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Group Meet of AINP on Arid Legumes

Group Meet of All India Network Project on Arid Legumes (Guar, cowpea, moth bean and horse gram) was organised at IIPR, Kanpur on December 6, 2014. The Meet was inaugurated by Dr. B.B. Singh ADG (O&P), ICAR. Dr. A.K. Tiwari, Director, Directorate of Pulses Production, Bhopal was also present at this occasion. Dr. N.P. Singh, Director, IIPR, in his welcome address, stressed upon the need to devise strategies to increase the production of arid legumes and to establish a synergy between the other AICRPs to bring out convergent research and development in all the pulse crops.

Dr. A. Henry, Project Coordinator presented the report of Network Project on Arid Legumes and appraised the overall scenario and current status of arid legumes. He called upon the researchers to encash the export value of guar gum which is fetching more than 12,000 crore rupees annually.

Later, a Brain Storming meeting was organised in which major constraints in each of the four arid legumes were discussed in detail. Dr. N.P. Singh opined that the benefits of NFSM can come to arid legumes except guar crop.
Indian Institute of Pulses Research

Group Meet on Mungbean and Urdbean

Group Meet on mungbean and urdbean for spring, summer and rice fallow cultivation was organized at ICAR-Central Costal Agricultural Research Institute (ICAR-CCARI), Old Goa on November 22, 2014. About 27 participants from different states attended the group meet. Dr. B.B. Singh, Assistant Director General (O&P), ICAR, and Chief Guest of the event, deliberated upon various issues on pulses research in the country. Dr. Narendra Pratap Singh, Director, ICAR-CCARI in his welcome address emphasized the need and scope for pulse research in the coastal region.

Dr. N.P. Singh, Director, ICAR-IIPR, Kanpur expressed satisfaction on the research and development efforts which could make possible to produce pulses over 19 million tonnes in the country. Dr. Sanjeev Gupta, Project Coordinator (MULLaRP) delivered the exhaustive report on research achievements and future programmes. He mentioned that over 16 lakh ha area is available for introducing summer mungbean in rice-wheat system of irrigated plains. Summer mung is also becoming the candidate crop in new delta area of southern peninsula. Similarly, there is vast potential of urdbean cultivation in rice fallow situation of peninsular India.

Dr. Atar Singh, Acting Zonal Project Director (Zone IV), Kanpur elaborated about importance and role of Krishi Vigyan Kendra in upliftment of socio-economic status of farmers.

Advanced Solar Station to Monitor Weather

A high precision weather station has been established at IIPR Kanpur by Solar Radiation Resource Assessment (SRRRA) and Centre for Wind Energy Technology (CWET), Chennai under Ministry of New and Renewable Energy (MNRE,GoI), to monitor sun track, real time radiation, global/diffuse radiation, sun elevation and inclination along with all major weather parameters. With this, Kanpur has figured as one of the 60 Solar stations installed across the country for generating information on solar energy and climate change. MNRE, GoI initiated this project to establish India as a global leader in solar energy and to meet the challenges of climate change. A high powered sun-tracker Geonica, Spain, ultrasonic anemometer, barometer, temperature and humidity sensor and triple bucket raingauge from USA have been integrated with the system. Online data is accessible through GPRS/central server and password on desktop and android mobile round the clock at every 1 minute intervals. The weather data will be useful for studies on impact of climate change on pulses, and disease and pest dynamics.

World Food Day celebrated by IIPR Kanpur

World Food Day was celebrated by Indian Institute of Pulses Research, Kanpur in collaboration with Deen Dayal Research Institute (DRI), Krishi Vigyan Kendra, Ganiwan, Chitrakoot (UP) on October 16, 2014. The main event was organized at Chitrakoot and Dr. Bharat Pathak, General Secretary DRI, Dr. N.P. Singh, Director IIPR and Dr. Atar Singh, Acting Zonal Project Director (Zone IV), Kanpur graced the occasion. While addressing the gathering, Dr. N.P. Singh highlighted the importance of pulses in the context of nutritional security of the society. He emphasized upon more and closer interaction of pulse growers of Bundelkhand region of U.P. and M.P. with IIPR. Dr. Bharat Pathak urged the farmers to adopt new technology in agriculture production for sustaining soil health as well as system productivity. Dr. Atar Singh elaborated about importance and role of Krishi Vigyan Kendra in upliftment of socio-economic status of farmers.

At this occasion, a Farmers-Scientists interaction workshop was also organized, wherein IIPR scientists Drs. S.K. Chaturvedi, S.S. Singh, S.K. Singh and Dr. Najmuddin delivered special lectures on various aspects of pulses production in Bundelkhand which is the pulse bowl of Uttar Pradesh. About 550 farmers including large number of women farmers from six districts of Bundelkhand region participated in the event. Farmers of NABARD Farmers Club and about 50 farmer representatives of Bhartiya Kisan Union also participated in the programme. Dr. Sushil Kumar Singh, Principal Scientist (Agril. Extension) coordinated the overall programme.
Foreign Delegates Visited Institute

Dr. Roland Schafleitner, Head, Molecular Genetics and Dr. Ramakrishnan M. Nair, Vegetable Breeder, Legumes, South Asia from AVRDC-The World Vegetable Centre, Taiwan and Dr. Col Douglas, DAFF, Warwick, Australia visited IIPR on December 8, 2014 to explore the possibilities of initiating an International Mungbean Network. They interacted with the scientists of the Institute and discussed the status of mungbean crop as well as the objectives and work plan of the proposed network. With an objective to include AVRDC, Australia, India, Myanmar and Bangladesh in this network, they explored the strengths and researchable issues of Indian mungbean programme and desired to include IIPR as one of its major partners. Director IIPR appreciated this move and assured the visitors to contribute significantly in the International Mungbean Network with tremendous strength in technology and material in mungbean crop. A field trip was also arranged to Barahapur village of Kanpur Dehat district. Delegates visited demonstration site of long duration pigeonpea along with a group of farmers.

Attachment of IAS Officer Trainees

Under institutional attachment programme, 20 IAS Officer Trainees of 2014 batch were deputed at IIPR during 24-26 December, 2014 by Lal Bahadur Sastri National Academy of Administration, Govt. of India, Mussoorie. The purpose of this attachment was to expose the officer trainees to the functioning of organization and role in the economy/society. Dr. N.P. Singh, Director, IIPR briefed about Institute achievements, pulse production scenario and strategy for enhancing pulses production in India. The IAS officer trainees also visited Biotechnology Labs and Technology Park of the Institute, besides participating in the interaction-cum-visit programme.

IIPR Awarded ISO Certification

Indian Institute of Pulses Research has been awarded ISO 9001:2008 certificate for Quality Management System to Ensure Self-Sufficiency in Pulses Production and Improve Nutritional Security and Sustainability.

Personnel

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<tr>
<th>Name</th>
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<tr>
<td>Mr. A. Lamichaney</td>
<td>Scientist</td>
<td>13.10.2014</td>
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<td>Mr. B. Mondal</td>
<td>Scientist</td>
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<td>Mr. D.N. Borase</td>
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<td>Mr. S.K. Meena</td>
<td>Scientist</td>
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<td>Mr. A.K. Konda</td>
<td>Scientist</td>
<td>22.10.2014</td>
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<td>Dr. A.K. Srivastav</td>
<td>Scientist</td>
<td>15.12.2014</td>
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Transfer

Dr. S. Datta, Sr. Scientist (Plant Biotechnology) has been transferred to ICAR-CRIJAF, Barrackpore on 17.11.2014.
Variability for Folic Acid in Mungbean Genotypes

Folic acid is important from health point of view as human body needs folic acid to synthesise DNA and to act as a cofactor in certain biological reactions. Its deficiency leads to neural tube defects during pregnancy. Mungbean is one of the important pulses to contain high folic acid. Folic acid was quantified in the seeds of 20 genotypes of mungbean using HPLC technique. It was found in the range of 352.6 – 905.1 µg/100g with a mean of 568.3 µg/100 g seeds. Genotypes viz., HUM 1, Co 4, LGG 450, BDN 2, GM 4, HUM 16, NDM 1 and Meha had higher folic acid.

R.P Srivastava, N.L. Meena, S. Gupta and Jagdish Singh

Bradford Method for Protein Estimation

Accurate quantification of protein based on standard Bradford assay relies on shift of absorption maxima from 465 to 595 nm. The temporal factor of protein-dye complex stabilization is crucial for linear standard curve. The standard protein, Bovine Serum Albumin (BSA) at four different dilutions (1.44, 0.72, 0.36 and 0.18 mg/ml) relates to linear curve linearity of BSA. Albumin (BSA) at four different dilutions (1.44, 0.72, 0.36 and 0.18 mg/ml) relates to linear curve as indicated by multiple correlation value ($R^2 = 0.9982$), after 15 minute of incubation at 200 rpm. The standardized technique can be repetatably used for quantification of target proteins in transgenic chickpea and pigeonpea lines.

Alok Shukla, Arvind Kumar Singh, Shallu Thakur, Alok Das and N.P. Singh

Research Highlights

Soil Matrix for Screening Transgenic Chickpea

Generation advancement of putative transgenic chickpea lines is an important activity, requiring suitable matrix to support growth in time bound manner. Four different matrices consisting of Vermicompost, Vermiculite, Coco peat (VVC-1:1:1) and soil (100% soil, 50% soil+50% VVC, 25% soil+75% VVC and 100% VVC) was assessed for germination and establishment subsequent to transfer. Combination of 25% soil + 75% VVC exhibited complete germination and percent establishment subsequent transfer, obviating other bottlenecks like damage of primary roots, fragile matrix and poor vegetative growth. The matrix grown plants could be easily removed from tray and established in soil for normal growth and development.

Alok Das, Malkhan Singh, Alok Shukla, Jamal Ansari, Subhojit Datta and N.P. Singh
Phosphorus Availability affects Protein in Chickpea

A study was initiated to evaluate effect of soil phosphorus deficiency on grain yield and protein content in seven elite chickpea breeding lines viz., IPC 2005-44, IPC 2006-14, IPC 2006-84, IPC 2008-34, IPC 2008-92, IPC 2010-152 and IPC 2011-01 along with two check varieties viz., BG 256 and JG 16. These genotypes were grown under low and high soil phosphorus availability (Olson’s P). The P deficiency resulted in decreased grain yields with exception of almost no reduction in IPC 2008-92. Under low P conditions, IPC 2006-14 and IPC 2008-92 gave higher yields in comparison of JG 16. Reduction in grain protein content was also observed in some of the genotypes under soil P deficiency condition, indicating that P deficiency in soil not only decreased grain yield but also adversely influenced seed protein content.

In view of the prevalent P deficiency in soils of pulse growing areas and limited application of ‘P’ fertilizers in pulses, it would be more advantageous to develop varieties having potential to efficiently utilize soil ‘P’ from both soil as well as externally applied phosphorus fertilizers.

Mohan Singh, S.K. Chaturvedi and M.P. Singh

Dry Root Rot of Chickpea in Dharwad

During rabi 2014-15, chickpea crop in different parts of Dharwad district of Karnataka was found to be severely infected with dry root rot disease. The root system of diseased plants shows extensive rotting with most of the lateral roots completely destroyed. Among various villages, dry root rot incidence was maximum in Narendra village and minimum in Hosayallapur. This variation in the disease incidence was due to different soil conditions, cultivars used and prevailing weather conditions. Dry weather and soil moisture stress are known to influence the severity of the dry root rot as most of the chickpea was grown under rainfed conditions. Dry root rot caused by Rhizoctonia bataticola in recent years is emerging as major threat to the production of chickpea, therefore integrated disease management and development of cultivars resistant to dry root rot are needed to minimize the incidence of disease at farmers’ fields.

Revanappa, S.B., Shamarao Jahagirdar and Venkatesh, M.S.
IIPR-Regional Research Centre-cum Off-season Nursery, Dharwad
Effect of Nutrient Management System on Chickpea under Rice-Fallow Condition

A field study was conducted during 2011-14 to evaluate the nutrient management strategies for chickpea (*Cicer arietinum*) under rice fallow condition. During the three years of investigation with different nutrient management systems (NPK+FYM, NPK and Farmers’ practice), it was found that application of FYM enhanced the plant growth parameter (plant height, plant biomass, etc.), physiological parameters (chlorophyll content, leaf area) and yield attributes such as pods/plant, grain/pod and 100 seed weight, which consequently resulted in higher (14.1%) yield of chickpea under the combined application of FYM and NPK combination over farmers’ practice.

Narendra Kumar, S.S. Singh, C.S. Praharaj, Arti Yadav, S.L. Yadav and Saumya Singh

Effect of Culture Technique on Infestation of *C. Arvensis* under Rice Fallows

A study comprising of three rice culture techniques viz., puddle transplanting, unpuddled transplanting and direct seeded was undertaken to see their effect on weed population in chickpea under rice fallows. The study revealed that chickpea crop was infested with diverse group of annual and perennial weeds with maximum weed density and weed dry biomass in direct seeded, followed by unpuddled transplanting and least in puddled. Infestation of perennial weed *hirankhuri* (*Convolvulus arvensis*) was higher in direct seeded rice (46/m²) in comparison to unpuddled transplanted rice (17/m²) and almost negligible under puddled transplanted rice. Thus, change in rice transplanting technique can cause shifts in weed flora in succeeding chickpea crop.

Narendra Kumar, S.S. Singh, C.S. Praharaj, Arti Yadav, S.L. Yadav and Saumya Singh

Resistance Source for Multiple Diseases in Lentil

A number of lentil breeding lines have been evaluated in wilt sick plot over 7 locations viz., Durgapura, Shillongani, Faizabad, Ranchi, Sehore, Pantnagar and Sagar under AICRP on MULLaRP programme. Genotype IPL 321 derived from a cross K 75 × DPL 62 has shown resistance to wilt over three years (2012-2014). It also showed resistance to rust and ascochyta blight. The average rust incidence, measured on 1 (resistance) to 9 (susceptible) scale over the locations, ranged from 3.4 to 4.0. It has also performed well in UP state adaptive varietal trials over three years and is identified for cultivation as high yielding variety. Further, considering the data of resistance reaction against 3 diseases viz., wilt, rust and ascochyta blight, this genotype can be used as resistance source of multiple diseases in lentil.

Jitendra Kumar and Rohit Kant
Enhancing RUE in Soybean+Pulses System

A research effort is made to enhance the productivity and resource use efficiency (RUE) of soybean based systems in Central India at the IIPR-Regional Research Station, Phanda, Bhopal by involving integration of various crop management modules such as land configuration (Broad bed furrow and flat planting) and diverse (cereal/pulses/oilseed) intercrops viz., maize, sorghum, urdbean, pigeonpea and til with soybean. The major emphasis is to raise the productivity and farm income per unit area and time in presence of instable crop performance or failure of soybean due to various factors. With this view, an experiment was conducted during kharif 2014 involving above crop combinations along with land configuration to ascertain its suitability in soybean-lentil system in central India. Based on the growth, biomass and seed yield, urdbean and maize were better competitive, followed by pigeonpea, jowar and til. Out of these five intercrops, pigeonpea (being medium duration) only grew upto mid-December (even after harvest of soybean) which might reduce the performance of lentil being planted late during succeeding rabi season. Further study on the compatibility of crops on system mode i.e., soybean-lentil and its economics is being undertaken.

C.S.Praharaj, S.S. Singh, R.P. Singh, Ummed Singh and N.P. Singh

Pulses Newsletter : October - December, 2014

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Dear Readers,

Gram pod borer, *Helicoverpa armigera* is widespread, polyphagous, having wide range of hosts and tremendous ability to survive under extreme conditions under dormant phase. It is the most damaging pest of pulse crops. Looking back to the past several years, particularly in northern India, the cool season pulses were heavily infested by this insect. Notably during 2010, the crop loss was substantial due to this pest.

It is an interesting phenomenon to put on record that there is a decline in the status of *H. armigera* in the northern pulse growing areas of the country, whereas reports are available for sporadic incidence of pod borer attack in few pockets of central and South India. It is important to analyze the behavioral changes of this pest in the context of climate change.

Insect pests of crop plants are the real candidates most affected by global climate change. Complex physiological effects exerted by increasing temperature and CO$_2$ may affect profoundly, the interactions between crop plants and insect-pests. Temperature, humidity and photoperiod greatly influence the egg laying, hatching and pupatization of *Helicoverpa* along with changes in the fecundity and sex ratio. Temperature has a strong influence on the viability and incubation period of *H. armigera* eggs. Egg incubation period can be predicted based on the degree days required for egg hatching. The egg incubation period decreases with increase in temperature from 10 to 27°C. It means larva formation from eggs is depended upon temperature which falls in the range of 10-30°C. The larval stage is most detrimental as they attack on leaves, flowers and pods for their feed. In northern belt, temperature extremities both low and high during December-January (low temperature) and February-March (high temperature) induce diapauses which are known as hibernation (<10°C) or aestivation (>32°C) under which pupa remains inactive. The incidence of diapause in *H. armigera* during peak winter and late-winter is governed by agroclimatic factors.

The multi-year data on the patterns of cool and hot diapause development and emergence correlated with the field activity of adult moth emergence is important for better understanding the role of local population dynamics and ecology and genetics of *H. armigera*. In northern India winter diapauses starts when temperature goes down below 10°C and therefore threshold levels of moth does not build-up to affect the crop. Moreover such extreme low temperature (>5°C) induces massive flower drop and virtually pod formation ceases, consequently, the lack of preferred feed (flowers and pods) does not favour to build-up larval population. Similarly, delayed flowering and pod setting in northern India discourages threshold larval population build-up due to lack of preferred feed. Temperature increase during February-March, although favours pod borer incidence but this conditions does not last longer as temperature steeply increases during peak podding stage which forces diapause of *Helicoverpa* which means they undergo inactive phase. Comparative studies showed that initial stages of growth and during peak reproductive growth, the conditions are not favourable for this pest due to extreme temperature under northern plains. As a result, the pest migrates for alternate host and conducive environment of central and South India.

Reports are available which indicate that egg laying occurs during night and during prevailing low temperature of North India retards the egg-laying process. The insect pest dynamics in North India is most important as climate model suggests that higher latitudes under which northern India is falling, is more prone to climate change as compared to low latitudes falling under South India. This means that climatic conditions are more stable in peninsular India than in the northern plains which stands that South Indian conditions support natural habitat for the insect, while insect population and crops under North is presently under dynamic transition stage and remains unpredictable. This model also suggests that minimum temperature is more affected than maximum day temperature. The overall climate trend suggest that, the C:N (carbon and nitrogen) ratio in the crop is changing as a result feeding pattern of pests is also modified.

The changing pattern of *Helicoverpa* incidence is a matter of interest and worth investigating to make new strategies to control this menace in the target specific locations. The role of Bt-cotton in minimizing the *Helicoverpa* menace can not be ruled out, as this crop is most preferred feed for this pest. Studies on eco-dynamics of pod borer and its present geographical distribution in the changing scenario of climate will throw light on the behavior of this dreaded pest.