed results indicated that foil laminated packing material and storage condition of 27°C/65%RH provided excellent storage stability to packed coconut oil blends.

N02 Farm Layout

124. Aravindakshan, M.; Amrita Vishwa Vidyapeetham University, Coimbatore (India). Centre for Environmental studies. Precision farming and its relevance in Coconut. Indian Coconut Journal (India). (Dec 2010) v.73(8) p.12-14 KEYWORDS: FARMING SYSTEMS.

P10 Water Resources and Management

125. Bandyopadhyay, K.K.; Central Institute for Cotton Research, Coimbatore (India). Regional Station). Ghosh, P.K.; Indian Institute of Soil Science, Bhopal (India). Haiti, K.M.; Indian Institute of Soil Science, Bhopal (India). Misra, A.K.; Indian Institute of Soil Science, Bhopal (India). Efficient utilization of limited available water in wheat through proper irrigation scheduling and integrated nutrient management under different cropping systems in vertisol. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.121-128 KEYWORDS: CROPPING SYSTEMS. IRRIGATION SCHEDULING. WHEATS. WATER AVAILABILITY. VERTISOLS.

Limited availability of irrigation water is one of the major constraints for higher productivity of wheat in Vertisols of central India. There is a need for efficient utilization of the limited water through improving the water use efficiency of wheat. A field experiment was undertaken to study root growth, yield and water use efficiency of wheat grown on a deep Vertisol under soybean-wheat, soybean+sorghum-wheat and sorghum-wheat cropping systems with two irrigation schedules i.e. 0.8 and 0.6 IW/CPE and six different nutrient management strategies. The results showed that yield and water use efficiency of wheat under soybean-wheat and soybean+sorghum-wheat system were more than the sorghum-wheat system because of better root growth and higher soil water extraction in the former cropping systems. The root length density of wheat was significantly correlated with the soil water extraction (R2=0.32*), grain yield (R2=0.84**) and water use efficiency (R2=0.79**) of wheat. Irrigation at 0.8 IW/CPE significantly improved the soil water extraction, root length density and grain yield of wheat over irrigation at 0.6 IW/CPE. Integrated use of 75% NPK and farmyard manure 5 Mg ha^{-1} or poultry manure 1.5 Mg ha^{-1} or phosphocompost 5 Mg ha^{-1} to rainy season crops and 75% NPK to wheat significantly improved the root length density, yield and water use efficiency of wheat over application of 100% NPK to both the crops leading to a saving of 25% fertilizer NPK in both the seasons.

P30 Soil Science and Management

126. Natarajan, C.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Subramanian, P.S.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Mohandas, S.; Tamil Nadu Agricultural University, Veppankulam (India). Coconut Reasearch Station. Intercropping system in coconut for East Coast region of Tamil Nadu. Indian Coconut Journal (India). (Jul 2010) v.73(3) p.7-11 KEYWORDS: INTERCROPPING. BACTERIA.

127. Suseela, P.; College of Agriculture, Vellanikkara (India). Water Management Research Unit. Best Management Practice for moisture conservaion in coconut garden. Indian Coconut Journal (India). (Jul 2010) v.73(3) p.12-14 KEYWORDS: MOISTURE CONTENT. SOIL WATER CONTENT.

128. Arora, S.; Central Soil Salinity Research Institute, Bharuch (India). Regional Research Stn.). Chahal, D.S.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils). Boron desorption kinetics in inceptisols representing benchmark soils of Punjab. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.145-153 KEYWORDS: BORON. PUNJAB. SOIL. DIFFUSION. DESORPTION.

Boron (B) desorption is one of the most important factors in deciding the efficiency of B fertilization and its management in intensively cultivated soils. A study was conducted in benchmark soils of Punjab to ascertain the rate of B release in relation to soil properties. Four mathematical models viz. Integrated second approximation rate

equation, Elovich, power function and parabolic diffusion were used to describe B desorption kinetics. The total desorbable B was higher in coarse textured soils as compared to the fine textured soils of Punjab. Maximum desorbable B of 13.36 mg kg^{-1} soil was in Tulewal, while minimum of 9.04 mg kg^{-1} in Chamror soil series. The integrated rate equation indicated two types of pseudo-first order reactions in B desorption from soils and the rate coefficients from both sites were positively and significantly correlated with organic carbon content (r=0.82** and r=0.76**) while these had negative association with soil pH (r=-0.69* and r=-0.74**) and clay content (r=0.67*). The power function and Elovich kinetic equations were found to be successful in describing B desorption data in all the soils. The Parabolic diffusion kinetic model could not describe the B desorption satisfactorily in all the soils. The total desorbable B was negatively correlated with clay content (r=-0.93**), CEC (r=-0.84**) and organic carbon (r=-0.65*) while it was positively associated with sand content (r=0.75*). Soil pH, EC, organic carbon, $CaCo_3$, clay content and CEC together explained 97% of variation in Elovich desorption rate coefficient and 96 and 92% variation in rate constants of power function and parabolic diffusion model.

129. Kabat, B.; Central Rice Research Institute, Cuttack (India). Panda, D.; Central Rice Research Institute, Cuttack (India). Nitrogen release characteristics of controlled release N fertilizers and their effect on yield and N nutrition of rice in alluvial and laterite soils. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.154-160 KEYWORDS: YIELDS. NITROGEN. FERTILIZERS. UREA. ALLUVIAL SOILS. FERRALSOLS.

Cumulative N release from four grades of controlled release N (CRN) fertilizer was studied in a laboratory incubation experiment using alluvial and laterite soils both at 60% water holding capacity (WHC) and waterlogged condition maintained at 30°C. The functional relationship between cumulative release of N from CRN fertilizers and the time of their incubation in soil at varying water regimes was quadratic in nature. A linear relationship was also established between these two variables by their natural log transformation. From these established relationships, the patterns of N release fr6m CRN fertilizers were predicted to synchronize N supply from the polymer coated urea (PCU) fertilizers with the N demand patterns of rice varieties. The controlled release fertilizer CRN-6C exhibited smaller initial release but subsequent faster release than CRN-2D. The cumulative N release gradually increased with time of soil-fertilizer interaction and reached 80% of total N content after 41-78, 29-52, 44-81 and 29-50 days of incubation in CRN-IC, CRN-3C, CRN-6C and CRN-2D, respectively, depending upon the type of soil and moisture regimes. In a green house experiment on alluvial and laterite soils, basal application of CRN fertilizers like CRN-IC and CRN-3C along with prilled urea (PU) at 3:1 ratio was as efficient as conventional split application of PU in terms of grain yield and N uptake pattern of rice (cv. IR-36). In on-farm trials on improvement of N use efficiency in direct sown rice (cv. Durga) grown on alluvial soil under unfavourable rainfed lowland conditions of Cuttack district of Orissa, basal furrow placement of CRN-6C+PU at 3:1 proportion registered 25% higher grain yield and larger N use efficiency (25 kg grain kg^{-1} N added) than the conventional practice of basal broadcasting of PU (14 kg grain kg^{-1} N added).

130. Sharma, S.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science), Verma, T.S.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science). Chander, G.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science). Effect of long-term lantana addition on soil phosphorus fractions and their relationship with crop yield and phosphorus uptake in rice-wheat cropping in North West Himalayan acid alfisol. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.161-166 KEYWORDS: ACIDS. LANTANA. PHOSPHORUS. CROPPING SYSTEMS. HIMALAYAN REGION. ORGANIC SOILS.

A long-term field experiment with rice-wheat cropping was started in wet season of 1988 with four levels of lantana (0, 10, 20 and 30 t ha^{-1} on fresh weight basis) and

three tillage practices (No puddling, puddling and soil compaction). From wet season of 1997, however, three tillage practices were replaced with three levels of N and K to rice (33, 66 and 100% of recommended) and 66% of recommended N, P and K to wheat. The P was totally omitted to rice crop. The recommended N and K to rice were 90 and 40 kg ha^{-1} whereas N, P and K to wheat were 120, 90 and 30 kg ha^{-1}. Lantana biomass was added to rice exactly 10-15 days before transplanting, puddling every year. Among P fractions, the highest increase was observed in $NaHCo_3$-Po (35-71%) followed by NaOH-Po (19-49%) and minimum in Res-P (8-17%) with twelve annual additions of lantana. The continuous twelve annual additions of lantana also increased available P by about 23-71% over no lantana addition. It was observed that among different P fractions $NaHCo_3$-P_1 and $NaHCo_3$-Po were the most important P fractions contributing to nutrition of rice and wheat grown in a sequence. All the organic and inorganic fractions of P except Res-P and HCl-P were independent of one another.

131. Desai, R.M.; Navsari Agricultural University, Navsari (India). Dept. of Soil Science). Patel, G.G.; Navsari Agricultural University, Navsari (India). Dept. of Soil Science). Patel, T.D.; Navsari Agricultural University, Navsari (India). National Agricultural Research Project). Das, A.; Navsari Agricultural University, Navsari (India). Dept. of Soil Science). Effect of integrated nutrient supply on yield, nutrient uptake and soil properties in rice-rice crop sequence on a vertic haplustepts of South Gujarat. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.172-177 KEYWORDS: YIELDS. SOIL. NUTRIENT UPTAKE. GUJARAT. CHEMICOPHYSICAL PROPERTIES.

A field experiment was conducted with rice-rice cropping sequence for seven consecutive years (from 1999 to 2006) on a Verti-Haplustepts. Twelve treatments comprised of 50 to 100% of recommended dose of fertilizer (RDF) to both kharif and summer crops applied alone and in combination with P solubilizing bacteria (PSB), crop residues, FYM, or pressmud or with biocompost. In one treatment N, P and K were applied as per soil test value to both the crops. The treatment receiving N, P and K, as per soil test yielded at par with treatments of RDF, RDN and 50% P with PSB to both the crops, RDF+ crop residues 5 t ha^{-1} to both the crops and RDF + 50 kg K ha^{-1} to both the crops. The treatments receiving organics along with inorganic sources showed lower values. The effect of different treatments was significant on the uptake of N, P, K, Zn and Fe and was maximum in either RDF + 50 kg K ha^{-1} to both the crops (kharif and summer) or N, P, K as per soil test to both the crops, remaining at par with RDF to both the crops and RDN + 50% RDP+PSB to both crops. Application of PSB was effective when applied with inorganic P, while application of organic manures did not show significance on uptake. The only S uptake varied significantly during summer. At the end of 71h crop sequence, soil quality status improved upon initial status with indication of significantly lower bulk density, higher organic carbon, available N, P and K, heat soluble Sand DTPA-extractable Fe and Zn and water stable aggregates (1.0 mm) in the treatments receiving either of the organics in combination with inorganic fertilizers. Though inorganic fertilizer showed its superiority with respect to sequential (kharif+summer) higher rice yield, from soil health sustainability point of view integrated nutrient system performed better than inorganic fertilizers.

132. Singh, A.K.; National Bureau of Soil Survey and Land Use Planning, Udaipur (India). Regional Centre). Singh, R.P.; National Bureau of Soil Survey and Land Use Planning, Udaipur (India). Regional Centre). Mustard yield prediction based on soil site characters in Udaipur, Rajasthan. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.196-201 KEYWORDS: MUSTARD. YIELDS. SOIL. IRRIGATION. RAJASTHAN.

The study was conducted to evaluate production potential of mustard crop in soils of Udaipur district of Rajasthan, representing 4.2 Agro-ecological Sub-region. The yield was monitored at farmers' fields consecutively for three years viz., 2004, 2005 and 2006. Multivariate regression model was developed to relate mustard crop yield with a set of independent variables such as soil depth, texture, slope, AWC, irrigation and agronomic management. These variables together governed 99% variability in mustard

yield. The yield was predicted for the years 2005 and 2006. The predicted mustard yield ranged from 450 to 1550 kg ha^{-1} in shallow <50 cm) sandy loam soils on gently sloping land having low AWC under low (37.5 kg N+15 kg P_20_5+ no weeding + low/high plant population), medium (75 kg N+30 Kg P_20_5+ one weeding + optimum plant population) and high agronomic management (150 kg N+60 P_20_5+ 2 weedings + optimum plant population). One to three irrigations were provided in all the three conditions. Regression equation predicted 1120 to 1776 kg ha^{-1} mustard yield in moderately shallow (50 to 75 cm) sandy loam to loamy soils on very gently sloping land, having medium AWC under the similar set of agro-management. In the similar set of management, mustard yield increased to 2900-3000 kg ha^{-1} in very deep (100 cm) clay loam/clayey soils on nearly leveled plain with high AWC. The relationship between the observed and predicted yield was highly significant (r=0.99).

133. Kushwaha, A.K.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry). Singh, S.; Institute of Agricultural Sciences, Varanasi (India). Dept. of Soil Science and Agricultural Chemistry). Available nutrients and response of lentil (Lense esculenta) to boron application in rainfed upland soils of Ranchi. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.219-222 KEYWORDS: BORON. NUTRIENTS. LENTILS. SOIL. RAINFED FARMING. LENTIBULARIACEAE.

134. Dhir, R.P.; 498, Defence Colony, Kamla Nehru Nagar, Jodhpur (India). Tandon, S.K.; University of Delhi (India). Dept. of Geology). Singhvi, A.K.; Physical Research Laboratory, Ahmedabad (India). Kar, A.; Central Arid Zone Research Institute, Jodhpur (India). Sareen, B.K.; Geological Survey of India, Jaipur (India). Western Region). Soil profile modification, gtenesis, chronology and paleo-environmental interpretations from paleosols in a multi-episode aeolian section in Western Rajasthan. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.225-236 KEYWORDS: SOIL GENESIS. GEOLOGY. EARTH SCIENCES. RAJASTHAN. SOIL SCIENCES.

A 12 meter deep section in the dune-sandy plain terrain of western part of Thar desert was investigated for aggradation history, paleoenvironment and diagenesis. Based on optical luminescence dating, this study extends the record of aeolian dynamism in the Thar Desert to -160 ka with successive sand aggradations at 100-90, 60, 27 and 17-13 ka. The aggradation episodes were separated by marked breaks, mostly of 30-40 ka duration. Only a part of this experienced stability, pedogenesis and calcrete development and suggested climate amelioration. From the form of calcrete and the likely time for its formation, the duration of climate amelioration phase could be of the order of 10 ka for chalky and 15-20 ka for the hard nodule calcretes. Truncated calcrete profiles provided evidenc of denudation prior to subsequent aeolian aggradation. These, besides the dynamism related to physiographic position, add further complexity in interpretation and it is quite possible that occasional episode is missed out. Nodule form is characteristic feature of calcretes. Chalky nodules reflect an early stage in the formation of hard, dense nodules that also involve some dissolution and re-precipitation of calcite mass. The process was accompanied by degradation of host. minerals and formation of palygorskite even in these rather young calcretes. The b13C values of calcretes lie in a narrow range and are typical of a C4 vegetation ecosystem. The b18Q values of calcrete are typical of those from slightly to moderately evaporated monsoon-sourced water.

135. Bhaskar, B.P.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Baruah, U.; National Bureau of Soil Survey and Land Use Planning, Jorhat (India). Regional Centre). Vadivelu, S.; National Bureau of Soil Survey and Land Use Planning, Bangalore (India). Regional Centre). Raja, P.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Sarkar, D.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Pedogenesis in some subqaueous soil of Brahmaputra valley of Assam. Journal of the Indian Society of Soil Science (India). (Sep

2009) v.57(3) p.237-244 KEYWORDS: SOIL CLASSIFICATION. ASSAM. SOIL MORPHOLOGICAL FEATURES.

Soils developed in the low lying areas of floodplain (bils) beyond natural levees were examined near Nimatighat and Kakilamukh of Brahmaputra valley in Assam to infer pedogenesis with respect to landscape position. The bil environs in the valley have channel bars in the midst of Brahmaputra river, swamps adjoining to the southern bank and flood plains over bils. These soils exhibit light grey to light brownish grey matrix, yellowish brown to reddish distinct mottles with high chroma and abrupt variations in texture. These soils are slightly acid to slightly alkaline with irregular distribution of organic carbon, calcium carbonate, total and pedogenic iron. The mass balance of pedogenic iron showed considerable gain in the soils of floodplain but losses in soils of bils. The dominant pedogenic processes identified include sedimentary laminations, ferrolysis, development of acidity and weak structural development in B horizons. The soil morphology exhibits intensely expressed site-specific redoximorphic features related to degree of saturation. The pattern of iron distribution expressed through diagnostic redoximorphic features has been found to be an ideal tool to delineate wetlands. These soils were classified upto subgroup level as Typic Fluvaquents (Kakilamukhghat, Barchala bil and Baraligaon), Aeric Fluvaquents (Gohaingaon) and Typic Endoaquepts (Dangari biZ and Rangadaijan).

136. Deka, B.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science. Baruah, T.C.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science. Dutta, M.; Assam Agricultural University, Guwahati (India). Krishi Vigyan Kendra. Karmakar, R.M.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science. Landscape-soil relationships and pedogenic evaluation of soils in Ghiladhari watershed of the Brahmaputra valley of Assam. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.245-252 KEYWORDS: WATERSHEDS. LANDSCAPE. ASSAM. EVALUATION. SOIL SCIENCES.

Geomorphology plays a major role in regulating the process that dictates the distribution of soils on the geomorphic units. The relationship between landscape and soil was studied in the Ghiladhari watershed of the Northern Brahmaputra valley of Assam. Image interpretation of IRS-l C data led to the recognition of six different landscape units in the studied area which include structural hill (SH), upper piedmont plain (UPP), lower piedmont plain (LPP), upper alluvial plain (UAP), lower alluvial plain (LAP) and old flood plain (OFP). Soils from unstable geomorphic surfaces viz. shoulders showed A-C profiles, while soils developed on other relatively stable geomorphic surfaces had well developed A-Bw-C profile development. Topography along with nature of parent material and time was found to be responsible for the pedogenic differences in the soils developed on different landscapes. Field morphology rating system using relative horizon distinctness (RHD) and relative profile development (RPD) rating values were used to assess the pedological evaluation of the soils. Based on the RHD and RPD values, the studied soils could be arranged as: LAPUAPOFPLPPUPPSH. The study established a well defined relationship between geomorphic surfaces and development of soils. Concatenation of soils on these landform units was the result of surface and subsurface movement of materials.

137. Patil, N.G.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Prasad, J.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Srivastava, R.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Dhale, S.A.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Estimation of water retention characteristics of shrink-swell soils using pedotransfer functions. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.273-279. KEYWORDS: SOIL WATER CONTENT. HYGROSCOPICITY.

The shrink-swell soils under orchards (irrigated) over a long period develop unique hydraulic characteristics. As a case study, water retention characteristics of sweet orange growing soils were analyzed to define their analytical behaviour so that simulations can be made for projecting changes. Soil water retained (9) at seven varied

matric potentials(h) namely 33, 50, 75, 100,400, 800, 1500 kPa was measured in the laboratory and seven water retention functions proposed by different researchers were fitted to the laboratory measured data. It was also observed that the h-9 relationship proposed by van Genuchten (VG) fitted better for these soils. Pedotransfer function (PTF) 'Rosetta' (computer code) was used to predict VG parameters from basic soil data. The parameters estimate suggested that the soils were unique in hydraulic behaviour. It was observed that the residual soil-water content and saturated soil-water content were lower in magnitude as compared to 'the class values. The estimates of VG parameters were used to predict soil-water retention at varied suction pressure(s). Observed and predicted values of soil-water retention were compared to evaluate the performance of Rosetta. The coefficient of determination (R2 0.88) values suggested that it could predict soil-water retention in lower suction range with relatively greater accuracy. Comparatively better predictions were obtained with basic data on texture, bulk density and field capacity as an input.

138. Das, D.K.; AD-115 C, Shalimar Bagh, New Delhi (India). Bandyopadhyay, S.; Indian Space Research Organization, Bangalore (India). Chakraborty, D.; Indian Agricultural Research Institute, New Delhi (India). Div. of Agricultural Physics. Srivastava, R.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Application of modern techniques in characterization and management of soil and water resources. Journal of the Indian Society of Soil Science (India). (Dec 2009) v. 57(4) p. 445-460 KEYWORDS: SOIL. WATER RESOURCES. MODERNIZATION. MANAGEMENT.

P32 Soil Classification and Genesis

139. Leelavathi, G.P.; Acharya N.G. Ranga Agricultural University, Tirupati (India). Dept. of Soil Science and Agricultural Chemistry. Naidu, M.V.S.; Acharya N.G. Ranga Agricultural University, Tirupati (India). Dept. of Soil Science and Agricultural Chemistry. Ramavatharam, N.; Acharya N.G. Ranga Agricultural University, Tirupati (India). Dept. of Soil Science and Agricultural Chemistry. Sagar, G.K. Acharya N.G. Ranga Agricultural University, Tirupati (India). Dept. of Soil Science and Agricultural Chemistry. Studies on genesis, classification and evaluation of soils for sustainable land use planning in Yerpedu Mandal of Chittoor district, Andhra Pradesh. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.109-120 KEYWORDS: SOIL CLASSIFICATION. LAND EVALUATION. SOIL GENESIS. ANDHRA PRADESH. LAND MANAGEMENT.

Seven typical pedons representing major land forms (uplands and plains) of Yerpedu Mandal in Chittoor district of Andhra Pradesh developed from granite-gneiss and alluvium parent materials under varying land uses were studied for their morphological characteristics, physical and physico-chemical properties. The soils were slightly acidic to moderately alkaline (pH-6.5 to 8.9) in reaction, non-saline, deep to very deep in depth and have iso-hyperthermic temperature and usitc soil moisture regimes. Texture, organic carbon, CEC and base saturation ranged from loamy sand to sandy clay loam in surface whereas sandy to clay in sub-surface; 0.5 to 4.4 g kg-I, 8.80 to 30.67 cmol(p+)kg-l; and 37.73 to 88.06%, respectively. Soils were low to medium in available nitrogen and phosphorus, low to high in available potassium and sufficient in sulphur. The DTPA-extractable iron (Fe) was deficient whereas Cu and Mn were sufficient. However, the DTPA-Zn was sufficient in surface soils while deficient in sub-surface soils. The soils on very gently sloping (1-3%) topography exhibited the development of argillic horizon (Bt) whereas the soils on nearly level (0-1%) lands had cambic horizon (Bw). However, the Entisol pedons did not show presence of any diagnostic horizon. Soils were classified as Ultic Haplustafs, Fluventic Haplustepts, Typic Ustipsamments and Typic Ustifluvents. All the soils of the study area fall under agricultural land with land capability classes ranging from II to IV. Further, the lands have limitations of slope and erosion. On the basis of major soil constraints, suitable land use plan for Yerpedu MandaI was suggested for sustainable management.

140. Kumar, M.; Central Arid Zone Research Institute, Jodhpur (India). Div. of Natural Resources and Environment. Singh, S.K.; National Bureau of Soil Survey and Land Use Planning, Kolkata (India). Regional Centre. Sharma, B.K.; 17-E, 229 CHB, Jodhpur (India). Characterization, classification and evaluation of soils of Churu district, Rajasthan. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.253-261 KEYWORDS: EVALUATION. LAND USE. SOIL SCIENCES. RAJASTHAN. ARID SOILS.

Soils of Churu were characterized, classified and mapped on 1:50,000 scale. The results showed that the soils of aeolian plains (93.9% area of Churn) were very deep, somewhat excessively drained, loamy sand to fine sand, single grained, moderately alkaline and were mapped as association of normal, moderately and highly hummocky phase of Molasar, Modasar and Dune complex series. Chirai series with its hummocky phase were the other soils of aeolian plains. These were moderately deep, well drained, fine sand to loamy sand, single grained at the surface, loamy sand to sandy loam in the subsurface with fine to medium weak subangular blocky structure on lime-rich substratum. Devas series, occurring as association of shallow and moderately deep phase, had sandy mantle on lime sedi.ment rich in silica nodules. Soils of alluvial plains (6.1% of the district) were sandy loam, occasionally silty loam with medium moderate sub-angular blocky structure and were mapped as association of Masitawali, Saroopdesar and Naurangpura series. An excessive drainage and higher sand content restricted pedological manifestations in soils of aeolian plains, while the distance from the source of alluvia and load of overburden sand governed pedality in soils of alluvial plains. Molasar, Modasar, Devas and Dune complex were classified as Typic Torripsamments, while Naurangpura series as Typic Torrifluvents subgroups of Entisol soil order. Chirai series was classified as Typic Haplocalmbids, while Masitawali and Saroopdesar were placed in Fluventic Haplocambids subgroups of Aridisol soil order. Land suitability evaluation of these soils is described for arid agriculture and other alternate land uses.

141. Bhattacharyya, T.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Ray, S.K.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Pal, D.K.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Chandran, P.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Mandal, C.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Wani, S.P.; International Crop Research Institute for Semi Arid Tropics, Patancheru (India). Soil carbon stocks in India- issues and priorities. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.461-468 KEYWORDS: SOIL CLASSIFICATION. CARBON.

P33 Soil Chemistry and Physics

142. Naidu, L.G.K.; National Bureau of Soil Survey and Land Use Planning, Bangalore (India). Regional Centre. Srinivas, S.; National Bureau of Soil Survey and Land Use Planning, Bangalore (India). Regional Centre. Kumar, S.C.R.; National Bureau of Soil Survey and Land Use Planning, Bangalore (India). Regional Centre. Characterizing soil and climatic constraints for sustainable forest development in Karnataka using remote sensing and geographic information system. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.101-108 KEYWORDS: REMOTE SENSING. KARNATAKA. REMOTE SENSING. FORESTATION. GEOGRAPHICAL INFORMATION SYSTEMS.

The soil and land use cover maps were digitized and overlaid to critically evaluate the soil-site parameters for the growth and development of different forest types in Karnataka. Soil-site conditions supporting evergreen/semi-evergreen, moist dry deciduous and scrub/degraded forests are quantified. Soil depth and length of dry period have been found to be two important parameters influencing the kind of forest vegetation. Potential areas for new plantations in the existing forest sites are identified based on the soil depth and length of dry period.

143. Chand, T.; Chaudhary Charan Singh Haryana Agricultural University, Hisar (India). Dept. of Soil Science. Tomar, N.K.; Chaudhary Charan Singh Haryana Agricultural University, Hisar (India). Dept. of Soil Science. Phosphate adsorption of some acid soils in relation to their properties. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.129-136 KEYWORDS: PHOSPHATES. ADSORPTION. ACID SOILS. SOIL CHEMICOPHYSICAL PROPERTIES.

Effect of soil properties on phosphate adsorption was examined on 14 surface (0-0.15 m) soil samples of Eutric Dystrochrepts and Mollic Udorthents from hilly area of Haryana; Typic Haplequolls, Aquic Hapludolls of U.P.; Typic Hapludalfs, Typic Haplustalfs, Typic Paleohumelts of H.P.; and unclassed soils of Assam. The samples of each soil were equilibrated for 24 hrs at 25.2°C with aqueous solution of KHZP04 containing (0-500g P mL-l) in a 1:20::soil:solution ratio. The amount of P adsorbed increased and distribution coefficient (Kd) and percentage of added phosphate adsorbed (Xad) decreased with increasing solution P concentration. Phosphate adsorption was satisfactorily described by the two surface Langmuir (RZ = 0.97-0.99, P=0.01) and Freundlich equations (RZ=0.97- 0.99, P=0.01). The values of bz (adsorption maxima of lower energy sites) were 2.82 to 8.78 folds as compared to bJ (adsorption maxima of higher energy sites); whereas the values of kj (bonding energy constants of higher energy sites) were 4.58 to 51.99 folds of kz (bonding energy constants of lower energy sites). The contribution of high and low energy sites to total adsorption maxima ranged from 10.23 to 26.18% and 73.82 to 89.77%, respectively. Inverse relationship was observed between adsorption maxima and bonding energy constants. The pH was correlated negatively and significantly with constants of Langmuir (bl bz, kJ) and Freundlich-K, while non-significantly with kz and n. The AI was correlated positively and significantly with bJ, kJ, kz and Fr undlich-K but non-significantly with bz and n. The Al + Fe were correlated non-significantly with bz, kJ, kz, K and n, while significantly with b1. The Fe and clay had non-significant correlations with all the constants of Langmuir and Freundlich equations. However, when the effect of individual property (e.g. AI, Fe) was compared for soils, not varying in other soil properties, it was found to be highly marked. The multiple regression equations revealed that soil properties (pH, EC, OC, CaC03, CEC, clay, AI, Fe and available P) jointly accounted for 73.80% variation in b1, 64.30% in bz, 73.0% in kJ. 43.0% in kz, 85.30% for Freundlich-K and 26.40% for n in these soils.

144. Wani, M.A.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir (India). Div. of Soil Science. Kinetics of non-exchangeable potassium release from some soils and their separates of lesser Himalayas of India. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.137-144 KEYWORDS: POTASSIUM. INDIA. HIMALAYAN REGION. SOIL. OXALIC ACID.

The dynamics of non-exchangeable potassium (NEK) in 10 soils and their separates from different altitude zones of Kashmir valley was studied by successive extraction with 0.1 IM oxalic acid over a period of 200h. The amount of NEK released after 200h in whole soil, clay, silt and sand fractions ranged from 95.2 to 106.9, 152.1 to 161.9,28.9 to 32.0 and 48.4 to 52.7 mg kg^{-1}, in the soils of high altitude zone, 92.8 to 95.9, 147.0 to 158.0,28.1 to 30.8 and 47.2 to 52.7 mg kg^{-1}, respectively, in the soils of mid-altitude zone and 67.1 to 74.9, 79.2 to 103.4, 26.9 to 28.9 and 46.0 to 51.1 mg kg^{-1}, respectively, in the soils of low-altitude zone. Based on high coefficient of determination (R2) and higher values of standard error of estimate (SE), the first order, zero order and power function equations could not describe the NEK release kinetics. In contrast, Elovich and parabolic diffusion law described the data satisfactorily, indicating diffusion-controlled exchange. Rate constant variations in whole soil were attributed to differences in particle size distribution and in clay fraction, and to the type and extent of clay minerals. The data indicated that the equilibrium had not reached even after 200h of extraction with O.OIM oxalic acid.

145. Chand, T.; Chaudhary Charan Singh Haryana Agricultural University, Hisar (India). Dept. of Soil Science. Tomar, N.K.; Chaudhary Charan Singh Haryana Agricultural University, Hisar (India). Dept. of Soil Science. Phosphate adsorption behaviour of the soils of North-West India. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.291-299 KEYWORDS: ADSORPTION. PHOSPHATES. INDIA. SOIL.

Laboratory investigation was carried out to study the phosphate adsorption behavior on seventeen non-calcareous soils belonging to Camborthids, Torripsamments, Haplustepts, Hapludolls of different agro-climatic zones of north-west India. The samples of each soil were equilibrated for 24 hrs at 25.2°C with aqueous solution of KHZP04 containing (0-500 Kg P mL^{-1}) in a 1:20 soil:solution ratio. The amount of P adsorbed increased and distribution coefficient (Kd) and percentage of added phosphate adsorbed (Xad) decreased with increase in solution P concentration. Phosphate adsorption was satisfactorily described by the two surface Langmuir equation (Rz=0.94-0.99, P=0.01) and Freundlich equation (RZ=0.98-0.99, P=0.01). The values of bz (adsorption maxima of lower energy sites) were 1.41 to 11.11 folds higher than bl (adsorption maxima of higher energy sites); whereas the values of kl (bonding energy constants of higher energy sites) were 0.96 to 41.52 folds higher than those of kz (bonding energy constants of lower energy sites). The contribution of high and low energy sites to total adsorption maxima ranged from 8.25 to 41.47 and 58.53 to 91.75%, respectively. Inverse relationship was observed between adsorption maxima and bonding energy constants. The adsorption maxima of region-I (bl) was positively and significantly correlated with organic carbon (r=0.64**), clay (r=0.74**), and CEC (r=0.56*) and adsorption maxima of region-II (bz) was positively and significantly correlated with clay (r=0.81**), CEC (r=0.59*), exchangeable AI (r=0.53*) and exchangeable Fe (r=0.58*) content. Individually, none of the soil properties were significantly correlated with bonding energy constants (kl, kz) of Langmuir and K and n of Freundlich equations except CEC. The CEC had significant negative correlation (r=-0.49*) with n. The stepwise multiple regression equations revealed that soil properties (pH, EC, OC, CEC, clay, AI, Fe, and available P) jointly contributed for 77.3% variation in bl, 91.8% in bz, 27.7% in kl, 27.2% in kz, 66.5% in K, and 76.4% in n in these soils.

146. Singh, V.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Environmental Sciences). Agrawal, H.P.; Banaras Hindu University, Varanasi (India). Dept. of Soil Science and Agricultural Chemistry). Prasad, S.; Indian Agricultural Research Institute, New Delhi (India). Div. of Environmental Sciences). Distribution of DTPA-extractable micronutrients in the soils of district Ghazipur, Uttar Pradesh. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.370-372 KEYWORDS: CHEMICOPHYSICAL PROPERTIES. WHEATS. RICE. UTTAR PRADESH. SOIL. TRACE ELEMENTS.

147. Parmar, D.K.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Hill Agriculture Research and Extension Centre). Integrated nutrient management for sustainable production and profitability of off-season vegetables in cold arid region of Kinnaur, Himachal Pradesh. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.378-381 KEYWORDS: VEGETABLES. SUSTAINABILITY. PROFITABILITY. NUTRIENT AVAILABILITY. COLD STORAGE. HIMACHAL PRADESH.

148. Patel, G.G.A.; Navsari Agricultural University, Navsari (India). Dept. of Soil Science). Das, A.; Navsari Agricultural University, Navsari (India). Dept. of Soil Science). Chemical composition of pressmud and biocompost in relation to their use as organic manures and possible effect on soils. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.382-384 KEYWORDS:ORGANIC FERTILIZERS. CHEMICOPHYSICAL PROPERTIES. ORGANIC COMPOUNDS. SOIL. ORGANIC FERTILIZERS.

149. Maurya, B.R.; Banaras Hindu University, Varanasi (India). Dept. of Soil Science and Agricultural Chemistry). Ram, H.; Banaras Hindu University, Varanasi (India). Dept. of Soil Science and Agricultural Chemistry. Prasad, S.S.; Banaras Hindu University,

Varanasi (India). Dept. of Soil Science and Agricultural Chemistry). Impact of soil amendments on properties of the salt affected rice soil. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.385-388 KEYWORDS: SOIL AMENDMENTS. SALT TOLERANCE. RICE.

150. Dhanorkar, B.A.; National Bureau of Soil survey and Land use planning, Bangalore (India). Naidu, L.G.K.; National Bureau of Soil survey and Land use planning, Bangalore (India). Ananathanarayana, R.; Gandhi Krishi Vigyan Kendra, Bangalore (India). Soil and land characteristics of rubber (Hevea brasiliensis) growing tracts of Karnataka and their suitability for rubber cultivation. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.201-206 KEYWORDS: RUBBER. HEVEA BRASILIENSIS. SOIL.

Eight pedon locations representing different rubber growing tracts of Karnataka were selected to study variations in soil, climate and productivity of plantations (latex yield). These pedons were analysed to study their physical and chemical properties. Leaf nutrient status was also determined from same site. Rubber growing soils of Dakshina Kannada and Udupi district were grouped under order Ultisols and classified as Ustic Kandihumults, Rhodic Kandiustults and Typic Kandiustults. Soils from Kodagu district were grouped under order Inceptisols and classified as Oxic Dystrustepts. All the pedon sites studied are moderately acidic with pH ranging from 5.1 to 5.9. The organic carbon content varied from 3.7 to 24.8 g/ kg-1. The surface layers in general recorded higher amount of organic carbon. The cation exchange capacity varied from 2.2 to 9.9 cmol(P+) kg-1. Exchangeable Ca, Mg, K and Na are very low and are present in the following order Ca Mg K Na. Available nitrogen status was medium whereas available phosphorous in general was low. Available potassium dominantly was low. Sulphur status was adequate to high. The leaves of rubber plantations were low in N and K. P content was low to medium in range. Magnesium and calcium content was medium to high. Micronutrients like Fe, Cu, Mn, and Zn were adequate.

P34 Soil Biology

151. Singh, B.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Singh, S.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Singh, J.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Kumar, A.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Singh, S.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Tikkoo, A.; Chaudhary Charan Singh Haryana Agricultural University, Bawal (India). Regional Research Station). Response of Indian mustard (Brassica juncea L.) to nitrogen and phosphorus with and without gypsum in sodic soils irrigated with sodic water. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.178-182 KEYWORDS: BRASSICA JUNCEA. NITROGEN. PHOSPHORUS. GYPSUM. SOIL.

Effect of nitrogen and phosphorus fertilizer levels and gypsum was studied on the yield of Indian mustard (Brassica juncea L.) grown in sodic soil irrigated with sodic water. Treatments comprised of combination of two levels of gypsum viz. no gypsum (Go) and gypsum application (G100) based on 100% gypsum requirement of irrigation water and three levels of N (80, 100 and 120 kg N ha-1) as main plots. The sub-plot treatments consisted of three levels of P (30, 37.5 and 45 kg P_2O_5 ha-1). Indian mustard responded significantly upto 125% of the recommended dose of NP (100 kg N + 37.5 kg P_2O_5 ha-1) with gypsum application and up to 150% of the RD of NP (120 kg N + 45 kg P_2O_5 ha-1) without gypsum under sodic soil and water condjtions. Indian mustard required 25 and 50% higher doses of N P under sodic soil and water conditions with and without gypsum application, respectively as compared to normal soil and water conditions for achieving optimum economical yield under semi-arid climatic conditions of the south-western part of Haryana. Gypsum application also improved chemical properties of the soil in terms of marginal decrease in pH, exchangeable sodium

percentage, maintenance of organic carbon content and build up of available P status of the soil.

152. Masthanareddy, B.G.; University of Agricultural Sciences, Dharwad (India). Agricultural Research Station). Hebbara, M.; University of Agricultural Sciences, Dharwad (India). Agricultural Research Station). Patil, V.C.; University of Agricultural Sciences, Dharwad (India). Agricultural Research Station). Patil, S.G.; University of Agricultural Sciences, Dharwad (India). Agricultural Research Station). Response of transplanted rice to levels, splits and timing of NPK application. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.183-190 KEYWORDS: LEACHING. RICE. TIMING. AMMONIA. NPK FERTILIZERS.

The effect of two levels (150:33:62 and 250:55:104 kg N, P and K ha^{-1}), two types of splits (N splits and NPK splits) and four timings and proportion of NPK application: 50% at transplanting (TR), 25% each at active tillering (AT) and panicle initiation(PI) (Ti), 33% each at TR, AT and PI (Tz), 25% each at TR, AT, PI and panicle emergence (PE) (T3) and 25% each at TR, AT, PI and 12.5% each at PE and beginning of grain filling stage (BGF) (T4) on losses, uptake and use efficiency of N in transplanted rice (Oryza sativa L.) was studied at Agricultural Research Station, Gangavathi, Kamataka during kharif 2000 and summer 2001. Ammonia volatilization losses accounted for less than 7% of the applied N. Application of 250:55:104 kg N, P and K ha-1 recorded higher ammonia loss (9.71 and 9.19 kg N ha-1, during kharif and summer, respectively) than recommended level of 150:33:62 kg N, P and K ha-1 (7.69 and 7.45 kg N ha-1, respectively). However, split and timing of NPK application had no significant effect on total ammonia losses. The leaching losses of N ranged from 3.6 to 7.0% of applied N. The losses were significantly higher at 250:55:104 kg N, P and K ha-1 (12.92 and 10.83 kg N ha-1 during kharif and summer, respectively) than the recommended dose. Leaching losses were more under NPK splits than N splits. Split application of NPK upto beginning of grain filling stage for long duration rice cultivars in kharif and upto panicle emergence stage for medium duration rice cultivars in summer improved the recovery efficiency of N and resulted in higher N uptake and grain yield.

153. Saikia, A.J.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Patgiri, D.K.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Deka, P.K.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Effect of liming materials on water retention and transmission charactestistics in soils of Upper Brahamputra valley of Assam. Journal of the Indian Society of Soil Science (India). (Jun 2009) v.57(2) p.202-204 KEYWORDS: LIMING. ASSAM. TRANSMISSIONS. HYGROSCOPICITY.

154. Bansal, O.P.; D.S. College, Aligarh (India). Chemistry Dept.). Adsorption and desorption of carbamate pesticides by montmorillonite and humic acid-clay complexes. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.287-290 KEYWORDS: ADSORPTION. DESORPTION. CARBAMATES. PESTICIDES. HUMIC ACIDS.

In this study adsorption and desorption of three carbamate pesticides namely, oxamyl (I); S-Ethyl-N-(methyl carbamoyl) oxythioacetimidate (II); and N-Phenyl (ethyl carbamoyl) propylcarbamate (III) by Na+-, Ca2+- montmorillonite, and humic acid-montomorillonite, was investigated. The adsorption of pesticides was in the order III I II; adsorption for Na-montmorillonite was more than that for Ca-saturated clay. The presence of humic acid enhanced the pesticide adsorption. A composite model for estimating pesticide adsorption, which assumes mineral and organic matter functioning individually as adsorbent phases, predicted sorption within a factor of 0.75-1.4. The desorption data indicated that humic acid retains more pesticide than the clay mineral. The XRD patterns showed that humic acid is restricted to the external surfaces of clay tactoids, denoting that clay mineral fractions in soils including those with organic coatings play an important role in the retention of polar carbamate pesticides.

155. Talukdar, M.C.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Basamatary, A.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Dutta, S.K.; Assam Agricultural University, Jorhat (India). Dept. of Soil Science). Status of DTPA-extractable cationic micronutrients in soils under rice and sugarcane ecosystems of Golaghat district in Assam. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.313-316 KEYWORDS: TRACE ELEMENTS. SOIL. RICE. SUGARCANE. ASSAM.

The DTPA extractable cationic micronutrients and their relationship with some important soil physicochemical properties were investigated in two agro-ecosystems of Golaghat district of Assam. Considering the critical limits of soil micronutrients, all the soil associations were adequately supplied with DTPA extractable micronutrients. Higher amounts of DTPA-extractable cationic micronutrients were noticed under rice land use system as compared to sugarcane land use system. Irrespective of land use, the DTPA extractable cationic micronutrients were positively correlated with organic carbon content and CEC. However, all micronutrients recorded significant negative correlation with soil pH. The DTPA-Cu content of the soil under sugarcane land use exhibited a significant positive correlation with DTPA-Zn and Mn (r=0.432* and 0.505*, respectively).

156. Rao, D.L.N.; Indian Institute of Soil Science, Bhopal (India). Patra, A.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Soil microbial diversity and sustainable agriculture. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.513-530 KEYWORDS: BIODEGRADATION.

157. Singh, B.; Punjab Agricultural University, Ludhiana (India). Singh, J.P.; Chaudhary Charan Singh Haryana Agricultural University, Hisar (India). Dept. of Soil Science. Nitrogen-A continuing enigma. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.531-535 KEYWORDS: NITROGEN CONTENT. NITROGEN FERTILIZERS.

P35 Soil Fertility

158. Singh, R.; Central Soil Salinity Research Institute, Karnal (India). Singh, Y.P.; Central Soil Salinity Research Institute, Lucknow (India). Regional Research Station. Yaduvanshi, N.P.S.; Central Soil Salinity Research Institute, Karnal (India). Sharma, D.K.; Central Soil Salinity Research Institute, Lucknow (India). Regional Research Station. Effect of irrigation scheduling and integrated nutrient management on yield of rice-wheat system and properties of a reclaimed sodic soil. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.280-286 KEYWORDS: NUTRIENT AVAILABILITY. SODIC SOILS. RICE. WHEATS. IRRIGATION. INTEGRATED CONTROL.

A field experiment was conducted at the Central Soil Salinity Research Institute Regional Research Station, Lucknow during 1999-2002. Effect of irrigation scheduling and integrated use of organic manure and inorganic fertilizers for maximizing yields of rice-wheat cropping system in the sodic soils was studied. Grain yield of rice was significantly higher under continuous submergence over the irrigation at 4 days after disappearance of pounded water (DADPW). However, the grain yield with 2-DADPW was at par with continuous submergence. The growth and yield of rice were significantly higher under 100% NPK+green manure dhaincha (Sesbania aculeata) followed by 100% NPK+10t sulphitation pressmud cake (SPMC) ha^{-1} in comparison to other treatments under continuous submergence and 2-DADPW. Irrigation amounting to 57.5 cm at 2-DADPW saved 24% of water over the continuous submergence without reducing the grain yield. Growth and yield of wheat were significantly higher with the application of 100% NPK with residual effect of green manure followed by SPMC in comparison to other treatments. Wheat yield was higher with 4 irrigations applied at critical root initiation (CRI), tillering (T), jointing (J) and milking (M) stages as compared to 3 irrigations at CRI, T and M stages. Integrated use of inorganic fertilizers and organic manures reduced soil pH from initial 10.2 to 9.0 in 0-15 cm soil layer. Organic carbon content (2.6 g kg^{-1})

and infiltration rate of (1.5 mm h^{-1}) were higher in case of 100% NPK + green manuring.

159. Sood, A.; Punjab Remote Sensing Centre, Ludhiana (India). Sharma, P.K.; Punjab Remote Sensing Centre, Ludhiana (India). Tur, N.S.; Punjab Remote Sensing Centre, Ludhiana (India). Nayyar, V.K.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils. Micronutrient status and their spatial variability in soils of Muktsar district of Punjab-A GIS approach. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.300-306 KEYWORDS: GEOGRAPHICAL INFORMATION SYSTEM. TRACE ELEMENTS. GLOBAL POSITIONING SYSTEMS. PUNJAB.

A systematic set of geo-referenced samples was collected from the Muktsar district covering the entire area using GPS (global positioning system) and the maps showing the spatial variability of individual micronutrient cation (Zn, Cu, Mn and Fe) were generated using Arc Info GIS (Geographic information system). The multi micronutrient status map was also generated by Integrating the individual micronutrient cation map in GIS. The results of the study revealed that in Muktsar district of Punjab, the 39, 7, 8 and 34 percent of the total geographical area (TGA) of the district was deficient in Zn, Cu, Mn and Fe, respectively. It was also clear from the multi-micronutrient map that the deficiency of two or more micronutrients at one location is less prevalent than the deficiency of individual micronutrient.

160. Somasundaram, J.; Indian Institute of Soil Science, Bhopal (India). Singh, R.K.; Central Soil and Water Conservation Research and Training Institute, Kota (India). Parandiyal, A.K.; Central Soil and Water Conservation Research and Training Institute, Kota (India). Prasad, S.N.; Central Soil and Water Conservation Research and Training Institute, Kota (India). Micronutrient status of soils under different land use systems in Chambal ravines. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.307-312 KEYWORDS: LAND USE. TRACE ELEMENTS.

To assess the micronutrient status of soils under different land uses in Chambal ravines a study was !conducted at CSWCRTI, Research Centre, Kota. A total of 80 surface and sub-surface samples, representing eight different land use systems were analyzed for DTPA-extractable micronutrients status and soil properties in Chambal ravines. The DTPA-extractable micronutrients in soils showed wide variation under different land uses. The DTPA-Mn and Cu recorded the highest (23.85 mg kg^{-1}) and the lowest values (0.12 mg kg^{-1}),respectively. Content of micronutrients was in the order Mn Fe Zn Cu. Mean value of DTPA- Mn, Zn, Fe and Cu in surface soils varied from 6.98 to 23.85, 0.44 to 1.41,2.14 to 11.59 and 0.23 to 2.88 mg kg^{-1}, respectively. Mean value of DTPA- Mn, Zn, Fe and Cu in sub-surface soils varied from 5.01 to 23.03, 0.44 to 1.29, 1.49 to 10.24 and 0.12 to 2.58 mg kg^{-1}, respectively. The DTPA- Mn, Zn and Fe showed negative correlation with pH and EC of soils, whereas Cu exhibited positive correlation. Manganese, Zn, Fe and Cu showed positive correlation with organic carbon. Micronutrient content was low in agricultural fields and ravine lands as compared to the other land uses. Results of the study indicated that iron (Fe) and zinc (Zn) deficiencies are the major disorders in agricultural fields (marginal land) along the Chambal ravine systems.

161. Verm, G.; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Mathur, A.K.; Maharana Pratap University of Agriculture and Technology,Udaipur (India). Effect of integrated nutrient management on active pools of soil organic matter under maize-wheat system of a typic haplustept. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.317-322 KEYWORDS: MAIZE. WHEATS. ORGANIC MATTER.

The effect of integrated nutrient management (INM) on active pools of soil organic matter (SOM) under maize-wheat cropping sequence of a Typic Haplustept was studied in a long-term field experiment initiated during kharif 1997 at the Instructional Farm of Rajasthan College of Agriculture, Udaipur. Effect of varying doses of N, NP, NPK with FYM, Zn, S and Azotobacter on active pools of SOM viz., soil microbial biomass

carbon, nitrogen and phosphorus; water soluble carbon; water soluble carbohydrates and dehydrogenase activity after 9th year of maize-wheat crop rotation was studied. Application of FYM 20t ha^{-1} significantly increased the microbial biomass carbon (SMB-C), water soluble carbon (WS-OC) and water soluble carbohydrates (WS-CHO), whereas maximum amount of soil microbial biomass nitrogen (SMB-N) and dehydrogenase activity (DHA) was found in 100 NPK+10 t FYM ha^{-1} treatment and maximum soil microbial biomass phosphorus (SMB-P) was observed in 150 NPK treatment compared to sole use of chemical fertilizers. Integrated use of FYM with chemical fertilizers or use of FYM alone exerted significant effect on the active pools of soil carbon. The C/N ratio was highly and significantly correlated with soil microbial biomass carbon (SMB-C), soil microbial biomass nitrogen (SMB-N), water soluble carbon (WS-OC), water soluble carbohydrates (WS-CHO) and dehydrogenase activity (DHA) under maize crop.

162. Sharma, R.P.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science. Datt, N.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science. Chander, G.; Chaudhary Swaran Kumar Himachal Pradesh Krishi Vishwavidyalaya, Malan (India). Dept. of Soil Science. Effect of vermicompost, farmyard manure and chemical fertilizers on yield, nutrient uptake and soil fertility in Okra (Abelmoschus esculentus) - Onion (Allium cepa) sequence in wet temperate zone of Himachal Pradesh. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.357-361 KEYWORDS: FARMYARD MANURE. SOIL FERTILITY. FERTILIZERS. CHEMICAL COMPOSITION. ABELMOSCHUS ESCULENTUS. ALLIUM CEPA. HIMACHAL PRADESH. COMPOSTING.

Effect of applying organic manures (vermicompost and farmyard manure) and inorganic fertilizers on yield and nutrient uptake by okra (Abelmoschus esculentus)-onion (Allium cepa) and nutrient build up in the soil was studied under field conditions. Highest yield of okra was recorded in the treatment comprising 100% recommended NPK+vermicompost 10t ha^{-1}, 11.10 and 11.63t ha^{-1} during 2003 and 2004, respectively. Similarly, maximum yield of onion was observed in plots receiving 100% recommended NPK plus 25t vermicompost ha^{-1} during both the years i.e. 9.83 and 14.67t ha^{-1} during 2003-04 and 2004-05, respectively. After completion of the experiment, the highest available NPK content (303, 28.1, 345 kg ha^{-1}, respectively) were recorded in case of the treatment consisting of 10t vermicompost ha^{-1} to okra and 25t vermicompost ha^{-1} to onion along with 100% NPK to these crops. Similar effect was observed on mineral composition and nutrient uptake. Furthermore, yield of okra obtained at 5t vermicompost ha^{-1} plus 100% NPK (9.73 and 10.83t ha^{-1} during 2003 and 2004) was at par with that under 10t farmyard manure plus 100% NPK (10.03 and 10.46t ha^{-1} during 2003 and 2004). Similarly, yield of onion obtained at 12.5t vermicompost ha^{-1} plus 100% NPK (8.38 and 12.56t ha^{-1} during 2003-04 and 2004-05) was at par with that under 25t farmyard manure ha^{-1} plus 100% NPK (8.86 and 12.08t ha^{-1} during 2003-04 and 2004-05). This demonstrated the superiority of vermicompost over farmyard manure in okra-onion sequence.

163. Singh, A.K.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Sarkar, A.K.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Kumar, A.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Singh, B.P.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Effect of long-term use of mineral fertilizers, lime and farmyard manure on the crop yield, available plant nutrient and heavy metal status in an acidic loam soil. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.362-365 KEYWORDS: YIELDS. LIMES. FERTILIZERS. MINERALS. FARMYARD MANURE. SOIL FERTILITY. LOAM SOILS. PLANT NUTRITION.

The effect of balanced and imbalanced nutrient use on crop yield and availability of plant nutrients over the years is being studied in a Paleustalf of Ranchi under long-term permanent manurial trial. The present paper reports the long-term effect of organic manures, fertilizers and lime on secondary and micronutrient status of an acid soil.

Results revealed that the yield of maize under the treatments decreased in the order: NPK+lime FYM+PK NPK NP control N. Lime application with NPK resulted in significantly higher uptake of P, Ca, Mg, Sand B. Imbalanced use of N alone had a depressing effect on soil pH and Ca uptake by maize. The pH of acid soil (5.5) increased by 0.9 units with lime and fertilizer use, while it decreased in unlimed plots. Farmyard manure treated plots had a favorable influence on soil pH and organic carbon content. Application of N, NP and NPK fertilizers did not increase exchangeable Ca status of acid soil. The DTPA-extractable micronutrients in acid soils increased in N, NP and NPK treated plots while a decrease was recorded in limed plots. Liming decreased the DTPA-Cd in soil while FYM increased its content.

164. Kumar, R.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Sarkar, A.K.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Singh, K.P.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Agarwal, B.K.; Birsa Agricultural University, Ranchi (India). Dept. of Soil Science and Agricultural Chemistry. Karmakar, S.; Birsa Agricultural University, Ranchi (India). Dept. of Agronomy. Appraisal of available nutrients status in Santhal Paraganas region of Jharkhand. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.366-369 KEYWORDS: CHEMICOPHYSICAL PROPERTIES. NUTRIENTS.

165. Saharawat, K.L.; International Crops Research Institute for the Semi-Arid Tropics, Patancheru (India). Global - Theme Agroecosystems- Organic nitrogen mineralization in submerged soils:The role of inorganic electron acceptors. Journal of the Indian Society of Soil Science (India). (Dec 2009) V.57(4) p.391-397 KEYWORDS: ORGANIC COMPOUNDS. NITROGEN. MINERALIZATION. SOIL.

166. Deb, D.L.; Indian Agricultural Research Institute, New Delhi (India). Nuclear Research Lab.). Isotope-aided research for enhancing use efficiency of nitrogen, phosphorus and zinc. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.412-421 KEYWORDS: PHOSPHORUS. NITROGEN. ZINC. ISOTOPES. EFFICIENCY.

167. Pal, D.K.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Div. of Soil Resource Studies. Dasog, G.S.; University of Agricultural Sciences, Dharwad (India). Dept. of Soil Science and Agricultural Chemistry. Bhattacharyya, T.; National Bureau of Soil Survey and Land Use Planning, Nagpur (India). Div. of Soil Resource Studies. Pedogenetic processes in cracking clay soils (vertisols) in tropical environments of India: a critique. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.422-432 KEYWORDS: CLIMATIC FACTORS. VERTISOLS. TROPICAL ASIA.

168. Swarup, A.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Singh, M.; Indian Institute of Soil Science, Bhopal (India). Soil carbon dynamics under intensive cropping systems. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.469-476 KEYWORDS: SOIL. CARBON. INTENSIVE FARMING. CROPPING SYSTEMS.

169. Sanyal, S.K.; Bidhan Chandra Krishi Viswavidyalaya, Nadia (India). Directorate of Research. Majumdar, K.; International Plant Nutrition Institute-India Programme, Gurgaon (India). Nutrient dynamics in soil. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.477-493 KEYWORDS: SOIL. NUTRIENTS.

170. Ghosh, K.; University of Calcutta, Kolkata (India). Dept. of Agricultural Chemistry and Soil Science. Nayak, D.C.; National Bureau of Soil Survey and Land Use Planning, Kolkata (India). Regional Centre. Ahmed, N.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Soil organic matter.

Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.494-501 KEYWORDS: SOIL. ORGANIC MATTER.

171. Pattanayak, S.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Dept. of Soil Science and Agricultural Chemistry. Sureshkumar, P.; College of Horticulture, Vellanikara (India). Radiotracer Lab. Tarafdar, J.C.; Central Arid Zone Research Institute, Jodhpur (India). New vista in phosphorus research. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.536-545 KEYWORDS: PHOSPHATES. PHOSPHORUS. FERTILIZERS. RESEARCH.

172. Rattan, R.K.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Patel, K.P.; Anand Agricultural University, Anand (India). Micronutrient Project. Manjaiah, K.M.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Datta, S.P.; Indian Agricultural Research Institute, New Delhi (India). Div. of Soil Science and Agricultural Chemistry. Micronutrients in soil, plant, animal and human health. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.546-558 KEYWORDS: TRACE ELEMENTS.

173. Rao, A.S.; Indian Institute of Soil Science, Bhopal (India). Muralidhararudu, Y.; Indian Institute of Soil Science, Bhopal (India). Lakaria, B.L.; Indian Institute of Soil Science, Bhopal (India). Singh, K.N.; Indian Institute of Soil Science, Bhopal (India). Soil testing and nutrient recommendations. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.559-571 KEYWORDS: SOIL ANALYSIS. NUTRIENT AVAILABILITY. SOIL FERTILITY.

174. Sharma, K.L.; Central Research Institute for Dryland Agricultture, Hyderabad (India). Mandal, B.; Bidhan Chandra Krishi Vishwavidyalaya, Nadia (India). Soil quality and its relevance for sustainable agriculture. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.572-586 KEYWORDS: SOIL SCIENCES.

P36 Soil Erosion, Conservation and Reclamation

175. Kohli, A.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Rajouri (India). Regional Agricultural Research Station. Khera, K.L.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils. Evaluation of modelled soil erodibility estimates using lab-scale simulated rainstorms in submountaneous region of Punjab. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.262-272 KEYWORDS: PUNJAB. RAIN. EROSION. SOIL SCIENCES.

There is a need to provide a spatial prediction and uncertainty analysis of the soil erodibility. Erodibility of thirteen soils from submontaneous region of Punjab was determined by subjecting the replicated sets of selected soils packed at field measured levels of bulk densities in square soil boxes to simulated rainstorms using a micro-sprinkler based rainfall simulator. These values were compared with erodibility estimated using a nomograph, an empirical equation and a fuzzy K frequency distribution generated using the programme FUZKBAS. The measured soil erodibility was significantly correlated with nomographic estimates of soil erodibility when steady state infiltration rate was used to delineate the permeability classes. The value of soil erodibility at maximum membership obtained from fuzzy K frequency distributions and the value at fuzzy centroid determined by FUZKBAS were also significantly correlated with measured soil erodibility. Estimated K values were considerably higher than the measured K values. The models and relationships used in the present study are good indicators of relative susceptibility of the soils to erosion. The fuzzy logic-based approach used in the present study for estimating soil erodibility appears to be promising as it provides freedom to choose from a range of erodibility values, each associated with a membership grade and an uncertainty assessment.

176. Yadav, B.K.; Central Arid Zone Research Institute, Jodhpur (India). Tarafdar, J.C.; Central Arid Zone Research Institute, Jodhpur (India). Extracellular acid phosphatase and phytase activities of buffel grass (Cenchrus ciliaris L.) genotypes. Journal of the Indian Society of Soil Science (India). (Sep 2009) v.57(3) p.332-337 KEYWORDS: CENCHRUS CILIARIS. ACID PHOSPHATASE. GENOTYPES. PHYTASE.

Seven selected buffel grass (Cenchrus ciliaris L.) genotypes grown in nutrient solution under P deficient (5 mg P VI) and P sufficient (250 mg P L-I) sterile conditions were compared for the activity of root-associated and root-released acid phosphatase and phytase to select the best genotypes to exploit native unavailable P for better nutrition and higher production. The activity of root-associated acid phosphatase and phytase of all genotypes was significantly more than that of root-released acid phosphatase and phytase and the genotypes performed differently with regard to the activity of the enzymes and P mobilization. The Cenchrus ciliaris genotype, CAZRI-1106 had the highest activity of root-associated and root-released acid phosphatase and phytase, which differed significantly from other genotypes tested as far as root released enzymes are concerned and exploited maximum amount of native P. Phosphorus deficiency increased significantly (p 0.01) with both acid phosphatase and phytase release. There was a significant correlation (p 0.01) between the activities of root-associated and root-released acid phosphatase and phytase. The results suggested that genotypes CAZRI-1106 might be used for exploitation of native unavailable phosphorus for plant nutrition.

P40 Meteorology and Climatology

177. Beni, D.K.; Punjab Agricultural University, Ludhiana (India). Dept. of Soils. Kaur, R.; Indian Agricultural Research Institute, New Delhi (India).Div. of Environmental Sciences. Modeling soil processes in relation to climate change. Journal of the Indian Society of Soil Science (India). (Dec 2009) v.57(4) p.433-444 KEYWORDS: CLIMATIC CHANGE. SOIL.

Q01 Food Science And Technology

178. Nagaraja, K.V.; Directorate of Cashew Research, Puttur (India). Bioavailability of minerals in cashew. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.175-182 KEYWORDS: BIOAVAILABILITY. CASHEWS.

Bioavailability of Fe, Cu, Zn, Mn and Se in defatted cashew kernel flour, methanol extracted cashew apple powder and cashew kernel testa of released varieties varied with respect to minerals and varieties. Variety V-7 exhibited better per cent bioavailability of minerals in all the flours analyzed. Extraction of flours with 0.5% $NaHCO_3$ enhanced the bioavailability of a few minerals to a limited extent in different flours. Extraction with 0.5% NaCl or autoclaving did not significantly improve the extent of bioavailability of minerals in different flours analyzed. Bioavailability of a few minerals was higher in denatured 0.05 N NaOH extracted proteins compared to native proteins of different flours analysed.

Q02 Food Prcessing and Preservation

179. Ramaswamy, Lalitha; PSG College of Arts and Science, Coimbatore (India). Dept. of Nutrition and Dietetics. Dhanalakshmi; Mother Teresa Women's University, Kodaikanal (India). Incorporation of Coconut flour in Bakery Products. Indian Coconut Journal (India). (Mar 2010) v.72(11) p.2-5 KEYWORDS: FLOURS. BAKERY PRODUCTS.

180. Krishna, Gopala A.G.; Central Food Technological Research Institute, Mysore (India). Dept. of Lipid Science & Traditional Foods. Raj, Gaurav; Central Food Technological Research Institute, Mysore (India). Dept. of Lipid Science & Traditional Foods. Bhatnagar, Ajit Singh; Central Food Technological Research Institute, Mysore (India). Dept. of Lipid Science & Traditional Foods. Kumar, Prasanth P.K.; Central Food

Technological Research Institute, Mysore (India). Dept. of Lipid Science & Traditional Foods. Chandrashekar, Preeti; Central Food Technological Research Institute, Mysore (India). Dept. of Lipid Science & Traditional Foods. Coconut Oil: Chemistry, Production and Its Applications- A Review. Indian Coconut Journal (India). (Jul 2010) v.73(3) p.15-27 KEYWORDS: COCONUT OIL. FATTY ACIDS. FOOD PROCESSING. PHARMACEUTICAL INDUSTRY. OILSEEDS.

Coconut oil is produced by crushing copra, the dried kernel, which contains about 60-65% of the oil. The oil has the natural sweet taste of coconut and contains 92% of saturated fatty acids (in the form of triglycerides), most of them (about 70%) are lower chain saturated fatty acids known as medium chain fatty acids (MCFAs). MCFAs are not common to different vegetable oils with lauric acid at 45-56%. Various fractions of coconut oil have medium chain triglycerides and are excellent solvent for flavours, essences, emulsifiers etc. These fatty acids are used in the preparation of emulsifiers, as drugs and also in cosmetics. Its metabolism is different from that of the normal vegetable oils containing long chain fatty acids. Hence, it cannot be generalized as an oil similar in properties to that of a 92% long chain saturated fatty acids containing oil/fat. More studies are required to prove the good effects of coconut oil, medium chain triglycerides (MCT) and the fatty acids on humans especially on the ill effects on cardiovascular and other diseases. The review covers the production of coconut oil, its chemistry, MCT and its applications taking a holistic approach on the good and bad effects of coconut oil reported in the literature.

Q04 Food Composition

181. Sabitha, P.; Amritha Institute of Medical Sciences, Kochi (India). Dept. of Biochemistry. Vasudevan, D.M. Lipid profile and antioxidant enzymes in coconut oil consumers. Indian Coconut Journal (India). (Apr 2010) v.72(12) p.3-6 KEYWORDS: LIPID CONTENT. ANTIOXIDANTS. COCONUT OIL.

In this study, we compared the lipid profile and antioxidant enzymes of normal and diabetic subjects consuming coconut oil and sunflower oil. Seventy normal healthy persons and 70 patients with diabetes were studied. Each group was further subdivided into two groups of 35 subjects each, consuming coconut oil and sunflower oil respectively as cooking medium. Samples of blood were analyzed for serum total cholestrol, triacylglycerols and cholestrol in lipo-protein fractions. Total glutathione and glutathione peroxidase were measured in erythrocytes and superoxide dismature in serum. Though lipid profile parameters and oxidative stress were high in diabetic subjects compared to controls, no pronounced changes for these parameters were observed between the subgroups (coconut oil vs. sunflower oil).

182. Nair, Unnikrishnan G.S.; Farm Information Bureau, Thiruvananthapuram (India). The health benefits of Virgin Coconut Oil. Indian Coconut Journal (India). (Aug 2010) v.73(4) p.12-15 KEYWORDS: COCONUT OIL. NUTRIENTS.

183. Rajan, Raja R.G.; Central Food Technological Research Institute, Mysore (India). Kumar, Prasanth P.K.; Central Food Technological Research Institute, Mysore (India). Gopalakrishna A.G.; Central Food Technological Research Institute, Mysore (India). Tocopherols and phytosterols content of coconut oil blends prepared for coconut oil consumers and non-coconut oil consumers. Indian Coconut Journal (India). (Aug 2010) v.73(4) p.16-20 KEYWORDS: COCONUT OIL. TOCOPHEROLS. PHYTOSTEROLS.

Q70 Processing of Agricultural Wastes

184. Parama, V.R.R.; University of Agricultural Sciences, Dharwad (India). Dept. of Soil Science and Agricultural Chemistry. Biswas, D.R.; Indian Agricultural Research Institute, New Delhi (India). Assessment, safer disposal and utilization of agricultural and industrial wastes. Journal of the Indian Society of Soil Science (India). (Dec 2009)

v.57(4) p.502-512 KEYWORDS: AGRICULTURAL WASTES. INDUSTRIAL WASTES. WASTE DISPOSAL. BIOMASS. DEGRADATION.

S30 Diet And Diet Related Diseases

185. Vasudevan, D.M.; Amritha Institute of Medical Sciences, Kochi (India). Dept. of Biochemistry. Lipid profile in blood and in plaque material from diseased coronary artery. Indian Coconut Journal (India). (Oct 2010) v.73(6) p.17-21 KEYWORDS: DIET. FATTY ACIDS.

Serum was analyzed for lipid profile, including total cholesterol, HDL cholesterol, LDL cholesterol and triaclyglycerol (TAG) concentrations. Comparisons were drawn between coconut oil and sunflower oil consumers. There was no statistically significant difference in the cholesterol, HDL or LDL levels in coconut oil consuming population versus sunflower oil consuming population. Thus plasma fatty acid composition reflected no changes with dietary fat source. Moreover, we have analyzed the fatty acid composition of the plaques taken from diseased coronary arteries has been analzsed (supplying heart muscle). A total of 71 samples of plaques were analyzed, of which 48 persons were using coconut oil and 23 persons were using sunflower oil routinely. Fatty acids were extracted by chloroform and then analyzed by HPLC (high performance liquid chromatography). It was seen that Plaques from coronary artery did not contain fatty acids from coconut oil. Fatty acid content of plaques from coconut oil group and sunflower group were the same. This clearly shows that coconut oil does not have any effect to produce plaque or heart disease.

186. Hegde, B.M.; Manipal University Manjunath, Mangalore (India). Mind your heart. Indian Coconut Journal (India). (Jan 2010) v.72(9) p.2-5 KEYWORDS: HEALTH. HEART. DIET.

S40 Nutrition Programmes

187. Gawankar, M.S.; Agricultural Research Station, Mulde (India). Gajbhiye, R.C.; Regional Fruit Research station, Vengurle (India). AICRP on Cashew. Arulraj, S.; Central Plantation Crops Research Institute, Ksasaragod (India). AICRP on Palms. Nutritional requirement of oil palm in Konkan region. Journal of Plantation Crops (India). (Dec 2010) v.38(3) p.183-187 KEYWORDS: NUTRITIONAL REQUIREMENTS. OIL PALM. PALMS.

A field investigation was undertaken under All India Coordinated Research Project on Palms at Agricultural Research Station, Mulde in Sindhudurg district of Maharashtra since 1989 to assess the feasibility of growing oil palm in Konkan region and to assess the fertilizer and irrigation requirement. Five years pooled data from 12th to 16th year after planting revealed that oil palm showed high degree of response to fertilizer and irrigation. Irrigation by drip system with a discharge of 70l of water per day during post monsoon season and by giving NPK fertilizer 1200:600:2700g per palm per year secured the total returns of Rs. 75,775 (with the FFB rate of Rs.3500/t) with a benefit:cost ratio of 1.86 over rain fed condition. In the present study, cultivation of oil palm with basin irrigation at 560l of water at an interval of four days from cessation of monsoon along with NPK at 1200:600:2700g per palm per year recorded total returns of Rs.69615 with benefit:cost ratio of 1.74 over rainfed crop. Cultivation of oil palm under rainfed condition along with same fertilizer level earned total returns of Rs.44450 with benefit:cost ratio of 1.0 and cultivation of oil palm as rainfed crop without fertilizer was not a profitable proposition. Based on the study, it is recommended that cultivation of oil palm under irrigation (either by drip or through basin) along with a fertilizer dose of 1200:600:2700g per palm per year is beneficial under Konkan conditions.

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