Published : March, 2017

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

001 Paul, P.R.C.; Xavier, F.; Leena, A. (College of Veterinary and Animal Sciences, Trissur (India), Department, of Livestock Production Management)


To exploit the full potential of dairy sector, a computerized 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
C10  Education

217. Pandey, Ankit; Department of Extension, Krishi Vigyan Kendra, RVSKVV, Dewas (India) Bhargav, S.K.; Department of Agril Engg., Krishi Vigyan Kendra, RVSKVV, Dewas (India) Sharma, P.R.; Programme Coordinator, Kristi Vegan Kendra, RVSKVV, Dewas (India) Nayak, P.M.; Department of Agronomy, Krishi Vigyan Kendra, RVSKVV, Dewas (India) Jain, K.V.; Department of Agril Engg., Krishi Vigyan Kendra, RVSKVV, Dewas (India). Impact of ATMA training of knowledge empowerment. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.437-442

KEYWORDS: TRAINING. EMPOWERMENT. MANAGEMENT. GROWTH. FARMERS ANIMALS. AGRICULTURE.

The study was undertaken among 290 trainees farmer among 43 selected villages under the domain of krishi vigyan Kendra Dewas. Two krishak sangosthi and one interface organized by ATMA Dewas were selected for this study. Two variables namely, level of knowledge and opinion of trainees about training programme of the ATMA were measured by utilizing pre-structured and pre-tested interview schedule. Finding of the study showed that mean score of the knowledge were 23.24 and 33.55 before and after the training programme respectively. It is also observed that 66 present participant agreed about most of the doubts were cleared and 40%fanners opined that literature provided during the training was very relevant and field visit during training programme was very useful.

C20  Extension


KEYWORDS: INDIA. EDIBLE FUNGI. PRODUCTION INCREASE. POVERTY. ECONOMIC DEVELOPMENT.

Any training programme irrespective of subject matter has a definite sequences of event that takes place before, during and after of training. It is also fact that if fidelity of training programme is high, it will be more effective in terms of its process as well its outcome. Like other institutions Mushroom Research and Training Centre of G.B. Pant University of Agriculture and Technology Pantnagar also conducts various training programmes for different segments of population including BPL people (Below Poverty Line). The present research study was undertaken to have an insight of various aspects of mushroom training conducted for BPL people such as training methodology used, trainees’ opinion and usefulness of content etc. The ex-post-facto research design was used to meet outthe objectives set forth for the study. Census method was used to collect relevant data from 48 respondents trained by MRTC,
Pantnagar from three villages. The study revealed that the methodology used and content covered in the training programme were chosen keeping in view the profile characteristics of the trainees and trainers made considerable effort for making training a success. The study pointed out the need for support to training with variety of audio visual aids.


KEYWORDS: LIVESTOCK. MANAGEMENT. RURAL AREAS. WOMEN.

Livestock is an important source of economic activity in the agricultural sector contributing a major portion of GDP to India and improving socio-economic conditions for people in general and rural people in particular. Rural women play an important role in livestock management activities besides fulfilling their responsibility as home maker. The crucial role of women in agriculture and allied activities has however been grossly underestimated and undervalued. Hence, present study has been undertaken to study gender role differentiation in livestock sector. Study was conducted in 750 households of five selected districts of Uttarakhand. From the study it could be inferred that majority of livestock management activities in Uttarakhand hills were performed by women independently or jointly with their male counterparts and women were totally responsible for them. Women have more access to as well as control over majority of the livestock related resources.

220. VERMA, DEEPIKA; College of Agriculture, G.B. Pant University of Agriculture and Technology Pantnagar, (India) AMARDEEP; College of Agriculture, G.B. Pant University of Agriculture and Technology Pantnagar, (India). Analysis of mushroom production training for below poverty line beneficiaries conducted by Mushroom Research and Training Centre, Pantnagar. International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p.377-381

KEYWORDS: EDIBLE FUNGI. PRODUCTION. TRAINING. POVERTY. RESEARCH.

Any training programme irrespective of subject matter has definite sequences of event that takes place before, during and after of training. It is also fact that if fidelity of training programme is high, it will be more effective in terms of its process as well its outcome. Like other institutions Mushroom Research and Training Centre of G.B. Pant University of Agriculture and Technology Pantnagar also conducts various training programmes for different segments of population including BPL people (Below Poverty Line). The present research study was undertaken to have an insight of various aspects of mushroom training conducted for BPL people such as training methodology used, trainees; opinion and usefulness of content etc. The ex-post facto research design was used to meet out the objectives set forth for the study. Census method was used to collect relevant data from 48 respondents trained by MRTC, Pantnagar from three villages. The study revealed that that methodology used and content covered in the training programme were chosen keeping in view the
profile characteristics of the trainees and trainers made considerable effort for making training a success. The study pointed out the need for support to training with variety of audiovisual aids.

221. Tripura, Binoy; Department of Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya, Nadia (India) Mondal, Sagar; Department of Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya, Nadia (India). A study on socio-economic and agronomic factors responsible for jhum cultivation in Tripura. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.443-447

KEYWORDS: STATISTICAL METHODS. CULTIVATION. PRODUCTIVITY. TRIPURA. INDIA. FOREST PATHOLOGY. A study was conducted on 40 Jhumia farmers randomly selected from two villages under the Dhumbur Nagar R.D block of Dhalai district, Tripura. To find out the important factors responsible for Jhum cultivation, 13 independent and one dependent variables were selected for the study. Data were collected by personal interview method in the month of October and November 2014. For analysis of the data, coefficient of correlation and factor analysis was followed. It was found that selection of crop varieties, time of sowing, methods of sowing, irrigation and income are found to be positively significant with Jhum yield and six important factors were identified such as package of practices, media exposure, resource, socio-personal, manpower and capacity which are also associated with Jhum yield in Tripura.

E10 Agricultural economics and policies


KEYWORDS: CASHEWS. INTERCROPPING. LAND. SOLE CROPPING. SPICE CROPS. SPICES.

A field experiment was conducted with eight seasonal spice crops grown as intercrops in cashew plantation in comparison with sole crop, in open area to work out the economic potential and land equivalent ratio under the northern transition zone of Karnataka (zone-8) during 2011-12. The economics worked for intercropping and sole cropping situation differed significantly with regard to gross return and net profit per hectare. Higher gross return was obtained by cashew based intercropping system with turmeric (₹1.385 lakhs/ha) and sole cropping of turmeric in open area (₹3.142 lakhs/ha) followed by garlic intercropping (₹0.887 lakhs/ha) and in sole cropping (₹2.404 lakhs/ha). Highest net profit was obtained by cultivating turmeric (₹2.151 lakhs/ha) followed by garlic (₹1.832 lakhs/ha). The B:C ratio was the maximum for chilli (3.78) followed by fenugreek (3.47), garlic (3.20) and turmeric (2.17) compared to the minimum in coriander (0.73). The magnitude of B:C ratio was lower in mango ginger, pickling coleus and ginger because of higher expenses on the
inputs as well as higher cost towards processing and prevailing lesser market price. Land equivalent ratio (LER) of all intercropping systems was greater than one, indicating higher yield advantages and efficient land use. LER was worked out based on yield performance of associated intercrop with main crop (cashew). Maximum LER was recorded in turmeric and chilli (2.10 each). CII values were noticed among cropping systems and higher CII was worked out for cashew + turmeric (1.31) and the lower CII value was worked out for cashew for both the seed spices viz., coriander and fenugreek (1.13 each).


Economics of feeding creep ration supplemented with conventional feed ingredient (CR-1) (T) and creep ration supplemented with poultry carcass meal (CR-2) (T3) during the pre-weaning period was compared to natural suckling in Malabari kids (T1). The cost of live weight gain was significantly (P0.01) lower in T3 (Rs.100.12) while it was high in T2 (143.83) and it was intermediate (Rs.129.10) in T1 group which was not creep fed. Since the net live weight gain was high in T3 followed by T2 and T1. the respective output price were Rs.2358 in T3 and Rs.1524 in T2 while it was only Rs.1005 in T1. The net profit was Rs.1269.64 per kid in T1, Rs.338.14 per kid in T2 while it was only Rs.72 per kid in T1. Feeding CR-II was 3.75 times more economical than CR-I during the pre-weaning period and gave the best cost benefit ratio of 1:0.116 while cost benefit ratio was 1:0.028 in T2. The common practice of natural suckling (T1) was least economical with a cost benefit ratio of 1:0.028.

E12 Labour and employment

224. Saharia, R.R.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Borah, Ajanta; NICRA Project, KVK, Cacjar, Assam Agricultural University, Arunachal (India) Deuri, Deepshikha; NICRA Project, KVK, Cacjar, Assam Agricultural University, Arunachal (India) Rahman, Britan; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Bhattacharyya, K.S.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Bharali, D.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Kakati, K.B.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Bharali, M.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India) Sarma, P.; Krishi Vigyan Kendra (KVK), Cachar, Assam Agricultural University, Arunachal (India). Impact assessment of custom hiring centre in the village calchapra part-1, Cachar, Assam under NICRA project. Journal of Interacademicia (India). (Jul 2015) v. 19 (3) p.448-454 KEYWORDS: ASSAM. CLIMATE. HIGH WATER. AGRICULTURE. FARMING SYSTEMS. INDIA.
Climate variability and climatic change are resulting in a more severe occurrence of extreme events, such as droughts, floods, hailstones and cyclones, which affect the poor most and jeopardize agricultural production and livelihoods of rural communities. In the recent past, due to high degree of weather aberrations, the timeliness of agricultural operations has come into sharp focus. With increasing climatic variability, timely sowing or re-sowing alone can reduce crop losses significantly. Use of high capacity and energy efficient farm implements are more important in changing climate scenario. The present study was conducted in the Salchapra-I village of Cachar district, Assam which is basically flood affected area and recurrent flood is the common phenomena of the village. In order to find out the impact of Custom Hiring Centre (CHC) established in the village under the National Initiative on Climate Resilience Agriculture (NICRA) project, information on utility of machineries and equipments were collected from the beneficiaries of the CHC. There are a total 125 households in the village Salchapra-I, out of which 80 number of household's primary source of livelihood is agriculture. Out of the 80 farmers, a total of 50 farmers were selected as a respondent purposively based on the farmer's attachment and using the farm implements from CHC. The study revealed that farm implements like power tiller, pump set, Japanese paddy weeder, sprayer and duster etc. found great help for farmers in timely operation and reducing the labour cost. Moreover, it helps to eradicate the major issues like higher hiring charges and unavailability of implements during peak season which was the biggest matter of concern. During last two year (2012-2013 and 2013-2014) a total revenue generated through CHC was Rs. 70,397/- and after excluding all the expenses, the net income of the CHC is Rs. 17,000/-, which is quite encouraging. Establishment of CHC under NICRA brought a significant impact on the farming community of village Salchapra-I, CHC not only helped farming community by making agricultural implements available at minimum hired charge at crucial time for timeliness of agricultural operations but also helped them in crop planning, improved the decision making ability and minimizing climate risk which they are facing since long time.

E13 Investment, finance and credit

225. Narendra; Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, S.K.; Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Investment credit gap at the farm economy of Almora district of Kumaon hills of Uttarakhand. International Journal of Basic and Applied Agricultural Research. (Sep 2014) v.12 (3) p. 318-321 KEYWORDS: INVESTMENT. CREDIT. AGRICULTURAL ECONOMICS. PLANT PRODUCTION. LIVESTOCK. FARMERS.

With saving being negligible among the farmers, investment credit for livestock appears to be an essential support system of livelihood besides crop production. The present study was conducted in Almora district of Uttarakhand to examine the gap between requirements for and supply of investment credit based on data collected from sample farmers for the
agricultural year 2009-10. In the study area about 51.41 per cent and 48.59 per cent of total farm households were borrowers and non-borrower, respectively. About 38 per cent and 62 per cent of borrower-farmers were production credit and investment credit borrowers, respectively. Investment credit at the farm economy of the study area was used for purchase of livestock viz; buffalo, cow, horse, mule and goat. Majority, about 43 per cent of the farmers borrowed their investment credit from Cooperative bank followed by Commercial bank. The gap between investment credit demand and supply thereof was highest for commercial bank borrower-farmers i.e. Rs 5535.72. (22.63 per cent) followed by RRB (Rs 4571.46, 18.39 per cent) and cooperative bank (Rs.2058.83, 11.48 per cent) borrower-farmers. All the gaps estimated in the study were found statistically significant. The gap between actual investment made and credit supplied was also found significant for the borrowers of all the financial institutions, which was highest to the extent of 15.23 per cent (Rs 3400) for the borrowers of Commercial bank followed by RRB and Cooperative bank borrowers. On overall basis this gap was Rs 2579.50 i.e. about 13 per cent of the actual investment made by the borrowers-farmers. From the above findings, it is established that there was investment credit gap in financing of livestock by all three financial institutions in the study area but the severity of gap was highest for Commercial bank borrower-farmers and least for Cooperative bank borrower-farmers, which attracts majority of the farmers to borrow from the Cooperative banks. This credit gap forced farmers to sacrifice with the purchase of their desired livestock. This calls for such a credit policy which may bridge the investment credit gaps at the farm economy across the financial institutions in the study area.

226. Narendra; Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, S.K.; Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Institutional production credit gap: a study of borrower-farmers of Almora district of Uttarakhand. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p.322-328 KEYWORDS: PRODUCTION. CREDIT POLICIES. FARMERS. AGRICULTURE. CROPS. COOPERATIVE BANKS. Agriculture production credit appears to be an essential input along with modern technology for higher productivity of crops on almost all the farms. The present study was conducted in Almora district of Uttarakhand to examine the gap between requirements for and supply of agricultural production credit for the agricultural year 2009-10. In the study area about 51.41 per cent and 48.59 per cent of total farm households were borrowers and non-borrower-farmers, respectively. About 38 per cent of borrower-farmers were production credit borrowers. The financing pattern of institutions other than Commercial bank viz; District Cooperative bank and Regional Rural Bank has been observed different from the Scale of Finance recommended by the District Level Technical committee (DLTC). The Scale of Finance recommended by DLTC did not fulfil the requirements for the adoption of recommended package of practices. The production credit gap with the farm households between potential credit
requirement and potential credit supply has been observed Rs.4827.35 (including human labour cost) and Rs.519.04 (excluding human labour cost). The gaps estimated were found statistically significant. The results suggested that there is need to build the coordination between different financial institutions to follow the scale of finance at par with the DLTC norms. The scale of finance needs to be upgraded according to cost incurred in the adoption of recommended package of practices for crop production.

E14 Development economics and policies


The use of modern technologies in Indian Agriculture to enhance productivity, profitability and quality improvement has been warranted since independence. Introduction of high yielding varieties of rice and wheat have outset the adoption of modern technology in Indian Agriculture, which was latter known as Green Revolution. Since then thousands of high yielding varieties / hybrids of different crops have been released. Hybrid rice, one of the viable and proven technologies has been considered as a new intervention to increase rice production for meeting burgeoning demand for staple food in India. Using farm survey data this paper examines comparative profitability of hybrid and non-hybrid rice cultivation. Results show that hybrid rice gives substantially higher yield as well as net return compared to non-hybrid rice, which leads to higher and sustainable growth of food grain production in the country. Therefore, it can be inferred that hybrid rice cultivation is not only profitable for farmers but also improves food security of the nation.

E16 Production economics


Potato has earned the status of being world’s fourth important food crop because of its great yield and nutritional value. Globally the area under potato cultivation stands at 19.13 million hectares, producing approximately 328.87 million tonnes of potatoes. India produces 25 million tonnes of potato, which makes it third largest producer of potatoes globally. The potato space in India is fiercely competitive due to presence of significant number of global and
local players performing the roles of potato seed producer; potato processor; aggregator; retailers with outlet for fresh vegetables etc. All these players need to have a procurement section for ensuring two things (i) availability of produce to meet the demand, and (ii) to derive economies of scale. Procurement model of different companies differ based on the company specific requirements. The study resulted in identification of four models of procurement. These procurement models are named as (i) procurement from mandies; (ii) procurement from green belt area; (iii) procurement from cold stores; and (iv) procurement by contract farming. The study revealed that evaluation solely based on cost puts procurement from green belt area as well as by contract farming at same level, but decisions about selecting a particular procurement model is never based solely on 'costs'. The factors which have major influence in selection of procurement model are 'size of the demand', 'quality requirements' and 'availability of time with buyer'. The study further revealed that corporate houses in business of selling seeds potato prefer contract farming and those in business of processing potatoes prefer green belt area for procurement. The corporate houses in retail business prefer the procurement model from mandi as their daily requirement is not that high.

Sonawane, G.K.; Deptt. of Agricultural Economics, Mahatma Phule Krishi Vidyapeeth, Rahuri (India) Pokharsr, G. V.; Deptt. of Agricultural Economics, Mahatma Phule Krishi Vidyapeeth, Rahuri (India) Yadav, B.D.; Deptt. of Agricultural Economics, Mahatma Phule Krishi Vidyapeeth, Rahuri (India). Comparative economics of production and marketing of organic vs. inorganic brinjal in western Maharashtra. Green Farming. (Jul 2015) v.6(4) p.849-854

KEYWORDS: AUBERGINES. PRODUCTION. MARKETING. YIELDS. ORGANIC ACID SALTS. ORGANIC AGRICULTURE. METHODS.

The farmers producing organic brinjal during the season 2012-13 were selected. Besides this, the samples of organic brinjal were also selected from the organic farm, College of Agriculture, Pune. The major organic inputs used for producing one hectare of brinjal were vermi-compost (25250.00). It is revealed that the per hectare cost $C$ worked out to be 1,98,078.72 and 1,15,576.60 for producing the organic brinjal at Paragon and Agricultural College, Pune, respectively. Whereas, the total cost for producing one hectare of inorganic brinjal was 2,00,281.56. The yield of inorganic brinjal was highest (179.25 q/ha). The organic brinjal of pargaon organic unit was profitable with B: C ratio of 1.79. The average per quintal cost of organic brinjal was 59.57 and 99.57. Grading charges was the major item contributing 79 per cent to the total marketing cost at organic unit Agric. College, Pune and The producer's share in consumer's rupee was more than 98 per cent. The majority of the farmers (89 per cent) reported low demand for organic produce was major constraints in organic farming. The present study suggest switching over to organic farming. Producers of organic vegetables are not finding market for their produce locally and marketing expenses are more for marketing the produce in Metropolitan cities, hence consumer awareness about health consciousness and the quality of products produced from organic farming should be increased, so that producer will get good price for the organic produce.
E21 Production economics


A biomass based forced convective drying system was designed at College of Technology and Engineering, Udaipur and installed in asmall food processing unit at village Vana, Panchayat Samiti Bhinder, Udaipur. The developed dryer had drying capacity of 500 kg of freshginger slices per batch. The developed system was evaluated for techno-economic feasibility with three economic indicators i.e. NPW:BIC ratio and pay-back period. During no load testing maximum temperature achieved in the system was 63.8°C. The full load performance of the system was evaluated with 500 kg of ginger slicesper batch. The ginger slices were dried from moisture content of 78.37% (w.b.) to 10.09% (w.b.) in 10 hrs. The capital investment of biomass based forced convective drying system was 1, 83, 539.2/-.The full load performance was conducted from 9:00 to 19:00 h inwinter season and the hourly data was recorded. The NPW, BIC ratio and pay-back period of developed system was found to be 16,89,855.00, 1.02 and 0.62 years respectively.


Post-harvest management of lime fruit is prime importance in order to sustain higher production, proper distribution with minimumlosses and increasing export. The rotating type concentric circular screen fruit grader was designed for kagzi-lime. The experimental plan was undertaken at 14 rpm, 17 rpm and 21 rpm of speed of grading unit and feed trough angle at 3.8 degree, 7 degree and 9.5 degree. The maximum overall grading efficiency were 95 percent was found at 14 rpm speed and 7 degree feed trough angle. The actual capacity of grader was found 354 kg/h at optimized speed and feed trough angle. During the performance test not a single fruit was damaged.

Agricultural University, Navsari (India). Adoption of improved dairy husbandry practices and constraints in rural areas of Surat district. Indian Journal of Animal Production and Management (India). (Dec 2015) v.31(3-4) p.1-5

KEYWORDS: DAIRY INDUSTRY. RURAL AREAS. CONSTRAINTS. GUJARAT. MILKING. ANIMALS.

The present study was conducted in the Surat district of Gujarat. Total 300 respondents were interviewed for the questionnaire prepared about improved dairy husbandry practices adopted by them and constraints in adoption of those practices. The findings indicated that majority of dairy farmers held medium adoption level on different component of improved dairy husbandry practices viz. 62.33% for housing, 65.33% for feeding, 57% for breeding, 62.34% for healthcare, 68.33% for milking management and 70% for calf rearing. The overall adoption levels of the respondents in improved dairy husbandry practices fall under low, medium and high categories are 9.33%, 75.34% and 15.33%, respectively. The adoption index of different aspect of improved dairy husbandry practices of housing, feeding, breeding, health care, milking and calf rearing were 44.97, 40.90, 64.98, 51.55, 50.60 and 50.85%, respectively and overall adoption index of improved dairy husbandry practices was 50.64% which indicated medium adoption level of dairy farmers in the study area. The majority of dairy farmers had high construction cost (94%), lack of own capital (64%), high cost of feed (97.33%), non-availability of green fodder round the year (85.33%), lack of awareness about treatment of poor quality straw to improve its nutritive value (68.67%), repeat breeding problems in dairy animals (88.67%), non-remunerative price for milk (93.67%), lack of knowledge in clean milk production (71.33%), high cost of veterinary medicine (78.67%), problem of mastitis in dairy animals (71.33%) and inadequate knowledge of diseases and their control (67.33%) were major constraints in adoption of improved dairy husbandry practices.

E40 Cooperatives


E50 Rural sociology

234. RAGHAV, SHALINI; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, S. K; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Socio-economic status of tribal farm households under different farming systems in the plain region of Uttarakhand, India. International Journal of Basic and Applied Agricultural Research. (May 2014) v.12(2), p. 160-166 KEYWORDS: HOUSEHOLDS. FARMING SYSTEMS. FRUIT CROPS. LIVESTOCK. CROPMANAGEMENT.
The study was carried out in the plain region of Uttarakhand state of India. The data were collected through interview schedule from sixty tribal farmers of the study area for the agricultural year 2008-09. Simple descriptive statistical tools like average, percentage, etc. were used to analyze the socio-economic status of tribes. Tribal farmers were found following 04 farming systems (FS) namely; Crop + Livestock, Crop only, Crop + Livestock + Orchard, and Livestock only. The results revealed that culture, traditions and festivals of tribal people were not very much different from the Hindus. Most of the tribal farmers belonged to the category of small and medium size of the land holdings. Overall average size of tribal farm family was 7.16 and number of females was more than male members in each farming system. Educational status of sample tribal families showed that percentage of illiteracy was higher in female than the male family members across all the farming systems. Cropping pattern of the study area revealed that more than 90 per cent of the total cropped area was devoted to subsistence food crops. Agriculture was the main source of their income. There is scope to follow different crop rotations which may increase cropping intensity and returns thereof as all the operational area was irrigated on the tribal farms under different farming systems. Therefore, more concern towards agriculture is needed with the introduction of high value crops in the cropping patterns. Women led developmental activities be more fruitful in the study area. More emphasis need be given to the education of female members of the tribal families. Buffalo was found to be the most preferred livestock by the tribes across the farming systems as it shared about two third of total livestock population on their farms in the study area.

Consumer economics

Sharma, K. P.; Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi (India) Samuel, K. V. D.; Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi (India). Solar photovoltaic (SPV) powered appliances for rural applications. Green Farming. (Jul 2015) v.6(4)p.904-907 KEYWORDS: SOLAR ENERGY. DRYING. TECHNOLOGY. COOKING. ELECTRICITY. EQUIPMENT.

Solar power from solar photovoltaic system was used for operation of refrigerator, lights, fan and blower of a solar dryer. Four solar panels of 100 W each total 400 W (open circuit voltage 18V) were used to operate the system. The direct current (DC) power of the solar panel was converted into single phase alternating current (AC) power with the help of a 1400 VA inverter. A battery was used to provide back up to the system in the absence of solar energy. With this system a refrigerator (80 l, 90 W), three tube lights (84 W), a fan (50 W) was operated for 24 h, 6 hand 18 h respectively. Besides, this system could also be used for operation of a blower (375 W) of the solar dryer for 6 h successfully. The system could be very useful to farmers/rural poor for operation of lighting, fan, refrigeration system and dryer in rural areas where electricity is not available or its supply is erratic.

Home economics, industries and crafts

237. PANDEY, KUMKUM; College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar (India)ADITI , VATS; College of Home Science, University of Agriculture and Technology, Pantnagar (India). Assessment of performance time and rest periods between different activities related to raw brick making unit. International Journal of Basic and Applied Agricultural Research. (May 2014) v, 2(12), p.277-281 KEYWORDS: TECHNOLOGY. MUSCULOSKELETAL DISEASES. BRICKS.

This study investigated the time spent in performing different activities in various awkward postures, resting period between different activities and resting period in different activities taken by brick factory workers in five brick making factories, concentrating on raw brick making activities. To fulfill the aim of study forty workers in which twenty males and twenty female workers were selected randomly and interview schedule was developed and workplace analysis has been accomplished by observing the employee as they were doing the task. Results of interviews showed that total 45 min. 11 hrs. of time taken by the workers for doing all raw brick making activity and total 62 min. of resting period taken by the employees between different activities. When asked about the activities causing pain and discomfort it was reported that 100 per cent of the respondents complained pain in different raw brick making activities and they were not aware about the musculoskeletal problems. In conclusion the result of the study point out a number of important factors that must be addressed which include the workplace design necessitating frequent bending and twisting of the trunk, handling techniques, the way work is organized. Others problems such as inadequate breaks and high speed of work also need to be address.


Child care products should communicate safety information effectively and a warning should be comprised of a signal word to convey the gravity of the
risk, an indication of the hazard, the possible consequences in terms of injuries and instructions as to how to avoid injuries. Effective warning should result in safe behaviour leading to reduction in number of accidents. Unfortunately the response rate to the warning is usually low, that is why the study was planned with the objectives to study the expectations of parents with regards to presentation of product information and development of warning symbols on the basis of estimation and comprehension test. The study was purposively carried out at Pantnagar on the sample size of 75 out of which 35 parents and 35 general population, using estimation and comprehension test. The results of estimation and comprehension test reveal that pictorial symbols with written test increase the level of comprehension.

239. VANDANA; Department of Home and Food Sciences, SAPKM, Kichha, (India) KUSHWAHA, ARCHANA; Department of Foods and Nutrition, College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar (India) KUMAR, ANIL; Department of Plant Breeding and Genetics, BAU, Sabour, Bhagalpur, (India). Development of high protein biscuits from cowpea (Vigna unguiculata) flour. International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), p.288-291 KEYWORDS: PROTEIN CONTENT. VIGNA UNGUICULATA. LEGUMES. NUTRITIVE VALUE.

Cowpea (Vigna unguiculata) along with other legumes is recognized as an important source of protein. They are cooked plain, mixed with other foods or processed into formulated recipes. Biscuits can be easily fortified with protein rich flours to provide convenience food in order to supplement protein in the diet. An experiment was conducted to develop protein rich biscuits of cowpea without impairing their acceptability. Refined wheat flour (RWF) was substituted with cowpea flour (CPF) at levels of 20, 40, 60 and 80% (L1, L2, L3 and L4) and control sample contained 100% RWF. Nutrient composition and sensory evaluation of biscuits containing various percentages of RWF and CPF were studied. Nutritive value determined by calculation method showed that biscuits with increasing levels of cowpea had higher protein, crude fibre, iron and calcium content compared with control biscuits. The results of sensory attributes revealed that cowpea biscuits containing 20% CPF secured the highest score for overall acceptability among other substitution levels.


In this study six primary schools of Pantnagar were selected out of which three were government schools which provided mid-day meals and in three were private schools in which children brought packed lunches.
Comparison between the nutrient intake and height and weight of the children consuming mid-day meals and packed lunches was made. The study was conducted for a period of three days in each school. Students were randomly selected with the help of attendance registers. Approximately equal number of girls and boys were selected (94 girls and 86 boys). Children age ranged from 6-11 years. Height and weight of the selected children was taken on the first day of study at each school. Participants were observed for three days at each school once at a meal time and the food items consumed were recorded. A predesigned proforma was used to collect information from the children regarding their food habits and other general information. Wastage was also observed and the weight estimated visually. Mean energy, protein, fat, calcium and iron intakes of children consuming school meals was significantly lower than the children consuming packed lunches. No significant difference in the mean carbohydrate intake and Vitamin C intake was found. The mean weight of the children consuming packed lunches (24.84 kg) was significantly higher than the mean weight of the children consuming mid-day meals (21.88 kg) although no significant difference was found among the heights of the children. The quality of food provided by the schools was good although the quantity was not up to the government standards. The reason for the insufficient quantity of food being provided by the schools may be due to the rising prices of the food commodities and also partly due to the mis-management caused by the school authorities. Proper food based nutrient standards need to be made for school meals as well as for packed lunches.


The use of synthetic raw materials in the textile sector has become essential to meet the present day needs of different sectors. Their use could not be stopped as such due to the vast demand of products and non-availability of safe alternatives. Among synthetic fibres, polyester is most versatile fibre owing to its properties and can be used in apparels, furnishings and even in technical textiles. The use of polyester is increasing in various fields at very rapid pace. As a result, it has been termed as 'fibre of 21st century'. Presently its consumption is second only to cellulosic fibres. Growing eco consciousness all over the world has prompted textile industry to search for less polluting options for textile coloration particularly for synthetic textile fibres. Since antiquity natural dyes were used on natural fibres only. Recently, efforts are on to identify the natural dyes that have affinity for synthetic fibres. This paper, therefore, includes results of study involving dyeing of polyester with natural dyes using optimized dyeing conditions with different metallic mordants and K/S values of the dyed fabrics. The maximum colour strength was observed in the case of turmeric dye, followed by pine and onion dyes. The colour strength of the dyes on polyester
increased on application of all the mordants as indicated by higher K/S values of the mordanted samples than that of control (unmordanted) sample. The mordant that resulted in best K/S values with each dye varied from dye to dye. Thus the application of natural dyes on polyester is an eco alternative to use of synthetic dyes in textile coloration sector.


KEYWORDS: CHEMICOPHYSICAL PROPERTIES. WASTEWATER. DYES. TEXTILES.

Colour is considered as one of the elements of nature that made human beings more aesthetic and fascinating in the world. Dyeing and printing are two most common techniques of colouring the materials that consume huge amount of water, chemicals, different types of dyes and auxiliaries. The pre treatment, colouring and post treatment processes carried out even in tiny scale unit generate waste stream which on accumulation in community disposal system is causing pollution in the areas nearby the units. In the present study, the liquid waste (effluent) collected from community disposal channel of three different types of units namely, dyeing unit only, printing unit only and dyeing and printing unit (composite unit) of Jaspur area were tested to know the physico-chemical characteristics [temperature, pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Solids (TS), Total Dissolved Solids (TDS) and Total Suspended Solids (TSS)] of effluent samples. The overall mean of the physico-chemical characteristics of effluents collected from different types of units were beyond the permissible limits in term of all the parameters when compared with the standards given by CPCB (1995) indicating highly polluting nature of the dyeing and printing units located at Jaspur. The mean values of physicochemical characteristics of the effluent collected from dyeing units were lower than the mean values of all the parameters of the effluents collected from printing units as well as combined dyeing and printing units. Thus the dyeing units were causing less pollution as compared to other two types of units. The higher pollution load may be due to the presence of thickening agent and dye content in the effluent stream. The results revealed that the parameters such as temperature, pH, DO, BOD, COD were non-significant while TS, TDS and TSS were significant on basis of one way ANOVA.

243. POONAM; Department of Family Resource Management, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SHUKLA, CHHAYA; Department of Family Resource Management, College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar (India) SHARMA, PROMILA; Department of Family Resource Management, College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar
The SWOT analysis of Self Help Groups is very helpful in identifying positive tangible and intangible attributes which are under its control. It also explores the areas needing improvement, existing opportunities and various risks. An awareness of external attractive factors that represent the reasons for SHG to exist and develop propels others also to follow the same. Clear identification of external factors, beyond the control of SHGs, which could place the SHGs mission or operation at risk, is beneficial for having contingency plans to address them and maintain the long term sustainability of SHGs. There were total 8 SHGs associated with College of Home Science, G.B. Pant University of Agriculture & Technology Pantnagar, Uttarakhand with the strength of 90 members working there in. A purposive sampling technique was used with combination of deliberate random sampling for the selection of total sample. The data was collected personally through interview technique with the help of pre structured questionnaire. The study brought out the holistic view of SHGs in empowering women. The strengths, weaknesses, opportunities and threats explored through the research work are helpful for development personals in government/non government organizations and policy makers to formulate suitable policies that better guarantee the rural women empowerment. The SWOT analysis is also helpful for upcoming SHGs to develop beneficial linkages with other organizations and trace the guidelines for their long term sustainability.


Adolescence is a period of transition when the individual changes take place physically and psychologically from a child to adult. The cross-sectional study was undertaken with objective to assess nutritional status of 1152 adolescent girls of Uttarakhand. Anthropometric measurements were made on height, weight, waist circumference and hip circumference of adolescent girls as per standard methods. Nutritional status has been assessed using BMI Z scores. It was observed that 53.47 per cent adolescent girls were normal. Prevalence of moderate under-nutrition was found to be 28.03 per cent and severe under-nutrition was 7.72 per cent. Prevalence of overweight was recorded to be 10.76 per cent. Mean BMI was 18.76±2.76 kg/m2. An increasing trend has been recorded with rising age from 14 to 17 years. BMI was positively correlated with waist circumference, hip circumference and waist hip ratio at 5 per cent level.
(p0.05) of significance. Mean waist hip ratio was found to be 0.80±0.05. It is concluded that there is a high prevalence of under nutrition among adolescent girls. Nutrition and health education could be imparted to raise awareness among adolescent girls.


KEYWORDS: EVALUATION. NUTRITIVE VALUE. FUNCTIONAL DISORDERS. APPLES.

The present study aimed to investigate the functional and nutritional composition of apple pomace powder along with antioxidant activity. Apple pomace powder showed high values of hydration properties such as water absorption capacity (11.36), bulk density (0.53 g/cc), true density (0.56 g/cc) and per cent porosity (1.23 per cent). Moisture content in apple pomace powder was 7.86 g/100 g whereas total ash and crude fat were 3.60 and 5.64 g/100 g. It was characterized by its higher amount of crude fiber (16.48 per cent) and dietary fiber (63.38 per cent). The soluble and insoluble dietary fibre was 8 and 55.38 per cent, respectively. Apple pomace powder contained higher amount of calcium (0.06 mg/100 g) and iron (3.35 mg/100 g). The same trend was observed in total antioxidant activity and â-carotene which were 39.23 per cent and 150 µg/100 g, respectively.

246. PANT, RICHA; Department of Food and Nutrition, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar (India) AWASTHI, PRATIMA; Department of Food and Nutrition, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of roasting on the nutritional composition of flaxseeds (Linum Usitatissimum). International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p.478-481

KEYWORDS: ROASTING. NUTRITIONAL REQUIREMENTS. LINUM.

Present study was designed to evaluate the effect of roasting technique on nutrient and antinutrient content of flaxseeds. The optimum duration of heat roasting was found to be 4 minutes in open pan. Moisture content of the raw and roasted flaxseeds was found to be 6.65 and 2.72 per cent respectively, while the protein content was 23.69 and 23.4 per cent respectively. Fat content of raw flaxseeds was found to be 37.77 per cent while that of roasted flaxseeds was 35.85 per cent. Crude fiber content was 5.4 and 6.03 per cent for raw and heat roasted flaxseeds respectively. Total ash and calcium content of roasted flaxseeds was found to be 2.54 per cent and 229 mg per 100 g respectively. The roasting of the flaxseeds significantly increased the in-vitro protein digestibility (IVPD) (p0.05) as 29.66 per cent in roasted flaxseeds against 12.94 per cent in raw Flaxseeds. Total dietary fiber content of raw and heat roasted flaxseeds was found to be 31.66 and 30.10 per cent and the soluble fiber content was 11.96 and 12.05 per cent respectively. Raw flaxseeds had the highest phytate content.
as 2.03 g per 100 g which decreased significantly on roasting to 1.51 g. The tannin content of raw flaxseeds was found to be 7.26 mg/100 g, which decreased significantly to 7.05 mg/100 g with roasting. The cyanide content of raw flaxseeds (167.70 ppm) decreased significantly with roasting (12.00 ppm).


Fresh flowers can not be stored for life time, but gifts in the form of dry flowers are the most precious gift memories of which always remain in the heart of the person forever. In this study dried flowers were arranged in five shadow boxes made out of different packaging materials i.e. wooden fiber-board, glass, acrylic, plastic (PVC) and thermocol. The products were evaluated by consumers in respect of visual appearance, size, weight, cost, ease of maintenance, durability and overall acceptability by 5-point scale. It can be concluded that most of the consumers preferred wooden fiber-board display packaging material for shadow box. It might be due to consumer’s familiarity with the wooden packaging and its appealing visual appearance, light weight, durability and remarkable cost.


Present study was conducted to know the dynamics and performance of women Self Help Groups in two districts viz. Nainital and Udham Singh Nagar district of Uttarakhand state. Data was collected from one office bearer and two members of each SHG thus total data was collected from 100 SHG’s and 300 SHG members. Findings reveals that out of the total groups studied 39.00 per cent groups were active, 19.00 per cent were dormant and 42.00 per cent were discontinued. Active groups had undertaken income generating activities at individual level. Dairy was the main activity undertaken by SHG members and on an average each member was earning Rs. 27,165 annually. Majority of the SHG members had availed loan from bank for starting income generating activity. Out of the total groups, who availed loan 41.02 per cent groups had returned the complete loan amount to the bank and 58.98 per
cent groups had to return the balance amount. Level of empowerment of the Self Help Group members was found to be of medium level.

F01 Crop husbandry

249. SHARMA, RASHMI; Department of Plant Physiology, College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PANDEY, SUNITA T.; Department of Plant Physiology, College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India) JOSHI, NEHA; Department of Plant Physiology, College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, R.C.; Department of Plant Physiology, College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India) GURU, S.K.; Department of Plant Physiology, College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India) Effect of physical and metaphysical energy on germination and seedling vigor of Chick pea. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p. 339-346 KEYWORDS: ENERGY. GERMINATION. SEEDLING PRODUCTION. VIGOUR.

Seeds of chickpea (var. PG 114) were exposed to physical energy through static magnetic fields of 100 to 250 milli Tesla intensity with the intervals of 50 milli Tesla for 1-4 hour, and to metaphysical energy through BK Rajyog meditation (BKRYM, a positive thought energy based meditation) with an interval of 1 hour. Treatment of chickpea seeds through metaphysical as well as physical energy fields resulted in significantly increased root length, shoot length, seedling dry weight, seedling vigor index, dehydrogenase enzyme activity over control. Electrical conductivity of seed leachate of treated seed significantly decreased over control.


A field experiment on the effect of pinching and plant bioregulators on growth and yield of marigold (Tagetes erecta L.) cv. Pusa Basanti was conducted during the rabi season (October 2009 to March 2010) to find out the effect of pinching and eight levels of plant bioregulators (viz. four levels of each ethrel and paclobutrazol 100, 200, 300 and 400 ppm). The results revealed that pinching significantly decreased the plant height (64.40 cm) and increased number of primary branches (37.67), more number of flowers per plant (92.04), higher estimated flower yield per hectare (115.4 q). Paclobutrazol (100 ppm) was found best for higher estimated flower yield per hectare (145.48 q), whereas ethrel 100 ppm increased the number of primary branches (38.46) and higher
estimated flower yield per hectare (119.73 q). Among the plant bioregulators Paclobutrazol (100 ppm) significantly increased more numbers of flower per plant (100.58), the maximum flower yield per plant (631.45g), higher flower yield per plot (10.103 kg) and higher estimated flower yield per hectare (145.48 q), while, ethrel 100 ppm increased number of primary branches (38.46), fresh flower weight (7.73 g), more number of flower per plant (86.45), the maximum flower yield per plant (519.72 g), higher flower yield per plot (8.315 kg) and higher estimated flower yield per hectare (119.73 q).

251. CHAND, SATISH; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SONALI.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, RANJAN.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, RANJAN.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SRIVASTAVA, RANJAN.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Response of IBA concentrations and application dates on the performance of air layering in litchi cultivars. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p. 460-465 KEYWORDS: IBA. PERFORMANCE TESTING. LAYERING. LYCHEES.

252. SAH, HARIOM.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) LAL, SHANT; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) PRATIBHA.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of shoot pruning on growth, flowering and yield in meadow orchard of guava CV Pant Prabhat. International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p.395-399 KEYWORDS: SHOOT PRUNING. GROWTH. FLOWERING. YIELDS. FRUIT CROPS.

A field experiment was conducted during 2010-11 to assess the effect of time of shoot pruning with different combinations on vegetative growth, flowering and yield attributes in meadow orchard of guava cv Pant Prabhat. The study of one (year) indicates that half shoot (50%) pruning significantly influenced cropping pattern of guava. Half shoot pruning in April and July have positive effect towards vegetative growth viz., plant height, plant spread, plant volume, emergence of new shoots and similar yield in each rainy and winter season crop. Half shoot pruning in April results in lowered rainy season yield and more number of emergences of new shoots/ plant, flower buds/ plant and increased fruit weight during winter season. Lowest yield (1.24 kg/plant) recorded in unpruned control in winter (season).

253. SINGH, ARADHANA; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, C.P.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, A.K.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Flowering behaviour of mango genotypes under Tarai conditions of Uttarakhand. International Journal of Basic and Applied Agricultural Research.
The present study was done to evaluate the mango varieties for flowering behaviour in tarai region of Uttarakhand. The experiment was carried out with forty three mango varieties in Randomized Block Design with three replications each at H.R.C., Patharchatta during the years 2012 and 2013. The varieties were found to differ significantly for the flowering traits investigated. Time of panicle emergence varied from 8 Feb in Duddha Peda; to 14 Mar in Sensation while time of full bloom varied from 11 Mar in Bara Malda to 1 April in Amrapali varieties in year 2012 and 2013, respectively. The panicle length ranged from 32.85 cm in K.O.-07 to 16.82 cm in Safeda Lucknow, panicle breadth varied from 22.05 cm in Amrapali to 8.07 cm in Zardalu; per cent male flowers ranged from 87.05% in Bada Mald to 27.09% in Pulgoa Darbhanga, per cent hermaphrodite flowers varied from 72.94% in Pulgoa Darbhanga to 12.95% in Bara Malda and the sex ratio varied from 6.77 in Banarasi Betali to 0.37 in Pulgoa Darbhanga.

SINGH, SUNEETA; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India)MISRA, K. K; College of Agriculture, G.B. Pant University of Agriculture and Technology,Pantnagar (India)RAI, RATNA; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of cultivars and picking dates on physico-chemical characteristics of Karonda (Carissa carandas l.). International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p.407-412 KEYWORDS: VARIETIES. CHEMICOPHYSICAL PROPERTIES. AGRICULTURE.

The experiment was carried out during 2008-10 in Department of Horticulture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, district Udham Singh Nagar, Uttarakhand to see the effect of cultivars and picking dates on physico-chemical characteristics of Karonda. The treatments comprised of three cultivars viz., Pant Manohar, Pant Sudarshan and Pant Suvarna and three picking dates of berries (40, 60 and 80 days after fruit set). All the 9 treatment combinations were laid out in a 3x3 factorial randomized block design with 3 replications. Observations were recorded at three different picking dates. The treatment combination, Pant Suvarna and picking of fruits at 80 days after fruit set (C3D3) was found better in terms of moisture, total soluble solids (TSS), reducing sugar, non reducing sugar, total sugar, titrable acidity, ascorbic acid, phosphorus, calcium and iron content i.e. maximum moisture content (89.41 %), highest TSS (8.530 Brix), highest iron (6.74 mg/100g), maximum ascorbic acid (12.06 mg/100g) and lowest titrable acidity (1.74%) followed by Pant Manohar and picking at 80 days after fruit set (C2 D3). The treatment combination of Pant Suvarna and picking of fruits at 60 days after fruit set (C3 D2) recorded maximum pectin content.

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The present investigation was carried out under the laboratory conditions of the Model floriculture centre of the university to investigate the effect of various pulsing treatments on quality and longevity of cut rose cv. Naranja. The experiment comprised of three different chemicals (STS, 8-HQC and chlorine) which were tested alone in different concentrations and in combination with sucrose 3% and 5% along with distilled water as control. The flowers were pulsed for 12 and 24 hours duration. After pulsing the flowers were kept in distilled water and various observations like water uptake, water loss, flower diameter, sugar contents, vase life and other were taken. Studies revealed that pulsing the flowers with Sucrose (5%) + 8-HQC (200 ppm) for 24 hour duration helped the stems to maintain better water relation in terms of water uptake and water loss which consequence the maximum vase life of 10.50 as compared to control (4.08 days).


The present investigation was carried out to observe the effect of different high density planting on growth, flowering, fruiting and yield of guava during the year 2012-13 and 2013-14. Treatments were consisted of four plant spacings i.e. 1.0X1.0 m (S1), 2.0X1.0m (S2), 2.0X1.5m (S3) and 1.5X1.5m (S4), replicated six times in randomized block design. Findings revealed that plant spacing 1.0x1.0m (S1) gave higher increase in plant height (0.74 and 0.60m). Whereas, plant spacing 2.0x1.5m (S3) gave significantly higher annual increase in plant spread (54.04 and 56.15 cm) and stem diameter (2.14 and 2.24 cm) respectively during both the years. Significantly higher yield per plant was obtained with plants spaced at 2.0X1.5m (S3). While, significantly higher yield per hectare was obtained with plant spacing 1.0X1.0 m (S1) during both the years.


A study was conducted to evaluate three karonda cultivars viz., Pant Suvarna, Pant Manohar and Pant Sudarshan for their growth and fruit characters.
Cultivar Pant Suvarna recorded the highest tree height, canopy spread, stem girth, cross trunk sectional area (CTSA), tree volume, leaf area, leaf chlorophyll, fruit length, fruit breadth, moisture content and total soluble solids (TSS). The maximum number of fruits per 100 g yield of fruits per bush, titratable acidity and ascorbic acid were recorded in the cultivar Pant Sudarshan while number of seeds per fruit was highest in the fruits of Pant Manohar.


Efficiency of selection procedure viz., pedigree, random bulk and single seed descent method for yield and its attributes in pea was studied in F3 generation involving sixteen crosses. Significant differences were observed among the breeding methods for all the traits in all the crosses except for days to flowering. The pedigree selection method was found effective for improvement of characters viz., early flowering, 100-seed weight, pod length, number of pods per plant, green pod weight per plant and short plant height. Random bulk method was better for improvement of 100 green pod weight and number of pods per plant while, all the three selection methods were equally effective for improvement in number of seeds per pod.


Correlation and path coefficient analysis among forty-eight potato genotypes including four checks was studied and evaluated for nine quantitative traits in an augmented block design during winter season of 2012-13. All the characters studied showed highly significant difference among check varieties which indicates the existence of sufficient variability for various traits. Significant and positive correlation of total tuber yield was recorded with plant height \( (r=0.411) \), number of shoots \( (r=0.449) \), tuber yield per plant \( (r=0.757) \), marketable yield per plot \( (r=0.995) \) and average tuber weight \( (r=0.594) \) and non significant correlation with emergence per cent \( (r=0.284) \) and number of tuber per plant \( (r=0.153) \). Path analysis revealed that marketable yield per plot, number of tuber per plant, plant height and tuber yield per plant had highest positive direct effect on total tuber yield. This analysis showed that plant height, number of tuber per plant, tuber yield per plant and marketable yield per plot were main characters for tuber yield. Therefore, these characters should be preferred while making selection for improvement of tuber yield.
260. Arabhanvi, Fakeerappa.; Deptt. of Agronomy, ZARS University of Agriculture Science, GKVK, Bangalore (India) Murali,K.; AICRP on pigeonpea, ZARS University of Agriculture Science, GKVK, Bangalore(India) Mallareddy.; Deptt. of Agronomy, ZARS University of Agriculture Science, GKVK, Bangalore (India) Halli,M.Hanamant.; Deptt.of Agronomy, ZARS University of Agriculture Science, GKVK, Bangalore(India). Yield maximization through integrated agro-techniques on growth, yield and nutrient uptake of pigeonpea (Cajanus cajan (L.)Millsp). Green Farming. (Jul 2015) v.6(4) p.700-703 KEYWORDS: GROWTH. NUTRIENT UPTAKE. YIELDS. CULTIVATION. OESOPHAGUS. INDIA.

A field experiment was conducted at Gandhi Krishi.Vignana Kendra, University of Agricultural Sciences, Bengaluru in red sandy clay loam textured soil during kharif season of 2013 under rainfed condition to evaluate the integrated agro-techniques on growth and yield parameters of medium duration pigeon pea. Among the integrated agro-techniques, the combined application of integrated nutrient management (INM)+integrated weed management (IWM)+integrated pest management (IPM) practices recorded significantly higher growth attributes like, plant height (152.33 cm), number of primary branches (16.63/plant), number of secondary branches (11.43/plant), leaf area (35.23 ern/plant), leaf area index (1.95) and total dry matter accumulation (173.23 g/plant) at harvest as compared to other treatments. Similarly significantly higher yield attributes such as number of pods per plant (147.87), pod weight per plant (133.50 g), grain weight per plant (48.97 g), grain yield (1822 kg/ha) and stalk yield(4087 kg/ha) was recorded with combined application of INM,IWM and IPM practices as compared to other integrated agro-techniques. Further, the combined application of INM, IWM and IPM practices recorded 41.4 % higher grain yield over farmer's practice. Similarly the combined application of INM, IWM and IPM practices recorded significantly higher nutrient uptake of N (99.00 kg ha), P (28.80 kg ha), K (56.33 kg ha), S (14.10 kg ha) and Zn (0.046 ppm) by crops, but statistically it was on par with IWM + IPM practices. Whereas, lower nutrient uptake by crops was in farmer's practice i.e., N (63.01 kg ha) P (12.50 kg/ha) K (29.93 kg/ha) S (9.50 kg/ha) and Zn (0.006 ppm).

261. Angami, Thejangulie.; KVK Hailakandi ICAR (RC) for NEH Region,Laksmisahar, Hailakandi (India)Singh, Shamsher.; KVK Hailakandi ICAR(RC) for NEH Region, Laksmisahar, Hailakandi (India)Rahman, Azizur.Md. SK.; KVK Hailakandi ICAR (RC) for NEH Region, Laksmisahar,Hailakandi (India)Kumar, Abhishek.; KVK Hailakandi ICAR (RC) for NEH Region, Laksmisahar, Hailakandi (India). A case study on river bed vegetable cultivation : A sustainable approach in bark vally zone,Assam. Green Farming. (Jul 2015) v.6(4) p.911-913 KEYWORDS: FARMERS. VEGETABLE CROPS. ANIMALS. VALLEYS. ASSAM. SUMMER. INDIA.

River bed vegetable cultivation system has a long history of its practice by the farmers of Barak Valley Region of Assam. This cultivation is usually adopted by landless farmers residing in the vicinity of rivers for meeting their household food security which constitute a distinct type of farming has emerged as a niche based on- farm income generation activity and a livelihood alternative for land poor families and well accepted by farmers. However,
generally river bed farmers do not calculate the profit margin from the farming system, so an attempt has been carried out in the year 2013 under the supervision of KVK Hailakandi (ICAR) by selecting group of farmers to study the household income and nutritional aspects. The paper discusses about the river bed vegetable production system, future prospects, constraints, household income and nutritional value in particular from different vegetable crops grown in river bed. The benefit cost ratio of 2.35 was recorded from the farming system from one bigha area i.e., 1330 m². This confirms its suitability of growing different vegetable crops for achieving better livelihood. The net profit will further increase if proper scientific agro techniques are followed along with introduction of high yielding varieties.

262. Gohain, T.; School of Agricultural Sciences and Rural Development Nagaland University, Medziohema (India). Performance of some local rice cultivars under rainfed upland condition of nagaland. Journal of Interacademia (India). (Jul 2015) v.19(3) p.332-337 KEYWORDS: RICE. CULTIVATION. GROWTH. UPLAND RICE. MAIZE. HOUSEHOLDS. PRODUCTION.

A field experiment was conducted during kharif 2013 at SASRD, Nagaland University to see the performance of nine local rice cultivars collected from different parts of Nagaland. The crops were grown under scientific packages of practices giving a single dose of NPK (60:30:30). Results revealed that highest plant height was produced by the cultivar Hoikha (155.10 cm) and the shortest by Malaken (109.10 cm). Highest number of leaves plant I was recorded in the cultivar Hoikha (5.33) and lowest in the cultivar Taryu (4.44). Highest number of tillers meter was recorded by Shavuye (160) whereas the lowest in Hoikha (123). Gwabilo ssu cultivar produced the highest CGR (0.19) and lowest by Chali Youh (0.05). Highest RGR was produced by Chali Youh (0.011) and lowest in Taryu (0.005). Shavuye produced the highest panicles meter? (135) and the lowest was produced by Khatori (103). Longest length of panicle was recorded in the cultivar Gwabilo ssu (29.95 cm) and the shortest in the cultivar Taryu (23.60 cm). Weight of panicle was highest in Apaghi (6.72 g) and lowest in Malaken (3.72 g). Hoikha recorded the highest number of grains panicle' I (201) while the lowest in Ginlo (91). Test weight was recorded highest in the cultivar Taryu (33.66 g) and lowest in Hoikha (19.89 g). Hoikha produced the highest grain yield (18.52 q hal) and the lowest in the cultivar Ginlo (5.93 q/ha), Highest biological yield was produced by Hoikha cultivar (49.89 q/ha) while the lowest in Malaken (29.85 q/ha). Harvest index was recorded highest in Hoikha (37.07%) and the lowest in the cultivar Shavuye (28.86%). Among the different cultivar performance, Hoikha was found to performed better than the other cultivars producing the highest plant height (155.10 cm), number of leaves plant I (5.33), highest number of grains plant I (201), highest grain yield (18.52 q/ha), highest biological yield (49.89 kg/ha) and highest Harvest index (37.07%).

263. Anisha, N. P.; College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka (India)Hegde, V. R.; College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka (India). Dependence of gerbera plantlets to arbuscular mycorrhizal colonization. Journal of Interacademia (India). (Jul 2015)
Present study was conducted under shade net condition to screen the positive effects of inoculation of arbuscular mycorrhizal fungi (AMF) namely Acaulospora laevis, Gomus fasciculatum and Scerocystis dussii, on growth and development of plantlets of Gerbera (Gerbera jamesonii) cv. Pink Elegance and Danaellen, propagated in vitro. Mycorrhizae inoculated plantlets showed better shoot and root length, chlorophyll content, leaf area and leaf area ratio when compared to uninoculated plantlets. Scerocystis dussii was found to be the most proficient species in influencing the plant growth characters among the mycorrhizal fungi studied. On the other hand cultivar Danaellen exhibited better growth parameters compared to Pink Elegance. Scerocystis dussii inoculated plantlets showed 19.97 per cent, 46.36 percent, 13.41 per cent and 6.7 percent increase in shoot length, root length, leaf area and chlorophyll content, respectively, when compared to uninoculated plantlets 30 DAP. Roots of mycorrhizae inoculated plantlets showed presence of both external and internal hyphae with well-formed arbuscules and vesicles confirming the establishment of good mycorrhizal association. This investigation strongly reveals that the mycorrhizal association helps in successful growth of tissue culture raised plantlets of gerbera during ex-vitro establishments.

**F02 Plant propagation**

264. RAI, KRISHNA MADHAV; College of Agriculture, C.C.S. Haryana Agricultural University, Hisar, (India) GOYAL, R.K; College of Agriculture, C.C.S. Haryana Agricultural University, Hisar, (India) GODARA, A.K; College of Agriculture, C.C.S. Haryana Agricultural University, Hisar, (India). In vitro multiplication of strawberry (Fragaria x ananassa Duch.) cultivars Ofra and Chandler. International Journal of Basic and Applied Agricultural Research. (May 2014) v.12 (2), p.208-211. KEYWORDS: ECONOMIC THEORIES. ARBUTUS. VARIETIES. SHOOTS. KINETIN. Shoot tip of strawberry gave rise to multiple shoots when cultured on MS medium supplemented with different concentration of kinetin and BAP with IAA and TDZ. The highest response of shoot multiplication was obtained in MS medium containing 2.0 mg/L kinetin + 0.5 mg/L IAA and 1.5 mg/L kinetin + 0.5 mg/L TDZ for Ofra and Chandler cultivar respectively. The regenerated shoots were rooted in MS basal medium with IBA, NAA and control (without growth regulator). The highest root length and number of roots was produced in MS medium containing 1.0 mg/L IBA. The plantlets, thus developed were hardened and successfully established in mixture of coco-pit, vermiculite and perlite in ratio of 3:1:1. The plants raised through this technique exhibited normal growth and fruit setting.

**F03 Seed production**

265. Shinde, M.S.; Deprt. of Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkan Vidaepeth, Dapoli, (India) Haldankar, N.S.; Deprt. of Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkan Vidaepeth, Dapoli, (India) Parulekar,
R. Y.; Deptt. of Horticulture, College of Agriculture, Dr. Balasaheb Sawant KonkanVidapeeth, Dapoli, (India)Haldavanekar, C. P.; Deptt. Of Horticulture, College of Agriculture, Dr. Balasaheb Sawant KonkanVidapeeth, Dapoli, (India)Bhave, G. S.; Deptt. of Horticulture,College of Agriculture, Dr. Balasaheb Sawant Konkan Vidapeeth,Dapoli, (India)Godase, N. S.; Deptt. of Horticulture, College ofAgriculture, Dr. Balasaheb Sawant Konkan Vidapeeth, Dapoli, (India)Lawande, E. K.; Deptt. of Horticulture, College of Agriculture, Dr.Balasaheb Sawant Konkan Vidapeeth, Dapoli, (India). Effect of pre-harvest bagging with different type of bags on physico-chemical properties of mango cv. kesar. Green Farming. (Jul 2015) v.6(4) p.809-812 KEYWORDS: MANGOES. CHEMICOPHYSICAL PROPERTIES. PESTS. PROPERTY. CLIMATE. QUALITY. An investigation was undertaken to study the effect of differenttypes of bag for pre-harvest bagging on physico-chemical properties of mango cv. Kesar during 2012-2014. Egg size fruit (45 days after fruit set) were randomly selected for bagging. The field experiment was conducted in Randomised Block Design with 7 treatments of different types of bags viz, T,: Newspaper bag; T,: Brown paper bag; T,: Polythene bag; T4: Butter paper bag; T; Muslin cloth bag; T.: Scurting bag; T,: Control (no bagging). All the treatments were replicated three times with a unit of 30 fruits per replication per treatment. All types of bag improved fruit retention, fruit weight, fruit diameter, pulp weight, TSS, reducing sugars and total sugars of mature fruits. The sensory qualities were maintained by bagging treatments. The disease incidence and pests were significantly reduced by preharvest bagging. Among the different types of bag newspaper and scurting bags were found to be meritorious.

F04 Fertilizing

266. SHARMA, ASHEESH; Directorate of Experiment Station,G. B. Pant University of Agriculture and Technology, Pantnagar (India)BHATNAGAR,PRERAKJAIN, M.C.; Directorate of Experiment Station,G. B. PantUniversity of Agriculture and Technology, Pantnagar (India)SINGH, J.P; Department of Fruit Science,College of Horticulture and Forestry,Maharana Pratap University of Agriculture and Technology,Udaipur (India). Effect of integrated nutrient management on plant environment variables in custard apple cv. Arka Sahan. International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12),p.235-239 KEYWORDS: INTEGRATION. CULTURE MEDIA. ENVIRONMENT. HUMIDITY CONTROL. ANNONA SQUAMOSA.

An experiment was conducted to know the effect of organic and inorganic fertilizers along with bio-fertilizers on plant environment variables of custard apple cv. Arka Sahan during 2010-11. The experiment consisted of different treatment combinations comprising recommended dose of fertilizers, vermicompost and biofertilizer (Azotobacter, PSB and VAM). Experimental findings revealed that different treatments of integrated nutrient sources significantly increased the plant parameters. Among these integrated nutrient management treatments, treatment T10 comprising 50 % recommended dose of fertilizers + 50 % N through vermicompost and biofertilizers (Azotobacter 50 g + PSB 50 g + VAM 20 g ) was found significantly superior over other treatments with respect to plant environment variables viz. Photosynthetic rate (µmolm-2s-
1), Transpiration rate (mmolm-2s-1), Stomatal conductance (mmolm-2s-1), Photosynthetic Active Radiation (mmolm-2s-1), Internal CO2 Concentration (ppm), Vapour Pressure Deficit (mb), Leaf temperature (OC) and Relative Humidity(%) in custard apple cv. Arka Sahan.


In the intensive agriculture system, integrated nutrient management (INM) based on soil test value is the most appropriate approach to solve various issues related to sustainability, productivity, quality and conserving natural resources in efficient and economical way. Cabbage is well known for its nutritive value and health benefits. Field experiments were conducted to study the effect of fertilizers, FYM and micronutrients on yield and quality of cabbage and nutrient availability under intensive cultivation during Rabi season 2008-09 and 2009-10. Results indicate that yield and various yield components of cabbage were found to be highest and significant in the treatments where boron and molybdenum doses were applied along with recommended dose of N, P and K (RDF=NPK::120:80:40). Head yield of cabbage was significantly correlated with various yield components, uptake of N, P and K, protein and ascorbic acid content. Nitrogen, phosphorus and potassium uptake was highest in the treatments where RDF was applied with boron or molybdenum. Protein and Ascorbic acid contents in cabbage were highest with the application of 2 kg ha-1 Na-molybdate along with RDF. After harvest of crop, maximum available N was recorded in treatment where RDF applied while available P and K values were higher where 20 t ha-1 FYM was applied.


Soil health management is one of the major contributing factors for sustainable agriculture across diverse production systems. In intensive agriculture, a good soil health is essential to maintain the productive capacity of the soil system and to sustain high crop productivity and produce quality. In Indian context, soil health decline has been reflected in terms of emergence of multiple nutrient deficiencies in major crop production systems and reducing fertilizer response ratio. The decline is primarily caused by soil erosion, nutrient mining, reduced use of organics, imbalances in fertilizer use and decreasing landman ratio. Thus, a holistic approach involving the possible sources and best management practices is needed. The major strategy to improve soil health should aim at arresting nutrient mining and should be based on soil test based integrated nutrient management, promotion of balanced fertilisation, use of crop
residues, conservation agriculture and finding methods to incorporate organic matter into the soil. Periodic assessment of soil health with new tools and techniques is equally important and should be carried out for major production systems of the country.


India has a wide variety of climate and soil on which a large range of horticultural crops such as fruits, nuts, vegetables, root tubers, palms, spices, cashew, cocoa, ornamental crops, medicinal and aromatic plants are grown. The policymakers have realized that the horticultural crops need promotion for achieving sustainability of small holdings, crop diversification, increasing employment, providing an enormous export potential, improving environment, and more than anything for achieving nutritional security. As a result horticulture has received due emphasis during the last few decades. A due importance to nutrients is essential as these affect the productivity, quality and profitability of horticultural crops. To obtain desired yields in horticultural crops sufficient amounts of readily available essential plant nutrients need to be supplied to the plant. Soil nutrients, like all agricultural inputs, need to be managed properly to meet the fertility requirements of horticultural crops. Appropriate nutrient management practices for horticultural crops vary widely due to cropping, topographical, environmental, and economic conditions. With the variety of factors complicating the fertility management in horticultural crops, it is nearly impossible to recommend single set of best management practices uniformly to all the horticultural farms. Nutrient management practices for maintaining or improving farm profitability must be tailored to the unique conditions of individual farms. A number of options for improved nutrient management are available for the horticultural crops and are discussed in this paper.

270. Tarafdar, C.J.; Indian Council of Agricultural Research, Central Arid Zone, Jodhpur (India) Rathore, Indira.; Indian Council of Agricultural Research, Central Arid Zone, Jodhpur (India) Thomas, Esther; Indian Council of Agricultural Research, Central Arid Zone, Jodhpur (India). Enhancing nutrient use efficiency through nano technology interventions. Indian Journal of Fertilisers (India). (Dec 2015) v.11 (12) p.46-51 KEYWORDS: AGRICULTURE. FERTILIZERS. RHIZOSPHERE. FOOD PRODUCTION. PRODUCTION. INDIA.

271. Sundari, Hema.C.; Department of Business Economic Faculty of Commerce, Baroda (India). Fertiliser consumption in India under different policy regimes:
The role of price and non price factors. Indian Journal of Fertilisers (India). (Dec 2015) v.11 (12) p.56-69 KEYWORDS: FERTILIZERS. INDIA. IRRIGATION. ECONOMIC DISTRIBUTION. CROP MANAGEMENT.

During last four decades country witnessed an increase, both in intensity and dispersion, in the fertiliser consumption. Despite observed increasing spread, wide variations in per hectare consumption in the states are a common feature. It calls for a need to identify the factors that affect fertiliser consumption and their contribution to growth in the fertiliser demand. Differences in growth and stability have imprints of the changing policy environment. Lower fertiliser prices, rapidly falling real prices supported by higher growth in irrigation, HYV seeds, fertilizer distribution and credit flow, facilitated the growth of fertilizer consumption during the Retention Price Scheme regime as indicated by high consumption growth (7.48%) and low instability (4.58%). In the post-reform period, more rapid growth in fertilisers prices as compared to output prices, i.e., slower fall in real prices, slow growth in non-price factors and slow down in yield growth affected the agricultural growth. This resulted in lower growth in fertilizer consumption (3.75%) and higher instability (6.75%). Real prices, Irrigation and distribution showed significant effect on fertilizer demand in the period 1977-78 to 2011-12. In the post-reform period fertiliser demand was more responsive to price changes as support from non-price factors was less as compared to that in the RPS period. Price elasticity of demand is increasing. The contribution of prices to growth in fertiliser demand is also increasing. In view of the changing cropping pattern, there is a need to develop market infrastructure so that farmers get better prices for the output. Yield enhancing technology and irrigation together will bring more volumes to improve profitability and incomes. It will place farmers in a better footing to withstand the rising fertiliser prices.


Ammonia manufacturing technology is a challenging task for licenser of ammonia plant due to cost of energy and availability of raw material. This article discusses main features of technologies available from various vendors in the market including basic differences in process and the equipments used in these technologies to optimize the energy and plant capacity. KRIBHCO revamped both the ammonia plants to increase the capacity from 1520 MTPD to 1890 MTPD in 2011-2012 by shifting from conventional process to purifier process and developed the operating philosophy to run the revamped plant.

IFFCO Kandla has developed an innovative process for heating ammonia by utilizing the heat energy from the return chilled water to heat ammonia from \(-33^\circ\text{C}\) to 0 \(^\circ\text{C}\). The heat load from AHU system is adequate to meet the heating requirement of ammonia to be fed to NPKIOAP streams. Use of steam to preheat ammonia has been eliminated.


**KEYWORDS:** FERTILIZERS. CHEMICALS. WATER VAPOUR. AMMONIA. PRODUCTION. INDIA. SOLUTIONS.

Energy efficiency improvement is an important way to reduce costs and to increase predictable earnings, especially in times of high energy price volatility. There are a variety of opportunities available at individual plants to reduce energy consumption in a cost-effective manner. As we know that Ammonia & Urea manufacturing is highly energy intensive and contributes more than 80% of the total cost of Urea production. Therefore, a slight change in energy consumption affects the cost of production in a big way. Apart from cost of production, reduction in energy saves the valuable & fast depleting natural resources such as Natural gas and in turn reduces country’s import bill. Therefore, the Energy conservation is a major corporate objective at CFCL and CFCL is committed to make continuous process improvements for optimizing the plant performance. Based on our commitment for continual improvement in energy consumption, a potential energy saving scheme was identified based on the discussions with OEM and it was concluded that uprating of Synthesis gas compressor can be justified on standalone payback basis. The potential of energy reduction in Synthesis compressor was in improved Flow path design, parasitic loss reduction due to technological improvements and change in operating point of the compressor since installation in the year 1993. This paper describes bottlenecks experienced and journey from feasibility study to actual achievement with payback periods and improvements in terms of Energy, Green House Gas (GHG) emission reduction and better productivity. With the continual increasing Energy cost, we expect to achieve the desired returns on investments.


**KEYWORDS:** WATER. FERTILIZERS. INDUSTRY. INDIA. PRODUCTS. TIME. PRESSURE. ION EXCHANGE.

Water is a scare commodity. Conservation of water is not only necessary to save cost and minimize impact on environment but even to sustain production. The paper discusses various options available for reducing water consumption by proper treatment of raw water and waste water and also by recycle and reuse of water. A variety of new water treatment chemicals and
treatment technologies are available to minimize water consumption in fertiliser plants.

276. Jeyajothe, R.; Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore (India) Durairaj, Nalliah.S.; Agricultural College and Research Institute Tamil Nadu Agricultural University, Killikulam (India) Rajapandian, Sundersingh J.; Agricultural College and Research Institute Tamil Nadu Agricultural University, Killikulam (India). Effect of organic and inorganic source of nutrients & biofertilizer on growth, yield attributes & nutrient uptake of transplanted rice. Green Farming. (Jul 2015) v.6(4) p.687-691 KEYWORDS: GROWTH. FARMYARD MANURE. GREEN MANURES. NUTRIENT UPTAKE. MANAGEMENT. ORGANIC ACID SALTS. ORGANIC AGRICULTURE. INDIA.

A field investigation was carried out during rabi season (Pishanam rice) of 2012-2013 at wetland of Central Farm, Agric. College and Res. Instt., TNAU, Killikulam, to investigate the effect of organic and inorganic source of nutrients and biofertilizer on growth and yield attributes, nutrient uptake, yield and economics of transplanted rice (Oryza sativa). There were fourteen treatments laid out in a RB Design and replicated thrice using the rice variety ADT(R) 45. Among the different nutrient management practices, application of GLM 6.25 t ha⁻¹ + Azophosmet + 100 % NPK registered significantly the highest growth and yield attributes. The uptake of N, P and K nutrients by rice crop at all the stages of crop growth was remarkably increased by the application of GLM + Azophosmet + 100 % NPK. The grain yield was increased, when GLM was integrated with 100 % NPK application (6030 kg ha⁻¹). The grain yield was further increased, when Azophosmet was applied through seed and soil application along with GLM and 100 % NPK (6617 kg ha⁻¹). However, it was on par with application of FYM +Azophosmet + 100 % NPK. The same trend was noticed in straw yield also. Application of GLM +Azophosmet + 100 % NPK recorded the highest net return of 74,108 ha⁻¹ and B:C ratio of 3.63.

277. Halli, M.Hanamant.; Deptt. of Agronomy, University of Agriculture Science, GKVK, Bangalore (India)Geetha, N.K.; Deptt. of Agronomy, University of Agriculture Science, GKVK, Bangalore (India) Shankar, G.A.; Deptt. of Agronomy, University of Agriculture Science, GKVK, Bangalore (India)Arabhanvi, Fakeerappa.; Deptt. of Agronomy, University of Agriculture Science, GKVK, Bangalore (India). Response of seed treatment with micronutrients, bio-fertilizers and pesticides on uptake of nutrients, yield & economics of sunflower. Green Farming. (Jul 2015) v.6 (4) p.708-711 KEYWORDS: FERTILIZERS. TRACE ELEMENTS. NUTRIENT UPTAKE. SEED TREATMENT. USA. INDIA.

The investigation was undertaken to study the influence of seed treatment with micronutrients (Zn and B), bio-fertilizers (Azotobacter and PSB) and pesticides (Imidacloprid) on nutrient uptake, yield and economics of sunflower (Helianthus annuus L.) at Zonal Agricultural Research Station (AICRP on Sunflower scheme), GKVK, University of Agricultural Sciences, Bengaluru during kharif-2013. The experiment consists of fifteen treatments laid out in Randomised Complete Block Design with three replications. Treatments include application of micronutrients through different methods like soil application,
foliar application and seed treatment in combination with bio-fertilizers and pesticide as individual application and in combinations along with RDF (90:90:60 kg NPK ha-1). The field study indicated that, total uptake of macro nutrients (N, P, K and S) did not responded to seed treatment with micronutrients, bio-fertilizers and pesticides significantly but biofertilizer application increased the micro nutrient uptake compared to non-biofertilizer application treatments. Combined application of micronutrient (B), bio-fertilizers and pesticides through seed treatment in addition to RDF improved the seed yield (15.35 %) and oil yield (15.97 %) of sunflower (KBSH-53) significantly compared to soil application of micronutrients and control. Also recorded lower cost of cultivation and better BCR (2.10) compared to RDF alone (1.70), acts as alternate option to improve the economic yield with minimum cost.


A field experiment was conducted at the Agricultural College Farm, Bapatla to study the effect of nitrogen levels and weed control practices in baby corn. Application of 180 kg N/ha recorded significantly more plant height compared to that of 150 and 120 kg N/ha. Hand weeding twice (W1) recorded significantly more plant height. Higher ear and husk yields were obtained with the application of 180 kg N/ha. Among weed control measures, hand weeding twice (W1) recorded significantly higher ear and husk yield. Higher fresh fodder fodder yield was obtained with the application of 180 kg N/ha but it was on a par with 150 kg N ha-1. Among weed control measures, hand weeding twice (W1) recorded significantly higher fresh fodder yield. Butitwason a parwith pendimethalin 1.0 kg a.i./ha; 2,4-D amine 58kg a.i./ha. The maximum nitrogen content and uptake in ear was recorded with the application of 180 kg N/ha where as hand weeding twice (W) recorded significantly higher nitrogen content and uptake in ear. Application of 180 kg N/ha recorded significantly higher crude protein over the 150 and 120 kg N/ha. Among the weed control practices, hand weeding twice (W1) recorded significantly higher crude protein. The highest gross returns, net returns and returns per rupee investment were higher under hand weeding twice at all the levels of nitrogen.

279. Kulhare, P.S.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Jawaharlal Nehru Kristi Vishwavidyalaya, Jabalpur (India) Sharma, D.G.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Jawaharlal Nehru Kristi Vishwavidyalaya, Jabalpur (India) Tagore, S.G.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Jawaharlal Nehru Kristi Vishwavidyalaya, Jabalpur (India)Sharma, L.
B.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Jawaharlal Nehru Kristi Vishwavidyalaya, Jabalpur (India). Direct and residual effect of FYM & zn levels on yield, zinc content and uptake by maize - wheat sequence in a vertisol. Green Farming. (Jul 2015) v.6(4) p.735-739 KEYWORDS: FARMYARD MANURE. ZINC. MAIZE. PRODUCTION. RAIN. PHYSICAL ACTIVITY.

A field experiment was conducted during 2010-12 at College of Agriculture, J.N. Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh to study the effect of levels of FYM (0, 2.5, 5.0 and 10 t na) and Zn (0, 2.5 5.0 and 10 kg/ha) on yield, Zn content and uptake by maize (Zea mays L.) and their residual effect on wheat (Triticum aestivum L.) in a Vertisol. The application of FYM 5 and 10 t ha-1 and Zn 5 and 10 kg ha-1 in maize and their residual effect on wheat significantly increased the yield, Zn content of grain and stover/straw and Zn uptake by maize and wheat and available Zn after maize and wheat over control respectively.


A field study on long-term use of fertilizers, manure and their combination on physiological variables and productivity of wheat was conducted during rabi 2011-12 at the Instructional farm of the Rajasthan College of Agriculture, Udaipur. The crop rotation followed was maize-wheat. The uptake of N, P, K by different plant parts (leaf, stem and ear head) of wheat at 30, 60, 90 DAS and at harvest were increased significantly with the application of 100% NPK along with FYM 10 t/ha over control. The highest accumulation of these nutrients was recorded by treatment 1 100% NPK along with FYM 10 f/ha followed by 150% NPK. Integrated use of 100% NPK + FYM 10 t/ha maximized grain yield (5139 kg/ha) which represented increase of 693 and 3552 kg/ha over 100% NPK and control, respectively. Similarly, maximum straw yield (6616 kg/ha) were recorded when crop was supplied with 100% NPK + FYM 10t/ha which represented increase of 715 & 3938 kg/ha over 100% NPK & control, respectively.

The feasibility of aquaculture effluent as irrigation water for Salicornia brachiata Roxb. was determined to access the effect of effluent on fresh biomass, dry biomass, nutrient content and uptake. A field experiment was conducted using split plot design (SPD) with three factors (S- Sources of irrigation, M-Methods of sowing, F-Levles of fertilizer) at Central Soil Salinity Research Station, Dhanti-Umbharat, Navsari, India. The fresh and dry biomass yield of Salicornia was higher with the application of aquaculture effluent water to sea water irrigation. An application of 125:75:50 RDF of NPK conspicuously increased the fresh and dry biomass yield. The interaction study between the aquaculture effluent irrigation and 125:75:50 RDF of NPK on the fresh and dry biomass yield was significant. The individual effect of aquaculture effluent and 125:75:50 RDF of NPK were significant in the plant primary and secondary nutrient content and uptake. Concomitantly, the interaction of aquaculture effluent irrigation and 125:75:50 RDF of NPK was significant in plant primary and secondary nutrient uptake. In completion of the analysis, there was 40-50 per cent nutrient saving with using aquaculture effluent.


The present investigation on performance of N, P and K on growth, yield and quality of watermelon (citrullus lanatus Thunb.) cv. Kiran under South Saurashtra condition was carried out at Fruit Research Station, Deptt. of Horticulture, Junagadh Agric. Univ., Junagadh during the year 2010. The experiment was laid out in R.B. Design with Factorial concept (FRBD). In all there were 16 treatment combinations with 1 control treatment, which were assigned at random in each plots within replications such as a treatments in which three levels of Nitrogen (N1: 50, N2: 75, N3: 100 & N4 : 125 kg/ha), two levels of Phosphorus (P1 : 75 & P2 : 100) and two levels of Potassium (K1 : 40 & K2 : 60 kg/ha). The results of experiment reveal that growth characters such as number of branches per plant, number of nodes per plant, length of main axis and intermodal length were significantly influenced by higher dose of nitrogen (125 kg/ha). Number of branches and nodes per plant were also found significant differences due to levels of phosphorus and significant differences were observed in number of branches per plant and length of main axis due to different levels of potash. Whereas, significantly minimum values for growth characters were recorded under the control treatment. The yield attributing characters such as fruit length, number of fruits per plants and average fruit weight were significantly increased with increasing level of nitrogen (0 to 125...
kg/ha). Similarly yield attributing characters increased with increasing level of potash (0 to 60 kg/ha). Characters like fruit length and average fruit weight were increased significantly with higher dose of phosphorus. Yield of fruit per plant and per hectare were registered maximum under higher dose of nitrogen (125 kg/ha) and potash (60 kg/ha) while, lower yield recorded by control. Quality characters like pulp weight, TSS, reducing sugar and total sugar were also significantly increased with increasing level of nitrogen and phosphorus application, but non-significant differences were observed due to different level of potassium application except in pulp weight of fruit.


An experiment was conducted to study the effect of organic and inorganic mulches for weed management in chilli. Results revealed that the treatment of inorganic mulching with black polythene is mos! effective for controlling of Cyperus rotundus L., Cynodon dactylon (L) Pers., Melilotus alba, Convolvulus arvensis, Chinopodium album, Parthenium hysterophorus and argemone mexicana. The minimum weed biomass ,weed competition index, maximum weed control efficiency and higher yield was also reported with black polythene inorganic mulch.


A field experiment entitled effect of biofertilizers and micronutrients on yield and quality of garlic (Allium sativum L.) var. G-282’ under black cotton soils in Jhalawar condition was conducted during the rabi season in 2012-13 at the Department of Vegetable Science, College of Horticulture & Forestry, Jhalawar. The experiment was carried out by inoculating 2 biofertilizers viz., PSB and Azotobacter and foliar spray of 3 micronutrients viz., 0.4% ZnSO4, 0.2% Boric acid and 0.05% CuSO4. The application of biofertilizers and micronutrients had significant effect on yield and quality of garlic over control. The treatment T5 (PSB + 0.4% ZnSO4) recorded maximum yield attributes like fresh weight of bulb
(34.37 g), diameter of bulb (5.49 cm), number of cloves per bulb (30.67 cloves), fresh weight of 50 cloves (86.67 g), dry weight of 50 cloves (42.50 g), bulb yield per plot (5.15 kg plot-1), bulb yield per hectare (229.03 q ha-1) and quality attributes like TSS (43.33 %), ascorbic acid content (15.60 mg /100 g), dry matter content in bulb (49.01 %), nitrogen (3.33 %), crude protein (20.80 %), sulphur (1.48 %) and pungency (72.33 ?mol/g) in bulb. The treatment T6 (PSB + ZnSO4) and T9 (Azotobacter + ZnSO4) and T5 were at par with T5 in most of the characters such as neck thickness, diameter of bulb, fresh weight of 50 cloves, bulb yield plot-1, bulb yield ha-1 and ascorbic acid in bulb and the maximum nitrogen content (357.67 kg N ha-1), phosphorus (25.33 kg P ha-1) and potassium (227 kg K ha-1) was recorded with the treatment T11 (Azotobacter + CuSO4 @ 0.05%) and minimum in T5 (PSB + ZnSO4 @ 0.4%) i.e. 338.33 kg N ha-1, 20 kg P ha-1 & 223.33 kg K ha-1).

285. Banjara, C. N.; Deptt. of Horticulture, Indira Gandhi Kristi Vishwavidalaya, Raipur (India) Sahu, D. G.; Deptt. of Horticulture, Indira Gandhi Krishi Vishwavidalaya, Raipur (India) Sharma, G. H.; Deptt. of Horticulture, Indira Gandhi Krishi Vishwavidalaya, Raipur (India). Response of mulching and fertigation techniques in chilli (Capsicum frutescens L.) under Chhattisgarh plain. Green Farming. (Jul 2015) v.6(4) p.833-835 KEYWORDS: CHILLIES. FERTIGATION. GROWTH. MULCHING. HORTICULTURE. GROWTH. NUTRIENTS. A field experiment was conducted on response of mulching and fertigation techniques in chilli (Capsicum frutescens L.) under Chhattisgarh plain study during the year 2013-14 in winter season at Horticulture Instructional-cum-Research Farm, (PFDC) IGKV, Raipur (Chhattisgarh). The experiment was laid out in a split plot design with nine treatments combinations and three replications. The experimental plots were treated with three fertigation levels 100, 80 and 60 % RDF and different mulching materials consisting of black plastic, paddy straw and without mulch. The plant height, primary branches, fruit weight (g), number of fruits, days to first flowering and yield q/ha increased with fertigation levels and mulching.

Highest fruit yield was recorded in black plastic mulch with 402.16q/ha followed by 362.92q/ha in paddy straw and lowest fruit yield was recorded in without mulch, 340.38q/ha. Under fertigation experiment highest fruit yield was recorded in 80% RDF with 414.57q/ha followed by 100% RDF 372.99q/ha and lowest fruit yield was found in 60% RDF with 317.89 q/ha.

F06 Irrigation

286. Baskaran, R.; Cotton Research Station, Tamil Nadu Agricultural University, Veppanthattai (India) Kavimani, R.; Cotton Research Station, Tamil Nadu Agricultural University, Veppanthattai (India). Productivity of rainfed Bt cotton influenced by supplemental drip irrigation. Green Farming. (Jul 2015) v.6(4) p.806-808 KEYWORDS: COTTON. CROP RESIDUES. GROWTH. MINIMUM TILLAGE. SUPPLEMENTAL IRRIGATION. PRODUCTIVITY.

Field experiments were conducted at Cotton Research Station, Veppanthattai during 2012-2013 and 2013-2014 to carry out the studies on tillage with crop residues and supplemental irrigation through drip system on
rainfed Bt cotton. The experiments were laid out in a strip plot design with three replications. The main plot treatments were conventional tillage, minimum tillage without crop residue, minimum tillage with crop residue 2.5 t ha⁻¹; and minimum tillage with crop residue 5 t ha⁻¹. Conventional tillage comprised of one disc ploughing, four cultivator ploughing and two harrowing (0.3–0.4 m deep). Minimum tillage included only one ploughing (cultivator) and two harrowing (0.1–0.12 m deep). The sub-plot comprised of irrigation treatments viz., supplemental drip irrigation through drip system one, two and three times and without irrigation (control), during the cropping period. Under paired row planting system (120 + 30 x 60 cm spacing), one 12 mm lateral was laid out between two rows of Bt cotton. The supplemental irrigations were given to the crops at the time of moisture stress period determined based on the visual symptoms of wilting. Recommended dose of fertilizers viz., 120:60:60 kg NPK ha⁻¹ was applied to Bt cotton. The results revealed that minimum tillage (BBF) with crop residue application 5 t ha⁻¹ (M₅) recorded higher plant height, dry matter production, LAI, No. of sympodial branches/plant, No. of boils/plant and seed cotton yield.

F08 Cropping patterns and systems

287. PAINYULI, AMIT; Department of Agronomy, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) PAL, M.S; Department of Agronomy, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) BHATNAGAR, AMIT; Department of Agronomy, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) BISHT, A.S; Department of Agronomy, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of planting methods and irrigation schedules on growth, yield and nutrient content of sweet corn (Zea mays saccharata) in Tarai region of Uttarakhand. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p.332-338

KEYWORDS: PLANTING. IRRIGATION. SCHEFFLERA. NUTRIENT AVAILABILITY. SWEET CORN. ZEA MAYS.

Field experiment was conducted during spring season 2010 to study the influence of planting methods and irrigation schedules on growth dynamics, productivity and nutrient content of sweet corn (Zea mays saccharata). The experiment comprising of threeplanting methods (flat, flat followed by earthing up and ridge planting) and four irrigation schedules at 50, 75 and 100 mm cumulative pan evaporation (CPE) and at critical growth stages (i.e., knee high, tasseling, silking and grain filling) was conducted in factorial randomized block design with three replications. The results revealed that ridge planting recorded significantly higher shoot and root growth, more cob yield and higher nutrient content. Among the irrigation schedules, 75 mm CPE was significantly superior and recorded the highest value of nutrient content, growth and yield parameters.

288. Latha, S.; Deptt. of Floriculture & Landscape Architecture, College of Horticulture, Muddigere (India) Reddy, S. B.; Deptt. of Floriculture & Landscape Architecture,
College of Horticulture, Mudigere (India) Sudeep, P. H.; Deptt. of Floriculture & Landscape Architecture, College of Horticulture, Mudigere (India). Evaluation of anthurium cultivars under protected cultivation in hill zone of Karnataka. Green Farming. (Jul 2015) v.6(4) p.908-910 KEYWORDS: ANTHURIUM. GROWTH. FLOWERING. CULTIVATION. HORTICULTURE. OESOPHAGUS. INDIA.

The study was conducted on the experimental block of the Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, during 2012-13 to evaluate the performance of seven anthurium varieties viz., Fantasia, Acropolis, Arabhavi Local, Tropical, Fire, Cheers and Midori. Results revealed that varieties significantly influenced all the vegetative and flower parameters. Variety Tropical recorded the maximum plant height (63.11 cm), petiole length (46.91 cm), leaf length (31.50 cm), leaf width (22.91 cm) and leaf area per plant (4320.00 cm²), while the variety Arabhavi Local recorded maximum number of leaves per plant (8.67) and maximum number of suckers per plant (1.27) at 360 days after planting. Floral characters like; peduncle length (64.42 cm), spathe length (12.00 cm), spadix length (6.89 cm) and spadix girth (10.11 mm) was highest in variety Tropical compared to other varieties. The spathe width (14.83 cm) and vase life (35 days) was highest in variety Midori. Maximum mean number of flowers per plant (1.07), per plot (32.80) per month was recorded in variety Arabhavi Local. Among the anthurium cultivars studied, with respect to performance in terms of vegetative growth and flower quality of anthurium, variety Tropical was found superior, and with respect to flower yield, varieties Arabhavi Local and Midori were identified as promising suitable cultivars for cultivation under protected condition. Further rooting to the suckering habit, Arabhavi Local is found to be good as a potted plant.

F30 Plant genetics and breeding

289. SAMANT, POOJA; Department of Genetics and Plant Breeding, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, KAMENDRA; G. B. Pant University of Agriculture and Technology, Pantnagar (India) PUSHPENDRA; G. B. Pant University of Agriculture and Technology, Pantnagar (India) TIWARI, GUNJAN; G. B. Pant University of Agriculture and Technology, Pantnagar (India). Heterosis studies in soybean [Glycine max (L.) Merrill]. International Journal of Basic and Applied Agricultural Research. (May 2016) v.12(2), p.200-207 KEYWORDS: HETEROSIS. SOYBEANS. GENOTYPES. MATURITY. SEED.

The present investigation during Kharif, 2009 comprised 48 genotypes (25 F1s and 23 parents including one check/ standard variety PS 1347) of soybean and the experiment was laid down in a Randomized Complete Block Design with two replications. The objective of the present study was to estimate the heterosis for yield and its components. The mean squares due to genotypes were significant for all characters. The heterosis in 25F1s was estimated for 16 yield and its contributing characters viz., days to flower initiation, days to fifty per cent flowering, days to maturity, plant height, basal pod height, number of nodes per plant, number of primary branches per plant, number of pods per
pl, number of seeds per pod, hundred seed weight, harvest index, seed yield efficiency, dry matter weight per plant, oil content, protein content and grain yield per plant. High magnitude of heterosis was recorded in different F1s. The most promising crosses which were superior for seed yield and its components over their respective mid parent, better parent and standard parent were Doko x JS 335, Doko x JS 90 41, EC 389148 x PS 1092, JS 335 x JS 90-41, UPSM 534 x PS 1347, PK 515 x AGS 129, PK 1029 x PS 1241, PS 1241 x Doko, PS 1347 x MACS 450, PS 1347 x PS 1241 and PS 1368 x PS 1330. These F1s have been suggested to be utilized to get better segregant for yield and its components in advanced generations. Whereas, thirteen cross combinations showed earliness for days to flower initiation, days to 50% flowering and days to maturity over their respective standard parent.

290. KUMARI, JYOTI; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) MISRA, K.K; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) RAI, RATNA; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Genetic variability and correlation studies in snapdragon (Antirrhinum majus L). International Journal of Basic and Applied Agricultural Research. (May 2016) v.2(12), p. 215-219 KEYWORDS: GENETIC VARIATION. STATISTICAL METHODS. ANTIRRHINUM.

Genetic variability and correlation coefficient analysis were carried out for fifty-two genotypes of snapdragon during 2005-2006. Maximum genotypic variation was found with number of seeds/pod while number of leaves/plant had maximum phenotypic variation. Plant height, number of spikes/plant of cut flower value and weight of seeds/pod recorded low heritability. High genetic advance was recorded in weight of seeds/spike while maximum genetic gain was observed in weight of seeds/plant. Positive and direct correlation of number of spikes/plant with number of branches, number of leaves and plant height revealed that spike yield can be increased by direct selection of these characters. Seed yield/plant was significantly and positively correlated with number of flowers/spike, number of spikes/plant and weight of seeds/spike.


A field experiment was conducted during kharif season of 2009 and 2010 to observe the effect of foliar applied nutrients on the yield of paddy and also at five farmers’ fields in kharif, 2011 with two best contributing nutrients treatments for paddy production with paddy variety Pusa Basmati-1. One per cent sulphur and iron, 0.5 % zinc and manganese solutions were sprayed on
standing crop at tillering and heading stage. The results revealed that significantly higher values of plant height (94.40 cm), number of panicles (258/m²), grain yield (33.02 q/ha) and straw yield (66.95 q/ha) were recorded with the foliar application of zinc sulphate as compared to control treatment. The second best treatment was iron application with 32.75 q/ha grain and 64.30 q/ha straw yield followed by sulphur (32.00 and 63.20 q/ha) and manganese (31.58 and 61.06 q/ha) along with lowest under control plot (31.11 and 60.18 q/ha), respectively. Similar trends was also observed at farmer’s fields with maximum and significantly higher values of plant height (99.5 cm), panicle length (23.85 cm), grain (35.80 q/ha) and straw yield (66.96 q/ha) with the use of zinc sulphate as compared to control followed by iron application.

GARKOTI, ANKITA; Department of Plant Pathology, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) KUMAR, VIJAY; Department of Plant Pathology, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) TRIPATHI, H.S; Department of Plant Pathology, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Evaluation of lentil germplasms Lines against wilt disease. International Journal of Basic and Applied Agricultural Research. (May 2016) v.2(12), p.224-226 KEYWORDS: EVALUATION. LENTILS. WILTING. FUSARIUM OXYSPORUM. PATHOGENESIS.

Wilt of lentil, caused by Fusarium oxysporum f.sp. lentis is one of the most destructive disease of lentil. Various disease management strategies have been tried to reduce the disease incidence. The present work aimed at evaluating the lentil germplasms against wilt pathogen. During 2010-11, 59 lentil germplasm accessions were evaluated under sick plot to identify multiple sources of resistance against major diseases. A wide range of variation to disease reaction was observed among tested lentil genotypes. Majority of the accessions were susceptible to wilt, whereas three accessions, IPL 217, IPL 316 and IPL 101 were found resistant to wilt.

SARKAR, MANGALDEEP; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, D.K; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Exploitation of heterosis for earliness and vegetative characters of ridge gourd [Luffa acutangula (Roxb.) L.]. Indian Journal of Fertilisers (India). (May 2014) v.2(12), p. 240-242 KEYWORDS: EXPLOSIONS. HETEROSIS. PRECOCITY. LUFFA ACUTANGULA.

Eight parental lines and 28 F1 hybrids of ridge gourd obtained from half-diallel were studied to investigate the extent of heterosis for earliness and vegetative characters. Appreciable heterosis undesirable direction was found over better parent and check parent for the characters viz. days to first female flower, node number to first female flower, vine length (m), number of primary branches and days taken to Ist fruit harvesting. Crosses PCPGR 7256 X PRG 142, PRG 11 7 X PRG 142, PRG 117 X PRG 131, PRG 117 X PRG 132 and PRG 117 X PRG 120 were found promising for earliness. Crosses PCPGR 7256 X PRG 117, PCPGR
7256 X PRG 131 and PRG 132 X PRG 120 were recorded promising for vegetative traits.


Ninety six exotic germplasm of oats (Avena sativa L.) obtained from ICARDA; Syria was evaluated in an Augmented Block Design having 3 checks at Instructional Dairy Farm, Nagla of G. B. Pant University of Agriculture & Technology, Pantnagar. The variability was assessed on the basis of 19 morphological characters. It was observed that sufficient genetic diversity was present for stem weight, green fodder yield, leaf weight, number of spikelets per panicle and biological yield. Green fodder yield showed the highest, significant and positive correlation with stem weight followed by leaf weight, plant height and number of tillers. Grain yield showed the highest positive and significant correlation with panicle length followed by spikelets per panicle, number of panicles per plant and number of tillers. Plant height, leaf weight and stem weight taken for green fodder yield and panicle length, number of panicles per plant and spikelets per panicle taken for grain yield in path coefficient studies showed a high order of positive direct and indirect effect but number of tillers showed negative direct effect though it showed a positive correlation for both green fodder yield and grain yield. Ranking was done to select superior donors for various characters based on their mean performance.

295. JYOTI, BHIM; Department of Genetics and Plant Breeding, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). BHAJAN, RAM.; Department of Genetics and Plant Breeding, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). PANT, USHA.; Department of Genetics and Plant Breeding, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Influence of storage period on the seed quality parameters in Toria (Brassica rapa var toria). International Journal of Basic and Applied Agricultural Research. (Sep 2014) v.V.12 (3), p. 361-364 KEYWORDS: STORAGE. BRASSICA CAMPESTRIS. VIGOUR. BRASSINOSTEROIDS.

Seed deterioration due to ageing is a common phenomenon in most of the crops, including Brassicas. Deterioration in seed vigor was studied for four toria varieties, viz. PT-303, PT-507, T-9 and Bhawani-stored for one, two, three and four years in cloth bags under ambient conditions. The sixteen seed lots of these varieties so created were studied for seed germination, root and shoot length, seedling dry weight and seed vigour index, following standard procedures. The results revealed that germination percentage, seedling length, dry weight and seed vigour index-I as well as II declined significantly in all the
varieties with increase in storage periods. However, seeds stored for one and two years showed non-significant differences for germination percentage, seedling length and dry weight. The seeds stored for four years showed drastic reduction in all the seed quality parameters, including maximum reduction in seed vigour index-I and II. Amongst varieties studied, Bhawani emerged as the most suitable for long storage with significantly higher seed vigour index-I (894.33) as well as II (1.382). The other three varieties; PT 303, PT 507 and T 9 were at par with respect to Vigour index I. However, the varieties PT 303 and T 9 recorded lower values than the other two varieties and were at par with respect to Vigour index II.


The present study was undertaken on maize (Zea mays L.) in normal and excess soil moisture (ESM) during Kharif 2008 with the main objective of examining the tolerance of parental lines and hybrid combinations in ESM conditions. The experimental material consisted of twelve lines, four testers and their 48 single crosses planted in randomized block design with three replications. Parents, L2, L7, L9, L10, L12 and T1 were the best general combiners for earliness in ESM conditions. Crosses L2T4, L4T3, L5T2, L7T4, L8T1, L8T2, L9T1, L12T3 and L12T4 showed good GCA for ASI and L1T3, L2T4, L4T1, L5T2, LST3, L6T2, L6T3, L7T2, L8T1, L9T2, L10T1, L11T3, L11T4, L12T3 and L12T4 were good combiners for grain yield and crosses, L2T2, L4T4, L5T2, L7T1, L10T1, L10T4, L11T3 and L12T4 were observed to be high combiners for 100-kernel weight in ESM conditions.


In present study, 42 germplasm accessions of French bean were evaluated for eleven economically important characters. The study showed considerable variability for these characters. Heritability in broad sense was high for all the characters studied except for number of primary branches/plant. High genetic advance as percentage of mean coupled with high heritability was observed for characters namely, plant height at 60 days after seed sowing, number of pods/cluster, pod length and pod yield/plant. Number of pod/cluster,
diameter of pod, pod length and number of podcluster/plant had a significant positive association with pod yield/plant. Whereas, in genotypic level, maximum positive direct effect on number of pod clusters per plant, followed by pod length, seed yield per plant, days to 50% maturity, number of primary branches per plant, and diameter of pod. Hence selection on these traits could be improving pod yield in French bean.


Forty genotypes of French bean were used to study their performance, genetic variability, heritability, genetic advance and path analysis for pod yield and yield related characters viz., plant height at 30 days after sowing (cm), leaf length (cm), leaf width (cm), days to 50 per cent flowering, pod length (cm), pod width (mm), number of marketable pod per plant, pod yield per plant (g), number of pods per plant, weight of marketable pods per plant (g), days to 50 per cent maturity, seed length (mm), seed width (mm), number of seeds per pod, 100-seed weight (g) and green pod yield (q/ha). Significant differences were observed for all the characters in all the genotypes used in the experiment. Highest heritability 99.84% was recorded for green pod yield per hectare and pod weight (77.63%) had lowest heritability among all the characters studied and genetic advance as per cent of mean was highest for number of pods per plant (58.00%) and lowest for days to 50 per cent maturity (14.95%). A critical perusal of path-coefficient analysis, at the level of phenotypic correlation coefficient, revealed that green pod yield per plant (0.657) had the highest direct effect on pod yield per hectare.


KEYWORDS: BRASSICA CAMPESTRIS. GERMPLASM. ENVIRONMENTAL FACTORS.

Thirty one germplasm lines of Brassica rapa var. yellow sarson along with the two commercial varieties as a check in two different environmental conditions were evaluated and characterized for status of diversity for qualitative characters. The phenotypic diversity can be estimated by using Shannon-Weaver diversity index. The Shannon-Weaver diversity index (H’) was used to calculate the genetic diversity for the discrete morphological characters following Jain et al. (1975). All the characters showed significant results towards discrete phenotypic diversity for qualitative traits. The computed diversity indices ranged from 0.250 (petal length) to 0.986 (leaf width) in E1 whereas in E2 condition it ranged from 0.345 (petal width) to 0.981 (leaf length). The proportion of non-hairiness was found to be more than hairiness under both the environmental condition. Only two genotypes viz; PYSC-11-24 and PYSC-11-41 showed typical hairiness pattern on leaf and in late sown condition this character did not show any variation for leaf hairiness. Leaf colour showed a wide variation E1 condition whereas in E2 this character showed variation of low magnitude. Leaf lobes were present under both the environmental conditions and were found in more proportion than absence of leaf lobes. Number of lobes was a variable character, ranging from few to many lobes. Leaf length and leaf width also showed significant phenotypic diversity under both E1 and E2 conditions. Under timely sown condition proportion of medium leaf size was highest whereas under late sown condition maximum germplasm lines were having small leaf size. Petal width also varied under both the conditions, medium petal size was of maximum proportion in E1 whereas narrow petal size was highest under E2 condition.
BML 13 and BM 5050 × BML 7 had high mean performance and standard heterosis over check OHM117 for grain yield per plant & other yield contributing characters. Combining ability analysis reveals predominance of non-additive gene action was recorded for all the characters. Among the female lines, BM 5050, BM 1234, BM 3511 and BM 3521 and in testers viz., BML 10 & BML 7 were found to be good general combiners for grain yield and yield component traits. The most promising specific combiners for grain yield and other traits were BM 5050 × BML 10, BM 3511 × BML 7, BM 1234 × BML 10, BM 1234 × BML 13 and BM 5050 × BML 7. These hybrids can be further tested over locations before releasing as commercial hybrids.

303. Krian, Ravi T. K.; Deptt. of Genetics & Plant Breeding, Acharya N.G. Ranga Agriculture University, Rajendranagar, Hyderabad (India) Radhika, K.; Deptt. of Genetics & Plant Breeding, Acharya N.G. Ranga Agriculture University, Rajendranagar, Hyderabad (India) Kumar, Ashoke A.; Deptt. of Genetics & Plant Breeding, Acharya N.G. Ranga Agriculture University, Rajendranagar, Hyderabad (India). Heterosis and inbreeding depression for grain iron and zinc concentrations along with yield and its contributing traits in sorghum (Sorghum bicolor L. Moench). Green Farming. (Jul 2015) v.6(4) p.668-671 KEYWORDS: HETEROSIS, INBREEDING, IRON, ZINC, SORGHUM, FRUITS, INDIA.

The present investigation was carried out to quantify heterosis and inbreeding depression for grain iron and zinc concentrations along with the yield and its contributing traits in two crosses of sorghum with parents distinct for their grain iron and zinc concentrations during post rainy season, 2012-13 at ICRISAT, Patancheru, Hyderabad. Average heterosis was significant for grain yield plant; and grain iron concentration in the cross 'IS13205 x SPV 1359, while most of the traits except plant height and 100-grain weight showed significant average heterosis in the cross IS 13205 × IS 23464 where plant height and panicle length are significant in negative direction and grain iron and zinc concentrations are significant in positive direction. Significant residual heterosis over mid parent was obtained for plant height for both the crosses. Heterobeltiosis was negative for almost all the traits studied. Significant negative heterobeltiosis obtained for grain yield for both the crosses and plant height in the cross IS 13205 × IS 23464. Heterobeltiosis was non-significant for grain iron and zinc concentrations in both the crosses. Inbreeding depression was significant for plant height in the cross IS 13205 × IS 23464 and grain iron concentration in the cross IS13205 x SPV1359.

304. Pawar, B. M.; Department of Genetics and Plant Breeding, S.D. Agriculture University, Sardarkrushningar, Gujarat (India) Rathod, H. A.; Department of Genetics and Plant Breeding, S.D. Agriculture University, Sardarkrushningar, Gujarat (India) Patel, P. S.; Department of Genetics and Plant Breeding, S.D. Agriculture University, Sardarkrushningar, Gujarat (India). Combining ability effects of parents and hybrids for yield and its components in pearl millet [P. glaucum (L.) R. Br.]. Green Farming. (Jul 2015) v.6(4) p.672-676 KEYWORDS: COMBINING ABILITY, GRAIN, TISSUE ANALYSIS, INDIA, PARENTS.

The line x tester analysis using five lines and ten testers was carried out with a view to estimate of combining ability in pearl millet [Pennisetum
glaucum (L.) R. Br.] for eleven different characters. The analysis of variance for combining ability revealed that the estimates due to testers (males) were higher than those of lines (females) for all the characters, except, number of effective tillers per plant, ear head length, 1000 grain weight, grain yield per plant, dry fodder yield per plant and harvest index. The estimates of variance ratio (a2gca / a2sca) revealed predominance of non-additive gene action involved in expression of all the traits. The two parental lines leMA 95222 and J 2511 were the best general combiner for grain yield per plant which found promising for their exploitation in practical plant breeding. The hybrids viz., JMSA 20064 x J 2523, JMSA20064 x J 2511 and JMSA98444 x J 2511 expressed the significant sea effects for grain yield per plant.

305. Goudar, B.R.; Dept. of Seed Science & Technology, University of Agriculture Science, Dharwad, Karnataka (India) Sajjan, S. Ashok.; Dept. of Seed Science & Technology, University of Agriculture Science, Dharwad, Karnataka (India) Siddarudh, S.K., Dept. of Seed Science & Technology, University of Agriculture Science, Dharwad, Karnataka (India) Biradar,D.B.; Dept. of Seed Science & Technology, University of Agriculture Science, Dharwad, Karnataka (India) Swapnakumari, R.S.; Dept. of Seed Science & Technology, University of Agriculture Science, Dharwad, Karnataka (India). Evaluation of rabi sorghum [Sorghum bicolor (L.) Moench] genotypes based on biochemical tests. Green Farming. (Jul 2015) v.6(4) p.677-681 KEYWORDS: RABIES. SORGHUM. GENOTYPES. POTASSIUM. SEEDS. INDIA.

The study was conducted to evaluate and characterize 60 rabi sorghum genotypes based on biochemical tests. The genotypes displayed considerable variability for biochemical tests like phenol test and KOH-Bleach test. In the present investigations both the biochemical tests easily differentiated the rabi sorghum genotypes based on colour pattern developed on the seed coat. The response of sorghum genotypes were also studied by using suitable concentration of GA3 chemical through standard germination test and revealed that there were genotypes which respond positively as well as negatively to the growth regulator.

306. Vekaria, M.D.; Depptt. of Genetics and Plant Breeding, Junagadh Agricultural University, Junagadh (India) Dobariya,L.K.; Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh (India) Patel, B.M.; Main Oilseeds Research Station,Junagadh Agricultural University, Junagadh (India) Rajani,J.C.; Depptt. of Genetics and Plant Breeding, Junagadh Agricultural University, Junagadh (India). Genetic variability, correlation and path analysis in F2 generation of sesame (Sesamum indicum L.). Green Farming. (Jul 2015) v.6(4) p.682-686 KEYWORDS: SESAME. LEAVES. DESIGN. SEED. OILSEEDS. TISSUE ANALYSIS.

Six parents and their 15 F2s of sesame were evaluated during summer 2013 for genetic variability in respect of fourteen quantitative characters. The analysis of variance for experimental design revealed that the mean squares due to genotypes were significant for all the fourteen characters studied. High GCV and PCV were observed for number of capsules per leaf axil, height to first
_capsule and seed yield per plant. High heritability and genetic advance as percentage of mean was observed for seed yield per plant, height to first capsule and number of capsules per leaf axil. Seed yield per plant showed significant and positive association with days to 50% flowering, plant height, number of branches per plant, number of internodes per plant, number of capsules per plant and 1000-seed weight. The path coefficient analysis indicated that the highest positive direct as well as appreciable indirect influences were exerted by the number of capsules per plant followed by plant height, number of internodes per plant and 1000-seed weight.

307. Patel, D.D.; Deptt. of Crop Sciences, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodhaya Vishwa Vidyalaya, Chitrakoot (India) Mishra, P.S.; Deptt. of Crop Sciences, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodhaya Vishwa Vidyalaya, Chitrakoot (India) Moitra, K.P.; Deptt. of Crop Sciences, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodhaya Vishwa Vidyalaya, Chitrakoot (India). Genetic studies for seed yield and its components in linseed (Linum usitatissimum L.). Green Farming. (Jul 2015) v.6(4) p.696-699

KEYWORDS: GENETIC VARIATION. HERITABILITY. LINSEED. LIPID CONTENT. STATISTICAL METHODS. SEED. LINSEED.

Studies on genetic variability, correlation and path coefficient analysis in linseed was carried out at Research Farm, Rajoula, Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidyalaya, Chitrakoot, Satna (Madhya Pradesh) during rabi season of 2008-09 by adopting Randomized Block Design with three replications. The study revealed that wide range of variability for all the characters viz., plant high (cm), number of primary and secondary branches plant ; number of capsules plant ; number of seeds capsule ; days to maturity, 1 ODD-seed weight (g), seed yield plant ; (g) and oil content (%). High phenotypic and genotypic coefficients of variation were observed for number of capsules plant ; followed by seed yield plant ; and 1000- seed weight. The high heritability along with high genetic advance as per cent of mean was observed for number of capsules plant', seed yield plant', 1000-seed weight, plant height and secondary branches plant'. The association and path coefficient analysis revealed that 1 ODD-seed weight and oil content were the important characters. Therefore, this study suggested that linseed improvement programme could be based on these characters as selection criteria.

308. Saine, L.M.; Deptt. of Genetic and Plant Breeding, S.D Agriculture University, Sardarkrushinagar (India)Patel, P. M.; Deptt. of Genetic and Plant Breeding, S.D Agriculture University, Sardarkrushinagar (India) Ram, Chatra.; Deptt. of Genetic and Plant Breeding, S.D Agriculture University, Sardarkrushinagar (India). Genetic analysis for seed yield and its component for qualitative traits in Indian mustard [Brassica juncea (L.) czern & coss]. Green Farming. (Jul 2015) v.6(4) p.797-799

KEYWORDS: BRASSICA JUNCEA. COMBINING ABILITY. RESEARCH. ERUCIC ACID. SEED. POLLINATORS.

The experiment was conducted with ten diverse parental lines to identify the superior parents and hybrids for qualitative traits with respect to GCA and SCA effects in mustard by using dialiel analysis without reciprocals. GCA
and SCA variances were highly significant for seed yield per plant, oil content, protein content and lenoleic acid suggested importance of both additive and non additive type of gene action in the inheritance of these characters. Parents PUSA BOLD and GM1 exhibited significant gca effects for seed yield, protein content, oil content and Lenoleic acid content and emerged out to be good combiners. Three cross combinations namely, GM1 X BIO 902, GM3 x GDM4 and PUSA BOLD x PCR? were exhibited significant sca effects for seed yield and some of its related qualitative traits.

Malaghan, N. Shella.; Deptt. of Vegetable Science, College of Horticulture, Bagalkot University of Horticultural Sciences, Bagalkot (India)Madalageri, B. M.; Deptt. of Vegetable Science, College of Horticulture, Bagalkot University of Horticultural Sciences, Bagalkot (India)Kusuma, V. M.; Deptt. of Vegetable Science, College of Horticulture, Bagalkot University of Horticultural Sciences, Bagalkot (India). Analysis of variability for guar gum and dry pod yield in 67 cluster bean [Cyamopsis tetragonoloba (L.) Taub.] genotypes. Green Farming. (Jul 2015) v.6(4) p.803-805 KEYWORDS: GUAR GUM. CYAMOPSIS PSORALIOIDES. HERITABILITY. SCIENCE. CLIMATIC CHANGE.

An investigation on variability for dry pod yield and other component characters such as seed gum content, number of dry pods per plant, number of clusters per plant and number of pods per clusters was carried out in 67 cluster bean genotypes at College of Horticulture, Bagalkot, during summer 2011. All the characters studied had shown highly significant (at P=0.01) difference. The characters, viz., dry pod yield, number of dry pods per plant and number of cluster per plant recorded high estimates of genotypic and phenotypic coefficients of variation indicating ample scope for selection of genotypes from available germplasm. Based on this, some of the promising genotypes identified in the genetic stock are HG-04-875, Pusa Navabahar, HGS-881, RGC-1 025, IC 3773 for dry pod yield per plant. Seed gum content showed moderate to low estimates of PCV and GCV. Thus, for improvement of this trait there is need for creating variability through introduction and hybridizing the diversified genotypes to generate transgressive segregant.

Gamanagatti, B. P.; Deptt. of Agricultural Economics, University of Agricultural Sciences, Dharwad (India)Patil, L. B.; Deptt. of Agricultural Economics, University of Agricultural Sciences, Dharwad (India)Yeledhalli, A. R.; Deptt. of Agricultural Economics, University of Agricultural Sciences, Dharwad (India). Economic evaluation of protected cultivation technology for capsicum. Green Farming. (Jul 2015) v.6(4) p.824-828 KEYWORDS: CAPSICUM. RESOURCE MANAGEMENT. SWEET PEPPERS. PROTECTED CULTIVATION. FARMERS. TECHNOLOGY.

Capsicum is one of the most popular and highly remunerative annual herbaceous vegetable crop. The economics of Protected Cultivation Technology (PCT) under Capsicum was evaluated during year 2013-14. The average cost per hectare establishment cost for Capsicum PCT unit was found to be 7792.39 thousand. PCT Capsicum required 1166 human labour days, of which 18.58 per cent came from the family and remaining 81.52 were hired. The cost B was 1520.98 thousand and cost C was 1560.18 thousand. The gross return received
from Capsicum was 2914.92 thousands. The output-input ratio at cost D 1.83. Per fruit cost of production was the 19.24 and with subsidy it was 16.63. The B-C ratio was 1.36 for 10 per cent, where as 1.32 & 1.25 for 12 & 15 per cent respectively. The payback period for Capsicum is 3.66 years and internal rate of return was 28 per cent.

Kumari, Sunita.; Deptt. of Biochemistry, N.D University of Agriculture & Technology, Faizabad (India)Kewat, N. R.; Deptt. of Biochemistry, N.D University of Agriculture & Technology, Faizabad (India)Singh, Pratibha.; Deptt. of Biochemistry, N.D University of Agriculture & Technology, Faizabad (India). Biocemical screening of short grain scented rice (Oryza sativa L.) varieties/strains grown in Eastern U.P.. Green Farming. (Jul 2015) v.6(4) p.842-844

KEYWORDS: AMYLOSE. HUSKING. MILLING. RICE. GRAIN. GROWTH. FISHERIES. COOKING. The present investigation on biochemical screening of short grain varieties/strains of scented rice grown in Eastern U.P. was conducted at Crop Research Station, Masodha, Faizabad during kharif season. Twelve varieties/strains namely V1, (NOR-6279), V2 (NOR 6265), V3 (Badshah Bhog), V4 (NOR 6257), Vs (Badshah Pasand), V6 (Bhanta Phool A), V7 (IET-19800), V8 KalanamakA, Vg (Kanak Jeer), VIO (Rambhog B), V11 (Kalanamak Berdpur) and V12 (Lalmati) were screened out on the basis of physical and biochemical traits. Maximum hulling percentage was observed (83.53%) in strains IET-19800 and milling percentage (74.64%) in strain NOR-625. The alkali spreading value was reported higher in most of the variety. Maximum amylose content was found in variety Kalanarnak Berdpur (19.8%), Highest protein content was observed in strain IET 19800 (8.45%) and lowest content of protein was reported in variety Kalanamak Berdpur (7.62%). The essential amino acids composition namely tryptophan (0.22g/16gN) and methionine (1.55g/16gN) were reported maximum in variety Kalanamak 'A' while highest lysine content (2.7 4g/16gN) was found in Badshah Bhog variety. Highest total mineral content (1.81g/100g) was found in NOR 625 while lowest mineral content was reported in NOR 6265 strains. On the basis of above parameters variety Kalanamak 'A' IET 19800, NOR 6265 and NOR 625 were rated superior among the varieties/strains tested in the present investigation.


KEYWORDS: INDIGENOUS ORGANISMS. BITTERNESS. MOMORDICA. The field study, biochemical characterization of 10 indigenous germplasm viz. PBIG-197/10, VNR-28, PBIG-478, PBIG-194, Local, PBIG-192, PBIG-187, PBIG-191 including one variety developed at Pantnagar i.e. Pant karela-1 and other developed at CSAU i.e. Kalyanpur Sona were subjected
to seed protein analysis using SDS-PAGE. A total of 26 protein bands were resolved across all the genotypes where A2, A8, A10, B1, B2, B3, B4, B5, B6, C1, C2, C3, C6 and C8 were polymorphic and the remaining were monomorphic. All germplasm lines used in the study were differentiated on the basis of presence or absence of one or other band into eight different groups. Pair wise similarity index was found to range from 76.19% to 100%. Three genotypes namely, PBIG-197/10, VNR-28 and PBIG-478 represented group I whereas other groups consisted of single genotype in each on the basis of presence/absence of various protein bands.

313. THAKUR, BHAVNA; College of Agriculture, Guru Kashi University, Talwandi Sabo, Bathinda (India) KIRAN; College of Agriculture, Guru Kashi University, Talwandi Sabo, Bathinda (India) BAINS, GURDEEP; College of Basic Sciences and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of Trichoderma harzianum, Pseudomonas fluorescens and salicylic acid on physiochemical characteristics of grains in Rhizoctonia solani challenged rice (Oryza sativa). International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), p. 243-247 KEYWORDS: TRICHODERMA HARZIANUM. PSEUDOMONAS FLUORESCENS. SALICYLIC ACIDS. PHYSIOGRAPHIC FEATURES. RHIZOCTONIA SOLANI.

The present study was conducted to analyze physiochemical characteristics of grains in rice treated with Trichoderma harzianum, Pseudomonas fluorescens and salicylic acid. Rice (Oryza sativa L. cv. Pusa Basmati1 and Kalanamak 3119) plants treated with Trichoderma harzianum, Pseudomonas fluorescens and salicylic acid were subsequently challenged with Rhizoctonia solani, the rice sheath blight pathogen at three different growth stages viz. early vegetative stage, reproductive stage and maturity. Total seed protein content, seed protein profile and thousand grain weight was analyzed. The total seed protein and thousand grain weight increased in the treatments in which biocontrol agents or their consortium with salicylic acid was used.

314. KASHYAP, SHAKULI; College of Basic Sciences and Humanities, G. B. Pant University of Agriculture and Technology, Pantnagar (India) RAO, P.B; College of Basic Sciences and Humanities, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Assessment of antioxidant activity, enzymes and total phenolic content in three medicinal plant species. International Journal of Basic and Applied Agricultural Research. International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), P.248-253 KEYWORDS: ANTIOXIDANTS. ENZYMES. PHENOLIC COMPOUNDS. DRUG PLANTS.

Globally, there has been an increased interest to identify natural antioxidant compounds from different plant species which are pharmacologically potent and have low or no side effects. In this context, Artemisia annua L., Eclipta alba L. Hassk. and Spilanthes acmella Murr. belonged to the family Asteraceae were selected to determine antioxidant potential by using 2,2-diphenyl-1-picryl hydrazyl (DPPH), ferrous ion-chelating assay (FCA) and ferric reducing antioxidant power (FRAP); total phenolic content (TPC); and enzymatic antioxidants such as, superoxide dismutase (SOD), catalase (CAT) and peroxidase.
(POD). Among the extracts, *E. alba* showed comparatively higher values of DPPH and FCA activity with lower IC\textsubscript{50} → value \textit{i.e.}, 71.43 µg/ml and 0.78 mg/ml, respectively followed by *A. annua* and *S. acmella*. The FRAP values (mg TE/mg DW) were comparatively higher in *E. alba* (17.20±0.20) and lower in *S. acmella* (10.06±0.08). Similar trend was observed for TPC and ranged from 2.58 to 8.50 µg GAE/mg DW. Significant and positive correlations were found between phenolic contents and antioxidant capacities (R\textsuperscript{2}=0.943-0.981). The results also indicated presence of significant levels of enzymatic antioxidants (Unit/g tissue) \textit{viz.}, SOD-35.11, 38.74 and 36.37; CAT - 516.66,461.66 and 508.23; and POD - 1.77,2.55 and 2.10, respectively in *A. annua*, *E. alba* and *S. acmella*. These findings suggest that all these species could be a potential source of natural antioxidant that could have great importance as therapeutic agent.


An experiment on evaluation of white onion varieties for dehydrated powder on the basis of biochemical parameters was conducted at the Post Graduate and PHT Laboratory of N.M. College of Agriculture, Navsari Agric. University, Navsari during 2008-2009. Keeping the five varieties of white onion \textit{viz.}, Phule safed, G.J. white onion No.1, Agrifound white, G.J. white onion No.98-206, and Local white onion in C.R.D. with four repetitions. The physical characters of fresh white onion in respect to average weight (g) of bulb before drying, average weight (g) of dehydrated bulb and recovery % of dehydrated slices were recorded. The observations on various nutritional values of various aspects \textit{viz.}, TSS (oBrix), acidity in term of pyruvic acid (%), ascorbic acid (mg/100gm), total sugar (%), reducing sugar (%), moisture (%) was carried out periodically during 0, 3 and 6 months of storage. The higher chemical composition \textit{viz.}, T.S.S., Ascorbic acid, Total sugar and Reducing sugar and lower moisture level in G.J. white onion NO.1 variety. G.J. white onion NO.1 was found suitable for dehydrated powder. The white onion variety G.J. white onion NO.1 can be grown large scale for dehydration in Gujarat state.

316. Giri, Deepti.; Deptt. of Food Science and Nutrition, University of Agricultural Science, Gandhi Krishi Vignana Kendra, Bangalore (India)Sharan, Sunanda.; Department of Agriculture Microbiology,University of Agricultural Science, Gandhi Kristi Vignana Kendra, Bangalore (India)Chavannaavar, V. Suvarna.; Depttt. of Food Scince and Nutrition, University of Agricultural Science, Gandhi Krishi Vignana Kendra, Bangalore (India). Physcial characteristics & chemical constituents of market & NRCSS sativa (black seed/kalonji) samples. Green Farming. (Jul 2015) v.6(4) p.865-868 KEYWORDS: NIGELLA SATIVA. SPICES. SEED. SODIUM. PHYSICAL ACTIVITY. DRUG PLANTS.
Nigella sativa is an herbaceous and annual spice of the Rannunculaceae family. Investigation was undertaken to study the physical and nutrient composition including fatty acid and volatile oil profile of Nigella sativa seed spice from samples procured from NRCSS (National Research Center on Seed Spices, Ajmer) and local market. The results of the study indicated that this Nigella sativa spice contained substantial amounts of macro nutrients i.e., 16.31-16.52 per cent protein, 34-37 per cent fat, 6-7 per cent crude fiber and 4.15-4.18 per cent ash. It was also found to be abundant in several micronutrients. It was also found to be rich in unsaturated fatty acid such as linoleic acid to the extent of 79.20 per cent and oleic acid 10.8 per cent. Thymoquinone a major functional volatile oil fraction was found to be 37.70 percent. Results of the study uncover the secret of Nigella sativa as a bountiful source for many crucial health promoting nutrients. In addition, a high per cent of thymoquinone in the studied seed spice has several properties in disease management.

F61 Plant physiology – Nutrition

317. Kamble, R. D.; Deptt. of Agronomy, College of Agriculture, Nagpur, Dr. P.D. Krishi Vidyapeeth, Akola (India)Nagrare, I. M.; Deptt. of Agronomy, College of Agriculture, Nagpur, Dr. P.D. Krishi Vidyapeeth, Akola (India)Jadhav, B. P.; Deptt. of Agronomy, College of Agriculture, Nagpur, Dr. P.D. Krishi Vidyapeeth, Akola (India). Effect of nutrients and terminal clipping on growth and yield of summer sesame (Sesamum indicum L.). Green Farming. (Jul 2015) v.6(4) p.721-725 KEYWORDS: GROWTH. MANAGEMENT. SESAME. NUTRIENTS. SEED. CARBON.

A field experiment was carried out during summer (Feb-May) 2011-12 to study the effect of nutrients and terminal clipping on growth and yield of summer sesame (Sesamum indicum L.) at College of Agriculture, Nagpur. The experiment was laid out in FRB design. Twelve treatment combinations were tested in three replications. The experiment comprised of three levels of nutrients viz., N,-RDF, N2-RDF + ZnSO and N3-RDF + Fe SO, and four clippings viz., Co-no clipping, C,-clipping at 25 DAS, C2- clipping at 35 DAS and C3-clipping at 45 DAS. It is evident from the results that, treatment of nutrients N,-RDF + ZnSO. was proved to be significantly superior than over other levels of nutrients and control in respect of plant height, number of branches plant, mean dry matter accumulation plant, number of capsules plant, seed yield kg ha, oil content (%), oil yield kg ha, Gross monetary returns, net monetary returns and benefit cost ratio. Among different clippings treatments plant height was significantly superior in Co-no clipping, number of branches plant; in C2-clipping at 35 DAS followed by C-clipping at 25 DAS and C3-clipping at 45 DAS and dry matter accumulation/plant at 35 DAS. Highest seed yield kg/ha, oil yield kg/ha as well as gross monetary returns, net monetary returns and B:C ratio was recorded in clipping treatment C2-clipping at 35 DAS.

318. Prajapati, Dharmeshkumar; Deptt. of Soil Science and Agricultural Chemistry, BACA, Anand Agricultural University, Anand (India)Patel, C .K.; Deptt. of Soil Science and Agricultural Chemistry, BACA, Anand Agricultural University, Anand (India)Viradiya, B. M.; Deptt. of Soil Science and Agricultural Chemistry, BACA,
An experiment was carried out to study the evaluation of different sources of silicon on yield and chemical composition of maize at Department of Agric. Chemistry and Soil Science, BA College of Agric. Anand Agricultural University, Anand during April-June, 2012. The experiment was laid out in Factorial Completely Randomized design with three replications. Treatments consisted of four levels of organic and Calcium silicate. The results indicated that the FYM application at F5.0 level gave significantly higher green and dry shoot weight than F2.5 level and the green and dry shoot weight of maize were significantly increased with increasing levels of calcium silicate. N, P and S content in maize shoot also significantly influenced by application of different level of FYM and enriched FYM with PS whereas application of calcium silicate was found non-significant on N content, while the P and S content were significantly influenced with increasing levels of calcium silicate. Total uptake of nutrients viz., N, P and S was significantly influenced by application of FYM 5.0 t ha⁻¹ over FYM 2.5t ha⁻¹; and calcium silicate at increasing levels gave significantly higher N, P and S uptake by maize than control.

The findings of the conducted experiment as a part of Long-term fertilizer experiment in Vertisol under soybean-wheat intensive cropping system during 2010-11 revealed that the increasing fertilizer levels significantly enhanced the crop yields, total S uptake and different S fractions (heat soluble, organic and total) even after repeated application of fertilizers and manure for the last 39 years. The available S and its fractions were found maximum in 100% NPK+FYM treated plot and minimum in control. The successive addition of sulphur fertilizer increased the available S status and S fractions from its initial level with the highest deposition (43.35 kg/ha) in the treatment receiving 100% NPK+FYM followed by 150% NPK (38.67kg/ha) addition. While the lowest status was recorded where 8 free fertilizers were continuously added 17.94 kg S ha⁻¹ at the surface soil (0-20 cm). The value decreased significantly with increasing soil depth. The relationship between inorganic forms of S and availability of S...
showed that 8 application increased available 8 in the soil. Results also showed that 8 fractions were significantly correlated with productivity of soybean and amongst the various forms of 8, Available-8, Organic-8, Heat soluble-8 and total-S was positively and significantly correlated with organic carbon. Exclusion of sulphur in the fertilizer schedule had deleterious effect on crop productivity as well as nutrient availability. The highest crop productivity of soybean and wheat 2.67 and 5.80 t ha⁻¹ was recorded with balanced 100% NPK applied with FYM and the lowest 1.20 and 1.35 t ha⁻¹ of soybean and wheat, respectively in control plot. These findings clearly indicated that balanced fertilizer use in conjunction with organic manure resulted in a sustainable productivity of crops.


An investigation was carried out at Agroforestry research farm, Nagpur, to study the potential contribution of teak (planted during 1992, 1994, 1997 and 2004) and bamboo (planted during 1992, 1994, 1997) plantations on soil fertility status. The study evaluates the soil nutrient status in agroforestry research farm which was compared with cultivable land. Soil samples were taken from different depths 0-15 cm and 15-30 cm of 8-19 year old teak, 14-19 year old bamboo plantations and farm land, respectively. Samples were analyzed for pH, QC, inorganic carbon (IQC), available N, P, K, S and exchangeable Ca and Mg. Soil pH was lower in the teak plantation planted during 1994 at a spacing of 3 x 3m followed by other plantations and higher pH was observed in cultivable land. Higher QC, IQC, available potassium, sulphur and exchangeable calcium and magnesium concentrations was observed in bamboo planted area than teak plantations and farm land. Available nitrogen and phosphorus was significantly higher in teak (1994 3X3m) followed by bamboo plantations and cultivable land.


An experiment was carried out at Vegetable Experimental Farm, Division of Vegetable Science SKUAST-K, Shalimar Srinagar during kharif 2011 to find out the optimum dose and best time of potassium application for improving growth, yield and quality attributes of potato cv. Kufri Jyoti. The observations were recorded on growth parameters such as plant height, plant spread, No. of shoots plant \(^{-1}\), yield and yield related related parameters as number of tubers per plant, average tuber weight (gms), total yield (q ha\(^{-1}\)) and quality parameters viz., T.S.S, protein content, vitamin C, specific gravity and dry matter. The results proved among various treatments, the plants supplied with 150 kg per hectare potassium irrespective of time of applications recorded maximum values of plant height (75.16 erns), plant spread (44.15 cm), no of shoots plant \(^{-1}(9.36)\), number of tubers per plant (10.20), average tuber weight (gms) (65.16 gms), total yield (301.59 q ha\(^{-1}\)) and protein content (2.62%), specific gravity (1.14), dry matter (23.38%) and vitamin C (23.12 mg) except T.S.S (4.67%) where values were minimum at this level potassium application. However, results differed with time of application of potassium in case of same dose of potassium application.


A field experiment was conducted at Horticulture Research Farm, B. A. College of Agriculture, Anand Agricultural University, Anand during the kharif season 2009, respectively to study the effect of growth regulators and different manual practices on growth parameters like vein length, no. of plant stand, no. of branches per plant and sex expression parameters like no. of male flowers at 45, 60, 75 DAS, no. of female flowers at 45, 60, 75 DAS, & sex ratio and yield & yield attributes parameter like average length, weight, girth, volume of fruit and fruit set per plant & yield of ridge gourd cv. Pusa nasdar. The experiment consisted of 10 treatments combination involving three growth regulators viz., NAA 50 & 100 mg/lit., cycocel 100 & 200 mg/lit. and ethrel 100 & 200 ppm at 3-4 leaf stage of plant and control treatment & water spray (distilled water) with other treatment like pinching of primary bud at 30 days, removal of male flowers from 45 days onward (weekly). Among all the treatment combination ethrel 200 ppm was found to be the most effective in increasing more number of female flowers (6.13, 30.92 and 18.22 at 45, 60 and 75 DAS, respectively), decrease the number of male flowers (112.82 and 118.46 at 60 and 75 DAS, respectively) and thereby
reducing the male female ratio (3.61, 3.43 and 2.94 at 60, 90 and 120 DAS, respectively), the treatment of ethrel 200 ppm also increase the fruit setting (21.64), total number of fruits per plant (20.09), length of marketable fruits (23.73 cm), girth of marketable fruits (9.50 cm), weight of marketable fruits (331.67 g), volume of fruits (222.48 cc), thereby fruit yield per plot (20.18 kg) and per hectare (134.50 q) which was at par with ethrel1 00 ppm.

323. Chauhan, Beena.; Deptt. of Agronomy, B.A. College Of Agriculture, Anand Agricultural University, Anand (India)Patel, J. J.; Deptt. of Agronomy, B.A. College Of Agriculture, Anand Agricultural University, Anand (India)Desai, K. C.; Deptt. of Agronomy, B.A. College Of Agriculture, Anand Agricultural University, Anand (India). Response of different sources and levels of phosphorus on growth, yield attributes, yield of cowpea (Vigna unguiculata [L.] Walp). Green Farming. (Jul 2015) v.6(4) p.794-796 KEYWORDS: COWPEAS. GROWTH. PHOSPHORUS. WATER. INDIA. VIGNA UNGUICULATA. A field experiment was carried out during summer season of the year 2012 at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand (Gujarat) to study the effect of different sources and levels of phosphorus on cowpea. The treatments comprising of four sources of phosphorus [PAP (18-46-00), SSP (00-16-00-13), Narmada Phos (20-20-00) and IPL (20-20-00)] and three levels of phosphorus [20, 40 and 60 kg P, O/ha] with one control Po' The experiment was laid out in Factorial RBO with four replications. Higher values of growth characters and dry gotar yield were recorded under treatment S, (OAP), while yield attributes and seed yield were recorded higher under treatment S, (SSP). Each successive increase in the level of P from 20 to 60 kg P ,05/ha significantly increased the growth characters, yield attributes, seed and dry gotar yield.


Comparative effects of four treatments 60 ppm GA ; 40 ppm GA ; 60 ppm Mangiferin and 40 ppm Mangiferin along with control were tested on seed production aspects of four cyto-sterile line viz., IR 58025A, PMS 2A, PMS 3A and PMS 10A. It was observed that all the treatments scored much higher values than control for the characters like duration of florets opening, angle of florets opening, exserted stigma, panicle exsertion, grain yield per ha etc. Cyto-sterile line PMS 10A, PMS 3Aand PMS 2A possessed better important floral traits than IR 58025A. However, cyto-sterile line IR 58025A scored much higher values for seed grain yield per ha, spikelet length and plant height.
Majumder, Tarun; Department of Soil and Water Conservation Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India)Kundu, Rajib; AICRP on Groundnut, Directorate of Research, Bidhan Chandra Kristi Viswavidyalaya, Kalyani (India)Dasgupta, Shubhadip; AICRP on STCR, Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya, Kalyani (India). Nutrient management for enhancing productivity of potato and sustaining soil fertility in new alluvial zone of west bengal. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.363-372

KEYWORDS: NUTRIENT UPTAKE. FERTILITY. AGRICULTURE. PRESSURE. DETERIORATION. INDIA.

Heavy reliance on chemical based agricultural practices has been resulted serious ecological damage to the loss of productivity and loss of biodiversity particularly on the deficiencies of various essential nutrients associated with declining organic carbon status in soil. The present study was conducted to investigate the effect of integrated use of organic manures and inorganic fertilizers on the yield and the changes of N, P and K status in soil. Maximum tuber yield was obtained received 150% recommended levels of N, P and K along with organic nutrient treatments. Potato tuber yield was comparatively higher under sole inorganic fertilizers than organic manures alone though per cent responses in yield over the first year declined with the advancement of the year with higher levels of inorganic fertilizers. Higher availability of N, P and K was evidenced under the treatments receiving organic manures associated with highest level of inorganic fertilizers.

MISRA, K.K; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India)RAI, RATNA; College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar (India). Changes during development in fruits of Karonda (Carissa carandas L.). International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), p.212-214

KEYWORDS: FRUITS. REPLICATION. ACIDITY. CARISSA. FLOWERING.

The experiment was conducted during fruiting season of the year 2012. The experiment was conducted on twenty two years old bush of Karonda cv. Pant Manohar in completely randomized design using twenty fruits per treatment per replication. Fruit length and fruit diameter increased significantly upto 10th and 11th weeks after anthesis, respectively. Thereafter, the fruit length and diameter decreased. The mean fruit weight and volume were increased upto 11th weeks after anthesis and after that the mean fruit weight and volume decreased. T.S.S. and acidity of the fruits increased upto 8th weeks after anthesis and gradually decreased upto maturity. T.S.S.: acid ratio decreased significantly upto 9th week after anthesis and it increased significantly from 10th week after anthesis to 13th week after anthesis.

Rawat, Krian; Depdt. of Agronomy, College of Agriculture, R.V. Scindia Krishi Vishwa Vidyalaya, Gwalior (India)Rajput, L.R.; Depdt. of Agronomy, College of Agriculture, R.V. Scindia Krishi Vishwa Vidyalaya, Gwalior (India)Verma, S.K.;
The experiment was conducted at R.V.S.KVV. college farm Gwalior during 2012 and 2013 to find out the growth, yield, water use efficiency and moisture extraction pattern of pigeonpea as influenced by methods and scheduling of irrigation. Among methods and scheduling of irrigation, crop irrigated at IW/CPE ratio 1.0 with drip irrigation method registered higher value of consumptive use of water, water use efficiency, growth and yield over the scheduling of irrigation at IW/CPE ratio 0.8, 0.6 and 0.4. The soil moisture extracted from surface upper layer (0-40) was found maximum under drip irrigation with IW/CPE ratio 1.0.


A field experiment was conducted at Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bengaluru in red sandy clay loam textured soil during kharif season of 2013 under rainfed condition to evaluate the integrated agro-techniques on growth and yield parameters of medium duration pigeon pea. Among the integrated agro-techniques, the combined application of integrated nutrient management (INM) + integrated weed management (IWM) + integrated pest management (IPM) practices recorded significantly higher growth attributes like, plant height (152.33 cm), number of primary branches (16.63/plant), number of secondary branches (11.43/plant), leaf area (35.23 ern/plant), leaf area index (1.95) and total dry matter accumulation (173.23 g/plant) at harvest as compared to other treatments. Similarly significantly higher yield attributes such as number of pods per plant (147.87), pod weight per plant (133.50 g), grain weight per plant (48.97 g), grain yield (1822 kg/ha) and stalk yield (4087 kg/ha) was recorded with combined application of INM, IWM and IPM practices as compared to other integrated agro-techniques. Further, the combined application of INM, IWM and IPM practices recorded 41.4% higher grain yield over farmer’s practice. Similarly the combined application of INM, IWM and IPM practices recorded significantly higher nutrient uptake of N (99.00 kg/ha), P (28.80 kg/ha), K (56.33 kg/ha), S (14.10 kg/ha) and Zn (0.046 ppm) by crops, but statistically it was on par with IWM + IPM practices. Whereas, lower nutrient uptake by crops was in farmer’s practice i.e., N (63.01 kg/ha) P (12.50 kg/ha) K (29.93 kg/ha) S (9.50 kg/ha) and Zn (0.006 ppm).
329. Khunte, Das Sevan; Deptt. of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India) Saravanan, S.; Deptt. of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India) Singh, Shambhu; Deptt. of Horticulture, College of Agriculture, I.G. Krishi Vishwa Vidyalaya, Raipur (India) Prasad, M.V.; Deptt. of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India). Effect of plant growth regulators and organic manure on plant growth, flowering and fruit yield of strawberry (Fragaria x ananassa Dush.) cv. Chandler. Green Farming. (Jul 2015) v.6(4) p.817-819 KEYWORDS: CHLORMEQUAT. NAA. ORGANIC MATTER. ARBUTUS. FRUITS. SCIENCE.

A field experiment was carried out during the winter season at Crop Research Farm, Department of Horticulture, SHIATS, Allahabad, (U.P.) India. The maximum number of leaves per plant (20.56) was recorded with treatment Tg (5.50 tones poultry manure ha-1 + GA3150 ppm 1-1). The treatment T’3 (8.50 tones poultry manure ha-t + GA3200 ppm) showed the maximum plant height (27.57 cm), plant spread (26.41 cm) and petiole length (13.87 cm). Minimum days taken to first flower (55.77 OAT) and days taken to fruit bud development (62.78) were reported with the treatment T. (5.50 tones poultry manure ha-1 + CCC 800 ppm), The maximum days taken to fruit bud development (79.67 OAT) were recorded with treatment T’3 (8.50 tones poultry manure ha-t + GA,200 ppm). The maximum fruit yield per plant (330.18 g), fruit yield per plot (3301.83 g) and fruit yield per ha. (24.46 tones) was recorded with treatment T, (5.50 tones poultry manure ha-1 + triacontanol150 ppm), Highest benefit: cost ratio (1:3.62) was recorded with treatment T,(5.50 tones poultry manure + 150 ppm triacontanol).

Hence the application of poultry manure, GA3and triacontanol is recommended for better plant growth and fruit yield in strawberry under Allahabad region (U .P.).

330. Ganesh, S.; Deptt. of Floriculture & Landscaping, Tamil Nadu Agricultural University, Coimbatore (India)kannan, M.; Deptt. of Floriculture & Landscaping, Tamil Nadu Agricultural University, Coimbatore (India)Jawaharlal, M.; Deptt. of Floriculture & Landscaping, Tamil Nadu Agricultural University, Coimbatore (India). Growth, physiology and yield parameters as affected by growing media consortia on chrysanthemum var. amalfi under naturally ventilated polyhouse. Green Farming. (Jul 2015) v.6(4) p.883-887 KEYWORDS: CHRYSANTHEMUM. FARMYARD MANURE. GROWING MEDIA. GROWTH. PERLITE. POROSITY. OESOPHAGUS.

A field experiment was conducted at a private farm of M/s. Salem Green Plants Limited, Yercaud during the year 2011 – 2013 to find out the effect of growing media consortia on growth, physiology and yield of chrysanthemum var. Amalfi under greenhouse conditions. The experiment was laid out in a Randomized Block Design (RBD) with three replications. Treatments consisted of T1- Soil alone(control), T2-Soil +F YM(Growers practice), T3- Soil + FYM+ Coco peat + Microbial consortia, T4- Soil + FYM+ Perlite + Microbial consortia, T5- Soil + FYM+ Vermicompost + Microbial consortia, T6- Soil + FYM+ Coco peat + Perlite + Microbial consortia, T7- Soil + FYM+ Coco peat + Vermicompost + Microbial
consortia, T8 - Soil + FYM + Perlite + Vermicompost + Microbial consortia and T9 - Soil + FYM + Coco peat + Perlite + Vermicompost + Microbial consortia. Observations were recorded on growth, physiology and flowering parameters at peak vegetative, bud appearance and peak flowering stage. The results revealed that T9 recorded the highest plant height (46.09 cm, 78.70 cm and 98.33 cm), number of leaves (26.73, 38.82 and 39.72) at critical stages, internode length (3.95 cm), root length (13.43 cm), earliness in flower bud appearance (44.29 days) and days to harvest (81.41 days) than control (56.28 days and 104.08 days). Physiological traits include leaf area per plant (58.81 cm², 62.09 cm² and 65.53 cm²) and total chlorophyll content (1.72 mg g⁻¹, 2.34 mg g⁻¹, 2.47 mg g⁻¹) was found best at all the stages in T9. This treatment also recorded the highest flower stalk length (95.22 cm), flower stalk girth (3.52 cm), unopened and opened flower bud circumference (4.15 cm and 8.20 cm), number of quality grade cut stems (71.21 A grade, 1.53 B grade, 3.83 C grade) and marketable flower stalk yield per sq.m (76.57 cut stems). The study indicated that the growing media consortia containing Soil + FYM + Coco peat + Perlite + Vermicompost + Microbial consortia was found to be better in enhancing and sustaining the productivity per unit area under protected conditions.

331. Chaitanya, Poorna R.; Deptt. of Florculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, V.R.Gudem, West Godavari (India) Chandrasekhararao, C.; Deptt. of Florculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, V.R. Gudem, West Godavari (India) Suchitra, V.; Deptt. of Florculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, V.R.Gudem, West Godavari (India) Suneetha, Salomi. R.D.; Deptt. of Florculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, V.R.Gudem, West Godavari (India). Effect of IBA (auxin) concentration and size of cutting on rooting and per cent establishment of Jasminum sambac. Green Farming. (Jul 2015) v.6(4) p.888-892 KEYWORDS: IBA. JASMINUM. HARDWOOD. CUTTING. RESEARCH. PLANTING.

An experiment was conducted to find out the effect of IBA (auxin) concentration and size of cutting on rooting and percent establishment of Jasminum sambac stem cuttings at Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, Venkataramannagudem. The main objective of the study is to standardize propagation technique for quick and cost effective and efficient mass multiplicatton of Jasminum sambac cv. ; Double Mogra. The 3 node cuttings treated with IBA 2000 ppm exhibited significant increase in rooting percentage, root length, root number, root fresh weight, maximum sprout diameter, fresh and dry weight of rooted cuttings. The traits viz., number of days taken for sprouting and propagation cycle was recorded minimum in 3 node cuttings treated with IBA2000 ppm. Whereas 4 node cutting treated with 2000 ppm of IBAand 3 node cutting treated with 3000 ppm of IBA has obtained more number of sprouts and maximum number of leaves per cutting. Among all the treatment combinations, 3 node cutting treated with IBA 2000 ppm has shown best results regarding maximum traits. The result revealed that the three node cuttings treated with IBA at 2000 ppm concentration was most effective for
obtaining maximum shoot growth, root growth, survival percentage and for its large scale multiplication.

332. Rohith, H.C.; Deptt. of Floriculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, West Godavari (India) Rao, Chandrasekhara C.; Deptt. of Floriculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, West Godavari (India) Ushakumri, K.; Deptt. of Floriculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, West Godavari (India) Subbaramamma, P.; Deptt. of Floriculture, Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, West Godavari (India). Effect of micronutrients and GA3 foliar sprays on growth, flowering, yield and quality parameters in African marigold (Tagetes erecta L.). Green Farming. (Jul 2015) v.6(4) p.893-896 KEYWORDS: FLOWERS. GROWTH. TRACE ELEMENTS. QUALITY. NPK FERTILIZERS. MOISTURE CONTENT. RESEARCH. An experiment was conducted to find out the effect of micronutrients and GA3 on growth, flower yield, seed yield and seed quality parameters at Horticultural College and Research Institute, Dr. Y.S.R. Horticultural University, Venkataramannagudem. The experiment was replicated thrice in split plot design consists of five treatments including control (ZnSO4 0.5%, FeSO4 1%, Boric acid 0.5%, GA3 300 ppm and control). Foliar application of micronutrients and GA3 followed at 20 and 40 DAT. Among the foliar sprays GA3 300 ppm recorded maximum plant height, plant spread, number of branches per plant, stem diameter, biomass, number of flowers per plant, flower diameter, flower yield/plant, flower yield/square meter, flower yield/ha, seed yield/plant, seed yield/square meter, seed yield/ha, highest 1000 seed weight, seed germination %, seed moisture content %, seedling dry weight, seedling vigour index and minimum number of days to flower bud initiation, flower opening, 50% flowering, and duration of flowering followed by ZnSO4 5%.

333. F70Plant taxonomy and geography

334. Chakrabarty, Premangshu; Department of Geography, Visva-Bharati University, West Bengal (India) Mandal, Kumar. Prasenjit; Department of Geography, Visva-Bharati University, West Bengal (India). Coastal tourism and vulnerability:a study in coastal resorts of West Bengal. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.373-377 KEYWORDS: DISASTERS. COASTAL AREA. WEST BENGAL. GEOGRAPHY. MANAGEMENT. INDIA.

Coastal tourism is very popular all over the world. In India, there are a number of beaches which become tourist destination attracting both domestic and international visitors. From the disaster management perspectives, the coastal areas have been given special attention. Storms, tsunamis, floods, water spouts and storm surges are the basic natural factors that are responsible for disaster. To protect the coastal zone environment and to prevent the loss of life and resources from disaster, the Ministry of Environment and Forest (MoEF) introduced the Coastal Regulation Zone (CRZ) notification using the provision of Environmental Protection Act (EPA), 1986. Tourism growth in coastal areas violating its rules and regulations makes the area much more vulnerable. The
present paper is an attempt to study the tourism growth in the popular and potential coastal resorts of Purba Medinipur district in West Bengal with reference to their vulnerability status based on the ground realities as the outcome of our geographical surveys from the standpoint of sustainable tourism development.

H10 Pests of plants

335. PANDEY, RASHMI; Department of Entomology, College of Agriculture, G.B. Pant University of Agriculture and Technology Pantnagar (India) BISHT, R.S; Department of Entomology, College of Agriculture, G.B. Pant University of Agriculture and Technology Pantnagar (India) CHAUDHARI, DEEPTI; Department of Entomology, College of Agriculture, G.B. Pant University of Agriculture and Technology Pantnagar (India). Effect of physical and metaphysical energy on germination and seedling. Impact of various weather parameters on population build up of insect pest of potato crop at Pantnagar. International Journal of Basic and Applied Agricultural Research. (May 2014) V.12 (3), p. 347-350 KEYWORDS: GERMINATION. WEATHER REPORTS. INSECT CONTROL. BEMISIA TABACI.

The study was carried out to find out the effect of various weather parameters on population build up of aphid, Myzus persicae; jassids, Amrasca biguttula biguttula and white fly, Bemisia tabaci on two varieties of potato viz. Kufri Ashoka and Kufri Badshah. Studies on population dynamics revealed that the period of peak population of M. persicae, A. biguttula biguttula and B. tabaci was 3rd week of January, 1st week of January and third week of December respectively. The data pertaining to correlation coefficient indicated a significant negative correlation between temperature and population of Myzus persicae whereas, non significant positive correlation was observed in case of relative humidity and rainfall. A significant negative correlation was found between population and R.H. for B. tabaci on both the varieties. An increase in population of white fly was positively correlated with maximum and minimum temperature too. The population of A. biguttula biguttula was exhibited highly significant negative correlation with temperature, whereas a positive significant correlation was found with rainfall. Sunshine and wind velocity had no significant effect on pest’s population.


The incidence of Helicoverpa armigera Hub. on tomato (Solanum lycopersicum L.) at Pantnagar during the cropping season 2011-12 and 2012-13 revealed that the pest exhibited its incidence almost throughout the crop season marked its first appearance in 7th and 9th standard meteorological week
(SMW)i.e. (February and March), attain peak population in 16th and 15th SMW (April), respectively. The pest population exhibit non significant correlation with various abiotic factors, except significant positive correlation with sunshine hours and significant negative correlation with evening relative humidity during 2012-13.

337. Gomam, Suneel Kumar V.; Acharya N.G. Ranga Agricultural University, Andhra Pradesh (India). Agricultural Research Station. Budime, Ram Prasad; Acharya N.G. Ranga Agricultural University, Hyderabad (India). District Agricultural Advisory and Transfer of Technology Centre. Susceptibility Changes in Helicoverpa Armigera (Hübner) (Lepidoptera: Noctuidae) to Bacillus Thuringiensis Cry1Ac Toxin. Indian Journal of Entomology. Mar.2016 v78 (1) p. 01-09 KEYWORDS: HELICOVERPA ARMIGERA, COTTON, INSECT CONTROL.

The susceptibility of Helicoverpa armigera to the Cry1Ac was monitored during three seasons. The LC50 and LC90 values ranged from 0.018 to 0.040 and 0.344 to 0.462 μg per ml in 2005–06; 0.012 to 0.154 and 0.345 to 1.673 μg per ml in 2006–07; 0.016 to 0.112 and 0.159 to 0.711 μg Cry1Ac per ml of diet in 2007–08, respectively. Similarly, the IC50 values ranged from 0.001 to 0.004; 0.002 to 0.005 and 0.003 to 0.009 Mg per ml; IC90 values ranged from 0.007 to 0.017; 0.008 to 0.017 and 0.017 to 0.038 μg per ml in 2005–06, 2006–07 and 2007–08, respectively. The EC50 ranges were 0.0002 to 0.001; 0.0001 to 0.0017, 0.0004 to 0.0016 μg per ml and the range of EC90 values were 0.0013 to 0.0044; 0.0017 to 0.01 and 0.003 to 0.01 μg of Cry1Ac per ml in 2005–06, 2006–07 and 2007–08, respectively. The overall variability in susceptibility level indicated by larval mortality was to an extent of 2.2, 13 and 7-fold to Cry1Ac, respectively in 2005–06, 2006–07 and 2007–08 populations compared to baseline estimates of 5 and 5.5fold in 1999 and 2001 cropping seasons.

338. Sahoo S. K.; Pulses and Oilseeds Research Station, Berhampore (India).hyamalsahooahoo.co.in. Chemical Control of Red Banded Mango Fruit Borer, Autocharis Albizonalis Hampson (Pyralidae: Lepidoptera). Indian Journal of Entomology. Mar. 2016 v.78 (1) p. 10-14 KEYWORDS: INSECT CONTROL, MANGOES. The red banded mango fruit borer (RBMFB), Autocharis albizonalis Hampson has appeared in serious proportion in the mango growing areas of West Bengal particularly in the districts of Malda, Murshidabad, Nadia and Hooghly causing 10–52% damage. The insecticides namely, alphamethrin 10 EC, Bacillus thuringiensis (Bt.), dichlorvos 76 EC and monocrotophos 36 SL in different mixed combinations were evaluated against this pest in the private orchard of Murshidabad, West Bengal. A sticker, valvet® was used during each spraying. The treatment (T2) where mixture of alphamethrin 10 EC and dichlorvos 76 EC was used, registered minimum infestation and highest net incremental benefit-cost ratio of 1: 10.3. While, in other two treatments (T1 and T3), where alphamethrin 10 EC, Bacillus thuringiensis (Bt.) and monocrotophos 36 SL were used, performed also better but in most of the cases these were statistically at par.
Field studies were undertaken at research farm, IPFT, Gurgaon to study the comparative bioefficacy of diafenthiuron 47.8 SC, at four doses viz., 191.2 g a.i./ha, 215.1 g a.i./ha, 239.0 g a.i./ha and 286.8 g a.i./ha along with market sample diafenthiuron 50 WP 300 g a.i./ha and imidacloprid 17.8 SL 20.0 ml/ha against sucking pests of cotton and its safety to natural enemies during kharif, 2012-13 and 2013-14. Diafenthiuron 47.8 SC 286.8 g a.i./ha was highly effective in suppressing the sucking pests viz., *Amrasca biguttula biguttula* (Ishida), *Aphis gossypii* (Glover), *Bemisia tabaci* (Gennady’s) and *Scirtothrips dorsalis* Hood, and it had no adverse effects on the natural enemies.

A study was carried out in the Entomological Research Farm, SASRD, and Nagaland University during *rabi*, 2010–2011. Results showed that planting dates has significant influence on the aphid population with the peak population from 30 DAP to 75 DAP (days after planting), during December to mid-February. Maximum population (8.10 aphids/leaf) was recorded at 30 DAP and minimum (2.32 aphid/leaf) at 90 DAP on 15th December planting. Out of the five varieties tested, maximum population was recorded on G-8 variety (8.83 aphids/leaf) and least on the cultivar Rare Ball (5.26 aphids/leaf). Overall, late planted crop of 15th December harboured less population and variety Rare Ball planted on 30th November was found most ideal in Nagaland condition.
KEYWORDS: Atherigona soccata. Pest control. Maize. Five promising maize cultivars (HQPM-1, HHM-1, HM-4, HQPM-5 and HQPM-3) when evaluated the hybrid HQPM 5 showed higher 6.98%, 10.11%, and 34.14% deadhearts in case of treated, sprayed and control plot, respectively. The insecticidal treatments significantly reduced the deadhearts. Seed treatment with imidacloprid 70 WS applied @ 7.5 g/kg seed was more effective as compared to foliar application with endosulfan 35 EC @ 0.07%. Maximum yield of 21.08q/ha and 19.80q/ha was obtained in hybrid HQPM 1 in both treated and sprayed fields, respectively. Regardless of hybrids maximum yield (19.39 q/ha) was recorded with imidacloprid seed treatment followed by endosulfan (18.58 q/ha). The avoidable losses in seed treated with imidacloprid 70 WS varied from 26.34 to 31.03% whereas with endosulfan 35 EC it varied from 24.48 to 29.35%. It can be concluded that seed treatment with imidacloprid gave better results as compared to endosulfan.


Effect of modes of pollination on yield parameters of cucumber under polyhouse conditions when evaluated it was observed that fruit set under bee + hand pollinated (84.29%) condition was at par with bee pollinated (82.45%) or hand pollinated condition (79.99%), irrespective of hybrids. The fruit length under bee pollination (13.31cm) was at par with bee pollination + hand pollination (13.30cm) and significantly higher than hand pollination (13.19cm). Mean Fruit weight (135.25gm) observed under bee pollination + hand pollination, was at par with (134.91gm) under bee pollination and significantly higher than (132.83gm) under hand pollination. While mean fruit diameter under bee pollination and bee pollination + hand pollination was observed maximum (3.51cm), which was significantly higher than hand pollination (3.49cm). Hybrid Pusa Sanyog and Pant Sankar Khira recorded with maximum fruit set and fruit diameter, whereas hybrid Rani shows highest mean fruit weight and fruit length. While, minimum fruit set, fruit weight and fruit length were recorded on hybrid Sheetal and minimum fruit diameter was observed in Pusa Sanyog.


With the increase in international trade, there has been an enhanced risk of introduction of exotic pests into our country. Plant quarantine is the first line of defense in plant protection which keeps these injurious pests away from our territory. When considering the present pest status in India, we can infer that a vast majority of them are mere introductions. Pathways of introduction of exotic pests may be either natural or human mediated. The consequences of these introductions are manifold including imbalance of native ecosystem, loss of
biodiversity, transmission of dreadful diseases, creating genetic changes and threatening the existence of endangered species. All these adverse effects will lead to socioeconomic instability. Thus, the plant quarantine system in India is to be strengthened by various means like exotic pest surveillance, building up more infrastructural facilities, creating public awareness and formulating pest incursion management plans.


An investigation was carried out at the Animal House cum Rodent Laboratory, Department of Entomology, Assam Agricultural University, and Jorhat during 2013–14 to evaluate the efficacy of certain anticoagulant rodenticides against Bandicota bengalensis. In both, choice and no-choice feeding trials the efficacy of brodifacoum (0.005%) was significantly better than flocoumafen (0.005%) and difenacoum (0.005%) but at par with bromadiolone (0.005%). In no-choice feeding trial, 100% mortality was recorded with brodifacoum and bromadiolone within 4–9 days but significantly lower mortality was recorded in flocoumafen (80%) and difenacoum (60%). Difenacoum showed poor palatability as more consumption of plain bait was recorded over poison bait. The poison consumption for all the rodenticides was insignificant between the sexes (male & female) in no choice test; however, it was significant for difenacoum and flocoumafen in choice test. The consumption of poison bait by the test animals of both the sexes under choice test was less in comparison to no-choice test. The post treatment consumption of plain bait was significantly lower in case of brodifacoum and bromadiolone in comparison to flocoumafen and difenacoum. This shows relatively better effectiveness of brodifacoum and bromadiolone.


Diverse group of pollinators of Hymenoptera, Diptera, Lepidoptera and Coleoptera visit the sweet orange flowers. Of these twelve major true insect pollinators were observed during blooming stage; out of these nine belong to Hymenoptera. The highest foraging speed was observed with Tetragonula iridipennis, highest time serve/day for pollination by Nomia sp., and minimum transit time spent to locate the suitable flower and highest number of loose pollen carried on the body part by Xylocopatenuiscopa.

346. Mallick S.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India). Department of Agricultural Entomology. Chand P.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India). Department of

Okra is infested by various sucking insect pests among which jassids (*Amrasca biguttula biguttula*), aphids (*Aphis gossypii*), and whiteflies (*Bemisia tabaci*) are the major ones. Tolfenpyrad, belonging to the pyrazole class of insecticides is used against Hemiptera, Coleoptera, Diptera, Lepidoptera, Thysanoptera and Acarina. In this study tolfenpyrad 15% EC @ 125 and 150g a.i./ha showed better performance against sucking pest complex of okra. The observations on the phytotoxicity symptoms (viz., leaf injury, wilting, vein clearing, necrosis, epinasty and hyponasty etc.), if any, with tolfenpyrad 15% EC (300g a.i./ha) are also included. It is concluded that tolfenpyrad @ 125 and 150g a.i./ha might be recommended for okra and it is also safer to natural enemies.


The present study reports the occurrence of 42 species of flower inhabiting thrips, belonging to 19 genera from the state of Manipur. The results reveal that out of 42 species 8 are endemic, and 7 are new records for Manipur, and host plants under 19 families harbor flower thrips.


Two species of the lepidopteran subfamily Ennominae (Geometridae), *Achrosis pallida* (Moore) and *Achrosis incitata* (Walker) are analyzed for their morphology. Both these are new records from Northeast India.


Mungbean varieties/genotypes viz., GM-06-08, GM-4, GM-08-01, GM-05-08, GM-04-02, GM-08-09, KM-10-1038, WGG-37, KM-10-1040, COGG-912, KM-10-1039, ML-1256, ML-1268, KM-10-1037 and K-851 were evaluated for their susceptibility to *Callosobruchus maculatus*. Among these ML-1268 suffered maximum apparent (12.70% and 47.68%, respectively) and real loss in weight (25.40% and 51.72%, respectively) after one generation and after four months of
storage. Whereas, minimum apparent (3.09% and 34.52%, respectively) and real weight loss (7.00% and 38.72%, respectively) after one generation and after four months was observed in COGG-912. Comparative weight/volume ratio was highest in ML-1256 (1:0.594) whereas, the least (1:0.429) was observed in COGG-912. The percent infested grains after four months, was significantly maximum (99.03%) in ML-1268 and minimum (83.20) in COGG-912. It was observed that seed width and seed weight had no correlation with oviposition. The genotypes ML-1268 was most preferred for the development of adult showing 9.60 emergences per ten eggs.


The biometrics of the larva of *Earias vitella* on cotton in terms of head capsule width, body length and body width were studied. The range of head capsule width for I-IV instars was greater on Parbhani Turab (0.29 ± 0.01 to 1.56 ± 0.01mm) > NHH-44 (0.29 ± 0.01 to 1.53 ± 0.02 mm) and Paras Brahma (0.29 ± 0.01 to 1.46 ± 0.02 mm). Body length range of I-IV instars was greater on Parbhani Turab (1.13 ± 0.01 to 12.18 ± 0.02) > NHH-44 (1.11 ± 0.02 to 12.08 ± 0.04) and Paras Brahma 1.08 ± 0.01 to 11.97 ± 0.03 mm. Body width range of I-IV instars was greater on Parbhani Turab (0.28 ± 0.01 to 3.09 ± 0.03) > NHH-44 (0.28 ± 0.01 to 3.07 ± 0.02) and Paras Brahma (0.27 ± 0.01 to 3.01 ± to 0.02mm), respectively. Hence, Parbhani Turab was found more suitable for the development of the *Earias vitella* and the Paras Brahma cultivar less suitable.

351. Kumar, Anoop; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences, Department of Entomology & Agricultural Zoology. Singh N.N.; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences, Department of Entomology & Agricultural Zoology. Mishra V.K.; National Research Centre for Integrated Pest management, New Delhi (India). Safety of Insecticides to Egg Parasitoid Trichogramma Chilonis Ishii. Indian Journal of Entomology. (Mar 2016) v.78(1) p.82-88 KEYWORDS: TRICHOGRAMMA CHILONIS. INSECTICIDES.

Biosafety of commonly used insecticides was evaluated on *Trichogramma chilonis* Ishii. Immature and adult stages were exposed at the recommended field dosages. Chlorantraniliprole, indoxacarb and pyridalyl were found harmless to adults (IOBC-class-1, <30% mortality). Emamectin benzoate, profenofos, cypermethrin, lambdacyhalothrin, imidacloprid, thiamethoxam, propargite and abamectin were found harmful (IOBC class-4, >99% mortality). Against immature stages (inside the host eggs) insecticides though showed toxicity, none was found harmful.

H20 Plant diseases

353. KUMAR, VJAY.; Department of Plant Pathology,G. B. Pant University of Agriculture and Technology, Pantnagar (India) GARKOTI, ANKITA; Department of Plant Pathology, G.B. Pant University of Agriculture and Technology (India) TRIPATHI, H.S.; Department of Plant Pathology, G.B. Pant University of Agriculture and Technology (India). Management rust (Uromyces vicia fabae) through animal products. International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), p.306-308 KEYWORDS: MANAGEMENT. RUSTS. UROMYCES VICIAE FABAE. ANIMAL PRODUCTS.

354. TRIPATHI, SAURABH; Centre of Advanced Studies in Plant Pathology, Department of Genetics and Plant Breeding, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) MISHRA,PRIYANKA; Centre of Advanced Studies in Plant Pathology, Department of Genetics and Plant Breeding, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINHA, A.P.; Centre of Advanced Studies in Plant Pathology, Department of Genetics and Plant Breeding, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). In-vitro evaluation of fungicides against Ustilaginoidea virens (Cke.)Takahashi, the incitant of false smut of rice. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p. 379-381 KEYWORDS: FUNGICIDES. USTILAGO. SMUTS. CHLOROTHALONIL. HYDROXIDES.

False smut, caused by Ustilaginoidea virens (Cke.)Takahashi has recently become a serious disease of rice and yield loss varies from 0.50 to 50%. Five systemic fungicides hexaconazole, carbendazim, propiconazole, tebuconazole and tricyclazole and five non-systemic fungicides, copper hydroxide, chlorothalonil, mancozeb, copper oxy chloride and Thiram were tested against Ustilaginoidea virens. Maximum inhibition of colony diameter (88.61%) was recorded propiconazole fungicides at 20 ppm. Tebuconazole was next in order of effectively against Ustilaginoidea virens inhibiting the colony diameter of 88.01%. In non-systemic fungicides, Maximum inhibition of colony diameter (88.61%) was recorded with chlorothalonil fungicide at 200 ppm.

355. KUMAR,VIJAY.; Department of Soil Science, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) GARKOTI, ANKITA; Department of Soil Science, College of Agriculture, G.B. Pant University of
A field experiment was conducted to observe the role of Rhizobium and PGPR inoculation to manage the rust of lentil. A trial comprising six strains along with two N levels and control was laid out during Rabi seasons 2007-08 and 2008-09. All the strains of PGPR were procured from different centre of AICRP on pulses. Seed treatment with Rhizobium strains LR-35-01 showed significant response with respect to disease severity, grain yield followed by LRB-1, and LRB-2. Maximum disease severity and low grain yield was observed in DL-1 treated plots. A combined application of Rhizobium + and PGPR strains PUK-171 resulted minimum disease severity and maximum grain yield followed by Rhizobium + RB-2; other strains were also effective in reducing rust severity at par with each other while Rhizobium + CRB-2 showed minimum grain yield and maximum disease severity.

SHAILBALA; Sugarcane Research Centre, Kashipur G.B. Pant University of Agriculture and Technology, Pantnagar (India) SIDHARTH KASHYAP; Sugarcane Research Centre, Kashipur G.B. Pant University of Agriculture and Technology, Pantnagar (India). Trichoderma harzianum induced effect on red rot disease and quantitative parameters of sugarcane cultivars. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p. 386-391 KEYWORDS: TRICHODERMA HARZIANUM. SUGARCANE. VARIETIES. FIELD CAPACITY. FIELDS.

Application of Trichoderma harzianum is an eco-friendly, economical and easy approach for disease suppression, improving growth of the plant and increase the sugarcane production. So it becomes imperative to know the field performance of T. harzianum on red rot disease management and quantitative parameters of sugarcane cultivars. Before this, longevity test was conducted to know the viability of formulated product under proper storage condition. In this study to assess the longevity of T. harzianum, cfu count was observed. The population of T. harzianum decreased significantly (10.00x10^6 to 2.00x10^6 cfu/g) over the period of its storage (120 days). Disease management was ascertained by inoculation challenged with Colletotrichum falcatum. Red rot incidence showed decreasing trend with application of bio-agent T.harzianum. Red rot infection was considerably suppressed in all the treated plants as compare to control. Trichoderma harzianum was found significantly effective in improving germination, tillers counts, number of millable canes and cane yield over the control in plants cane of sugarcane cultivars CoS 8436, CoPant 90223, CoS 8432, CoJ 64, CoS 88230, CoPant 97222, CoPant 3220 and CoPant 99214. The application of treatment metabolites were found to be more efficient and
significantly better than other treatments i.e. spore suspension, T.harzianum + FYM and talc based T.harzianum.

357. JOSHI, HIMANSHU; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) KUSHWAHA, K.P.S; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) NEELAM; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Efficacy of fungicides for the management of web blight of mungbean (Vigna radiata (L.) Wilczek). International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p. 429-431 KEYWORDS: FUNGICIDES. MANAGEMENT. VIGNA RADIATA. RHIZOCTONIA SOLANI. IN VITRO. CARBENDAZIM.

The five fungicides were evaluated in vitro and field condition against Rhizoctonia solani causing web blight disease of mungbean. In vitro screening of fungicides exhibited that propiconazole (0.05% and 0.1%), hexaconazole (0.1%), carbendazim (0.1%) and mancozeb (0.2%) were found most effective by inhibiting 100% mycelial growth of the pathogen. In case of prophylactic spray of fungicides propiconazole (0.1%) resulted minimum disease severity (33.3%) and the maximum grain yield (1027.33 kg/ ha) followed by carbendazim and hexaconazole.

358. Malathi, V.G.; Department of Plant Pathology, Tamil Nadu Agriculture University, Coimbatore (India). Biology and pathogenesis of begomovirus. Journal of Mycology and Plant Pathology. (June 2015) v.45(2) p.123-143 KEYWORDS: RECOMBINATION. PLANT VIRUSES. DNA. BEAN COMMON MOSAIC POTYVIRUS. GEMINIVIRUSES. INDIA.

Begomoviruses transmitted by whitefly infect a large number of dicotyledonous hosts causing diseases of economic importance. In the last decade using rolling circle amplification, more than hundred isolates of begomoviruses have been characterized. About 385 begomovirus isolates have been characterized in India from crop and weed species. Comparative genome analysis revealed events of recombination as a major factor contributing to variability .The intricate events of replication, movement, encapsidation, PTGS and transmission by the vector are being unravelled, which will open up interesting option for the management of diseases.

359. Balodi, Rekha.; Department of Plant Pathology, College of Agriculture, GBPUA&T, Uttarakhand (India)Kumar, j.; Department of Plant Pathology, College of Agriculture, GBPUA&T, Uttarakhand (India). PCR Assay for rapid and accurate detection of magnaporthe oryzae in rice (oryza sativa) using primers specific to PWL gene family. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.144-155 KEYWORDS: PCR. DNA. PATHOGENESIS. PRODUCTION. RICE. SEED. MANAGEMENT. INDIA.

Magnaporthe oryzae is a destructive pathogen of rice and other economically important crops and causes huge losses both qualitatively and quantitatively. The pathogen can infect all the above ground parts of the rice plants including seeds. Association of this pathogen with the seeds contributes as
the source of primary inoculum for development of epidemics in the field. Likewise, infected seeds may introduce the pathogen to un-invaded areas. Therefore, seed health testing of rice for blast should be the essential component of an integrated disease management programme. Routinely used seed health testing methods are tedious, time consuming and difficult to interpret. Therefore, an attempt was made to develop a polymerase chain reaction-based assay for specific, sensitive and economical detection of the pathogen from seeds. PWL gene family specific primer was designed using NCBI-Primer designing tool and a PCR assay was standardized. The primer produced an amplicon of 200 bp with the genomic DNA of Magnaporthe spp and sensitivity of the assay was found to be 50 pg ul'. The primer was found to be very specific, as with other fungal and bacterial pathogens tested, it did not produce 200 bp amplicon. Seed assay was developed with infected seeds of five different rice varieties. Sensitivity of the seed assay was found to be 5 per cent though after enrichment of seeds in potato dextrose broth the sensitivity of the assay increased to 1 per cent. The assay was found to be specific with seeds also, as only 200 bp amplicon was observed in every PCR. Further, on comparison of the PCR assay with the conventional methods used in the detection procedures, it was found that the assay is more specific with high positive predictive value, indicating its usefulness in detection protocols. Results obtained in this study indicate that PWL gene specific primer could be utilized for sensitive and specific detection of M. oryzae. The assay will be useful in determining rice seed health and thus will help in effective and economic management of the disease by adopting knowledge based management program.

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**360.** Swamy, K.M.; Department of Plant Pathology, University of Agricultural Sciences, Dharwad (India)Patil, MS.; Department of Plant Pathology, University of Agricultural Sciences, Dharwad (India)Bhat, RS.; Department of Biotechnology, University of Agriculture, Dharwad (India). Development of coat protein mediated resistance in peanut plants against peanut bud necrosis virus. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.156-165

KEYWORDS: MICROBIAL PROTEINS. PLANTS. OILSEEDS. DISEASE CONTROL. INDIA.

Bud necrosis, caused by Peanut bud necrosis virus (PBNV), is a devastating disease of many crops including peanut (Arachis hypogaea). The coat protein gene of 831 bp was amplified and cloned. The coat protein gene was sub cloned into a plant transformation vector pCambia1305.1 to get a plant expression cassette under the control of CaMV 35S promoter and nos terminator. The resulting vector was mobilized into the Agrobacterium tumefaciens LBA 4404 strain by triparental mating. Coat protein gene was transferred to peanut (cv GPBD 4) by Agrobacterium-mediated in planta transformation of embryo axis. Of the 200 embryo axis infected with Agrobacterium, 140 developed into plants (To), and thirteen plants (6.5%) showed the presence of coat protein gene when checked with PCR and GUS assay. Of the 52 T, transgenic plants from thirteen (To) events, 37 showed stable integration of the coat protein gene. Expression of the coat protein gene was confirmed using DAC-ELISA. The challenge inoculated plants were resistant to
PBNV. Absence of virus was confirmed in PCR positive T, transgenic plants by negative amplification for movement protein gene of PBNV.

361. Bhukal, Nitesh; Department of plant Pathology, CCS Haryana Agriculture University, Hisar (India) Singh, Ram.; CCSHAU Rice Research Station, Kaul, Haryana (India) Mehta, Naresh; Department of plant Pathology, CCS Haryana Agriculture University, Hisar (India). Progression and development of sheath blight of rice in relation to weather variables. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.166-172

KEYWORDS: RICE. CROPS. TRANSPLANTING. DATA. FUNGAL DISEASES. INDIA.

Role of weather parameter in the progression and development of the sheath blight of rice revealed that a maximum temperature range between 31 C to 33 C, minimum range between 16 C to 25 C and relative humidity (morning and evening) more than 90 per cent played major role in the progression of the disease. The regression equation developed indicates that minimum temperature played major role in the development of the sheath blight of rice. The weekly disease progression in Basmati CSR 30 ranged from 1.66 to 7.12, 1.94 to 6.00 and 3.97 to 6.94 per cent during first, second and third date of transplanting, respectively while the corresponding figures for the other variety HKR 127 were 2.61 to 13.54, 2.79 to 31.43 and 7.38 to 29.86. The delayed transplanting resulted in lesser disease severity in Basmati CSR 30 while the reverse trend was observed in HKR 127.

362. Lovejot, K.; Department of Plant Pathology, Center for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore (India) Jadhav, M.S.; Department of Plant Pathology, Center for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore (India) Sethil, N.; Department of Biotechnology, Agriculture College and Research Institute, Madurai (India) Bharti, N.; Department of Plant Pathology, Center for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore (India) Nagarajan, P.; Department of Biotechnology, Agriculture College and Research Institute, Madurai (India).

Molecular cloning and characterization of yellow mosaic virus from mung bean from northern region of Tamil Nadu indicated association of mungbean yellow mosaic India virus DNA A with a recombinant DNA B. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.173-181

KEYWORDS: AGRICULTURE. DNA. MICROBIAL PROTEINS. CLONING. ROLLING. INDIA.

Genomic components of the yellow mosaic virus, the causal agent of yellow mosaic disease in mung bean were cloned and sequenced from an infected sample of mung bean. Nucleotide sequence analysis of DNA A component revealed more than 98 per cent identity with mung bean yellow mosaic India virus (MYMIV) isolate from West Bengal (Gene bank accession no:HF92262) and therefore designated as an isolate of MYMIV-[IN::Vrng::Mg:13-A] whereas analysis of DNA B component revealed more than 93 per cent identity with some DNA B variant reported for mung bean yellow mosaic virus (MYMV) and mung bean yellow mosaic India virus (MYMIV) but showed very less identity (only 45%) with one set of DNA B components of MYMV. Total
nucleotide and predicted amino acid sequence analysis of MYMIV-[Mg] with other yellow mosaic isolates clearly established dichotomy of the isolates.

363. Aryal, H.P.; Institute of Science and Technology, Tribhuvan University, Siddarthnagar (India) Budhatoki, U.; Central Department of Botany, Kirtipur (Nepal). New record of termite mushrooms from Nepal. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.182-188 KEYWORDS: ECONOMIC DISTRIBUTION. EDIBLE FUNGI. NEPAL. INDIA. GENERA. TEETH. NATURAL HISTORY.

During a survey of wild edible mushrooms in tropical to temperate belt of Nepal in rainy season 2010-12, many macro fungal species were collected and identified. This paper highlights on new records of Termitomyces mammiformis R Heim, T. robustus (Beeli) R Heim, T. striatus var. griseus (Beeli) R Heim T. striatus var. ochraceus R Heim and T. umkowaan (Cooke & Massee) DA Reid, reported for the first time from Nepal and re-described. Samples were collected deep into the forest of different ecological zones, within an altitude between 60-3000 m asl in tropical, subtropical riverine forest to temperate deciduous forest. The specimens have been deposited in Natural History museum (NHM), Swayambhu, Tribhuvan University, Kathmandu, Nepal.

364. Sharma, I.M.; Department of Plant Pathology, Dr YS University of Horticulture and Forestry, Solan (India) Prashad, Durga.; Department of Plant Pathology, Dr YS University of Horticulture and Forestry, Solan (India). Prevalence, etiology and management of green mould rot (Penicillium digitatum) in citrus (Kinnow) fruits. Journal of Mycology and Plant Pathology (India). Jun 2015 v.45(20) p.189-205 KEYWORDS: FRUITS. CITRUS. CHEMICALS. AETIOLOGY. FUNGICIDES. DISEASE CONTROL. INDIA.

Green mould rot caused by Penicillium digitatum (Pers.) Sacc. is a most destructive disease of citrus fruits. It is one of the major limiting factors in successful production by affecting both quality and yield of citrus (Kinnow) fruits in Himachal Pradesh. Present investigation was undertaken with the objectives to study the prevalence; etiology and management of green mould rot pathogen of citrus fruits to develop suitable management practices. Survey of different terminal fruit markets in the state indicated that incidence of green mould rot varied between 18.5-25.9 percent. Maximum incidence of green mould rot was recorded at Paonta Sahib (25.9%) in district Sirmour. The freshly inoculated citrus (Kinnow) fruit with P digitatum developed discoloured soft area around injuries on second days and white mycelium starts appearing on discoloured area on fourth days after 90 h of inoculation, olive green coloured spores appeared in the centre of white mycelium on sixth days of inoculation and the entire fruit surface was covered with olive green spores of fungus on eighth days of inoculation. In management studies, among eight different fungicides tested in vitro against P digitatum, difenoconazole 25 EC, carbendazim 50 WP and hexaconazole 5 EC were most effective in order with 99.51, 98.54 and 98.17 per cent growth inhibition (PGI). Similarly, out of six chemicals, diphenyl amine was most effective (92.5 PGI) followed by potassium sorbate (74.05 PGI) and sodium bicarbonate (73.12 PGI), respectively. Under in vivo evaluation, difenoconazole was most
effective and exhibited complete control of target disease followed by
carbendazim with 4.30 per cent disease index (PDI). Hexaconazole 5 Ee,
diphenylamine and potassium sorbate were the next best in order and recorded
90.71, 90.36 and 89.51 per cent.

365. Cherian, K. Anita.; Banana Research Station, Kerala Agriculture University, Kerala (India) Menon, Rema; Banana Research Station, Kerala Agriculture University, Kerala (India) Sindu’ G.P.; Banana Research Station, Kerala Agriculture University, Kerala (India) Linse, Paulose; Banana Research Station, Kerala Agriculture University, Kerala (India). Fungal pseudostem rot of banana variety kadali. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.207-208 KEYWORDS: BANANAS. LEAVES. SYMPTOMS. GROWTH. INDIA.

366. Kour, Harpreet.; Department of Botany, University of Jammu, Jammu (India) Kour, Satvinder.; Department of Botany, University of Jammu, Jammu (India) Sharma, P.Y.; Department of Botany, University of Jammu, Jammu (India) Kumar, Sanjeev.; Department of Botany, University of Jammu, Jammu (India). Additional records of craterellus from Jammu and Kashmir, India. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.209-214 KEYWORDS: TAXONOMY. INDIA. DNA. SPECIES. MICROSCOPY. ELDERLY. BOTANY.

367. Thind, S.T.; Department of Plant Pathology, Punjab Agriculture University, Ludhiana (India) Attri, Monica; Department of Plant Pathology, Punjab Agriculture University, Ludhiana Singh, Amarjit; Department of Plant Pathology, Punjab Agriculture University, Ludhiana. A simple method for early detection of metalaxyl resistance in phytophthora parasitica dast causing foot rot of citrus. Journal of Mycology and Plant Pathology (India). (Jun 2015) v.45(20) p.215-217 KEYWORDS: FUNGICIDES. METALAXYL. PHYTOPHTHORA. FEET. GUMMOSIS. INDIA.


Early blight disease is a serious threat to tomato cultivation in India
causing severe loss in yield due to pre and post harvest losses. Apart from host
environmental conditions are one of the major factors in disease development.
Screening of different lines were done considering climatic conditions like
temperature and relative humidity during year 2012 and 2013 and their
alternaria disease symptoms was recorded as percent diseases index (PDI) at regular interval continuously for two years for different tomato cultivars/lines. Different lines were categorised on the basis of their PDI values and susceptible and resistant lines were selected among 77 lines during both years. None of the varieties registered highly resistant reaction but the varieties were resistant to the disease in both the years.

369. Pal, Rini; All India Co-ordinated Rice Improvement Project, Regional Research and Technology Tranfer Station, O.U.A.T, Chiplima, Sambalpur, Odisha (India) Mandal, Dipankar; All India Co-ordinated Rice Improvement Project, Regional Research and Technology Tranfer Station, O.U.A.T, Chiplima, Sambalpur, Odisha (India) Naik, S. B.; RRTTS, OUAT, Chiplima (India). Screening of rice cultivars for resistance against sheath rot disease of rice caused by Sarocladium oryzae. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.349-354 KEYWORDS: GERMPLASM. RICE. SAROCLADIUM. CHEMICALS. INFLORESCENCES. TOXICITY. INDIA. Experiment was conducted at the research field of All India Co-ordinated Rice Improvement Project, RRTTS, Chiplima, Sambalpur, Odisha during kharif seasons of 2012 and 2013. Fifty seven test entries of rice were screened against sheath rot (Sarocladium oryzae) after heading stage in-the-field. Among S7 entries, 10 lines were found moderately resistant. 32 lines were moderately susceptible, III were susceptible and 1 showed highly susceptible reaction.

370. H60 Weeds


Three nitrogen levels with four weed management agro techniques for direct seeded rice (DSR) were evaluated in DSR during wet season of 2009. The results showed that grain yield of rice and N, P and K uptake by rice crop and weeds increased significantly with successive increase in nitrogen up to 125 kg ha⁻¹. The interaction of nitrogen application 125 kg ha⁻¹ (N125) with the application of pendimethalin 1 kg a.i. ha⁻¹ + 2 hand weedings at 20 & 40 DAS of rice (W3) resulted in significantly higher nitrogen and potassium uptake by grain (73.1 and 21.7 kg ha⁻¹, respectively), phosphorus uptake by straw (14.0 kg ha⁻¹) and total N, P and K uptake by crop (116.1, 34.4 kg ha⁻¹ and 48.8 kg ha⁻¹, respectively) than weedy check plot, which ultimately resulted in high grain yield (6.3 t ha⁻¹). This treatment also significantly reduced the density and dry weight of weeds and nutrient depletion by weeds. The brown manuring with Sesbania and cowpea (W1 and W2) also had positive responses in lowering weed populations and increasing yield in DSR.
SEEMA; Department of Agronomy, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) BISHT, P.S.; Department of Agronomy, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) KRISHNA, MAYA; Department of Agronomy, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Agronomic weed management practices with varying levels of N in direct seeded aerobic rice. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p.329-331 KEYWORDS: AGRONOMIC CHARACTERS.  WEEDS.  MANAGEMENT.  SEEDS.

A field experiment was conducted during the Kharif season 2010 to find out the nitrogen requirement and suitable agronomic weed management practices in direct seeded aerobic rice. Grain and straw yields of rice crop increased significantly with successive increase in Nitrogen up to 100 kg N/ha. Increased nitrogen level also increased the yield contributing characters. Among weed management practices, all the treatments were found statistically at par to each other except unweeded check, but the application of pre emergence of pendimethalin 1 kg /ha + brown manuring + 1 hand weeding at 60 DAS was recorded with the highest grain yield (4.12 t/ha) and lowest weed dry matter at all growth stages.

J11 Handling, transport, storage and protection of plant products

VERMA, MUKESH KUMAR; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) RAGHAV, MANOJ; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Effect of calcium on growth, yield, quality and storage of potato (Solanum tuberosum L.). International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12) p.231-234 KEYWORDS: CALCIUM.  GROWTH.  YIELDS.  SOLANUM TUBEROSUM.

An experiment was carried out during rabi season of 2011-12 to evaluate the effect of calcium on growth, yield, quality and storage of potato (Solanum tuberosum L.) The experiment was conducted in Randomized Block Design with three replications. The experiment consisted of seven treatments viz., no application of calcium (control), application of 40 kg/ha calcium at planting, application of 20 kg/ha calcium at planting and 20 kg/ha at earthing up, application of 80 kg/ha calcium at planting, application of 40 kg/ha calcium at planting and 40 kg/ha at earthing up, application of 120 kg/ha calcium at planting, application of 60 kg/ha calcium at planting and 60 kg/ha at earthing up. The calcium was applied in the form of gypsum. The results showed that the applied calcium had positive impact on morphological parameters i.e. increase in emergence, plant height, number of leaves per hill, number of haulms per hill and was recorded maximum with application of 120 kg/ha calcium at planting. The tuber yield was significantly higher with application of 40 kg/ha calcium at planting and 40 kg/ha at earthing up. Calcium application increased the specific gravity and dry matter content of tubers and reduced the skin damage tuber at harvest, physiological weight loss and rotting of tuber at room storage.

The experiment was conducted during 2011-2012 with the objective of determining suitable treatment for better shelf life and quality of mango. The experiment was conducted on 25 years old Dashehari mango trees and the number of treatments was 8 and each treatment was replicated 3 times. The pre harvest application of GA3 15 ppm + CaCl2 2.0% resulted in minimum physiological loss in weight (10.30 %) and reduced acidity (0.291%) and maximum shelf life (13.25 days), TSS (22.28 OB) and total sugars (18.76%).

376. Fazulla, Shariff; Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad (India) Sajjan, S. Ashok; Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad (India) Hunje, Ravi; Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad (India). Effect of botanical seed treatment on seed quality during storability of greengram (Vigna radiate L.). Green Farming. (Jul 2015) v.6(4) p.712-715 KEYWORDS: SEED TREATMENT. INFECTION. MUNG BEANS. VIGOUR. AZADIRACHTA INDICA. DELTAMETHRIN.

A laboratory experiment was carried out at the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad during 2013-14 to study the effect of botanical seed treatment on storability of greengram seeds. The investigation consists of eight treatments (T1-Neem oil, T2-Castor oil, T3-Neem leaf powder, T4-Prospis leaf powder, T5-Sweet flag rhizome powder, T6-Vitex negundo leaf powder, T7-Deltamethrin,T8-Untreated control) and in four replications. The results indicated that Deltamethrin 0mg/kg of seed significantly reduced the seed insect infestation, disease infection, maintained the proper germination percentage, seed moisture, root length, shoot length and seedling vigour index. However, the botanicals like neem oil and castor oil (5 ml/kg seed) have on par with Deltamethrin (40 mg/kg seed), followed by sweet flag rhizome, Vitex negundo leaf powder & neem leaf powder (1 0 g/kg seed) but they were superior over the untreated control.

N20 Agricultural machinery and equipment

377. Satyanarayan,; Deptt. of Farm Machinery & Power Engineering, College of Agric. Engineering, University of Agricultural Sciences, Raichur (India)Anantachar, M.; Deptt. of Farm Machinery & Power Engineering, College of Agric. Engineering, University of Agricultural Sciences, Raichur (India)Reddy, Sanjeeva. B.; Central Research Institute for Dryland Agriculture, Hyderabad (India) Veerangouda, M.; Deptt. of Farm Machinery & Power Engineering, College of Agric. Engineering,
University of Agricultural Sciences, Raichur (India). Evaluation of seed planters using electronic sensors based instrumentation system. Green Farming. (Jul 2015) v.6(4) p.869-873

KEYWORDS: SENSORS. SEED DRILLS. SOWING. SOWING. EQUIPMENT. CLAMS.

A photo electronic sensor based instrumentation system was developed to match the tractor drawn seed planters to quickly assess the seed metering rotor performance. The data thus collected and logged using instrumentation system without manual interference while in operation could quickly subjected to analysis, to identify defects in critical components, so that such machine components be redesigned to improve precision. Inclined and horizontal rotor plate metering mechanisms were test using a grease belt test rig in laboratory conditions fitted with the instrument system. The developed electronic sensor based instrument seed counting accuracy ranged between 96.88 to 99.55 percent of the actual seeds metered. The mean number of seeds counted by the sensor at different forward speeds for maize varied from 257.54 to 253.88,267.45 to 265.82 for inclined and horizontal rotor plates respectively, whereas for castor in the range of 258.52 to 254.74 and 266.40 to 265.28 against the theoretical number of seeds to be dropped is 270. Seeding rate obtained for maize and castor for horizontal and inclined plate at forward speed of 3.5 km h\(^{-1}\) were 11.13 and 11.18 seeds m\(^{-1}\); and 5.58 and 5.63 seeds m\(^{-1}\);. Seed spacing interval observed for horizontal rotor at the forward speed of 3.5 km h\(^{-1}\) was 201.33 mm for maize and 201 mm in case of castor and 207.01 mm for maize and 207.66 mm in case of inclined plate meters mechanism. Horizontal metering plate recorded more consistent seed to seed spacing interval when compared with the other mechanism. Sensing the seeds flowing through the seed tubes helps the operator to observe functioning of the planter.

P06 Renewable energy resources


KEYWORDS: FUELS. CATTLE. FARMYARD MANURE. PINUS. BRIQUETTES.

Pine needles are available abundantly in the hills of Uttarakhand and have no use except for animal bedding. It is solely responsible for forest fire during the summer season resulting in irreparable loss of valuable forest wealth. With a view to utilize the pine needles and reducing the dependency on forest for firewood, briquettes were formed using a die, through cold process, by using cattle dung and pine needles in various proportions and at different die pressures. The study of its fuel properties showed maximum increase in heat value by 64.06% and ash content by 2.46% by mixing pine needles into cattle dung by 40% at 110 kg/cm\(^2\) die pressure compared to pure cattle dung briquettes. The briquettes having more than 40% pine needle in it was not found stable. The die pressure was found to have influence over all the parameters considered for the study.
SINGH, T.P.; Department of Farm Machinery and Power Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar (India) KUMAR, SUMIT; Department of Farm Machinery and Power Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar (India) SINGH, JAYANT; Department of Farm Machinery and Power Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Fuel characteristics of blends of rice bran oil methyl ester and kerosene and its effect on engine performance. International Journal of Basic and Applied Agricultural Research. (May 2014) v.2(12), p.268-276

KEYWORDS: FUELS. RICE. PARAFFIN. PARAFFIN. JATROPHA. PONGAMIA PINNATA.

The use of diesel engines, as prime source of power, is growing fast as a result the demand of fossil fuel has increased tremendously. The lesser production has put pressure on government to import the fossil fuel from oil producing countries to meet the domestic requirement. Biodiesel, from Jatropha and Pongamia Pinnata, a non-edible vegetable oil, has been tried as a substitute fuel for diesel engines. Rice bran oil and its methyl ester also have good potential as a fuel substitute. In this study, rice bran oil methyl ester was prepared by transesterification process and was blended with kerosene fuel. The fuel properties of pure rice bran oil methylester (B100K0) and its blend with kerosene fuel in 90:10 (B90K10), 80:20 (B80K20), 70:30 (B70K30) and 60:40 (B60K40) proportions, on v/v basis, was determined and also the engine performance including exhaust emission was studied. The studies on fuel properties revealed that kinematic viscosity, API gravity and gross heat of combustion of fuel blend, B60K40, was almost similar to diesel fuel. The engine was observed to produce almost equal power on all the fuel blends and its brake thermal efficiency was also observed higher. The brake specific fuel consumption was observed minimum for B80K20 fuel blend. It also resulted in maximum reduction of unburned HC emission where as minimum NO2 emission was observed for fuel blend B60K40 at all the brake loads. The study reveals that kerosene can safely be mixed, up to 20%, in biodiesel (rice bran oil methyl ester) as a substitute to diesel fuel.

P10 Water resources and management

PANWAR, RAJDEV; 1Department of Soil and Water Conservation Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar (India) KUMAR, DEVENDRA; College of Agribusiness Management, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Disaggregation of monsoon season runoff into shorter time periods for a hilly watershed by artificial neural network. International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p. 466-473

KEYWORDS: MONSOON CLIMATE. WATERSHEDS. TRAINING. STANDARDIZING.

Present study represents application of artificial neural network for disaggregation of monsoon season runoff series in short time interval divided into duration of 7/8 days and is illustrated by an application to model the river
flow of Naula watershed of Ramganga river in Uttarakhand state, India. For this purpose different models are developed and the best two is selected according to desired condition, in the first ANN model training is done for durations of 7/8 days of June, July, August, September month;s runoff as output. For this calibration, best results are obtained in ANN architecture of 1-1-4 for both training and testing. In second model, active monsoon months (July and August) total runoff and less active months (June and September) total runoff was used as input and runoff of 7/8 days of July and August; June and September runoff respectively as output. Best result in training and testing was found in ANN architecture 1-3-3-3-2 for June and September total runoff and 1-1-2 for July – August total runoff. To arrive at the best model, lower value of ARRE and ISE and higher value of r was obtained for all months for selected architecture. However, correlation coefficient between measured and simulated data series are 0.87 and 0.59 for training and testing respectively for model 1, 0.90 and 0.59 in July – August and 0.93 and 0.61 in June – September for model 2. The result of both the models are found to be comparable though model 2 performed better for the months of July and August sub periods.

P31 Soil surveys and mapping

Ghosh, N. S.; Deptt. of Fruits & Orchard Management, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India). Integrated nutrient management in sweet orange for better fruit production & soil health under rainfed condition. Green Farming. (Jul 2015) v.6(4) p.839-841 KEYWORDS: FARMYARD MANURE. FERRALSOLS. RAINFED FARMING. SWEET ORANGES. FRUITS. UTRIENTS. FERTILIZERS.

With the view to integrate use of organic and inorganic fertilizers for sustainable production and maintenance of crop and soil health, a long term investigation was made at the Regional Research Station, B.C. Krishi Viswavidyalaya, Jhargram, West Bengal, India during 2005-06 to 2007-08 on sweet orange cv. Mosambi budded on rough lemon (Citrus jambhiri) rootstock. There were 7 treatment combination based on application of nutrient source per plant per year; viz., T1 : Full recommended dose of N.P.K.; T2 : Neem cake 3 kg; T3 : Cowdung manure 40 kg ; T4 : Vermicompost 5 kg; T5 : Half recommended dose of N.P.K. + Neem cake 3 kg; T6 : Half recommended dose of N, P, K + Cow dung manure 40 kg ; T7 : Half recommended dose of N.P.K. + Vermicompost 5 kg. The experiment was conducted following randomized block design having five replications with four plants in each replication. The results from three consecutive years of study indicated that organic manures along with 50% RDF (recommended dose of fertilizers) was very effective in fruit production and quality improvement in fruits of Mosambi – sweet orange grown in laterite soil under rainfed condition. Application of 5 kg vermicompost or 40 kg FYM combined with 50% RDF resulted in higher fruit production with better plant health in terms of least amount of dry shoot production. These treatments were also helpful for production of quality fruits and better nutrient mobilization from soil to plant as reflected through higher values of NPK in leaves. The soil pH value was near neutral in plots applied with organic manure, while it was acidic in plots.
where inorganic fertilizers were applied. Nutrient analysis was made from the soil collected from the root rhizosphere of individual plant on each plot. The depletion of nutrients from soil in terms of N, P and K was lowest in organic manure applied plants and highest in inorganic fertilizer applied plants.

P33 Soil chemistry and physics

382. Chowdhury, R. Md.; Deptt. of Agronomy, Faculty of Agric., Bidhan Chandra Krishi Viswavidalaya, Mohanpur (India) Choudhury, Roy S.; Dept. of Agronomy, BAC-Sabour, Bihar Agricultural University, Bhagalpur (India) Brahmachari, K.; Deptt. of Agronomy, BAC-Sabour, Bihar Agricultural University, Bhagalpur (India) Kumar, V.; Deptt. of Agronomy, BAC-Sabour, Bihar Agricultural University, Bhagalpur (India). Productivity and fertility build-up of the soil through INM under rice-onion-residual greengram crop sequence. Green Farming. (Jul 2015) v.6(4) p.716-720 KEYWORDS: BIOFERTILIZERS. FERTILITY. NUTRIENT UPTAKE. RESEARCH. MUNG BEANS. ONIONS. RICE.

One experiment was carried out on production stability of crops and fertility build-up of soil, at the farmer’s field at Kalyani, Nadia, India under New Alluvial Zone of West Bengal during the years of June 2011 to June 2013, in strip plot design with two (2)main plot treatments (B, i.e. without biofertilizer and B, i.e. with biofertilizer) and seven (7) sub plot treatments (F,: 100% of the Recommended dose of fertilizer i.e. RDF, F2: 75% of the RDF, F3: 75% of the RDF +25% of N through FYM, F4: 75% of the RDF +25% of N through vermicompost, F5: 75% of the RDF +25% of N through neem cake, F: 75% of the RDF +25% of N through groundnut cake and F7: 75% of the RDF +25% of N through mustard cake replicated thrice, with the broader objective of sustaining the intensive cropping system in terms of production and soil health. The treatment ascendancy was observed under the main plot treatment B, (biofertilizer), sub-plot treatment F, 75% RDF + 25% N through groundnut cake) in enhancing and sustaining the productivity and soil fertility. The main plot treatment B, and sub-plot treatment F, recorded the highest rice grain yields of 4.38 and 5.16 t/ha respectively. The equatorial bulb diameter and marketable bulb yield of onion was ascertained under the main plot treatment B, and sub-plot treatment F, with the corresponding values of 6.69 cm and 23.81 t/ha respectively, In case of greengram the treatment dominance was observed under the main plot treatment B, sub-plot treatment F, applied to the previous onion crop recording the values of 0.832 and 0.861 t/ha respectively.

P34 Soil biology

383. Anwar, M.S.; Department of Biotechnology, Bhimtal Campus, Kumaun University, Nainital, (India) RANA, V.R.S.; Department of Biotechnology, Bhimtal Campus, Kumaun University, Nainital, (India) PANDE, V.; Department of Biotechnology, Bhimtal Campus, Kumaun University, Nainital, (India). Isolation, screening and characterization of Bacillus cereus and Enterobacter asburiae isolated from rhizospheric soils of Uttarakhand for different plant growth promotion (PGP) activities: an invitro-study. International Journal of Basic and Applied Agricultural
Plant Growth Promoting (PGP) Rhizobacteria is beneficial bacteria that colonize plant roots and enhance plant growth by wide variety of mechanism like phosphate solubilisation, etc. The use of PGP rhizobacteria is steadily increased in agriculture and offers an attractive way to replace chemical fertilizers, pesticides, and supplements. The present work was designed to isolate and characterize the effective PGP rhizobacteria. For this purpose PW2a and BHMa were isolated and characterized on various parameters of PGP activity like phosphate solubilisation, IAA production, HCN production were performed. The results of enhanced phosphate solubilisation (165-415 g/ml) upon 4 days of growth and IAA production (1.5-7.5 egg/ml) upon 2 days of growth in the presence or absence tryptophan concentration were noticed. A remarkable change in colour from yellow to brown against the control in King’s-B medium amended with 4.4g glycine, were suggests the positive result for HCN production. Consequently, the efficient strain PW2a and BHMa were identified on the basis of 16s rRNA sequencing and confirmed as Enterobacter asburiae and Bacillus cereus, respectively. Therefore, the present study suggests that both the strains have effective PGP activity and would be extremely useful for plant growth promotion.

384. SAIKIA, SWARGADEEP; Department of Microbiology, College of Basic Science and Humanities G.B. Pant University of Agriculture and Technology, Pantnagar (India)
PANDEY, RAJ KUMAR; Department of Microbiology, College of Basic Science and Humanities, G.B. Pant University of Agriculture and Technology, Pantnagar (India)
TEWARI, LAKSHMI; Department of Microbiology, College of Basic Science and Humanities G.B. Pant University of agriculture and Technology, Pantnagar (India). Phosphate solubilising potential of fungal isolates from Bamboo rhizosphere. International Journal of Basic and Applied Agricultural Research. (Sep 2015) v.13 (3), p. 492-496 KEYWORDS: PHOSPHATES. MYCOSES. BAMBOOS. RHIZOSPHERE.

385. Bhatt, Rajan; Department of Soil Science, Punjab Agricultural University, Ludhiana (India) Kukal, S.S.; Department of Soil Science, Punjab Agricultural University, Ludhiana (India). Tillage residual effects on soil moisture dynamic after wheat during intervening period of rice-wheat sequence in South-Asia. Green Farming. (Jul 2015) v.6(4) p.744-747 KEYWORDS: LYSIMETERS. SOIL. THERMOMETERS. TIME. TILLAGE. WHEAT FLOUR. RICE. RESEARCH.

An experiment was conducted with an objective was to evaluate the residual tillage treatmental effects viz., conventionally (CT) and zero tilled plots (ZT) on soil moisture dynamics, for which time domain reflectometer (using 7.5 cm and 20 cm probes), tensiometers (at 10, 20 and 30 cm soil depths), soil thermometers (upto 5 cm soil depth) and lysimeters (in selected treatments) were used. The CT plots conserved more moisture than ZT plots (with 2 t/ha) after wheat. On an average, during the intervening period after wheat, soil matric tension reported to be 28%, 18% and 18 % higher in ZT plots than CT plots in 10,20 and 30 cm soil depths respectively while soil temperature was 2.2% higher in the ZT plots. Recorded water depths upto 7.5 cm of soil surface
was 10.3% higher in C'T plots in comparison to the ZT during the intervening periods. Evaporation losses pragmatic to be higher (7.6%) in ZT plots, because of recorded lower mulch loads, higher surface temperature and continuity of soil pores in compare to C'T plots and this conserved soil moisture helps in cultivating intervening green manuring crops which further improves the declining soil health, water productivity and finally livelihoods in the region.

386. Kumar, Naveen B.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Achary N.G. Ranga Agricultural University, Hyderabad (India) Padmaja, G.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Achary N.G. Ranga Agricultural University, Hyderabad (India) Rao, Chandrasekhar P.; Department of Soil Science and Agricultural Chemistry, College of Agriculture, Achary N.G. Ranga Agricultural University, Hyderabad (India). Interaction effects of nitrogen and potassium on soil nutrient fractions, yield and nutrient uptake by okra. Green Farming. (Jul 2015) v.6(4) p.764-767 KEYWORDS: NITROGEN. OKRAS. POTASSIUM. NUTRIENT UPTAKE. AGRICULTURE. SOIL.

A field experiment was conducted during kharif season of 2011 on a sandy loam soil (Alfisof) at Student’s Farm, College of Agriculture, Rajendranagar, Hyderabad with a view to study the effect of levels of nitrogen (0, 60, 120 and 180 kg N/ha) and potassium (0, 30, 60 and 90 kg K/ha) on soil nutrient (N and K) fractions, pod yield and total nutrient uptake by okra. Randomized Block Design with factorial concept was followed. The pod yield of okra was significantly increased with nitrogen, potassium and their interactions. Among the different interactions (NxK), the highest pod yield (126.17 q/ha) was recorded by combined application of nitrogen 180 kg/ha+ potassium 90 kg/ha (N3K3) which was on par with nitrogen 180 kg/ha + potassium 60 kg K,O/ha (N3K,). Highest total N (83.83 kg/ha) and K (75.19 kg/ha) uptake was recorded with combined application of 180 kg N/ha + 90 kg K,O/ha (N3K3). Among the different forms of nitrogen and potassium, both NH4- N and N03- N forms of nitrogen and readily available forms of potassium viz., water soluble K and exchangeable K contributed to pod yield and total Nand K uptake, which was evidenced by their significant correlation with these plant parameters.


A survey was conducted during 2011-12 covering litchi orchards of U.S. Nagar, Nainital, Champawat, Dehradun and Haridwar districts in Uttarakhand where litchi extensively grown. Surface (0-22.5 cm) soil samples (n=145) were collected and analyzed for soil properties and extractable soil
nutrients. The contents of alkaline KMnO, hydrolysable N, Olsen's P and -Neutral 1N ammonium acetate (NH₄OAc) K in soils ranged from 134.8 to 376.3, 10.9 to 123.6 and 34.7-285.6 kg tie ; respectively. The DTPA extractable Fe, Mn, Zn and Cu in soils ranged from 5.55 to 171.2, 2.38 to 87.4,0.20 to 14.9 mg kg ; and 0.33 to 4.24 mg kg', respectively. Hot water soluble B and ammonium oxalate (pH 3.3) extractable Mo in soils ranged from 0.31 to 3.45 and 0.30 to 0.58 mg kg ; respectively. As per the values of nutrient indices, the soils of litchi orchards of U.S.Nagar district, were low in N and K, medium in Sand Zn but high in P, Fe, Mn, Cu, B and Mo, and of Nainital district, were low in N, Kand S and high in P, Fe, Mn, Cu, Zn, B and Mo, of Champawat district, were low in N, Kand S and medium in Zn but high in P, Fe, Mn, Cu, B and Mo fell and of Haridwar and Dehradun districts were low in N, K and medium in S but high in P and micronutrients Fe, Mn, Cu, Zn, B and Mo. The relationship between soil properties, extractable soil nutrients and fruit yield per tree was also studied.

388. Mir, M.M.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Baba, A.J.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Umar, I.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Rather, H.G.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Rehman, U.M.; ETC/KVK, SKUAST-K Malangpora, Pulwama (India) Banday, A.S.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Kumar, A.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India) Nazir, N.; Divison of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar (India). Effect of soil applied paclobutrazol on vegetative and quality attributes of apricot (Prunus aramenica L.). Green Farming. (Jul 2015) v.6(4) p.813-816 KEYWORDS: APRICOTS. PACLOBUTRAZOL. TREES. QUALITY. PENETROMETERS. SHOOTS.

An eight year old 'Roundel' apricot trees growing under low density planting system were treated with paclobutrazol as a soil drench at 0(control), 5,10 and 12g/tree in the year 2010 and 2011. In this experiment, paclobutrazol significantly retarded the shoot growth, shoot diameter and TTCSA during the course of investigation. The minimum shoot growth was observed when 10g paclobutrazol was applied/plant as compared to rest of the treatments. As far as number of fruits/plant and yield was concerned, application of 10g paclobutrazol significantly recorded the highest in both the years as compared to rest of the treatments. The effect of paclobutrazol on fruit LID ratio, seed weight, acidity and total sugars were non-significant. The results of the present study revealed that paclobutrazol significantly reduced the vegetative growth of plants, enhanced the fruit quality and increased the yield during both the years of study.
A field experiment was conducted during the rabi season of 2012-13 at Research-cum-Instructional Farm of I.G. Krishi Vishwavidyalaya, Raipur (Chhattisgarh) to study the response of seaweed saps on soil health and productivity of maize (sweet corn) in Inceptisols (Matasi) of Chhattisgarh. The foliar spray of two different species (Kappaphycus and Gracilaria) was applied thrice at different interval of crop with different concentrations (0, 2.5, 5.0, 7.5, 10.0 and 15% v/v) of seaweed extracts. Foliar applications of seaweed extract significantly enhanced the yield, nutrient uptake and soil fertility parameters. The highest green cob yield was recorded with applications of 15% Gracilaria sap + recommended dose of fertilizer (RDF), followed by 15% Kappaphycus sap + RDF extract resulting in an increase by 37.37% and 33.95% green cob yield, respectively compared to the control (water spray + RDF). The highest nutrient uptake nitrogen (N), phosphorus (P) and potassium (K) by green cob and fodder were observed under 15% G sap + RDF (T.). After harvest the maximum available N (229.97 kg ha⁻¹) was observed under treatment 15% K sap + RDF (T.). The maximum available P (23.68 kg ha⁻¹) and K (535.36 kg ha⁻¹) was observed under treatment 5% G sap + RDF (T.).

P40  Meteorology and climatology

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Water is a key driver of agricultural production and its most precious input. An experiment to study water demand of Potato with two dates of sowing i.e. October 12, 2010 & November 8, 2010 was conducted during rabi season of 2010-11. Applying the CROPWAT MODEL which was developed by FAO to several
incremental climatic change scenarios under the same crop, same dates of sowing and harvesting and soil properties (as in the present study) for the year 2050 for Pantnagar. Results shows that with changing climate crop water requirement and irrigation requirement is found to increase in 2050 as per the CSIRO MODEL output (B2A), scenario.


A study was conducted to explore the spatial distribution of organic carbon and available nitrogen in soil over Nainital district of Uttarakhand state using geo spatial technique. To analyze soil variability, one eighty soil samples (90 villages) were collected by stratified multistage random sampling method from medium farmer’s category using GPS, covering the whole district. The soil chemical properties i.e pH, EC, organic carbon and available nitrogen were measured in laboratory adopting the standard methods. Soil nutrient index was calculated by categorizing the samples into low, medium and high category. Spatial variability of soil chemical properties and soil nutrient index were computed. Results show that the overall quality of the soil were found to be fertile. Overall soil pH varies from 5.0-8.56 with the mean value 6.58 while EC values varied from 0.001-1.30 dS m-1 with mean value 0.205 dS m-1. The percent organic carbon content varied from 0.08-2.96 recorded as high in all the blocks over study area. Majority of the surface soil were medium to high in available N except few points. The overall available nitrogen status in the surface soils ranged from 125.65-1122.54 kg ha-1. Hence, high status of organic carbon were observed at Nainital in comparison to available N.

Q01 Food science and technology

392. Sanas, P.M.; Dept. of Horticulture, College of Agric., Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli (India) Haldankar, M.P.; Deptt. of Horticulture, College of Agric., Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli (India) Haldavanekar, C.P.; Deptt. of Horticulture, College of Agric., Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli (India) Godase, S.K.; Deptt. of Horticulture, College of Agric., Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli (India). Effect of pre-harvest fruit bagging on physico-chemical properties of karonda (Carissa conjesta Linn.) cv. 'Konkan Bold'. Green Farming. (Jul 2015) v.6(4) p.855-857 KEYWORDS: FRUIT. PACKAGING. CHEMICOPHYSICAL PROPERTIES. HARVESTERS. PAPER. ACIDITY.

An investigation was undertaken to find out the effect of pre-harvest fruit bagging on physico-chemical properties of karonda (Carissa conjesta Linn.) cv. 'Konkan Bold' at Department of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (MH) India, dunq 2010-2012 for two
consecutive fruiting seasons. The experiment was conducted in randomized block design with SIX treatments replicated four times with a unit of 80 fruits per treatment per replication. The treatments comprised of various type of material used for bagging viz. T1 News paper bag; T2 Brown paper bag; T3 Butter paper bag; T4 Plastic bag; T5 Brown plastic bag and T6 - Control. The maximum fruit retention was noticed in T3 (Butter paper bag, 69.25%). Most of the treatments of fruit bagging improved the quality of karonda fruits among which T2 (Brown paper bag) recorded the highest T.S.S. (17.68°brix), reducing sugars (4.91%) and total sugars (8.49%). The highest fruit length (2.82cm), fruit diameter (2.56cm), fruit weight (12.45g) and pulp weight (11.23g) was recorded in control (No bagging) fruits. The highest score for colour, flavor, texture and overall acceptability was seen in T3 (Butter paper bag).

Q02 Food processing and preservation

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The study on the value addition of cashew apple juice by blending with mango, pineapple and sapota juice and utilization of cashew apple for preparation blended juice by using mango, pineapple and sapota juice conducted during the year 2012-2013 at Horticultural College and Research Institute, Dr. YS.R. Horticultural University, Andhra Pradesh, with Completely Randomized Design (CRD) with 3 replications and 10 treatments. In the present investigation the cashew apple juice extracted from the fruits was blended with the fruit juices of mango, pineapple and sapota at different percentages. The significant differences were observed among the different cashew apple blended juices for various physico-chemical parameters viz., the p ; was highest (3.66) in T1(50% cashew apple juice + 50% sapota juice) followed by T2 (75% cashew apple juice + 25% mango juice) (3.63) and the lowest (3.44) was observed in T3 (25% cashew apple juice + 75% pineapple juice). The density, TSS and TSS/Acid ratio were highest in T1 (25% cashew apple juice + 75% sapota juice) (1.06) and lowest in T0 (100% cashew apple juice) (0.80), T0 (25% cashew apple juice + 75% mango juice) (8.53) and T1 (75% cashew apple juice + 25% pineapple juice) (10.23) respectively. The titratable acidity was found to be highest in T1 (0.97) followed by T2 (75% cashew apple juice + 25% sapota juice) (0.95) and low in T0 (0.85). The percent reducing sugars was highest in T1(50% cashew apple juice + 50% mango juice) (7.18) followed by T5(50% cashew apple juice + 50% pineapple juice) (6.97) and lowest in T2 (5.72). The per cent non-reducing sugars were more in T1(5.13) followed by T2(3.93) and low in T0 (1.49). The ascorbic acid content was recorded.
highest in T,o(192.20) followed by T, (161.28) and low in T, (86.70) and the highest organoleptic score with respect to colour was high in T, (9.16) and low in T, and for taste and overall acceptability high was recorded in T,(8.49) and low in T,o(7.49).


A study was conducted on preparation of pumpkin candy to find out a suitable recipe acceptable to the consumers. The experiment was conducted in completely randomized block design with seven treatments and three replications. The various physico-chemical parameters like carotene, non-enzymatic browning, water activity, moisture content, recovery and organoleptic evaluation were carried out during storage period. The result revealed that among the treatments, significantly maximum recovery was observed in pumpkin slices blanched for 10 min and steeped in 40-70° brix syrup + 1 % citric acid (82.80%). However, minimum percent recovery was found in control (37.87%). Maximum carotene was recorded in control (6.33ppm). However minimum non-enzymatic browning was recorded in slices blanched for 7 min and steeped in 40-700brix syrup + 1 % citric acid whereas maximum was recorded in control. Highest scores for color and appearance (3.60), texture (3.55), taste (3.63) and overall acceptability (3.72) were noticed in slices blanched for 7 minutes and then steeped in 40-70°8 syrup + 1 % citric acid at third month after storage. Whereas least score for organoleptic parameters was noticed in control. Thus blanching for 7 min and steeped in 40-70° brix syrup + 1 % citric acid treatment was most suitable for preparation of pumpkin candy for consumer acceptance with respect to color and appearance, texture, flavor, taste & overall acceptability.


The preserved mango pulp of cv. Alphonso was blended either with Ratna and Sindhu pulp in the ratio of 70:30, 80:20 and 90:10 and stored under ambient condition. The pulp samples were analyzed for various chemical parameters at 0, 30, 60 and 90 days of storage. The RTS (ready-to-serve) beverage was prepared at each interval and evaluated organoleptically. Results revealed that addition of Sindhu pulp improved the colour of Alphonso pulp with
significant by increase in yellowness index. Significant increase in the content of total soluble solids (TSS) and total sugars was also observed by pulp blending. During storage, the content of TSS and sugars increased. The organoleptic evaluation of prepared beverage, based on colour, flavour and overall acceptability, showed that a drink prepared from blended mango pulp was not acceptable. However, acceptability of beverage increased with the increasing concentration of Alphonso pulp. The best treatment was observed to be 0:100 (pure Alphonso pulp) after 90 days of storage. The pure pulp of Alphonso was better over Ratna, Sindhu and their blends with Alphonso.

396. Gojiya, K.D.; Deptt. of Processing and Food Engineering, College of Agricultural Engineering and Technology, Junagadh Agriculture University, Junagadh (India) Moradiya, B.P.; Deptt. of Processing and Food Engineering, College of Agricultural Engineering and Technology, Junagadh Agriculture University, Junagadh (India) Vyas, M. D.; Deptt. of Processing and Food Engineering, College of Agricultural Engineering and Technology, Junagadh Agriculture University, Junagadh (India). Drying characteristics of kothimbda (Cucumis callosus R.). Green Farming (India). (Jul 2015) v.6(4) p.900-903 KEYWORDS: DRYING. CUCUMIS. TEMPERATURE. VEGETABLE CROPS. TIME. INDIA.

The Kothimbda slice was dried in industrial tray dryer with three levels of drying temperature (50, 60 and 70°C) and three levels of thickness (3 mm, 5 mm and 7 mm). The air velocity was kept constant at 1.5 m/sec throughout the experiment. Besides mechanical drying the slices of 3, 5 and 7 mm thickness were dried in solar cabinet dryer also. The observations on reduction in weight were taken regularly with increase in time and were evaluated in terms of drying characteristics. Three drying models i.e. Page, Henderson and Pabis and Logarithmic were tested for their validity. The values of coefficient of determination (r^2) for all the three models under all the treatments were found to be above 0.9, suggesting good fit of the observations. Though, the value of r^2 under the Logarithmic model was more followed by page and Henderson and Pabis, indicating the Logarithmic model more reliable for prediction and found best fitted. For all the drying treatments taken the value of drying constants a, k and c under Logarithmic model was varying from 0.00018 to 0.00233, 1.17 to 1.66 and -0.05244 to 0.01749 respectively.


A lab experiment was conducted to know the effect of drying on colour and sensory characteristics of different varieties of coriander herbage during 201213 at department of plantation, spices, medicinal and aromatic crops, KRC of Horticulture, Arabhavi (Karnataka). The experiment was laid out in completely randomized design with three replications and thirteen treatments.
Studies on the effect of drying on colour and sensory characteristics of different varieties of coriander herbage revealed that the variety RCr-446 was only towards the lightness. The mean values of L decreased from fresh herbage to dried herbage. The mean values for redness (a) decreased from (-7.57) to (-2.26). The b* value was towards the yellowness for both fresh and dried herbage. The highest score for flavor and aroma was observed in DWD -3 and highest score for colour and overall acceptability was observed in RCr-435.

Q70 Processing of agricultural wastes

398. Saranraj, T.; Deptt. of Agronomy, Tamil Nadu Agricultural University, Coimbatore Amanullah, Mohamed. M.; Deptt. of Agronomy, Tamil Nadu Agricultural University, Coimbatore Muthukrishnan, P.; Deptt. of Agronomy, Tamil Nadu Agricultural University, Coimbatore. Effect of treated tannery effluent along with domestic waste water on growth, yield attributes and yield of cotton. Green Farming. (Jul 2015) v.6(4) p.791-793 KEYWORDS: COTTON. HOUSEHOLD WASTES. GYPSUM. VESICULAR ARBUSCULAR MYCORRHIZAE. INDUSTRY. LEATHER.

Field experiment was conducted at the common effluent treatment plant (CETP), Dindigul during winter 2012-2013 to investigate the effect of treated tannery effluent along with domestic waste water on growth, yield attributes and yield of cotton. The experiment was laid out in randomized block design replicated thrice. The results revealed that the mixing proportion of 1:3 (i.e.) application of 25% treated tannery effluent (TTE) + 75% domestic waste water (DWW) significantly increased the growth, yield parameters (plant height, dry matter production, number of sympodial branches per plant, number of fruiting points per plant, number of balls per plant) and yield of cotton. Regarding amendments, gypsum application registered higher seed cotton yield followed by VAM.

S01 Human nutrition - General aspects

399. Shweatha, E.H.; CSIR-Central Food Technological Research Institute, Mysore (India) Platel, Kalpana.; CSIR-Central Food Technological Research Institute, Mysore (India). Iron and zinc bioaccessibility from sprouted, malted and fermented grains as influenced by disodium EDTA. Green Farming. (Apr 2016) v.53(2) p.141-152 KEYWORDS: CHELATING AGENTS. IRON. ZINC. SPROUTING. BREWING. FERMENTATION. FOOD ADDITIVES.

In view of the widespread prevalence of micronutrient deficiencies, there is a need to evolve food-based strategies to enhance their bioavailability from predominantly vegetarian diets. Ethylene Diamine Tetra. Acetic acid (EDTA), a known metal chelator, has been previously found to enhance the bioaccessibility of iron and zinc from fortified millet flours. The present investigation was undertaken to examine the effect of EDTA on the bioaccessibility of iron and zinc from germinated, fermented and malted food grains. EDTA was added to the processed foods at molar ratios of 1:1, 1:1.5 and 1:2, relative to inherent iron and zinc content. EDTA significantly enhanced the
bioaccessibility of iron from all the processed foods examined, this beneficial effect being highly significant in the germinated and malted grains and significantly higher than the effect of the processing method per se. In the fermented foods, the effect of EDTA was to a lesser extent, except in the case of dhokla, where it was significant. EDTA significantly increased the bioaccessibility of zinc from malted grains, but this increase was only marginal in germinated and fermented grains. Germinated and fermented foods are a common part of Indian diets and are widely consumed, while malted grains find use in the preparation of weaning and geriatric foods. The results of this investigation have shown that EDTA could be used as an enhancer of bioaccessibility of iron and zinc from such traditionally processed foods. This strategy could also be adopted at the household level to improve mineral bioavailability from foods.

400. Anand, Pauline.; Division of Nutrition, Department of Physiology, Bangalore (India) Dwarkanath, Pratibha.; Division of Nutrition, Department of Physiology, Bangalore (India) Thomas, Tinku; Division of Epidemiology and Biostatistics, St. Jhon’s Research Institute, Bangalore (India) Kurpad, V. Anura; Division of Nutrition, Department of Physiology, Bangalore (India). Pattern of amino acid oxidation in low BMI South Indian pregnant women. The Indian Journal of Nutrition and Dietetics. (Apr 2016) v.53(2) p.153-163 KEYWORDS: PREGNANCY. PROTEIN SYNTHESIS. AMINO ACIDS. WOMEN. MORBIDITY. ENERGY. INDIA.

It is not known whether Indian pregnant women with low Body Mass Index (BMI) have adequate protein stores to provide sufficient amino acids for the growing fetus and how this interacts with the maternal body fat (energy) stores in early pregnancy. This study aimed to measure amino acid oxidation in pregnant women with low BMI and to evaluate the influence of maternal body fat on amino acid oxidation in early pregnancy. In two experimental studies of low BMI women, leucine oxidation rates significantly reduced from Is/ to 3rd trimester (post absorptive state, p 0.002 and fed state, p 0.003, Wilcoxon sign rank test). In the post absorptive state in the 1st trimester, leucine oxidation negatively correlated with maternal fat percentage.

T01 Pollution

401. Majumder, Tarun; Department of Soil and Water Conservation, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India) Kundu, Rajib; AICRP on Groundnut, Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya, Kalyani (India). A study of arsenic contaminated irrigation water and its carried over effect on potato. Journal of Interacademicia (India). (Jul 2015) v.19(3) p.355-362 KEYWORDS: ARSENIC. IRRIGATION. PRODUCTION. WATER. CROPS. INDIA.

In India, Arsenic (As) toxicity problem is prevalent in the endemic areas of Ganges delta of West Bengal, especially, in irrigated crops. During the past decade, arsenic (As) contamination in food chain has been reported from the Ganga basin of West Bengal and Bangladesh. The epidemiological studies show that chronic As poisoning can cause serious health problems to human beings through contamination of ground water and drinking water. The present study was aimed to assess As contamination in the crop and to explore
possibilities of reducing the accumulation through the use of surface water. With this view, the following experiment was undertaken to evaluate the carried over effect of arsenic contaminated irrigation water on potato in six different arsenic endemic locations of Nadia district during 2007-2008. Potato was grown in paired plots using both arsenic free and arsenic contaminated irrigation water. Plant samples, collected from both arsenic free and arsenic contaminated irrigation plots, were analyzed for arsenic. Relationship between arsenic content in irrigation water and arsenic accumulation as well as productivity of potato was strongly positive.


Open Defecation is the practice of defecating outside or as the disposal of human excreta in open space due to inaccessibility of toilets, latrines or any kind of improved sanitation. At present, it is shocking to know that, even in the 21st century open defecation is common practice in most of the developing and under-developed countries. Improper sanitation is one of the major concerns for this practice. Its consequence leads to increase various infectious diseases. Government of India has adopted various programmes to increase awareness and to reduce health hazards regarding open defecation, such as Central Rural Sanitation Programme (CRSP, 1986), Total Sanitation Campaign (TSC, 1999), Nirmal Gram Puraskar(NGP, October, 2003), Nirmal Bharat Abhiyan (NBA, April, 2012), and Swachh Bharat Abhiyan (SBA, October, 2014) etc. This research study in Simlapal Block of Bankura District in West Bengal shows that more than 85% household use to defecate in open places like pond side, agricultural fields and other nearest open spaces. Surprisingly, only 20% people, wash their hands with soap after visiting toilet. Unfortunately, 50% people of the study area, suffer from the symptoms related with Dysentery, Diarrhea, Cholera, Typhoid, Hook Worm infection and Urinary tract infection including other infectious diseases.

U40 Surveying methods

403. DHAMI, JAYA; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India) ROY, SUMANA; College of Agriculture,G.B. Pant University of Agriculture and Technology,Pantnagar (India) NAIN, A.S.; College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Evolving the suitable zones for plum production in Uttarakhand using remote sensing and GIS. International Journal of Basic and Applied Agricultural Research. (May 2014) v.12(2), p.167-172 KEYWORDS: PLUMS. PRODUCTION. REMOTE SENSING. GEOGRAPHICAL INFORMATION SYSTEMS.

The Zones in the State of Uttarakhand have different climatic conditions, slope and height. The variations extended to even short distances,
where the micro-climate changes due to interaction of these various factors. It is characterized by two types of climate, sharply differentiated in the plains and the mountainous regions. Horticultural crops especially fruit crops for which the Uttarakhand topography and agro-climate is well suited could be an ideal choice in achieving sustainability. Efficiency in the horticulture sector can be augmented effectively by using Information Technology such as remote sensing and GIS. Thematic layer of different weather parameters (temperature, precipitation) were generated by adding their attribute data in ARC-view GIS software. Soil attribute data from published soil map by NBSS&LUP, Nagpur were also added in it. Suitability model were developed in GIS using model builder module extension. All these parameters were added in this model and with the overlay function suitability classes were formulated. With these suitability classes Uttarakhand is divided into highly suitable, suitable, moderately suitable and unsuitable zones for Plum production. Result showed that the upper hilly and lower region (U.S. Nagar, Haridwar and some lower parts of Dehradun, Pauri-Garhwal and Nainital) of Uttarakhand is unsuitable for plum cultivation due to skeletal soils and adverse temperature, respectively. However, in general the middle parts of the state e.g. Pauri Garwal, Tehri Garwal, Dehradun, Almora etc. possess optimum soil and climatic conditions for Plum cultivation. The study has delineated the potential suitable areas for plum production in Uttarakhand.


A field study has been carried out in the year 2008-2009 at Agricultural Farm, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand for discriminating sugarcane crop from other features/objects. Cloud free LANDSAT-ETM images of path 145 and Row 40 (Containing Pantnagar and the adjoining regions) for the year 2004 to 2009 were acquired from USGS (United States Geological Survey). ENVI-4.8 (ENvironment for Visualizing Images) software was used for pre processing of satellite images and analysis of the data. Spectral library, which is the spectral behaviour of different objects was generated during the first analysis and was used in the subsequent analysis. The year having maximum number of cloud free satellite images was selected and the field boundary of objective crop having good crop cover was digitized in order to generate the spectral library. NDVI was considered to represent the growth of crop. After making subset of Agricultural Farm, Pantnagar from LANDSAT image of Haldwani region, supervised classification technique was used to identify the sugarcane crop at Pantnagar. Ground truth data combined with visual interpretation obtained from LANDSAT image dated 8th November, 2008 were used as training sets for supervised classification. The training pixels were selected from different fields. A total numbers of four classes...
(Sugarcane, Fallow land, Built-up land, and Forest/Orchard) were identified for which separate RoIs (Region of Interests) were generated. The accuracy of the classification was determined by comparing the test set with the classification results to generate producers, user's and the overall accuracies. Post classification statistics was generated to find out pixels belonging to different categories. The overall accuracy obtained was 100%. The value of Kappa coefficient (K=1) indicates perfect agreement between the training and classified classes.

405. JHA, ANKITA; Department of Agrometeorology, G.B. Pant University of Agriculture and Technology, Pantnagar (India) NAIN, A.S.; Department of Agrometeorology, G.B. Pant University of Agriculture and Technology (India) RAMU, N.; Department of Agronomy, G.B. Pant University of Agriculture and Technology (India) RANJAN, RAJEEV; Department of Agrometeorology, G.B. Pant University of Agriculture and Technology, Pantnagar (India). Determining rice suitability in Kumaon region using Geospatial Technologies. International Journal of Basic and Applied Agricultural Research. (Sep 2014) V.12 (3), p. 313-317

KEYWORDS: RICE. TECHNOLOGY. LATITUDE. CLIMATIC CHANGE. TEMPERATURE.

The present study was conducted at six districts of Kumaon region of Uttarakhand state namely Almora, Bageshwar, Champawat, Udham Singh Nagar, Nainital and Pithoragarh. The area is located between latitude 29.270 N and 79.470E longitude. The climatic condition of Kumaon division varies greatly with lowest recorded as -3°C at Mukteshwar and highest as 43.2°C at Pantnagar. The research needs data on climate. Therefore, climatic normal data (the average of at least 30 years of weather data) for a particular station were acquired from internet, IMD periodicals and other sources. The suitability classes for rice were delineated as most suitable, suitable and unsuitable. In most suitable and suitable zones there is a high correspondence between climatic conditions of the area and the climatic requirements of rice, e.g. temperature, rainfall in these regions are similar to the Rice requirement. The zone includes parts of Nainital, Almora, Bageshwar, Udham Singh Nagar and Champawat. Unsuitable zones are considered as areas that are not suitable for rice because of non-compatibility between prevailing climatic conditions and requirement of rice. Such zone includes a small part of Pithoragarh.
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Page 105 of 105