2016 INTERNATIONAL YEAR OF PULSES

PULSES Newsletter

ICAR-Indian Institute of Pulses Research, Kanpur

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Kharif Pulses Group Meet Held at UAS, Bangalore

Annual Group Meet of AICRP on Pigeonpea, MULLaRP and AICNP on Arid Legumes was held on May 22-24, 2016 at UAS, Bangalore. About 270 delegates from cooperating centres of SAU's, ICAR

Institutes and seed agencies attended the group meet. Dr. Trilochan Mohapatra, DG ICAR and Secretary DARE was the Chief Guest and Dr. H. Shivanna, Vice-Chancellor, UAS Bangalore chaired the inaugural session. Dr. Shivanna emphasized on devising an action plan based on Coordinators' reports.

Dr. Mohapatra in his address, exhorted that new research efforts should be initiated to achieve a breakthrough in the productivity. He said that innovative ideas need to be implemented instead of conducting routine research. Dr. Mohapatra emphasized to broadly explore the new scientific means to witness the projected gains in pulses production and advocated to build a robust action plan which can eventually lead to attainment of self sufficiency in pulses. Dr. J.S. Sandhu, Dy. Director General (CS), stressed upon fulfilling the targets of production of breeder seed so that targeted seed replacement could be achieved in all pulses and also informed the house about the creation of seed hubs. Dr. Sandhu stressed upon the need to demonstrate the existing technologies efficiently at farmers' fields.

Dr. N.P. Singh, Director IIPR, while presenting the overall scenario of pulses in the country, expressed concern over their fluctuating production over the years. He exhorted the scientists to work for development of shorter duration, widely adaptable and biotic and abiotic stress resistant varieties. He highlighted the significance of combining the annual group meet and the national conference especially in view of International Year of Pulses 2016 which will allow drawing of a roadmap for enhancement of pulses productivity in coming years. Significant reduction in the crop duration is evident in case of crops like greengram. With regard to diseases like YMV, development of modern molecular diagnostic kits is a remarkable feat. In addition to resistance breeding, exploitation of heterosis in pigeonpea remains an attractive avenue, however intensive efforts are needed to obtain a definitive CMS system for development of CMS hybrids at commercial scale. Dr. Singh also stressed upon the need for transgenic development and updated the house regarding progress in chickpea and pigeonpea. He said that pyramiding of genes resistant to different races would be a promising strategy to meet the challenges of important diseases of pulse crops. Dr. I.P. Singh, Project Coordinator (Pigeonpea), Dr. Sanjeev Gupta, Project Coordinator (MULLaRP) and Dr. Shiv Sewak, Nodal Officer (Arid Legumes) presented the research highlights of their respective Projects.

IRC Reviewed Research at IIPR

The Institute Research Council meeting was held on May 30 to June 2, 2016 under the chairmanship of Dr. N.P. Singh, Director. About 46 institute projects, 20 externally funded projects and 4 international collaborative projects were reviewed in this meeting. The projects were formulated as per Institute mandate and RAC recommendations. Director expressed concern towards the need of reorientation of research programme for improving pulse productivity in the country and called upon the scientists for putting concerted efforts and strengthen R&D activities in this direction. Total 68 scientists from different divisions presented their research findings including presentations of research highlights of IIPR-RS Bhopal and Dharwad during 2015-16, followed by technical programme for 2016-17 including externally funded projects. Five new research proposals were submitted for approval.

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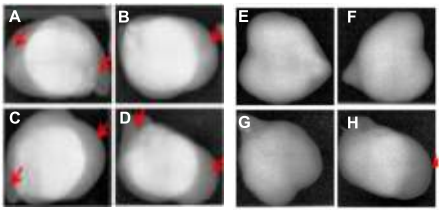
Research Highlights

X-ray Image Analysis of *Desi* and *Kabuli* Seeds

Rate of water absorption (RWA) by seeds was found to be negatively associated with field emergence in 22 chickpea genotypes. *Kabuli* genotypes imbibed water more rapidly than *desi* genotypes, leading to imbibitional damage as revealed by tetrazolium staining (poorly stained; and higher electrical conductivity of the seed leachate. *Kabuli* genotypes (G 137, BG 1088) stained poorly, while *desi* (G 118, G 39) showed normal staining following imbibitions.

Besides thinner seed coat of *kabuli* types, presence of air space between seed coat and cotyledon as revealed by X-ray images explained the reason for their RWA behaviour. Such air space was not observed in *desi* types and seed coat remained tightly adhered to the cotyledon. Loose adherence of the testa enabled free movement of water throughout the seed in *kabuli* types, while tight adherence of seed coat with cotyledon in *desi* types restricted the free flow of water between the cotyledons and testa, finally leading to slower imbibition. Leakage of seed metabolites from the seeds due to rapid imbibition acts as an entry point for fungal infection resulting into pre-emergence decaying of seed, thus affecting field emergence.



X-ray images revealing presence/absence of air space between the seed coat and cotyledon
{*Kabuli*: (A) BG 1088, (B) CSJK 21, (C) G 232, (D) G 227; *Desi*: (E) G 95, (F) G 66, (G) G 39, (H) G 148}

Amrit Lamichaney, Sripathy K, Umesh Kamble*, P.K. Katiyar and S.K. Chaturvedi *ICAR-Indian Institute of Seed Science, Mau (UP)*

Identification of High Protein Content Genotype in Wild Species of Lentil

Protein content in 25 accessions of 5 wild species including *Lens culanaris* ssp. *orientalis* (10 accessions), *Lens culanaris* ssp. *odemensis* (2 accessions), *Lens culanaris* ssp. *ervoides* (8 accessions), *Lens culanaris* ssp. *nigricans* (3 accessions) and *Lens culanaris* ssp. *tomentosus* (2 accessions) was determined using Kjeldahl method. It ranged from 18.1 to 32.7 per cent with an average of 22.6%. Minimum protein content (18.1%) was found in accession IG 13665, which belongs to wild species *Lens culanaris* ssp. *nigricans*, while maximum protein content (32.7%) was recorded in accession ILWL 45 of *Lens culanaris* ssp. *ervoides*. This high protein content containing wild species belongs to secondary gene pool, therefore can be utilized to improve seed protein content of existing lentil varieties through embryo rescue technique.

Jitendra Kumar, Jagdish Singh, Rajni Kanaujia and Sunanda Gupta

Customized Fertilizer Enhances NUE and PFP

Effect of application of straight fertilizers available in market (N:P:K:S:Zn:Fe:B:Mo::20:17:16:30:5:3:0.3:0.12) and customized fertilizer prepared locally (as per nutrient need based on chickpea formula of N:P:K:S:Zn:Fe:B:Mo:: 5.5:4.6:4.5:8.3:1.4:0.8:0. 08:0.034) was studied on nutrient use efficiency (NUE) and partial factor productivity (PFP) in chickpea under field condition. Application of customized fertilizer substantially enhanced both agronomic Zn and Fe use efficiency (110.4 and 184.1 kg grain/kg applied Zn and Fe, respectively) as compared to straight fertilizers (58.3 and 97.2 kg grain/kg Zn and Fe applied, respectively). It indicated that both Zn and Fe were taken up by the plant more efficiently from customized fertilizer. Also customized fertilizer enhanced PFP (12.32 kg grain/kg NPK applied) over straight fertilizers (11.02 kg grain/kg NPK applied). Moreover, the nutrients also released sustainably as per need of the crop from customized fertilizers as per the need of crop. Therefore, customized fertilizers could be useful for enhanced NUE and minimizing nutrient loss in subtropics.

Ummed Singh, Lalit Kumar, C.S. Praharaj, S.S. Singh and G.K. Srivastava

Pigeonpea Intercropping with Rejuvenated Guava Trees in Semi-arid Region of M.P.

Pigeonpea (var. JKM 189) was grown on ridge beds using dibbling method in rejuvenated guava orchard. This land-use system gave more than 2.67 q/ha pigeonpea yield. Pigeonpea intercropping not only enriched the soil health through nitrogen fixation but it also enhanced the level of organic matter through litter fall and also acts as nurse crop for guava trees. It was also noticed that the flowering/fruiting in guava generally occurred above 5 ft. height during vegetative phase of pigeonpea, so there is no competition for light during plant growth and development period. Both the crops have differences in vegetative and reproductive period and also in depth of root systems. Hence, both crops do not have any competition for moisture and nutrients. Thus, this practice can be utilized to maximize the use of orchard fields for growing pulses particularly pigeonpea in semi-arid regions of the country.

Archana Singh, R.L. Jat, D. Dutta, D.N. Gawande and S.S. Singh

Soybean+Pigeonpea : A Remunerative Intercropping System in Central India

An experiment was conducted at ICAR-IIPR, RS, Bhopal to diversify soybean based cropping system in rainfed Central India for its sustainable intensification through pulse/cereal/oilseed based intercropping. Five intercrops *viz*., short duration pigeonpea TJT 501, maize RASI 4242, sorghum MGSH 55, urdbean IPU 2-43 and sesame Western were taken along with soybean RSV 2001-4 in 2:2 replacement series both in flat bed and broad bed land configurations (BBF). These crops were followed by lentil during *rabi*.

Results revealed that soybean was highly compatible with short duration pigeonpea. The slow growth of pigeonpea during initial period facilitated soybean growth as a parallel cropping. After the maturity of soybean (3 months from sowing), pigeonpea occupied the total space and behaved as a pure or monocrop and gave higher soybean equivalent yield (SEY, 3556 kg/ha) in comparison to other intercropping situation (SEY, 544-707 kg/ha). When comparison was made on total system productivity for both *kharif*+*rabi* (soybean +intercrop-lentil), significantly higher total productivity was recorded with soybean +pigeonpea-lentil (SEY,4691 kg/ha), followed by soybean + urdbean - lentil (SEY, 2425 kg/ha). Net return was recorded INR 97238 and BCR (net return over CC) was 4.26 (the highest and double over other systems), thereby making the system most remunerative. Significantly higher productivity was observed under raised bed over flat planting.

Praharaj C.S., Singh S.S., Jat Ram Lal, Ummed Singh, Elanchezhian E. and Singh R.P.

Evaluation of Grasspea Lines for Low ODAP Content

Evaluation of 452 germplasm lines of grasspea (*Lathyrus sativus* L.) collected from different states, for qualitative and quantitative traits showed that many germplasm lines were mixture and needed to be purified. Among these, accessions having earliness (RLK 1116, RLK 116, RLK 226, RLK 1051, RLK 152, RLK 1206 and RLK 421) and white flowers (VKS 1723 and EC 5053) were selected for detailed analysis of ODAP. Limited variation was observed due to impurity in germplasm and hence, single plant selection was made for purifying the germplasm accessions for future use.

Variation in flower colour in grasspea

Archana Singh, Neetu Singh Kushwah, Sagar Parmar and N.L. Meena

Prevalence of *Ascochyta* Blight in Chickpea at Kanpur

A field survey showed *Ascochyta* blight disease infection of 30% at Kanpur on GG 2, Vishal and Bhagathgram 1 cultivars despite less winter rainfall. The characteristic symptoms of the disease like circular necrotic lesions on the surface of leaf

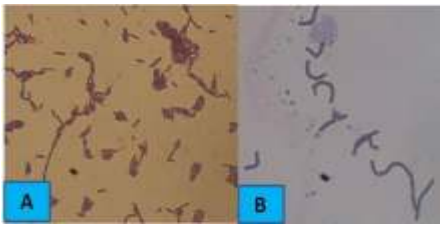
AB infection on leaf AB infection on petiole

and pods, elongated and irreguar lesions on the stems and petioles, stem girdling with abundant circular black /brown colour pycnidia on the surface of the infected stem, leaves and pod with malformed/no seed setting was observed. Pure culture of the pathogen was isolated from infected plant samples on *A. rabiei* specific media and proved pathogencity. The microscopic observation revealed the characteristic single and bi-celled conidia with blunt ends at both the sides and a size ranging from 3.1-4.0µmX8.0-14.2µm of an organism.

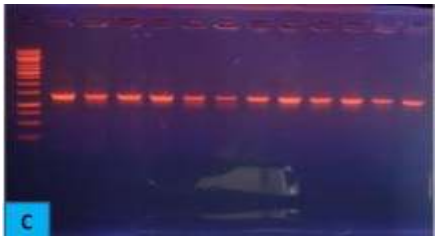
Manjunatha, L., G.P. Dixit, P.R. Saabale, and Krishna Kumar

Potential Bacterial Bioagents for Management of Lepidopteran Pests

Rhizosphere soil samples were collected from 62 different fields of five districts *viz*., Akbarpur, Fatehpur, Hamirpur, Varanasi and Jalaun for isolating native bacterial strains to have an eco-friendly sustainable Bihar hairy caterpillar (BHC) management through biopesticide. By deploying heat selection protocol, 62 endospore forming bacteria including 3 coloured bacterial colonies were isolated, purified and maintained. 19 strains were identified as *Bacillus*



A & B- gram positive bacillus strains



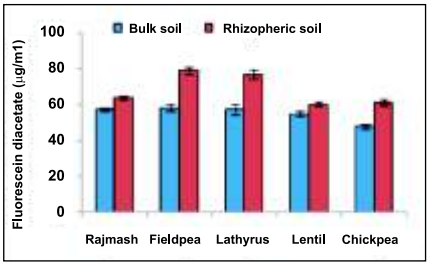
C- 16SrRNA gene amplification in different strains

thuringiensis and remaining were identified as *Bacillus cereus*, *Bacillus megaterium, Lysinibacillus* species, *Lysinibacillus fusiformis, Pseudomonas synxantha* and *Rhodococcus* spp on the basis of 16 rRNA gene. The *Bt* strains were mass multiplied and spore crystal mixture was purified and bioassay was conducted against 3 lepidopterans (*S. obliqua*, *Helicoverpa armigera* Hubner and *Spodoptera litura Fabricius*). The *Bt* strain F8.IIPR was found highly virulent against BHC (12 and 22 days old larvae) and found as effective as reference strain *Bacillus thuringiensis* var kurstaki Z-52. Highest per cent mortality (100) was recorded after 48 hrs in F8.IIPR, followed by F1.IIPR. These bacterial strains are being utilized for development of formulation as biopesticide for sustainable management of insect pests.

Sujayanand, G.K., Mohd. Akram, Ashish Nigam, Deepak Sachan and Krishna Kumar

Rhizospheric Modification by Pulses

Root associated changes in soil chemical and biological properties for five winter pulses (chickpea, lentil, fieldpea, rajmash and lathyrus) were evaluated in mild-alkaline soil (pH 7.9). Rhizospheric acidification was common in all pulses and chickpea brought about maximum reduction in pH (4.8%). The acidification of rhizosphere largely improved the nutrient accessibility. Independent of the crops, average enhancement in nutrient availability in pulses rhizosphere over inter row spaced soil was highest for available P and magnitude of change was found in the order P (37.4%)> Zn (35.8%)>Fe (32.4%)>S (17.5%). Soil biological indicator like soil microbial biomass carbon and fluorescein diacetate was enhanced by 63-243.5% and 9.8-36.3%, respectively and varied among different pulses. Significant ($P<0.05$) improvement in soil organic C was also apparent. Among the pulses, chickpea had the maximum rhizospheric enhancement in mild alkaline soil.



K.K. Hazra, S.S. Singh, C.P. Nath, D.N. Borase and N. Kumar

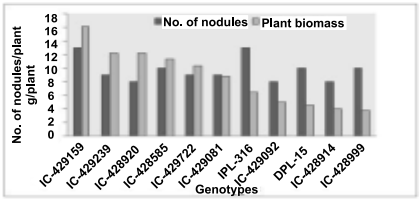
Severe Outbreak of *H. armigera* in Fieldpea in Jalaun District

Severe outbreak of *Helicoverpa armigera* was recorded during 2nd week of March in late sown fieldpea crop in Berai and Soharapur villages of Jalaun district. *H. armigera* larva was observed to feed on green seeds of mature pods. Observations on number of larvae/plant and total number of damaged pods/plant were recorded from a sample of 11 hectares area for quantifying the damage. Mean number of larvae/plant ranged from 0.4 to 3 with a mean per cent pod infestation of 25 to 65, which was above economic threshold level (1 larva/plant). Farmers were advised to spray Indoxacarb for management of this pest. This unusual high infestation of the pest appears be a survival strategy in situation of lack of other usual host. The changing host preference by the pest in the region, needs to be observed regularly to devise its management strategies.


Sujayanand G.K., Uma Sah and Arif Hussain

High Nodulator and Biomass Accumulator Genotypes in Lentil

Total 108 lentil genotypes with ten varietal checks were screened for high biological nitrogen fixation (BNF). The traits associated with BNF like earliness in nodulation, nodulation number and plant biomass were recorded at different growth stages (30 days interval from the date of sowing). Maximum



nodulation was recorded at 60 days after sowing and highest biomass accumulation was observed at 100 days after sowing. Eleven genotypes showed highest nodulation ranging from 8-16 nodules/plant) but their biomass accumulation varied. IC-429159 showed highest nodulation (13 nodules/plant) and biomass accumulation (16.2 g/plant), whereas IPL 16 exhibited high nodulation, but biomass accumulation was poor (6.4 g/plant). The genotypes contrasting in nodulation and biomass will be of great value for further understanding the BNF.

Dnyaneshwar Borase, Senthil Kumar, Mohan Singh and Jagdish Singh

*Spob*NPV: A Biopesticide for Bihar Hairy Caterpillar Management

*Spob*NPV infected Larvae in pigeonpea

Baculo virus is an established biocontrol agent used widely against lepidopteran pest. Viral bioagent, *Spilosoma obliqua* Nucleo Polyhedrosis Virus (SpobNPV) strain was isolated from diseased larvae at Badhapur village in an epizootic situation. Its pathogenicity and virulence under laboratory conditions resulted in 80% mortality at 7 days after treatment @ 5.67 X 10^7 POBs/ml. Based on the *polh* gene sequence, SpobNPV was found belonging to alpha baculovirus group-I category. This virus is phylogenitically close to Hyphantria cunea NPV (HycuNPV). The virus is processed further for developing it into a viable biopesticide for sustainable management of Bihar hairy caterpillar.

Sujayanand, G.K., Mohd. Akram, Ashish Nigam and Krishna Kumar

Screening of Chickpea Genotypes for Pod Borer Tolerance

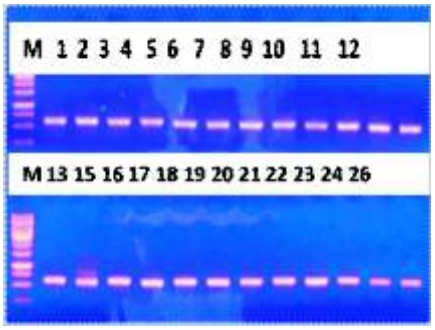
About 1005 germplasm (exotic and indigenous) lines collected from NBPGR, New Delhi were screened for pod borer tolerance/resistance under field condition. Data was recorded for number of larvae/plant, number of damaged leaflets/plant and number of damaged pods /plant. Accessions *viz*., EC 528499, EC 555195, EC 555196, EC 555217, IC 53243, IC 83369, IC 83418 and IC 83449 showed zero per cent infestation and tolerance to pod borer infestation. In general, it was also observed that *kabuli* genotypes were more susceptible to insect damage as compared to *desi* genotypes.

Archana Singh, G.K. Sujayanand, D.N. Gawande, Sagar Parmar

Characterization of Indigenous *Trichoderma* spp Based on ITS Sequences

Total 28 *Trichoderma* isolates recovered from rhizosphere of different pulse growing areas of Kanpur Dehat, Hamirpur and Jalaun districts of Uttar Pradseh were initially characterized based on their morphological characters. These isolates were subjected to molecular characterization based on amplification of ITS regions using ITS primers (ITS1 and ITS4). Based on ITS sequences, isolates were grouped into 3 species *i.e.*, *Trichoderma harzianum* (14 isolate), *Trichoderma asperellum* (12 isolate) and *T. longibrachiatum* (2 isolate).

Biocontrol potential of these isolates against pigeonpea wilt pathogen was assessed. *Trichoderma harzianum* isolates (IIPRTh-4, IIPRTh-10, IIPRTh-13, IIPRTh-15 and IIPRTh-22), *T. asperellum* isolates (IIPTas-6, IIPRTas-7 and IIPRTas-9) and *T. longibrachiatum* isolate (IIPRTlg-30) were found most promising.



Indigenous *Trichoderma* isolates amplified using ITS1/ITS4 primer

R.K.Mishra, Naimuddin, Mohd. Akram, P.R.Saabale, D.K.Sachan, Monika Mishra and Krishna Kumar

Validation of a New Set of Hyper-Variable SSR Markers in Pigeonpea

A set of 317 hyper-variable SSR markers *i.e.,* CcGM series was synthesized for pigeonpea improvement. These markers were selected from over 23,000 SSRs, based on the criterion of factors in their repeat lengths, perfectness and genomic location. Experimental validation of all these SSR markers was accomplished, and all SSRs provided scorable amplicons across a panel comprising of mapping parents of different experimental populations. The highly polymorphic nature of these new SSRs, as evident from simple agarose gel-detection system, renders them immensely useful for various genomic and molecular breeding applications in pigeonpea.

Furthermore, genomic DNA was extracted from 90 pigeonpea genotypes including cultivars/ donors and search for unique fingerprints for all these genotypes is underway using these DNA markers.

Representative gel image illustrating highly polymorphic nature of newly synthesized SSR markers

A. Bohra, R. Jha, I.P. Singh, G. Pandey, Satheesh Naik S.J., R.K. Mishra, P. Patil, F. Singh, S.K. Chaturvedi and N.P. Singh

Eco-physiological Indices of Maize Based Long Term Cropping System

The eco-physiological indices, the ratio of microbial biomass carbon to organic carbon (Cmic:Corg) and the metabolic quotient (qCO_2) associated with soil microbial activity, have been used to determine the sustainability of agricultural systems. Metabolic quotient reflect the maintenance energy requirement of the microbial community and the Cmic:Corg ratio show the development of microbial biomass per unit of organic carbon. Lower qCO_2 was observed in maize-wheat-mungbean (0.78), followed by pigeonpea-wheat (0.77) and maize chickpea (1.2), whereas maize-wheat (2.06) showed higher qCO_2. Integrated nutrient management (INM) exhibit lower qCO_2 as compared to control and recommended dose of fertilizer (RDF). Lower qCO_2 indicated relatively less loss of CO_2 and low microbial maintenance in pulse cropping system and INM.

Higher Cmic:Corg values were observed in maize-wheat-mungbean (3.40), pigeonpea-wheat (3.19), maize-chickpea (2.55) and maize-wheat (1.46) cropping system. Amongst nutrient management, INM showed higher value (2.78) than RDF (2.57) and control (2.6). Higher Cmic/Corg suggested a greater quantity of biomass was supported per organic carbon unit derived from the inputs of C in pulse based system and INM. The quality and quantity of carbon added through pulse cropping system and INM promotes higher microbial biomass which consequently leads to good soil heath and greater sustainability of the system.

D.N. Borase, Senthil Kumar, S.S. Singh, Ummed Singh, K.K. Hazra, Narendra Kumar, C.P. Nath and C.S. Praharaj

Potential Bacterial Isolates against Rhizoctonia bataticola Infecting Chickpea

Dry root rot caused by *Rhizoctonia bataticola* is one of the major constraint for chickpea production causing 10-20% yield loss. Biological control offers an effective alternative to indiscriminate chemical usage for management of the disease. To identify native potential bioagents for management of dry root rot, 71 bacterial isolates were isolated from chickpea nodules, rhizoplane and rhizosphere soils of Kanpur and Bundelkhand region of Uttar Pradesh. These isolates were subjected to confrontation and volatile assay by challenging *R. bataticola* isolate under *in-vitro* conditions. Only eight isolates *viz*., asfh2, fh8, ph8, fh5, IIPR-B1a, IIPR-BC, IIPRB53 and IIPRB58 belonging to *Bacillus spp.* and *Pseudomonas spp* were found promising and their per cent growth inhibition was found between 25 and 50. Highest growth inhibition was observed in IIPRB1a (52%), followed by ph8 (40%). The identified bacterial isolates are suitable candidates for dry root rot disease management.

Saabale P.R., Manjunatha L., Mishra R.K., Sujayanand G.K. and Krishna Kumar

प्रौद्योगिकी हस्तान्तरण

फतेहपुर एवं जालौन में प्रक्षेत्र दिवस का आयोजन

बसंत/ग्रीष्म कालीन मूँग की खेती से जुड़ी महत्वपूर्ण जानकारी को उपलब्ध कराने के उद्देश्य से जालौन जिले के बैराई गांव एवं फतेहपुर जिले के परादान गाँव में क्रमशः दिनाँक 13 और 14 मई, 2016 को प्रक्षेत्र दिवस मनाया गया। इस कार्यक्रम के दौरान, संस्थान के वैज्ञानिकों का एक दल जिसमें डॉ. एस.एस. सिंह, डॉ. राजेश कुमार, डॉ. पी.के कटियार, डॉ. नरेन्द्र कुमार, डॉ. आदित्य प्रताप, डॉ. नईमउददीन, डॉ. आर.के. मिश्रा, डॉ. जी. के. सुजयानन्द, अमृत लामाचने, डॉ. (श्रीमती) उमा साह शामिल थे, ने 10 गाँवों के 280 किसानों के साथ वार्तालाप करके उन्हें महत्वपूर्ण नवीनतम जानकारी उपलब्ध करायी। इस अवसर पर किसानों ने बसंत/ग्रीष्म कालीन मूँग की खेती से जुड़े अनुभवों को वैज्ञानिकों को बताया, और वैज्ञानिकों ने उन्हें उचित परामर्श दिया। वैज्ञानिकों ने किसानों को सुझाव दिया कि वे अतिरिक्त आय प्राप्त करने एवं मृदा स्वास्थ्य को बनाए रखने के लिए अपनी फसल प्रणाली में मूंग की खेती को शामिल करें। वैज्ञानिकों –किसानों ने मिलकर प्रक्षेत्र भ्रमण भी किया।

वार्तालाप आधारित एसएमएस परामर्श सेवा का शुभारम्भ

संस्थान द्वारा उत्तर प्रदेश के किसानों के लिए परियोजना ''उत्तर प्रदेश के दलहनी खेती करने वाले किसानों को आधुनिक संचार प्रौद्योगिकी के माध्यम से नवीनतम जानकारी उपलब्ध कराना'' के अंतर्गत समय से महत्वपूर्ण जानकारी देने के लिए एक वार्तालाप आधारित एसएमएस परामर्श सेवा का शुभारम्भ किया गया है। इस महत्वपूर्ण सेवा का नाम है ''दलहन संदेश सेवा''। इस सेवा के अंतर्गत उ.प्र. के जालौन, फतेहपुर, चित्रकूट, हमीरपुर, कानपुर देहात, बलिया और कानपुर नगर के कुल 2300 किसानों को सम्मिलित किया गया है। दलहनी फसलों की विभिन्न अवस्थाओं से सम्बन्धित जानकारी किसानों को उपलब्ध करायी जा रही है। मार्च–मई, 2016 के दौरान मूँग की खेती की उन्नत प्रौद्योगिकी सम्बन्धी 17000 सूचनाएं किसानों को प्रेषित की गई।

प्रशिक्षण कार्यक्रम का आयोजन

- संस्थान में अप्रैल 11–13, 2016 के दौरान ''राज्य ग्रामीण जिविका मिशन परियोजना'' के अंतर्गत बिहार के कर्मचारियों एवं किसानों के लिए ''दलहन उत्पादन प्रौद्योगिकियाँ'' विषय पर एक गहन प्रशिक्षण का आयोजन किया गया।
- आगामी खरीफ मौसम के लिए, वैज्ञानिक तरीकों से दलहनी खेती करने के लिए टाटा ट्रस्ट, मुम्बई के साथ सहभागिता करते हुए, संस्थान द्वारा खरीफ दलहन उत्पादन प्रौद्योगिकी विषय पर दो दिवसीय प्रशिक्षण का आयोजन किया गया।

जालौन जिले में ग्रीष्म कालीन मूँग की खेती शुरू की गई

उत्तर प्रदेश के जालौन जिले के महोबा ब्लाक के बैराई गांव में किसानों की अतिरिक्त आय हेतु ग्रीष्मकालीन मूँग की खेती शुरू की गई है। ग्रीष्मकालीन मूंग की खेती के सम्बन्ध में छुट्टा/जंगली जानवरों से होने वाले नुकसान एवं उन्नतशील प्रौद्योगिकी की जानकारी न होना मुख्य समस्या रही है। गांव के किसानों के एक समूह ''बैराई किसान सेवा समिति'' के सदस्यों को चारों ओर से सुरक्षित खेतों में ग्रीष्म कालीन मूँग की खेती करने के लिए प्रेरित किया गया। इसके अंतर्गत तिल–मटर एवं ज्वार–गेहूँ फसल प्रणाली में 5 हे. क्षेत्र में मूँग की अल्पावधि, रोगरोधी, उच्च उपज देने वाली प्रजाति आईपीएम 2–3, सम्राट, आईपीएम 205–07 एवं आईपीएम 409–4 को बोया गया। बुवाई मार्च के महीन में (अरहर के बाद) और अप्रैल के महीने में (गेहूँ एवं मटर के बाद) की गई। इससे प्रभावित होकर किसानों ने तिल–गेहूँ एवं ज्वार–मटर प्रणाली में, अतिरिक्त 15 हे. क्षेत्र में ग्रीष्म कालीन मूँग की बुवाई की। उन्नतशील जानकारी एवं प्रौद्योगिकी को अपनाया गया। इसके परिणाम स्वरूप किसानों को 8–10 कुन्तल/है. की दर से उपज प्राप्त हुई और 50,000/– से 60,000/– प्रति है. की दर से आर्थिक लाभ हुआ। इस योजना से जुड़े समस्त किसान पूर्णतया लाभान्वित एवं संतुष्ट रहे।

किसानमेला में सहभागिता

- मुजफ्फरनगर जिले के नवाला एवं मीरापुर दलपत गांवों में 7 मई एवं 25 मई, 2016 को आयोजित किसान मेला एवं कृषक प्रक्षेत्र पाठशाला में संस्थान ने सहभागिता करके संस्थान की प्रौद्योगिकी का प्रदर्शन किया।
- आईआईएसआर लखनऊ में 2 अप्रैल, 2016 को आयोजित प्रधानमंत्री फसल बीमा योजना जागरूकता दिवस की प्रदर्शनी में आईआईपीआर ने सहभागिता की।

Awards

- Dr. G. K. Sujayanand was awarded First Best Poster Award for his poster entitled 'No-choice assay for probing wild

pigeonpea derivatives against *Helicoverpa armigera* for resistance identification'.

- Best Poster Award was received for the poster entitled 'Combining sterilizing cytoplasms with diverse nuclear backgrounds and discovering potential restorers to underpin hybrid breeding in pigeonpea [*Cajanus cajan* (L.) Millspaugh]' authored by Bohra, A., Singh, I.P., Pandey, G., Jha, R., Pareek, S., Basu, P.S., Chaturvedi, S.K. and Singh, N.P.

Both these awards were received at National conference on 'Sustainable and self sufficiency in production of pulses through an integrated approach' held at UAS GKVK, Bangaluru on May 21-22, 2016.

Participation in ICAR-Zonal Sports Tournament

A contingent of 45 staff members of IIPR participated in ICAR-Zonal Sports (North Zone) Tournament-2016 held at ICAR-National Dairy Research Institute, Karnal, Haryana on April 16-19, 2016. The contingent was accompanied by Dr. Ummed Singh, Chairman, Sports Committee, Dr. Bansa Singh as *Chief de Mission* and Mr. Rajeev Nigam as Team Manager. In the closing ceremony, Dr. Gurbachan Singh, Chairman, ASRB, New Delhi and Dr. A.K. Srivastava, Director, ICAR-NDRI, Karnal distributed the trophies, medals and certificates to winning teams and player. Dr Amrit Lamichaney won Gold Medal in long jump. IIPR also won the Champion's Trophy in volleyball (smashing) under the captaincy of Dr. A.K. Parihar. The Institute also received most prestigious award 'Fair Play/Best Disciplined Team Award'.

Personnel

Appointments

Name	Post	Discipline	Date of joining
Miss. Kalpana Tiwari	Scientist	Biochemistry	11.4.2016
Mr. Alok Kumar	Scientist	Seed Science & Technology	11.4.2016
Mr. Vaibhav Kumar	Scientist	Biochemistry	11.4.2016

Promotions

Name	Promoted to	W.e.f.
Dr. Lalit Kumar	Principal Scientist	1.7.2014
Dr. Aditya Pratap	Principal Scientist	30.8.2014
Dr. Jitendra Kumar	Principal Scientist	30.8.2014
Dr. Narendra Kumar	Principal Scientist	12.8.2014
Dr. (Mrs.) Uma Sah	Principal Scientist	8.11.2014
Dr. Mohd. Akram	Principal Scientist	15.11.2014
Dr. Devraj	Principal Scientist	16.12.2014
Mr. H.N. Maurya	Technical Officer	1.1.2015
Mr. Ganesh Shankar Sharma	Technical Assistant	15.4.2015

Retirements

Name	Post held	Date of retirement
Dr. T.N. Tiwari	Chief Technical Officer	31.5.2016
Mr. D.K. Sharma	Chief Technical Officer	30.6.2016
Mr. Ved Prakash	Asstt. Chief Technical Officer	30.6.2016

Transfers

Name	Designation	From	To	Date
Dr. Prasoon Verma	Scientist	ICAR-IISR, Lucknow	ICAR-IIPR, Kanpur	4.6.2016
Mr. N.L. Meena	Scientist	ICAR-IIPR, Kanpur	ICAR-IIMR, Hyderabad	14.6.2016

Obituary

Mr. Jitendra Singh, Skilled Supporting Staff, left for his heavenly abode on 10.4.2016. May his soul Rest in Peace.

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Director's Desk

Dear Readers,

Insects are versatile organisms having higher adaptability to changing climate by virtue of its morphological (2 pairs of wings, 3 pairs of legs, *etc*.,) and physiological adaptations. Insect population is highly influenced by abiotic factors such as temperature, rainfall, wind speed and relative humidity and biotic factors like predators, parasitoids and pathogens. In recent years due to climate change, the scenario of crops and pest population dynamics has changed drastically. For example in summer mungbean, beet army worm, *Spodoptera exigua* has emerged as a key pest in Fatehpur, Kanpur Dehat, Jalaun and other parts of North India. Higher summer temperature benefits the Lepidoptera population in many ways by increasing their flight, thus, leading to higher mating success and egg laying; and ultimately larger brood development. The *S. exigua* incidence occurs at germinating stage. The larvae feed on apical growing buds, young developing leaves by scrapping the chlorophyll causing damage to photo-synthesis and seedling establishment. Severe infestation at this crop stage hampers the crop stand drastically. If crop protection measures are not taken the plant population reduces which drastically reduces the productivity of the crop. The prevailing temperature greatly influences the insect pest growth and development apart from the changing cropping pattern. The insect metabolism is at optimal stage at its temperature preferendum. Hence if the preferred temperature prevails for the required period it favours the higher egg hatching percentage or lower larval duration and mortality leading to higher population build-up of a particular insect pest. About 1-3^{o}C rise in temperature results in expansion of the European corn borer (*Ostrinia nibilalis* Hubner) distribution up to 1,220 km North wards. The insects remain active within temperature range from 15-32^{o}C.

Similarly, during last year there was heavy incidence of aphids in pigeonpea during pod maturation stage at certain places in U.P. This led to shrivelling of pods, seeds and occurrence of sooty mould due to honey dew secretion by aphids. The sucking pests especially aphids population outbreak is highly dependent upon temperature and absence of rainfall. Similarly, pod fly incidence in pigeonpea is increasing every year due to shortening of winter. The pest window has widened due to availability of its

preferred temperature for a long time. More pest generations are completed during the cropping period which results in more crop damage leading to yield loss. Pod borer, *Helicoverpa armigera* Hubner has emerged as a serious pest in fieldpea in Jalaun. Though pigeonpea and fieldpea were grown in adjacent fields, pod borer infestation was severe in fieldpea. Except last *rabi* season pod borer was a minor pest in fieldpea, it has emerged as a major pest. The per cent pod infestation in fieldpea varied from 25 to 65 in different fields.

Thus insect pest outbreaks has occured frequently in recent years due to dynamic nature of climate, by shifting its pest status, widening and shifting its host range, expanding its geographic region and occupying new ecological regions and changes in the voltinism (generations/year). The occurrence of *Spodoptera litura* epidemics on soybean in Vidarbha region of Maharashtra and brown plant hopper in Haryana or western Uttar Pradesh belt of Basmati rice was mainly due to favourable prevailing weather conditions. During 2006, mealybug, *Phenacoccus solenopsis*, which was never reported as a serious pest of cotton in India, gained pest status on *Bt* cotton in Gujarat, and during 2007, in Punjab, Rajasthan and Maharashtra causing heavy reductions in yield. Favourable prevailing weather conditions lead to the invasion of sugarcane wooly aphid, *Ceratovacuna lanigera* in Maharashtra in 2002. *Helicoverpa armigera* was a major pest of chickpea and pigeonpea, but after the introduction of *Bt* cotton in 2002, its infestation in these crops has significantly declined in the cotton based cropping system. There is no significant movement of this pest from cotton-to-pigeonpea-to-chickpea. Declined survival rate of brown plant hopper, *Nilaparvatha lugens* (Stal) and rice leaf folder, *Cnaphalocrocis medinalis* (Guen) at higher temperature indicates the impact of rising temperature, which could reduce the population of these insect pests of rice, leading to the changes in the insect pest population dynamics of rice ecosystem.

Around 87 food crops in the world depend on pollinators, representing almost 35% of global food production. The area covered by pollinator dependent crops has increased by more than 300% during the past 50 years. The pollinators arrive exactly at the flowering time and there exists a mutual interaction between them. If temperature rises, the phenology of the plant (date and frequency of flowering) and pollinator changes resulting in disruption or even elimination of mutualistic interactions (pollination and seed dispersion) among the species. About 17-50% of all pollinators suffer a reduction in food supply with a phenological advance of two weeks of their floral resources. The insects are very good indicator organism with regards to climate change because 54% of known species are insects. Hence, the insects reflect a clear picture on the changes that occur in biological systems due to climate change. Trophic level interactions, such as plant-insect, insect-natural enemy, and plant pollinator will be affected to a larger extent due to climate change.

The relative efficacy of pest control measures presently available such as host-plant resistance, natural enemies, bio-pesticides and chemicals is likely to change as a result of climate change. The ICAR-IIPR through various NARS systems in the country is presently looking forward to assess the efficacy of various Integrated Pest Management technologies under diverse climatic conditions, and to develop appropriate strategies to mitigate the adverse effects of climate change.

(N.P. Singh)