Agri search with a human touch

PULSES Newsletter

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New Regional Research Centre of IIPR, Kanpur in Karnataka

To enhance pulses production and productivity of pulse crops in southern India the Indian Institute of Pulses Research (IIPR), Kanpur has signed a Memorandum of Understanding (MoU) with University of Agricultural Sciences (UAS), Dharwad (Karnataka) for establishment of a Regional Research Centre cum Off-Season Nursery of the institute at Dharwad in Karnataka.

Dr. N. Nadarajan, Director, IIPR on behalf of Secretary, DARE & Director General, ICAR and Dr. H.S. Vijay Kumar, Registrar, UAS, Dharwad signed the MoU on October 18, 2011 in presence of the Vice Chancellor, Dr. R.R. Hanchinal. Dr. P.M. Salimath, Director of Research, Dr. B.M. Khadi, Dean, PGS and other dignitaries of the University and Dr. N.P. Singh, Project Coordinator (Chickpea), IIPR, Kanpur were also present on this occasion.

The centre will function from Sericulture Building of University in the begining. It will cater the research and extension needs of pulse crops like chickpea, pigeonpea, urdbean and mungbean grown in South Indian states including Karnataka. The centre will also act as an off-season nursery during summer months for advancing breeding material of chickpea, lentil and peas, and during winter season for urdbean and mungbean to hasten breeding cycle. In addition, the centre will develop location specific technologies for pulses and will contribute to capacity building of officials from department of agriculture of various southern states. The centre will also impart need-based training to pulse growing farmers in association with UAS, Dharwad. Generating breeding material for pulses grown in southern Indian states would also be the thrust area of research of this centre.

National Symposium on Biodiversity and Food Security

A two-day National Symposium on "Biodiversity and Food Security, Challenges & Devising Strategies" was organized at IIPR, Kanpur on December 10-11, 2011. Dr. G.C. Tiwari, Vice Chancellor CSA University of Agriculture and Technology, Kanpur, was the Chief Guest at the inaugural function.

While inaugurating the symposium, Dr. Tiwari emphasized that so far little attention has been paid on the effect of climate change on biodiversity in food and agriculture and has not been dealt with together. He explained that diversity includes the variety and variability of environmental ecosystem, animals, plants and micro-organisms. These are necessary to sustain human life and are key functions of ecosystem. The conservation and sustainable use of biodiversity for food and agriculture play a very critical role in fight against hunger.

Dr. N. Nadarajan, Director, IIPR & Organizing President of the Symposium explained the theme and necessity for its organization. He said that Indian population is increasing at a growth rate of 2.3 per cent and by 2050 it will be about 1.6 billion. Fertility of land is declining and productivity of many crops are at plateau. Climate changes pose a serious threat to food production. There is need for preservation of rich biodiversity, gene/ allele mining, tapping fertile lands, higher seed replacement rates, quality seed production and distribution, biotechnological intervention for pest and drought resistance. Utilization of these tools can be strong basis for ensuring food security.

Dr. Masood Ali Ex. Director, IIPR, highlighted the need of increasing food grains production for the mankind and importance of conservation agriculture. There is need of judicious use of natural resources and using biotechnological tools for food production in the coming years. Conservation of resources is the cry of the day and has to be taken care at every step.

Dr. S.S. Ali Organizing Secretary of the symposium highlighted the theme and objective of the symposium which was to provide a forum for policy makers, researchers and development personnel to debate on different issues related to the biodiversity and food security and give suitable recommendations.

Later, in different technical sessions deliberations were held on biodiversity and food security, global warming and climate change, water conservation and pollution, natural fauna, human health, and medicinal plants and theoretical medicines. The Symposium was attended by over two hundred delegates from across the country.

Research Highlights

Genetic Variability for Heat Tolerance in Lentil

Genetic variability among 334 accessions of lentil germplasm was assessed for heat tolerance under the late sown conditions (January 15) in the irrigated field. The maximum day temperature during flowering and podding (March 15 to April 30, 2011) varied from 30.6^0 to 43^o C. Out of these 176 accessions flowered early and matured before 80-85 days of sowing, while 62 accessions did not flower or flowered rarely and hence were considered highly sensitive to heat. Ninety six accessions flowered and podded after 85 days of sowing and were considered for recording the data on range of variability for 50% flowering, pod initiation, number of filled pods/ plant, number of unfilled pods/plant, grain yield/plant, biological yield/ plant and harvest index. Those genotypes showed maximum number of filled pods at >37^o C along with high HI, more number of filled pods/plant and minimum number of unfilled pods/plant were identified as tolerant to heat. Based on these criteria, three accessions FLIP 2009-55L, IG 2507 and IG 4258 were identified as tolerant. These genotypes can be potential genetic resources for lentil breeding programme for development of heat tolerant varieties.

Jitendra Kumar, Ekata Srivastava, Anzel-ul Islam and S.K. Chaturvedi

A New Viral Disease in Pea

A disease characterized by symptoms of browning of veins, leaves and stem, mostly in growing tips, brown spots on pods and bunching of the tops is being observed in pea plants at the IIPR, Kanpur for last three years and was also found at farmers' fields in Bareilly and Shahjahanpur districts (UP) and Udham Singh Nagar (Uttarakhand). Incidence of the disease ranged between 1-10% in different fields and affected plants finally dried up.

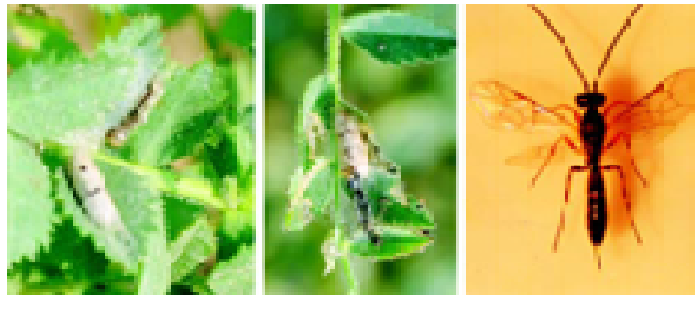
Sap inoculation from field-infected pea on to healthy pea resulted in development of characteristic symptoms. On cowpea cv. Pusa Komal, the causal virus produced necrotic local lesions on the inoculated primary leaves indicating tospovirus disease aetiology. Reverse transcription-polymerase chain reaction (RT-PCR) using a specific primer pair for the amplification of the coat protein gene of *Groundnut bud necrosis virus* (GBNV) amplified ~800 bp fragments of expected size in field-infected pea, inoculated pea and cowpea samples. No amplification was observed from healthy samples of pea or non-inoculated cowpea leaves. Sequence analysis revealed that the virus causing necrosis in pea is an isolate of GBNV. Though disease is not alarming at present, but since the virus causes necrosis and death of the plant, this needs continuous monitoring.

Symptoms of GBNV infection on pea

Mohd. Akram and Naimuddin

Natural Parasitization of *C. chlorideae* – A larval Endoparasitoid of *H. armigera* in Chickpea

A large number of parasitoids have been reported to occur on various stages of *H. armigera*, only a few contribute in regulation of population of this pest in chickpea ecosystem. The presence of glandular and non-glandular trichomes on the surface of the calyxes and pods and the acid exudates inhibit the parasitoids. *Campoletis chlorideae* Uchida (Hymenoptera: Ichneumonidae) is an important larval endoparasitoid of *H. armigera* in chickpea, which preferentially attacks early instars (second and third instar larvae). Natural parasitization of this parasitoid on *H. armigera* in chickpea ranged from 7.6 (second fortnight of November) to 44.4% (second fortnight of December) at main farm of IIPR, while at New Research farm it ranged from 7.1 (second fortnight of November) to 23.2% (first fortnight of December).



Cocoon of *C. chlorideae* emerged from larvae of *H. armigera*

C .chlorideae adult female

Hem Saxena, P. Duraimurugan and Uma Sah

Laboratory Efficacy of Metaflumizone against *H. armigera*

Metaflumizone is a novel insecticide which belongs to a new class semicarbazone with low mammalian toxicity. For determining the LC_{50} value of Metaflumizone against 3rd instar larvae of *Helicoverpa armigera*, larvae were collected and reared in laboratory for one generation and bio-assayed following 'treated larvae-treated food method'. Mortality of larvae was observed at 24, 48 and 72 h after imposing treatment. At 24 h LC_{50} value of Metaflumizone against *H. armigera* was 107.3 ppm and declined with time at 48 and 72 h. Treated larvae stopped feeding, secreting fluid from the mouth and were paralyzed. Metaflumizone acts by blocking sodium channels through binding selectively to the slow-inactivated state.

A.Ghosh, Hem Saxena and Garima Singh

Occurrence of NPV in Spotted Pod Borer, *Maruca vitrata*

Spotted pod borer, *Maruca vitrata* (Geyer) is the most serious insect pest of legumes, including pigeonpea. During natural epizootic conditions (*kharif* 2011) 543 *M. vitrata* larvae were collected from IIPR farms, Kanpur. Out of these, 16 larvae were diseased and infected with virus in short duration pigeonpea. The virus infected larvae were swollen, glossy and moribund with initial signs of gradual changes in the colour and luster of the integument and ruptured cuticle with discharging body fluid on to plant parts in some larvae. The larvae of *M. vitrata* crawled to the top of the twigs (negative geotropism) on which they were fed. The diseased larvae were collected in 2 ml tubes for identification of virus infection. Observation of discharged body fluid under phase contrast microscope revealed the presence of occlusion bodies.

NPV infected *Maruca* larva

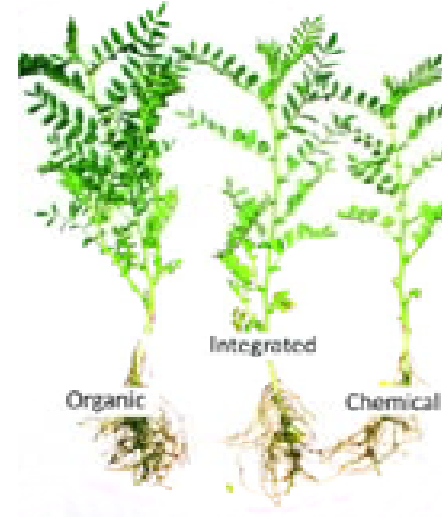
S.D. Mohapatra

Increased Nodulation and Grain Yield of Chickpea through Improvement in Soil Quality

A field study was initiated in 2004-05 at IIPR research farm to evaluate the impact of improvement in soil quality on nodulation, nutrient uptake and grain yield of chickpea, grown under fodder sorghum-chickpea (var. JG 16) rotation with three different nutrient supply systems *viz*., i) recommended dose of chemical fertilizer only, ii) integrated use of chemical fertilizer and compost, and iii) compost only. Quality compost was produced through use of crop residues and rock phosphate.

Soil analyzed for quality assessment showed significant improvements under organic and integrated production systems as compared to chemical production system. Organic production system sequestered highest amount of organic carbon as compared to integrated system, while in chemical production system soil carbon status remained similar to the initial levels. Soil basal respiration rate, activities of dehydrogenase and acid phosphatises and availability of nutrients like NO_3-N, P and K were significantly higher under organic as compared to integrated and chemical production systems.

Improvement in soil quality attributes improved growth and nutrient uptake by chickpea. Nodulation in chickpea under organic system was higher which resulted in significantly higher uptake of nitrogen in plant. Total N uptake in plants under organic production system was almost doubled as compared to chemical production system. Significantly higher uptake of P in both roots and shoot of plants was observed under organic and integrated systems compared to chemical production system. Increased nutrient uptake under organic and integrated production systems resulted in higher grain yield of chickpea (25.0 and 23.2 q/ha, respectively) as compared to the chemical system (16.3 q/ha).



Chickpea plant growth at an early stage (30 DAS) under different production systems

Mohan Singh, M.P. Singh, Shruti S. Bhadauria and Archna Mishra

Simple Conventional Technique Can Control Hairy Caterpillar

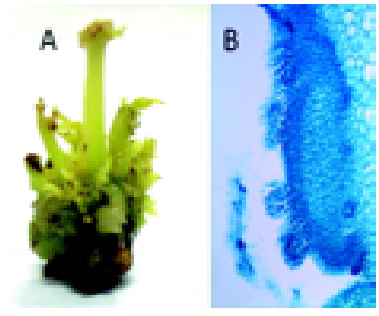
A simple conventional "Shake-down technique" was employed against Bihar hairy caterpillar (*Spilarctia obliqua* Walker) in late pigeonpea in 11 villages in three districts *viz*., Fatehpur, Kanpur and Ramabai Nagar (U.P.), where this noxious pest was noticed in alarming proportion (11 larvae/plant) during the 2nd fortnight of November, 2011 at various locations. The surveillance team under NICRA (Pigeonpea Pest & Disease) Project, based at IIPR Kanpur trained the farmers on shake-down technique.

The farmers learnt this easy technique at their respective fields, and experienced that by gently shaking pigeonpea plants, larvae easily dropped off on the sheet placed underneath in the inter-row spaces, and the larvae thus collected were destroyed. With this indigenous simple technique, 85% larval reduction of the pest was achieved. This practice proved an efficient, economically viable and eco-friendly approach. This is one of the components as cultural control under the umbrella of integrated pest management (IPM) strategy. The technique costs Rs.720/- per ha employing six persons. as compared to chemical spray costing > Rs. 1000/- per ha. Moreover, chemicals have adverse effects on non-target organisms.

S.K. Singh, Jeewesh Kumar, Avnish Panday, Sandeep Kumar and Mohit Sharma

Cytohistological Study of *in vitro* Shoot Organogenesis in Pigeonpea

The histology of adventitious shoot formation in pigeonpea (*Cajanus cajan* L.) was studied. Multiple adventitious shoot buds were induced in the axillary bud region of the germinating seeds cultured on a medium containing 22.0 ìM BAP. Longitudinal sections of shoot bud primordial fixed in FAA fixative at different development stages were stained with safranin, fast green. These sections were examined under a light microscope and showed that sub-epidermal cells proliferate to form multiple adventitious shoot primordia, supporting the formation of shoots *via* organogenesis and not embryogenesis.



A. Axillary meristem explants with multiple shoots
B. Emergence of shoot primordia from explants

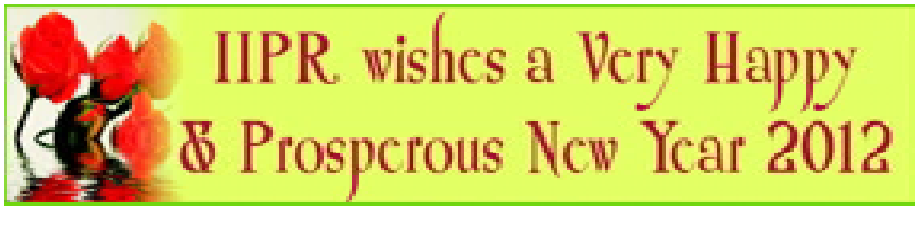
Ontogeny of multiple shoot induction in pigeonpea

Alok Das, Jharna Srivastava, Jaya Srivastava and Subhojit Datta

Low-Cost Manually Operated No-Till Drill for Rice Fallow Condition

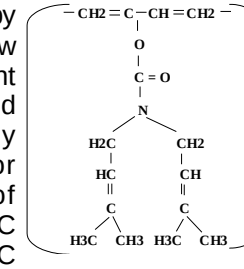
A low-cost manually operated No-Till Drill for small farmers having low purchasing power, has been developed for direct line sowing under residue moisture retained on the soil surface in rice fallow. This helps to retain more moisture due to least soil disturbance. By use of this no-till drill, the seeding is done timely at a reduced cost. It has field capacity of 0.05 ha/h with two manpower against four manpower needed for hand plough and is expected to be used for working on 20 ha per year. The cost of operating manual zero-till drill is Rs.845/ha as against Rs.1690/ha incurred in hand plough.

M. K. Singh, Narendra Kumar, Prasoon Verma, P.K. Ghosh



Major Nematicidal Constituent in Calotropis Latex Identified as Polymer

Studies were initiated to characterize the major bio-chemicals responsible for their nematicidal action in the latex of calotropis. A large quantity of latex was collected by making shallow cuts at different plant parts and immediately processed for recovery of chemicals. TLC and HPLC analysis of all the fractions revealed presence of more than hundreds of chemicals, however only one chemical was found in large quantity (*i.e.*,4.4% portion of the fresh latex). Instrumental spectrums and color reaction indicated the compound to be a derivative of aliphatic olefinic carbonyls. Sharp peaks at 3071 cm^{-1} and again at 1641 cm^{-1} under IR spectrum are ascribable to the Ó C=C stretching and bending vibrations in olifinic bonds of the molecule. H^1NMR and ^{13}CNMR also fully supported the findings of IR. Appearance of all the peaks at up field (ä 0-6) of the NMR spectrum confirmed the compound to be of aliphatic as earlier revealed by IR analysis. Hence instrumental analysis confirmed the extracted compound to be a polymer of carbamate containing isoprene units in which at least ten or twelve units of carbamate group containing isoprene polymerizes to form the molecule, which was further confirmed by decolorization of bromine in carbon tetrachloride without evolution of hydrogen bromide and decolorization of cold neutral dilute permanganate.



n = (minimum ten units in cyclic manner)

Expected structure of major compound of non-polar fraction of latex

Lalit Kumar, Jagdish Singh and G.K. Srivastava

Transfer of Technology

मॉडल प्रशिक्षण कार्यक्रम आयोजित

भारत सरकार द्वारा प्रायोजित "दलहनी फसलों की उन्नतशील उत्पादन तकनीक" विषय पर दिनांक 14-21 नवम्बर, 2011 को एक आठ दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया। उक्त प्रशिक्षण कार्यक्रम का मुख्य उद्देश्य सिद्धान्तों एवं व्यावहारिक स्थितियों के मध्य स्थापित अन्तर को कम करना एवं प्रसार कार्यकर्ताओं को भिन्न-भिन्न परिस्थितियों में उपयोगी सूचनाएं आदि उपलब्ध कराना था।

प्रशिक्षण कार्यक्रम का उद्घाटन करते हुए संस्थान के निदेशक डा. एन. नडराजन ने इस बात पर बल दिया कि उपयोगी जानकारियाँ जल्द से जल्द प्रसारित की जाएं और विभिन्न राज्यों के लिए संस्तुत प्रौद्योगिकी को अपनाया जाए, ताकि उत्पादन और उत्पादकता के बीच के अन्तर को कम किया जाए। प्रशिक्षण के दौरान परस्पर संवाद पर आधारित लगभग 26 व्याख्यान दिए गए और रमाबाई नगर के बड़हापुर और कुइतखेड़ा गांवों का भ्रमण भी कराया गया। उक्त कार्यक्रम में तमिलनाडु, आंध्र प्रदेश, मणिपुर, नागालैण्ड, राजस्थान, मध्यप्रदेश, छत्तीसगढ़, झारखंड, बिहार, उत्तराखण्ड, और उत्तर प्रदेश से आए 20 लोगों ने प्रशिक्षण प्राप्त किया। प्रतिभागियों को संस्थान द्वारा प्रकाशित साहित्य भी उपयोग हेतु वितरित किया गया। प्रशिक्षण कार्यक्रम से पहले और बाद में प्रतिभागियों के अनुभवों का मूल्यांकन किया गया।

डा.एस.के. सिंह, प्रधान वैज्ञानिक उक्त कार्यक्रम के समन्वयक थे।

रोएंदार सूंडी को नियंत्रित करने की सामान्य पारम्परिक तकनीकी

रमाबाई नगर, कानपुर और फतेहपुर जिलों में देर से बोई जाने वाली अरहर में बिहार रोएंदार सूंडी पर, शैक डाऊन तकनीकी का प्रयोग किया गया, जहाँ पर नवम्बर 2011 के द्वितीय पखवाड़े में इस महामारी का विकराल रूप (11 सूंडी/पौधा) देखने को मिला। संस्थान के वैज्ञानिकों ने किसानों को उक्त तकनीकी की जानकारी दी। किसानों ने उक्त सरल तकनीकी को अपनाया और पाया कि पौधों को हिला-हिला कर, आसानी से पौधों से कीटाणुओं को नीचे गिरा कर नष्ट किया जा सकता है। इस तकनीकी को अपनाकर, बड़ी आसनी से 85% कीटाणु नष्ट किए जा सकते हैं। यह पद्धति सरल होने के साथ ही सस्ती भी पाई गई। इस तकनीकी को अपनाने में प्रति हे. छः लोगों के साथ कुल लागत मात्र रू 720/- होती है जबकि रासायनिक छिड़काव में प्रति हे. रू 1000/- लागत आती है। साथ ही, रसायनों का प्रभाव गैर हानिकारक जीवों पर भी पड़ता है जो कि हानिकारक होता है।

एस.के. सिंह, जीवेश कुमार, अवनीश पाण्डे, संदीप कुमार और मोहित शर्मा

डीएसी-इकार्डा-आईसीएआर सह परियोजना के अंतर्गत *ऑन कैम्पस* प्रशिक्षण कार्यक्रम आयोजित

दिनांक 26 दिसम्बर, 2011 को संस्थान में, उ०प्र० के बलिया और फतेहपुर के किसानों को नवीनतम तकनीकी जानकारी देने के उद्देश्य से संस्थान में एक प्रशिक्षण कार्यक्रम आयोजित किया गया जिसका शीर्षक था - "मसूर की उन्नत उत्पादन प्रौद्योगिकी"। उक्त प्रशिक्षण कार्यक्रम, कृषि एवं सहकारिता विभाग द्वारा वित्त पोषित "उत्तर भारत में खाद्य एवं पोषण सुरक्षा एवं जीविका को बनाए रखने के लिए मसूर का उत्पादन बढ़ाना" परियोजना के अंतर्गत आयोजित किया गया था। संस्थान के निदेशक डा. एन. नडराजन ने, धान के बाद खाली खेतों में मसूर की बुआई करने पर जोर दिया। उन्होंने किसानों को मौद्रिक एवं गैर मौद्रिक लागतों के सामायिक प्रबन्धन पर बल दिया। जिससे उनको विभिन्न प्रौद्योगिकियों का पूरा-पूरा लाभ मिल सके। डा. एस.के. सिंह, प्रधान वैज्ञानिक ने प्रशिक्षण कार्यक्रम का समन्वयन किया साथ ही संस्थान के वैज्ञानिकों ने किसानों के सवालों के उत्तर दिए। प्रतिभागियों को, संस्थान द्वारा प्रकाशित साहित्य भी वितरित किया गया। संस्थान के नवीन शोध प्रक्षेत्र का भ्रमण भी कराया गया। उक्त कार्यक्रम में बलिया, फतेहपुर, रमाबाई नगर से आए करीब 134 किसानों ने भाग लिया।

राष्ट्रीय प्रशिक्षण कार्यक्रम आयोजित

संस्थान में "रबी दलहनी फसलों के लिए उन्नतशील प्रौद्योगिकी" तीन दिवसीय प्रशिक्षण कार्यक्रम दिनांक 7-9 दिसम्बर, 2011 के दौरान आयोजित किया गया। उक्त प्रशिक्षण कार्यक्रम राष्ट्रीय खाद्य सुरक्षा मिशन-दलहन के अन्तर्गत, कृषि एवं सहकारिता विभाग, कृषि मंत्रालय द्वारा प्रायोजित किया गया

था। प्रशिक्षण कार्यक्रम का उद्घाटन करते हुए, संस्थान के निदेशक, डा.एन. नडराजन ने मृदा के स्वास्थ्य एवं टिकाऊपन को बनाए रखने के लिए विभिन्न फसल चक्रों में दलहनी फसलों की भूमिका पर बल दिया। प्रशिक्षण में झारखण्ड, तमिलनाडु, कर्नाटक, छत्तीसगढ़, महाराष्ट्र, राजस्थान, गुजरात, नई दिल्ली और उत्तर प्रदेश से आये 26 प्रतिभागियों ने सहभागिता की। कार्यक्रम के दौरान, वार्ता पर आधारित चौदह व्याख्यान दिए गए जिसमें फसल सुधार, उत्पादन, सुरक्षा एवं कटाई उपरान्त प्रबन्धन आदि पर चर्चा की गई। उसके अतिरिक्त संस्थान स्थित नवीन शोध प्रक्षेत्र का भ्रमण भी किया गया, जिसके माध्यम से प्रतिभागियों को विभिन्न उच्चकोटि की प्रौद्योगिकियों की जानकारी दी गई। साथ ही प्रशिक्षण की उपयोगिता और प्रभावकता पर प्रतिभागियों के विचार एवं प्रतिक्रियाएं भी एकत्र की गई। प्रतिभागियों को संस्थान द्वारा प्रकाशित उपयोगी साहित्य भी वितरित किया गया।

अखिल भारतीय किसान मेला में आई.आई.पी.आर. स्टॉल सर्वश्रेष्ठ घोषित

दिनांक 12-15 अक्टूबर, 2011 के दौरान चन्द्रशेखर आजाद कृषि विश्वविद्यालय कानपुर में आयोजित अखिल भारतीय किसान मेला और कृषि प्रदर्शनी में भारतीय दलहन अनुसंधान संस्थान ने प्रतिभागिता की। उक्त किसान मेला में पोस्टर, चार्ट, चित्रों आदि के माध्यम से विभिन्न प्रजातियों के विकास, उत्पादन, सुरक्षा, कटाई उपरान्त प्रबन्धन सम्बन्धी प्रौद्योगिकियों को प्रदर्शित किया गया। साथ ही, संस्थान द्वारा विकसित विभिन्न दलहनी फसलों के बीजों को भी प्रदर्शित किया गया। संस्थान द्वारा विकसित मिनी दाल मिल ने लोगों का विशेष ध्यान खींचा। आई.आई.पी.आर. स्टॉल को सर्वश्रेष्ठ घोषित किया गया।

Personnel

Appointments

Name	Designation	Date of joining
Mr. P.R. Saabale	Scientist (Plant Pathology)	23.12.2011
Mr. D.N. Gawande	Scientist (Plant Breeding)	23.12.2011
Mr. Shripad Bhat	Scientist (Agril. Economics)	23.12.2011

Promotions

Name	Promoted to	w.e.f.
Mr. D.N. Awasthi	T-9	24.12.2010
Mr. A.P. Singh	T-6	2.9.2011
Mr. Ved Prakash	T-6	27.8.2010
Mr. Krishna Autar	T-5	23.8.2011
Mrs. Rashmi Yadav	T-5	7.1.2008
Mr. G. S. Pandey	T-5	12.11.2008
Mr. Kailash Chandra	T-5	20.3.2011
Mr. J.B. Thapa	T-4	29.6.2011
Mr. Jiya Lal	T-4	29.6.2011
Mr. S.N. Hatia	T-4	29.6.2011
Mr. Satish Kr. Singh	T-4	29.6.2011
Mr. K.S. Meena	T-4	29.6.2011
Mr. Deomani Pandey	T-3	31.1.2011
Mr. Raghubanshi Singh	T-3	31.1.2011
Mr. Raj Ram	T-3	31.1.2011
Mr. K.S. Sharma	T-3	29.6.2011

Transfers

- Dr. A.B. Mandal, Principal Scientist (Plant Breeding) was relieved from IIPR, Kanpur on 22.10.2011 to join at CRIJAF, Barrackpore, Kolkata.
- Dr. Amalendu Ghosh, Scientist (Entomology) was relieved from IIPR, Kanpur on 27.12.2011 to join at IARI, New Delhi

Retirement

Dr. Vishwa Dhar, Principal Scientist (Plant Pathology) retired from his service on 30.11.2011.

Award

Dr. M. S. Venkatesh, Sr. Scientist (Soil Science) was honoured with IMPHOS-FAI Team Award for the work on "Role of phosphorus on yield and quality of crops".

Director's Desk

Dear Readers,

The sequencing of the pigeonpea genome, announced at the close of 2011 by two independent groups, is a major scientific breakthrough that can pave the way for improvements in this important pulse crop of the country. Knowing the genes in pigeonpea can greatly speed up the development of improved varieties with higher yields and improved nutrition, and which can withstand pests, drought or poor soils. What has been learnt about the genes in pigeonpea is also expected to be applied to other major pulses that have larger genome and are harder to sequence.

The pigeonpea draft genome sequence developed by a group of 31 Indian scientists from ICAR institutes including IARI and IIPR, SAUs and BHU is a major scientific development entirely by Indian scientists. Using 454 FLX sequencing technology, 511Mbp of high quality genome sequences have been developed and besides 47004 protein coding genes, scientists have also identified 1213 genes related to disease resistance and 152 genes for tolerance to abiotic stresses. Besides this, the genome sequence was used to identify large number of hypervariable simple sequence repeats (SSR) markers, 437 of which were experimentally validated for high rate of polymorphism among pigeonpea varieties. Similarly in other project, the genome sequence by the ICRISAT led team has assembled 605 Mbp genome using Illumina – NGS platform and identified 48680 genes including those for stress tolerance. Beside this, several thousand SSR markers were mapped on pigeonpea chromosomes which will be readily available to breeder for mapping of important traits and QTLs.

With the availability of this enormous amount of genomic information and resources, stage is now set for a paradigm shift in the pigeonpea improvement programme. A concerted and massive effort is immediately required to identify, validate and utilize the SSR and SNP markers for marker assisted breeding and germplasm characterization. ICAR has already taken initiative to launch a network programme involving all major pigeonpea research stations of the country to utilize the genome information for pigeonpea improvement. I hope, with our committed work, we shall be able to make a breakthrough in pigeonpea improvement using latest tools of genomics assisted breeding.

IIPR is also making significant headway towards development of functional transgenics in chickpea and pigeonpea for pod borer resistance. Using the *Cry 1Ac* gene construct, over 1 lakh explants each have been transformed and after passing through stringent selection, several hundred positive plants are already established. Bioassay of these transgenics and their detailed molecular characterization are under way.

The year 2011 has been exciting in terms of our research achievements and addressing new challenges. I trust and believe the advances made in biotechnological research will accelerate the efforts for improvement of yield, quality and stress resistance in major pulses.

I wish you all happy and scientifically rewarding new year 2012.

(N. Nadarajan)

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