



# PULSES Newsletter



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## CONTENTS

### News 2-3

- Annual Group Meet of AICRP on Chickpea and Rabi MULLaRP Crops

### Research Highlights 3-5

- Monitoring of Drought Stress in Pigeonpea
- Induction of Dwarfism in Pigeonpea
- Critical Level of Zinc in Chickpea and Lentil
- Variations in Chickpea Wilt Pathogen *Foc* isolates from U.P.
- ET and EIL of Podfly *M. obtusa*
- Flower Thrips Menace in Mungbean and Urdbean
- Inhibitory Effect of Herbicides on *C. canescens*
- Infestation of Spotted Pod Borer in Cowpea
- Cytohistological Study of *In-vitro* Shoot Organogenesis in Chickpea
- New Varieties Identified

### Transfer of Technology 6-7

- Summer School on RCT
- Short Course in Biotechnology
- Training on NSKE for Pod Borer Management
- खरीफ दलहन के लिए उन्नत उत्पादन तकनीक पर प्रशिक्षण आयोजित
- हिन्दी दिवस का आयोजन
- राज्य-स्तरीय प्रशिक्षण आयोजित

### Director's Desk 8

## EDITORIAL COMMITTEE

Dr. N. Nadarajan	Chairman
Dr. C. Chattopadhyay	Member
Dr. P.S. Basu	Member
Dr. M.S. Venkatesh	Member
Dr. Jitendra Kumar	Member
Mr. D. Upadhyaya	Member Secretary

## IIPR Celebrated its Foundation Day

The 19<sup>th</sup> Foundation Day of Indian Institute of Pulses Research was celebrated on September 5, 2011 with great fervour and gaiety. Dr. B.B. Singh, Assistant Director General (O&P) was the Chief Guest and Dr. Masood Ali, former Director of IIPR was Guest of Honour on the occasion. While appreciating the Institute's achievements, Dr. B.B. Singh in his address congratulated the scientists for the record and all time highest pulses production in the country. Dr. Singh stressed on developing varieties capable to give high yield in extreme high and low temperature. He called for harnessing the rich biodiversity with modern tools of biotechnology for gene transfer and genetic improvement. Dr. Masood Ali highlighted that the agriculture science has to face new challenges

due to rapid weather changes and hence, the scientists need to put their efforts to combat the vagaries of changing seasons, environment and ecology.



Dr. N. Nadarajan, Director of the Institute presented a detailed resume of research programmes, activities and achievements made during 2010-11. He informed that during the year the Institute developed four new varieties of *kabuli* chickpea, mungbean, urdbean and fieldpea which have been

released for cultivation in different parts of the country. He commended the progress made in developing varieties with multiple disease resistance and said that efforts are going on to develop pod borer resistant varieties of chickpea and pigeonpea. IIPR is collaborating with



several international institutes and successfully pursuing various research programmes.

On this occasion, Dr. Subhojit Datta was given the 'Best Scientist Award 2011'. Mr. D.N. Awasthi, Mr. G.C. Sharma and Mrs. Vimla Devi were conferred with the 'Best Worker Award' in technical, administrative and supporting staff category, respectively. New Institute publications *viz.*, Molecular Markers in Crop Improvement, Breeding Improved Cultivars of Pigeonpea in India, and four farmers' friendly folders on gram pod borer were also released on the occasion. In the evening, a cultural programme was organized, wherein singing and dancing performances were held by the children of staff members.

### Dr. Sanjeev Gupta Joined as Project Coordinator (MULLaRP)

Dr. Sanjeev Gupta, a well known pulse breeder has joined as Project Coordinator (MULLaRP) on July 4, 2011. He has been involved in development of seven varieties of pulses and two varieties of apomictic grasses. Dr. Gupta has received a number of academic distinctions and awards like Dr. Rajendra Prasad Award 2003-04 and Netherlands Fellowship by Royal Government of Netherlands in 2002. He has been General Secretary of Indian Society of Pulses Research and Development (ISPRD) during 2006-09 and successfully organized the International Conference on Grain Legumes in 2009. He has more than 130 publications to his credit. Dr. Gupta has visited four countries *viz.*, Syria, Turkey, Netherlands and Nepal.



### Group Meet on Rabi MULLaRP Crops

Group Meet of AICRP on *rabi* MULLaRP crops was jointly organized by IIPR, Kanpur and Swami Keshwanand Rajasthan Agricultural University, Bikaner at Agricultural Research Station, Durgapura, Jaipur on 17-18 September, 2011. Total 93 scientists from all parts of India and abroad participated in the Group Meet. Dr. A.K. Dahama, Vice-Chancellor, SK Rajasthan Agricultural University was the chief guest of the inaugural function. While inaugurating the Group Meet, Dr. Dahama emphasized on the development of technologies with the use of low cost inputs and maintenance of soil health. Dr. N. Nadarajan, Director, IIPR, in his opening remarks congratulated pulse workers for their consistent efforts which led to achieve the record production of pulses to the tune of 18.09 million tonnes this year. He urged them to continue with the similar efforts to sustain this record level of production in view of emerging challenges. Dr. Sanjeev Gupta, Project Coordinator (MULLaRP), presented the

significant findings of the project and assured the house for making untiring



efforts for developing varieties and technologies in view of challenges faced by these group of crops. Dr. B.B. Singh, Assistant Director General (O&P) and Co-Chairman of the Plenary Session emphasized on timely management of biotic stresses for improving pulse production in the country.

In different sessions, research accomplished during *rabi* 2010-11 was reviewed and the technical programme for *rabi* 2011-12 was formulated. One variety of lentil IPL 316 was identified.

### Annual Group Meet of AICRP on Chickpea

Annual Group Meet of All India Coordinated Research Project on Chickpea was held on 20-22 August, 2011 at UAS, Bangalore. About 150 delegates from cooperating centres of SAUs, ICAR Institutes and State Department of Agriculture attended the Group Meet. Dr. Swapan K. Datta, Dy. Director General (Crop Science), ICAR was chief guest of inaugural session. The function was presided over by Dr. K. Narayana Gowda, Vice-Chancellor of UAS, Bangalore. Dr. Gowda in his presidential address stressed upon value addition and processing of different

pulses. He also urged scientists to construct the road map to develop farmers' friendly technologies for getting higher productivity and maximize post-harvest use of chickpea.



Dr. Datta, in his remarks advocated the exploitation of hybrid

vigour and changing the architecture of plant to maximize productivity. He also emphasized to work on insect pest control, nitrogen fixation efficiency, disease resistance and genetic make-up of pulse crops. Dr. N. Nadarajan, Director, IIPR made mention of highest production of pulses, especially chickpea during 2010-11. Dr. N.P. Singh, Project Coordinator (Chickpea) presented chickpea scenario in the country and presented highlights of research work carried out during 2010-11.

In different sessions, programme and achievements under the project were reviewed and technical programme for 2011-12 was finalized. In a special session, Plant Breeding - Biotechnology interface meeting was organized. In this session, lectures on molecular breeding, GM crops were delivered and guidelines for field testing of GM and MAS derived products were discussed by eminent scientists. In session 'Inter-project linkages', eminent scientists from ICARDA, ICRISAT, NBPGR, CRIDA, NCIPM presented the work done under collaborative projects and felt the need of further strengthening of collaborative projects. Three new varieties viz., HK 05-169, JSC 55 and JSC 56 were identified for release and notification.

## Personnel

### Our new colleagues

Sh. Abhishek Bohra has joined as Scientist (Plant Breeding) on 05.09.2011.



Sh. Deepak Singh, Scientist (Agril. Statistics) has joined on 05.09.2011.



Sh. Hasmat Ali, T-3 has joined on 27.07.2011.

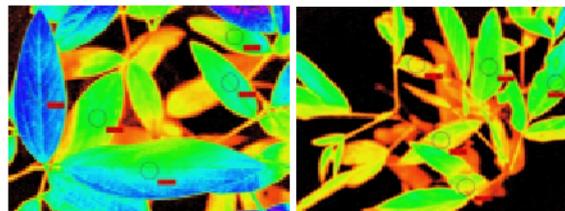
### Promotion

Smt. Meenakshi Varshney was promoted to Sr. Clerk w.e.f. 26.7.2011.

## Research Highlights

### Monitoring of Drought Stress in Pigeonpea

It is difficult to assess the magnitude of adverse effects of drought and water requirement of pigeonpea crop during its different growth stages. The chlorophyll fluorescence emission spectra keeps on changing along with increasing the level of water stress. Based on this principle, the fluorescence images were taken at low leaf water potential (-1.2 MPa) and severe stress (-2.4 MPa) level. The fluorescence images changed progressively with increasing drought



Low water stress

High water stress

and hence the technique proved to be potential phenotyping tool for drought.

Ritu Chandra, Navita Rai and  
P.S. Basu

### Induction of Dwarfism in Pigeonpea

High vegetative biomass and flower shedding often creates source-sink imbalance leading to poor yield in pigeonpea. The application of growth regulator, paclobutrazol with high

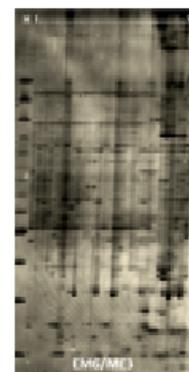


dilution successfully demonstrated a significant reduction in vegetative growth, prevention of excessive branching, enhanced flower retention and induced dwarfism. Its use also increased (almost two-fold) the leaf chlorophyll content and tolerance to drought.

P.S. Basu, J. Singh and  
Alagupalamuthir solai

### Sequence-related Amplified Polymorphism Marker System in Pigeonpea

Sequence-related amplified polymorphism (SRAP) markers were used to study the genetic diversity among 30 pigeonpea genotypes representing wild and cultivated species. Four SRAP primer combinations (EM5/ME2, EM7/ME2, EM4/ME2 and EM6/ME3) were screened, which produced total 126 fragments, out of which 114 were polymorphic. The number of fragments produced by four primer combinations ranged from 16 (EM7/ME2) to 47 (EM6/ME3), with an average of 31.5 fragments per primer combination. The polymorphism detection efficiency ranged from 75% (EM7/ME2) to 97% (EM4/ME2), with an average of 87.75% per primer combination.



SRAP banding profile of 30 pigeonpea genotypes on 6% PAGE (Lane M= 100bp DNA ladder, Lane 1-30= pigeonpea genotypes)

I.O. Agbagwa, P.G. Patil, S. Datta, A. Pathak,  
D. Datta, I.P. Singh, K.R. Soren, A. Das, S.K.  
Chaturvedi and N. Nadarajan

## Critical Level of Zinc in Chickpea and Lentil

Zinc is an essential micronutrient for plants and is believed to promote RNA synthesis, which in turn is needed for protein production. Critical concentration refers to a level of particular nutrient in soil/plant below which soil/plant is considered to be deficient and a significant response to its application can be expected. Determination of critical nutrient concentration (CNC) helps to predict the yield potential and adequacy of nutrient supply. Pot culture studies were conducted for establishing critical level of nutrients in chickpea and lentil. Results revealed that critical concentration of zinc in chickpea (DCP 92-3) was 33, 28 and 24 µg/g, whereas in lentil (DPL 62), it was 26, 30 and 26 µg/g at 45, 60 and 90 DAS, respectively.

M.S. Venkatesh, P.K. Ghosh,  
P.S. Basu and Vedram

## Variations in Chickpea Wilt Pathogen *F. oxysporum* f.sp. *ciceri* Isolates from U.P.

Wilt caused by *Fusarium oxysporum* f.sp. *ciceri* (*Foc*) is a major disease of chickpea. To study the pathogenic variations present in *F. oxysporum* f.sp. *ciceri*, 60 isolates of *Foc* were isolated from wilted chickpea plants collected from 24 districts of U.P. Based on pathogenicity tests, three isolates were found as weakly pathogenic causing <30.0% seedling mortality, while 17 isolates were moderately pathogenic causing 30.1-50.0% wilting. Remaining 40 isolates were categorized as highly pathogenic with >50% wilt incidence. The results demonstrated prevalence of highly (66.6%) and moderately (28.3%) pathogenic isolates of *F. oxysporum* f.sp. *ciceri* in Uttar Pradesh.

Shubha Trivedi and R.G. Chaudhary

## Flower Thrips Menace in Mungbean and Urdbean

The thrips species, *Megalurothrips usitatus* is one of the major pests in mungbean and urdbean. During vegetative stage, the thrips infest leaves and during reproductive stage when plants start bearing flowers, more thrips are found in flowers. The nymphs and adults (dark brown thrips measure 1 mm in size) infest the flowers and feed inside the stigma of the flower. In case of severe incidence, the plants attain a bushy growth and the crop looks dark-green in colour, there may be only few pods that too having shriveled grains. Both preventive and curative insecticide applications

have potential in giving adequate management of thrips. Foliar spray of any one of the insecticides like Dimethoate 30EC @ 1.7 ml/l of water, Triazophos 40EC @ 1.5 ml/l of water, Thiomethoxam 25WG @ 0.8 ml/l of water or Imidacloprid 17.8SL @ 0.4 ml/l of water at bud initiation stage can be used for the management of thrips. It is advised that farmers should observe the infestation of thrips after 30-35 days of sowing regularly and take necessary spray as suggested.

P. Duraimurugan, Mohd. Akram,  
Naimuddin and Sanjeev Gupta

## Inhibitory Effect of Herbicides on *C. canescens* Causing CLS in Mungbean and Urdbean

*Cercospora* leaf spot (CLS) caused by *Cercospora canescens* is an important disease of mungbean, urdbean, and cowpea in northern India. Disease appears on foliage in September and is managed by the sprays of fungicide carbendazim. Pre-emergence application of pendimethalin is routine in use, while some other post-emergence herbicides are also under evaluation for weed management in pulse crops. Seven herbicides, each at 500 ppm concentration were evaluated *in vitro* against *C. canescens* using poisoned food technique on potato dextrose agar

medium by using Kanpur isolate (IIPR main farm) as the test pathogen. Observations on colony growth were recorded after 7 days of incubation at 24.5±1°C in BOD incubator.

Highest inhibition of the pathogen was 81.9% in the imazethapyr and quizalofop ethyl, followed by gramexone, metribuzin and pendimethalin (61.6-65.2%). These results showed that use of imazethapyr and quizalofop ethyl, which are found quite effective as post-emergence herbicides in pulse ecosystem, may serve dual purpose of weed and disease management.

R.G. Chaudhary, Neetu Trivedi,  
V.D. Singh and Narendra Kumar

## Economic Threshold and Economic Injury Level of Podfly *M. obtusa*

The economic threshold level (ETL) and economic injury level (EIL) of podfly *Melanagromyza obtusa* Malloch in late maturing pigeonpea variety (NDA 1) was studied using regression equation [ $Y_e = y + by_x(x)$ ] that resulted as 5.99+ (-0.31) (x). The grain threshold (GT), considering management cost (Rs/ha) divided by market value of pigeonpea revealed as 0.502. The EIL, based on GT divided by regression coefficient was computed as 1.62 maggots/100 pods.

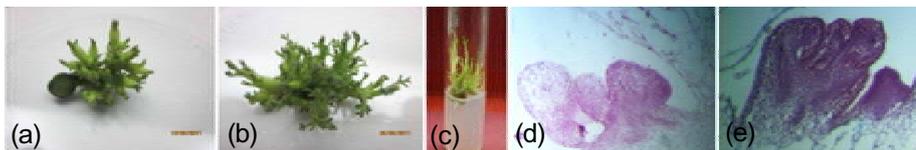
Consequently, ETL based on the daily reproduction rate (DRR) of podfly was inferred, which varied from 0.39 maggot/100 pods to 1.49 maggots/100 pods during 7<sup>th</sup> to 9<sup>th</sup> standard weeks (SW). The avoidable loss due to podfly was 67.2%, which can be saved by spray of indoxacarb @ 60 g a.i./ha in pigeonpea at reproductive stage of the crop as protection measure.

S.K. Singh and I.P. Singh

## Cytohystological Study of *In-vitro* Shoot Organogenesis in Chickpea

The histology and ontogeny of adventitious shoot formation in chickpea was studied using axillary

explant. Longitudinal sections showed that epidermal and sub-epidermal cells proliferate to form multiple adventitious



Regeneration of multiple shoots from axillary meristem explants and ontogeny of the shoot development: (a) Induction of multiple shoots (b) Multiple shoots produced after four weeks (c) Elongation of multiple shoots (d) Cross-section of explants with initiation of multiple shoots and (e) Differentiated shoots

meristem explants. Serial longitudinal sections of the explants with 12.0  $\mu\text{m}$  thickness were cut using a rotatory microtome. These sections were fixed on glass slides examined under a light microscope after staining with safranin and fast green. Explants sectioned at periodic intervals revealed direct adventitious origin of shoots from the

shoot primordia, supporting the fact that shoots were formed *via* organogenesis. Some of these primordia developed and transformed into the shoots.

Jaya Srivastava, Alok Das and  
Subhojit Datta

## Infestation of Spotted Pod Borer in Cowpea

Heavy infestation of spotted pod borer, *Maruca testulalis* (Geyer) was recorded in cowpea, *Vigna unguiculata* at ICAR Research Complex for Eastern Region, Regional Centre, Ranchi research farm during July-August 2011. Infestation started from early flowering stage and went up to 80% during pod stage. The damage symptoms in early stage were recognised by a black dot on the flowers and green pods, while in later stage excreta found near the bore hole. Adult spotted pod borer laid

eggs singly near the flower buds and feed on the flowers on hatching. After feeding the caterpillars move out to another flower making an exit hole, later they web the inflorescences with the adjacent leaves and developing pods and feed within by boring into the flowers and pods. The infested flowers do not develop into pods, while the affected pods become malformed as these are not able to grow normally due to webbing and feeding. Full grown

caterpillars are on an average 20 mm long, light brown in colour with irregular brownish-black dorsal, lateral and ventral spots. Adults are medium size moth with head, thorax and abdomen fuscous brown. Forewings are fuscous-brown with a lunate white spot at the



Larva of *Maruca* feeding on cowpea pod

Infested cowpea flower

end of and a maculate semi-hyaline spot beyond the cell. Hind wings are semi-hyaline white with a fulvous-brown distal patch. Wing spread is 20-30 mm. Incubation period is 2-3 days. Larval stage lasts for 8-14 days, pre-pupal 2 days and pupal 6-9 days.

J. S. Choudhary, Moanaro and R. S.  
Pan, ICAR Research Complex for  
Eastern Region, Regional Centre, Ranchi

## New Varieties Identified

**IPL 316:** The large seeded lentil variety developed from the cross Sehore 74-3 x DPL 58



has been identified for Madhya Pradesh, Chhattisgarh, Maharashtra and parts of the Rajasthan. It has yield potential of 1324 kg/ha with yield superiority of 30.7% over the check DPL 62.

**HK 05-169 :** The chickpea variety developed from cross HK 92-94 x HK 1 has been identified for eastern U.P., Bihar, Jharkhand, West Bengal and Assam. It is broad leaved genotype with profuse branching and light green foliage colour. The seed size is large (28.4 g/100 seeds) and of white colour. It matures in 125 days and its yield potential is 16.0 q/ha. It showed resistant to moderately resistant reaction against wilt.

**JSC 55 :** The chickpea variety developed from three-way cross (JAKI 9226 x DCP 20) x JG 412 has been identified for Madhya Pradesh, Maharashtra, Gujarat, Bundelkhand region of U.P. and Southern Rajasthan. It has semi spreading plant with medium height. Seeds are of angular shape with smooth surface. It is suitable for planting under late sown condition in paddy/cotton/soyabean - chickpea cropping system. Its average yield is 20 q/ha and matures in 100 - 105 days. It showed resistant reaction against wilt and moderately resistant reaction against dry root rot and collar rot.

**JSC 56 :** The chickpea variety developed from a three-way cross (ICCV 91902 x ICCV 10) x ICCV 89230 has been identified for Madhya Pradesh, Maharashtra, Gujarat, Bundelkhand region of U.P. and southern Rajasthan. It is dwarf with spreading plants. The seeds are light brown, angular shape with smooth surface. It is suitable for planting under irrigated and late sown conditions. Its average yield is 19.0 q/ha and matures in 100 days. It is moderately resistant against wilt and dry root rot.

## Transfer of Technology

### Summer School on RCT Organized

An ICAR sponsored summer school on "Resource conservation technology (RCT) for enhancing input use efficiency and sustainable pulse production" was organised at the Institute during 8-28 September, 2011.

Dr. Masood Ali, Former Director of the Institute inaugurated the training and highlighted that considering the present level of degradation of natural resources, this is high

time to understand the role of pulses in conservation agriculture. Dr. N. Nadarajan, Director, IIPR stressed upon the necessity of conservation of natural resources to achieve sustainable and profitable pulse production. Dr. P.K.



Ghosh, HoD (Crop Production) and Course Director of the Summer School stressed the need for upgrading the knowledge of Indian agricultural scientists working in different ICAR

Institutes and SAUs about the recent developments and strategies of RCT for sustainable pulse production in the country. Total 25 participants from various parts of the country attended the summer school. The course broadly

dealt with conservation tillage and residue management, farm machineries, improving input use efficiency and soil quality, climate change, organic farming, plant type and varietal features, weed management, bio-intensive management of pest and diseases, socio-economic implementation for adoption of RCT in pulses, etc. Renowned scientists from ICAR, SAUs and also from international organisations like ICARDA, International Zinc Association etc., besides Institute scientists shared their knowledge and vast experiences as resource persons with participants in the training. All the participants were satisfied with the course content and organization of training and rated the summer school as very good to excellent.

### ICAR Short Course in Biotechnology

An ICAR sponsored short course on "Molecular and genomic tools for crop improvement" was organized at the Institute during 27 June - 6 July, 2011. The course was aimed at enhancing expertise for marker aided and genomics enabled breeding technologies and genetic engineering of crops. Twenty three scientists/



faculty members from 10 different states of the country and one participant from abroad (Nigeria) attended the training. The training mainly focussed on latest molecular techniques like AFLP, SSR, RAPD, cDNA library construction and genetic transformation techniques

(*Agrobacterium* mediated and Gene gun). The training was inaugurated by Dr. N. Nadarajan, Director stating the objectives and importance of the training programme, followed by a lecture on 'Convergence of breeding and biotechnology for crop improvement'. Apart from in-house lectures on molecular markers, mapping population, marker assisted breeding, legume genomics, genetic engineering and IPR issues, several important lectures by invited speakers were also organized viz., Genetic Engineering of Crops for Quality Traits by Dr. (Mrs.) Karabi Datta, RNAi Technology in Crop Improvement by Dr. K. Subramaniam, Bio Safety Regulations in Biotechnology Research by Dr. S. K. Goel and Bioinformatics: Applications in Agriculture by Dr. Anil Rai. The Course Director of the training programme was Dr. Subhojit Datta, Senior Scientist (Biotechnology), Crop Improvement Division.

### Training on Production and Application of NSKE for Pod Borer Management

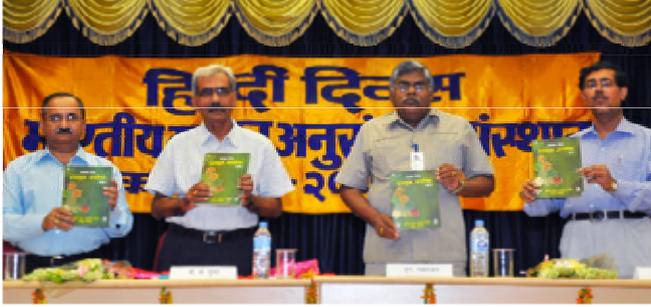
Neem seed kernel extract (NSKE) is a cost-effective and environmentally safe botanical for management of pod borer. For popularization of its use for management of *Helicoverpa armigera* in chickpea, an on-farm training was organized on 7 July, 2011 under DBT funded project in Mungarol and Barai villages of Maheva block and Khasikheda village of Kaudara block of Jalaun district of Uttar Pradesh. Total 49 participating farmers and 14 farm women were trained on collection, drying and storage of Neem seeds and subsequently on preparation as well as application of NSKE for management of pod borer. Participating farmers showed keen interest in the training and assured application of NSKE in the forthcoming chickpea crop.

## हिन्दी दिवस का आयोजन

भारतीय दलहन अनुसंधान संस्थान में दिनांक 29 सितम्बर, 2011 को हिन्दी दिवस समारोह पूर्वक मनाया गया। समारोह में केन्द्रीय विद्यालय, चक्रेरी, कानपुर के प्रधानाचार्य, डा. बी. के. गुप्ता मुख्य अतिथि थे। समारोह की अध्यक्षता संस्थान के निदेशक डा. एन. नडराजन ने की। अपने उद्बोधन में डा. गुप्ता ने कहा कि हिन्दी इस समय पूरे देश में समझी और बोली जाती है। हिन्दी की विकास

यात्रा पर प्रकाश डालते हुए उन्होंने कहा कि हिन्दी अपनी सरलता और सहज बोधगम्यता के कारण ही जीवन के हर क्षेत्र में व्यापक स्तर पर उपयोग की जा रही है। विज्ञान और प्रबंधन के क्षेत्रों में हिन्दी की सफलता का परचम लहरा रहा है। अध्यक्षीय उद्बोधन में निदेशक डा. नडराजन ने कहा कि हिन्दी दिवस के आयोजन से हम हिन्दी के प्रति अपना सम्मान और निष्ठा व्यक्त करते हैं और हिन्दी के उत्थान के लिए संकल्प लेते हैं। उन्होंने वैज्ञानिकों का आवाहन किया कि नई तकनीकी जानकारी किसानों तक उन्ही की भाषा में पहुँचाने के लिए सतत प्रयास करें और हिन्दी के नये प्रकाशनों पर बल दिया। संस्थान की राजभाषा समिति के सचिव श्री दिवाकर उपाध्याय ने संस्थान

में राजभाषा की प्रगति आख्या प्रस्तुत की। अतिथियों का स्वागत डा. संजीव गुप्ता ने किया।



हिन्दी पखवाड़े में आयोजित विभिन्न प्रतियोगिताओं के विजयी प्रतिभागियों श्री कन्हैया लाल, श्रीमती रश्मि यादव, श्री डी. एन. अवस्थी, डा. एस. डी. महापात्रा डा. के. आर. सोरेन, श्री रमेश चन्द्र, श्री ए. पी. सिंह, श्री मलखान सिंह, श्री अखिल गंगल, श्री आर. के सिंह, श्री जी. आर. पांगती और श्री एच. एन. मौर्या तथा कार्यालयीन कामकाज में हिन्दी का उत्कृष्ट प्रयोग करने के लिए श्रीमती रीता मिश्रा, श्रीमती मीनाक्षी वाष्णीय, सर्वश्री शुकदेव महतो, आलोक सक्सेना, शिव शरण, हरगोविन्द राठौर और प्रोमित डायस को मुख्य अतिथि ने पुरस्कार और प्रमाण पत्र प्रदान किए। कार्यक्रम का संचालन डा. (श्रीमती) उमा साह ने किया।

## राज्य-स्तरीय प्रशिक्षण आयोजित

● राष्ट्रीय खाद्य सुरक्षा मिशन (दलहन) के तत्वाधान में दिनांक 29-30 जुलाई 2011 को संस्थान में, प्रसार कार्यकर्ताओं की दक्षता को सुधारने एवं उनमें निदानकारी कुशलता विकसित करने के उद्देश्य से खरीफ दलहन की उत्पादन तकनीक विषय पर दो दिवसीय प्रशिक्षण कार्यक्रम आयोजित किया गया। प्रशिक्षण कार्यक्रम का उद्घाटन करते हुए संस्थान के निदेशक, डा. एन. नडराजन ने इस बात पर बल दिया कि किसान विभिन्न फसल पद्धतियों में, अल्पाधि की (मूंग एवं उर्द) फसलें बोएं। इससे मृदा भी ठीक रहेगी और पोषण सुरक्षा भी होती रहेगी। उक्त प्रशिक्षण कार्यक्रम में फसल प्रबन्धन के सभी पहलुओं जैसे उत्पादन, सुधार एवं सुरक्षा पर चर्चा की गई। उक्त प्रशिक्षण में उत्तर प्रदेश के पश्चिमी, पूर्वी, उत्तरी एवं बुन्देलखण्ड क्षेत्रों से आए करीब 34 लोगों ने भाग लिया।

● दिनांक 1-3 सितम्बर, 2011 को कृषि और प्रौद्योगिकी प्रबन्धन अभिकरण (ए.टी.एम.ए.) परियोजना के अंतर्गत, बिहार के शेखपुरा जिले के किसानों के लिए तीन दिवसीय प्रशिक्षण का आयोजन किया गया। प्रशिक्षण के दौरान, आज की आवश्यकता के अनुरूप और दक्षता पर आधारित व्याख्यान दिए गए, साथ ही मुख्य प्रक्षेत्र एवं नवीन शोध प्रक्षेत्र का भ्रमण भी आयोजित किया गया। प्रतिभागियों को संस्थान के नवीन प्रकाशनों की प्रतियाँ भी उपलब्ध करायी गईं। कुल 26 कृषकों एवं दो अधिकारियों ने प्रशिक्षण में भाग लिया। दोनों ही प्रशिक्षणों का समन्वयन डा. एस.के. सिंह ने किया।

## खरीफ दलहन के लिए उन्नत उत्पादन तकनीक पर प्रशिक्षण आयोजित

राष्ट्रीय खाद्य सुरक्षा मिशन (दलहन) के अंतर्गत, संस्थान में दिनांक 12-14 जुलाई, 2011 को देश के प्रसार अधिकारियों हेतु खरीफ दलहन के लिए उन्नत उत्पादन तकनीक विषय पर कार्य कुशलता सुधार के उद्देश्य से, तीन दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया। उक्त प्रशिक्षण कार्यक्रम का उद्देश्य था हाल ही में हुए दलहन शोध सम्बन्धी जानकारियों को प्रसार अधिकारियों की जानकारी में लाना, साथ ही यह बताना कि कैसे उक्त जानकारी देश के समस्त किसानों को दी जाए। उक्त प्रशिक्षण कार्यक्रम में, देश के 11 राज्यों तमिलनाडु, छत्तीसगढ़, मध्य प्रदेश, उत्तर प्रदेश,



हरियाणा, कर्नाटक, आंध्रप्रदेश, झारखण्ड, आसाम, महाराष्ट्र और पंजाब से आए 32 प्रसार अधिकारियों

ने भाग लिया। प्रशिक्षण कार्यक्रम के दौरान जिन विषयों पर चर्चा हुई उसमें प्रमुख विषय थे - क्षेत्र विशेष के लिए संस्तुत प्रजातियाँ, जल प्रबन्धन, संयुक्त पोषण प्रबन्धन, रोग और कीट प्रबन्धन, खरीफ दलहनों की गुणवत्ता वृद्धि और यह जानकारी देना कि खरीफ की दलहनी फसलों में शामिल करने के लिए और क्या-क्या तकनीकी विकल्प हैं।

## Director's Desk

Dear Readers,

Organic carbon in agricultural soil contributes positively to soil fertility, soil tilth, crop production and overall soil sustainability. During the past decades, intensive production systems (cereals, sugarcane and potato based) led to rapid decline of soil organic carbon and increase the emission of green house gases (GHG) from agricultural land. Low soil organic carbon (SOC) concentration is also attributed to heavy intensive ploughing, removal of crop residue and other bio-solids, less input supply and mining of soil fertility. In order to increase SOC, it is must to increase organic matter inputs into the soil, decrease decomposition of soil

organic matter and oxidation of SOC or a combination thereof. It can be achieved by changing the agricultural practices including reducing tillage intensity, decreasing or ceasing the fallow period, using a cover crop, changing from monoculture to rotation cropping, or altering soil inputs to increase primary production. However, restoration and build-up of SOC in Indian soils under different production systems specially in rice-wheat system is one of the challenging tasks.

Importance of pulses in Indian agriculture is well known since time immemorial. Pulses being a

component of crop diversification in different cereal based system hold a promise for system sustainability and maintenance of soil health. They add significant amount of organic residue to soil in the form of root and above ground biomass and leaf litter. Deep rooting, nitrogen fixing, leaf shedding



ability and release of chemicals to the soil by the pulse crop are the key characteristics which help in carbon sequestration. Incorporation of pulses in the crop rotation cycles increases SOC through leaf drop and root biomass due to the combined impact of C and nitrogen (N) on SOC pool. The quality of pulse residue in terms of C: N ratio, lignin, cellulose, and root exudates are better than cereals. Therefore, growing a pulse crop in place of cereal crop could potentially influence the magnitude of SOC changes and thus C sequestration. Moreover, continuously growing of

pulses as cover crop/catch crop/ intercrop /relay crop will pay much better return in long-run in terms of SOC restoration. Pulses may contribute significant quantity of carbon in sub-surface layer, which may last for longer time than surface layer due to less oxidation of carbon. Understanding the different forms of organic compounds (organic acids) present in root exudates of different pulses will also help in quantifying long-term carbon storage in sub-surface soil layers. A large number of improved varieties of pulses across the country have been popularized for yield, disease and pest resistance, and heat and drought tolerance. Variation in water use efficiency and nutrient acquisition of

some varieties are also tested. However, scope exists to test these varieties for C-sequestration potential so that SOC restoration in cereal-based system is further enhanced and farmers without any involvement of additional cost may maintain their farm productivity.

Incorporation of pulses in different cropping systems will certainly improve the soil health and system productivity on the one hand and farmers' livelihood and availability of pulses in the country on the other.

(N. Nadarajan)

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