ISO 900[illegible]-2008

हर कदम, हर डगर
किसानों का हमसफर

Agresearch with a human touch

PULSES Newsletter

ICAR-Indian Institute of Pulses Research, Kanpur

VOLUME 26, No. 3 JULY-SEPTEMBER, 2015

CONTENTS

News 2-4
- Director General, ICRISAT Visited IIPR
- Annual Group Meet on *Rabi* Pulses
- Meeting on Promotion of Pulses in NEH Region
- Scientists Bring Laurels to IIPR

Research Highlights 5-10
- Varieties Identified
- Heavy Infestation of *H. cajani* in pigeonpea
- Foc Race Identification Using Restriction and Multiplex PCR
- Chloroplast Targeting: Potential Tool For Functional Genomics In Pulses
- A Simple and Efficient Protocol for DNA Extraction from Fungi
- Three Different Pigeonpea Based Diets for Rearing of *H. armigera*
- Incidence of Cow bug in Pigeonpea
- Delayed Senescence Genotypes Perform Better Germination under PEG Treatment
- Genotypic Variability in Nodulation Traits among Mungbean Genotypes
- Variation in SCMR of Blackgram Genotypes
- Photoperiod Sensitivity Study in Mungbean
- Tagging Gene for Rust Resistance in Lentil
- Customized Fertilizers Improve Efficient Nutrient Use
- Identification of resistant sources against Fusarium wilt in chickpea
- Organic Acids Profiling of Chickpea Genotypes Exhibiting Differential P Uptake
- Field Resistance to PSB in Pigeonpea

प्रौद्योगिकी हस्तांतरण 10-11
- कृषि प्रदर्शनी में सहभागिता
- कृषक प्रशिक्षण का आयोजन
- किसानों का संस्थान भ्रमण
- क्षेत्रीय केन्द्र, धारवाड़ की कृषि मेला में सहभागिता

Director's Desk 12

EDITORIAL COMMITTEE

Dr. N.P. Singh	Chairman
Dr. P.S. Basu	Member
Dr. G.P. Dixit	Member
Dr. Jitendra Kumar	Member
Dr. Naimuddin	Member
Mr. D. Upadhyaya	Member Secretary

Institute Foundation Day Celebrated

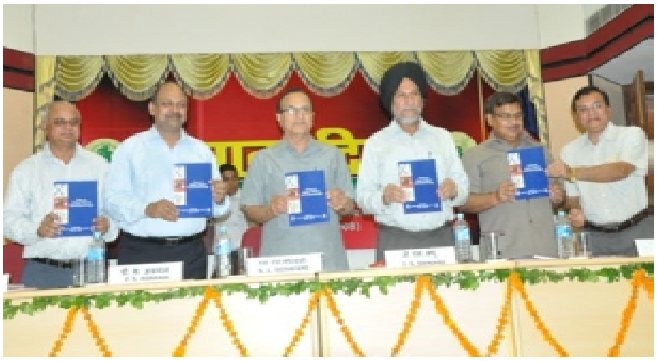
ICAR-Indian Institute of Pulses Research celebrated its 23rd Foundation Day on Saturday, September 5, 2015. Dr. J.S. Sandhu, Deputy Director General (Crop Science), ICAR, New Delhi, was the Chief Guest at the occasion. Vice-Chancellor, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur and Banda University of Agriculture & Technology, Banda, Dr. S.L. Goswami was Guest of Honour. Dr. P.K. Agrawal, ADG (NASF) and Dr. P.K. Chakrabarty ADG (PP) were also present at the occasion. Dr. N.P. Singh, Director, IIPR welcomed the honorable guests.

Speaking on the occasion, Dr. J.S. Sandhu said that in comparison to year 1950, the production of crops has increased by five times but still people are suffering from malnutrition. He expressed his concern over the declining availability of pulses for each individual. Dr. Sandhu suggested that the fertilizers should be used with constraints. He also expressed concern over changing climate scenario and the bad affects of rising pollution levels over the fields. He added that if the hybrid quality of seeds and production techniques are made available to the farmers, the production of pulse crops is likely to go up by 30%. He urged the scientists to work in the direction of benefitting the farmers.

Dr. S.L. Goswami expressed concern over the difficulties that farmers are facing in getting high quality of seeds and advanced production techniques. He said that if the farmers are made a part of the various research based programmes and the same research is applied in their fields they will surely get better results.

Dr. N.P. Singh, while delivering his address briefed about the various activities going on in the Institute. He also highlighted the achievements of the Institute and added that the various projects going on pulses under national programmes have been successful. Dr. Singh informed that

scientists of the Institute have identified heat tolerant varieties of chickpea and lentil, and large seeded lentil that will be shortly available for cultivation. He also said that research on development of pod borer resistant transgenic chickpea and pigeonpea is going in the right direction and yielded promising results. Notably, IIPR has also developed an online "PulsExpert" system for the benefit of farmers and agriculturalists to identify diseases in pulse crops and their remedies. At this occasion, a new publication on 'Primer on Modern Tools of Plant Biotechnology' was released.



At this occasion, Dr. Aditya Pratap, Senior Scientist was felicitated for getting ICAR's Lal Bahadur Shastri Outstanding Young Scientist Award-2014 and Dr. Shallu Thakur, Research Associate was felicitated for getting ICAR's Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agriculture and Allied Sciences-2014.

During the function, Dr. G.P. Dixit and Dr. Mohd. Akaram were awarded the Best Scientist Award for 2014 and 2015, respectively. Dr. Omkar Nath and Mr. Kanhaiya Lal were awarded as Best Worker for 2014 and 2015, respectively in Technical Category. Also, Sh. Rajendra Kumar Nigam and Sh. Shiv Saran Singh in the Administrative Category and and Sh. Devi Prasad and Sh. Yashvant Singh were awarded as Best Worker in Skilled Supporing Staff Categories, for the respective years. Vote of thanks was proposed by Dr. S.K. Chaturvedi, Head, Crop Improvement Division. The programme was conducted by Dr. Aditya Pratap and Dr. (Mrs.) Uma Sah.

Director General, ICRISAT Visited IIPR

Dr. David J. Bergvinson, Director General, International Crops Research Institute for the Semi Arid Tropics (ICRISAT), Hyderabad visited the ICAR-Indian Institute of Pulses Research, Kanpur on September 25, 2015 and discussed various IIPR-ICRISAT collaborative research programmes. Dr. B.B. Singh, Assistant Director General (O&P), ICAR, Dr. Rajeev Varshney, Research Programme Director, Grain Legumes, ICRISAT and Dr. K.C. Bansal, Director, ICAR-NBPGR were present at the occasion. Dr. N.P. Singh, Director, IIPR presented a brief about the Institute and explained various activities as well as significant achievements including those of the IIPR-ICRISAT collaborative projects. Dr. Bergvinson took keen interest in the Institute activities and got acquainted with various research programmes and was highly appreciative of the research efforts, infrastructure and scientific strength of the Institute and desired to have more fruitful collaborations. He also visited Institute facilities including laboratories, museum, containment facilities, *etc*. and met Project Coordinators as well as Heads of different divisions and interacted with them. He also participated in the closing ceremony of the 21 days' summer school on "Novel Genomic Tools and Modern Breeding Approaches for Enhancing Productivity and Nutritional Quality of Pulse Crops" and distributed course completion certificates to the recipients. He exhorted the audience to strive more for global food and nutritional security and desired that as agricultural scientists, we all should live to the expectations of poorest of the poor. Dr. Bergvinson left with a very high opinion about the Institute and expressed deep sense of gratitude for making his visit to IIPR successful.

Annual Group Meet on *Rabi* Pulses Organized

Annual Group Meet on Chickpea and *Rabi* MULLaRP and a Brain Storming Meeting on 'Promotion of Pulses in Indo-Gangetic Plains of India' were held at Punjab Agricultural University, Ludhiana on August 31 to September 3, 2015. The meeting was inaugurated by Dr. B.B. Singh, Assistant Director General (O&P), ICAR, New Delhi. Dr. B.S. Dhillon, Vice-Chancellor, Punjab Agriculture University was the Chief Guest of the function. More than 250 delegates from different parts of the country attended the Meet. Dr. N.P. Singh, Director, IIPR Kanpur presented overall progress made in pulses research and development. He also expressed his serious concern over deficit pulse production in the country due to unseasonal rains in the last year.

Dr. B.S. Dhillon, in his opening remarks, expressed concern over lack of sufficient genetic variability in pulses. He emphasized upon climate change as a threat and need to adopt technologies suited to changes in the climate. Dr. B.B. Singh expressed urgent need to reorient research towards development of new plant types and utilization of new genetic resources. Dr. G.P. Dixit and Dr. Sanjeev Gupta presented the Project Coordinators report of AICRP on chickpea and MULLaRP, respectively.

Dr. B.B. Singh mentioned that the brain storming session's primary objective is to rehabilitate the pulses in Indo-Gangetic plains, which could be possible through tailor made varieties having resilience to changing climate and efficient crop management. Deliberations were made by eminent scientists along with representatives from ICRISAT, ICARDA, BISA and AVRDC (WVC) on various issues related to crop diversification and genetic enhancement, resource conservation and mechanization for promotion of pulses in IGP. The major recommendations included (i) diversification of rice-wheat system by short duration pulse crop, (ii) bringing additional area under pulses in rice-fallows of eastern India, (iii) intercropping of pulses like mungbean, chickpea and lentil with spring sugarcane (ratoon crop) and autumn planted sugarcane in Punjab, Haryana, Uttar Pradesh and Bihar, (iv) popularization of pigeonpea-wheat cropping system in North India, (v) promoting pre-*rabi* pigeonpea in eastern India and (vi) developing pulse varieties suitable for mechanical harvesting.

Special Meeting on Promotion of Pulses in NEH Region

A special meeting on technological interventions for promotion of pulses in North-East Hill Region was held at Central Agricultural University (CAU), Imphal on September 28-29, 2015. The meeting was organized by IIPR, Kanpur in association with CAU, Imphal and ICAR Research Complex for NEH Region, Umiam (Meghalaya). Directors of ICAR Institutes, Vice-Chancellor of CAU, Imphal, Additional Commissioner (Crops) from DAC, GoI, New Delhi, Joint Directors and scientists of ICAR Institutes and State Agricultural Universities, Directors and officials from State Agriculture Departments, officials from ICARDA and farmers' representatives participated in this meeting.

Progress report on varietal evaluation and seed multiplication programme undertaken in NEH states during 2014-15 and action taken report on the recommendations made in the last meeting held at Kanpur was presented by Dr. C.S. Praharaj, Nodal Officer for NEH region. Dr. D.P. Malik, Additional Commissioner (Crops), DAC, New Delhi stressed the need of concerted efforts for promoting pulses in large scale.

The Chief Guest, Dr. M. Premjit Singh, Vice-Chancellor, CAU, Imphal was more critical

about the ill effects of rice-rice cropping system adopted in NEH. He stressed the need for popularization of pulses and oilseeds under no tillage or reduced tillage following rice crop, adoption of low cost technologies, acid tolerant varieties, conservation agriculture and diversification of agriculture through farming system approach.

While presenting the current scenario and strategies for enhancing pulses production in NEH region, Dr. S.V. Ngachan, Director, ICAR Research Complex for NEH region, Umiam, Barapani informed that considering the requirement of NEH region, it has around 78% deficit in pulses production. Cultivation of pulses under zero tillage and that of peas in rice fallows, rice bean, mungbean, urdbean and pigeonpea during *kharif,* french bean, lentil and fieldpea during *rabi*, faba bean, adzuki bean and moth bean in hilly areas, and rice bean, cowpea and pigeonpea in *jhum* areas hold promise, he added.

Dr. N.P. Singh, Director, IIPR, Kanpur and Chairman of the inauguration session, called for an aggressive and proactive role of all concerned keeping in view the deficit in production of pulses in NEH region. He emphasized certain measures like, area expansion through pigeonpea in hilly slopes and *jhum* areas, mungbean in spring/pre-*rabi,* urdbean in late *kharif*/pre-*rabi* seasons, lentil/lathyrus as *utera* after *kharif* rice, local underutilized pulses like ricebean, broadbean *etc*., popularization of suitable pulse varieties and appropriate technological intervention suiting NEH regions.

Scientists Bring Laurels to Indian Institute of Pulses Research

❖ Dr. Aditya Pratap, Senior Scientist (Plant Breeding) has been awarded with the prestigious ***ICAR-Lal Bahadur Shastri Outstanding Young Scientist Award.*** Dr. Pratap was conferred with this award in the ICAR Foundation Day function held at Patna on July 25, 2015. Dr. Pratap has been recognized for his pioneering works in development and release of 6 varieties of mungbean, wheat and rapeseed mustard, developing 2 extra early maturing genotypes/varieties of mungbean, identification of gene for resistance to yellow mosaic disease in urdbean and transfer of Fusarium wilt resistance gene in chickpea through molecular markers.

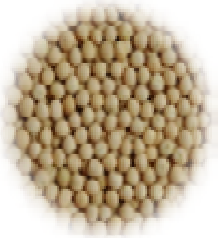
❖ Dr. S.S. Singh, Head, Crop Production Division, has been awarded with prestigious ***Rajeev Gandhi Rashtriya Gyan-Vigyan Hindi Maulik Pustak Lekhan Puraskar*** for his (Co-author) book '*Sametik Krishi Pranali:Ek Vrihad Drishtikon*' in *Protsahan Shreni.* Dr. Singh has been conferred with this award by Hon'ble President of India in the function held at New Delhi on September 14, 2015.

❖ Another award has been brought by Dr. Shalu Thakur for her Ph.D. research. She has been awarded with the ***Jawahar Lal Nehru Award*** for outstanding Ph.D. thesis for her work on development of new functional and gene specific markers in rice which could be used for marker assisted selection. Currently she is working as research associate at IIPR.

Research Highlights

New Varieties Identified

IPC 2006-77 : This *desi* type chickpea variety developed from the cross DCP 92-3 × T 39-1 is suitable for late sown conditions of central India. Its average yield is 2065 kg/ha with 22.7% and 13.5% yield superiority over the best check varieties BG 372 and JG 14, respectively. It is moderately resistant to fusarium wilt and has light yellow coloured seeds of medium size (16.5 g/100 seeds). It has been identified for Madhya Pradesh, Chhattisgarh, Maharashtra, southern Rajasthan, Gujarat and Bundelkhand tracts of Uttar Pradesh.



IPFD 12-2: This dwarf fieldpea variety is developed from the cross HUDP 15 × EC 342002. Its average yield is 2434 kg/ha with yield advantage of 26.51% over the check variety Prakash, 26.26% over Vikas, 41.98% over Adarsh and 44.69% yield advantage over KPMR 400. It is resistant to powdery mildew disease and matures in 110 days. It is also resistant to pod borer and moderately resistant to aphid and leaf miner. It has been identified for Madhya Pradesh, Chhattisgarh, Gujarat and southern Rajasthan.

GNG 2171 : This *desi* type chickpea variety developed from the cross GNG 663 × BG 1044 is suitable for timely sown irrigated conditions of NWPZ. Its average yield is 2014 kg/ha with significant yield superiority over the check varieties. It is tolerant to fusarium wilt disease and has yellow coloured seeds with seed-wt. of 15.9 g/100 seeds. It has been identified for Punjab, Haryana, western U.P., Jammu & Kashmir, Delhi, northern Rajasthan, Himachal Pradesh and Uttarakhand.

GNG 2144 : This *desi* type chickpea variety developed from the cross CSJD 901 × CSG 8962 is suitable for late sown conditions of NWPZ. Its average yield is 2281 kg/ha with 23% yield superiority over the best check variety Pusa 547. It has tolerance to fusarium wilt disease. It has been identified for Punjab, Haryana, Delhi, northern Rajasthan and Uttarakhand.

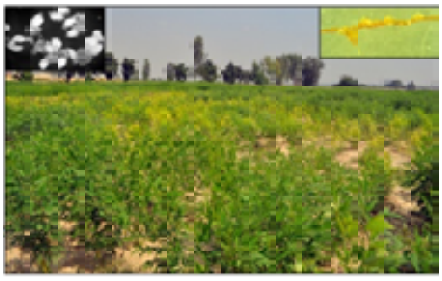
NBeG 119 : This large seeded *kabuli* variety developed from three way cross (ICCV 98502 × ICCV 98004) × ICCV 92311 is suitable for cultivation in South India. Its average yield is 1882 kg/ha with distinct yield advantage over the check varieties. It has attractive beige colour seeds with 100-seed wt. of 38.8 g. The variety has been identified for Karnataka, Andhra Pradesh and Tamil Nadu.

RKR 1033: This rajmash variety developed from the cross IPR 98-3-1 × HUR 203 has average yield potential of 1678 kg/ha with yield superiority of 15.40% over the best check variety GR-1 in central zone. It is resistant to angular leaf spot and anthracnose and tolerant to wilt, BCMV and alternaria leaf spot and has less incidence of aphids, whitefly and pod borer. It has been identified for Gujarat, Maharashtra and southern Rajasthan

RVL 11-6: This short duration and large seeded lentil variety developed from the cross JL 3 × DPL 62 with yield potential of 1200-1400 kg/ha. It has shown resistance against wilt. It has been identified for Madhya Pradesh, Chhattisgarh, Maharashtra and southern Rajasthan.

Heavy Infestation of *H. cajani* in pigeonpea at Kanpur, U.P.

Heterodera cajani causes serious yield reduction in pigeonpea. Its infection causes development of stunted and yellowish plants in patches. The first symptom of nematode parasitism appear after 30 to 45 days, around that time the pearly white lemon-shaped females start appearing on the roots of infected plants. This nematode damages the roots and hinders its normal functioning. Similar symptoms were observed in pigeonpea field at IIPR, Kanpur. The analysis of soil and root samples from the patches showed attachment of white cysts with the roots and 50 white cysts were counted on one root system, while 160 cysts per 250 g of soil were recorded. This indicated heavy infestation. *H. cajani* infestation was found commonly on

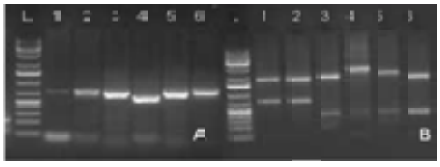


sandy and low fertility soil conditions. Summer ploughing and crop rotation with non-host crops such as sorghum/ maize in *kharif* and chickpea, lentil or fieldpea during *rabi* season are essential for bringing down the soil population and increasing the fertility of the soil to take good crop of pigeonpea or other susceptible crops like urdbean or mungbean.

Devindrappa. M., Bansa Singh and R. Jagadeeswaran

Foc Race Identification Using Restriction and Multiplex PCR

ITS region of *Fusarium* species was amplied from different races of *Foc* by PCR and digested with EcoR I and Hind III in order to identify single nucleotide polymorphisms present within the amplified region. This resulted in a polymorphic pattern with EcoR I digestion depicting sequence variation that could be used as a marker for race identification.

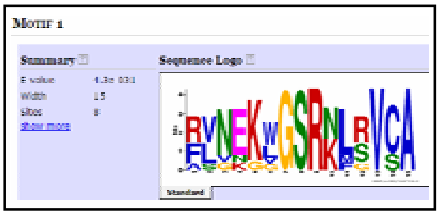


L-1 kb plus DNA ladder,
1-6 lanes represent the six races of foc.
Fig. A- PCR amplification with FDP 3 ITS specific primer, B- Eco RI restriction of FDP 3 amplied products

Poornima K.N., Naveen Kumar, Sabaale P.R. and Soren K.R.

Chloroplast Targeting: Potential Tool For Functional Genomics In Pulses

Ferritin chloroplast peptide (CTP) from chickpea and pigeonpea genome was isolated and analyzed. Sequence analysis revealed signature consensus sequences like 'homology block' Gly-X-Arg-XXX-Val with valine and alanine at -3 and -1 sites. Such sequences can be utilized for protein targeting in chloroplast.



Conserved sequences predicted at the cleavage site motif of the CTP by MEME software

Poornima K.N., Alok Das and N.P. Singh

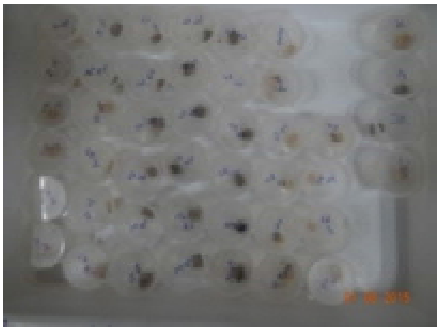
A Simple and Efficient Protocol for DNA Extraction from Fungi

DNA isolation is the most important pre-requisite for molecular study of fungi. An improved protocol for high quality DNA isolation from pathogenic fungi *Fusarium oxysporum* f. sp. *Ciceri* (foc) was standerdized. This protocol included use of C-TAB buffer instead of SDS for cellwall degradation. The procedure does use potentially hazardous chemicals such as phenol, chloroform and isoamyl alcohol. Use of these chemicals however helps removal of polyphenols and secondary metabolites along with protein precipitation as against use of PVP in other protocols. Primary alcohol was used for precipitating DNA in presence of high salt NaCl (1.4M). Further purification is done using RNAse A to remove RNA contamination. The purification is based on differential solubility of DNA in aqueous media. The purity of isolated DNA was confirmed by spectrophotometer analysis (absorbance at A260/280 ratio with reading of 1.80-1.87) and gel electrophoresis (0.8% Agarose Gel).

Naveen Kumar, Poornima K.N., Sabaale P.R. and Soren K.R.

Three Different Pigeonpea Based Diets for Rearing of *H. armigera*

To investigate the feeding preference of pod borer *Helicoverpa armigera* Hubner on pigeonpea and chickpea, four different artificial diets were prepared by adding different combinations of pigeonpea and chickpea with usual components of artificial diet *viz.,* pigeonpea seed (100%), pigeonpea flour + chickpea flour (80:20), pigeonpea flower powder + chickpea flour (80:20) and chickpea flour diet (control). Ten replications for each treatment and one larva for each replication were maintained. After nine days of observation, the highest diet weight was consumed in control (0.087 g/larva), followed by pigeonpea flower (0.068 g/larva), pigeonpea flour (0.062 g/larva) and pigeonpea seed diet (0.058 g/larva). Almost all the larvae went for pupation in all diets except pigeonpea seed based diet. The larval growth was highest in chickpea based diet (0.006 g/larva) in nine days. It is concluded that chickpea based flour diet was pod borers' most preferred diet among the four diets.



Larvae feeding on pigeonpea based diets

Sujayanand, G.K., Arti Katiyar, Umesh Kumar and Anuj Mishra

Incidence of Cow bug (*Oxyrachis tarandus* F.) in Pigeonpea

Severe infestation of cow bug, *Oxyrachis tarandus* F. was observed in 80 days old pigeonpea crop during field survey at IIPR. The cow bug nymphs and adults suck the sap from tender branches and growing twigs of

Cow bugs infestation in pigeonpea

pigeonpea. It reduces plant vigour and growth at vegetative stage. The cow bug population varied from 6 to 25 per plant and almost 50% of plants were found infested by cow bug at varying population intensities.

Sujayanand, G.K., Arti Katiyar, Umesh Kumar and Anuj Mishra

Delayed Senescence Chickpea Genotypes Perform Better Germination under PEG Treatment

Total 276 chickpea genotypes of ICRISAT minicore were screened for drought induced delayed leaf senescence trait. Thirteen contrasting genotypes each for delayed and faster senescence group were identified. The performance of delayed senescence chickpea genotypes *viz*., ICC 762, ICC 1715 and faster senescence genotypes *viz*.,ICC 8195, ICC 9755 was studied under water deficit stress with PEG. The water deficit stress created by using a PEG with water potential of -1.2 and -1.7 MPa was maintained. The seedling growth of genotypes ICC 762 and ICC 1715 was observed faster under water deficit stress condition as compared to ICC 8195 and ICC 9755 at the same concentration. The delayed senescence genotypes maintained higher germination percentage even under water deficit stress condition. However, at water potential of -1.7 MPa the growth of seedlings were affected in both groups of genotypes, but severity was more in faster senescence genotypes. The genotypes ICC 762 and ICC 1715 showed higher greenness index, germination percentage, seed vigor index, growth rate, root and shoot length in comparison to faster senescence genotypes ICC 8195 and ICC 9755.

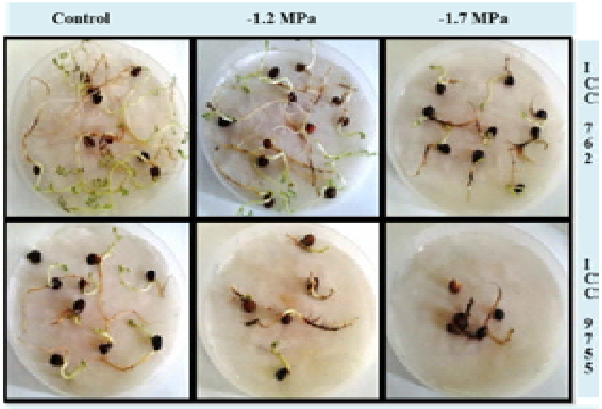


Fig: The germination performance of a different genotypes under different concentration of PEG

Gurumurthy S., Rinki Devi, Basu P.S. and Jagdish Singh

Genotypic Variability in Nodulation Traits among Mungbean Genotypes

Genotypic variability for plant traits associated with biological nitrogen fixation was studied among 55 genotypes of mungbean at pre-flowering stage. Wide variation was observed for nodules number, distribution, nodule size, nodule specific weight and plant dry weight among genotypes. Nodule number was highest in LM 5, followed by LM 16 and highest nodule specific weight was recorded in LM 3. The biomass

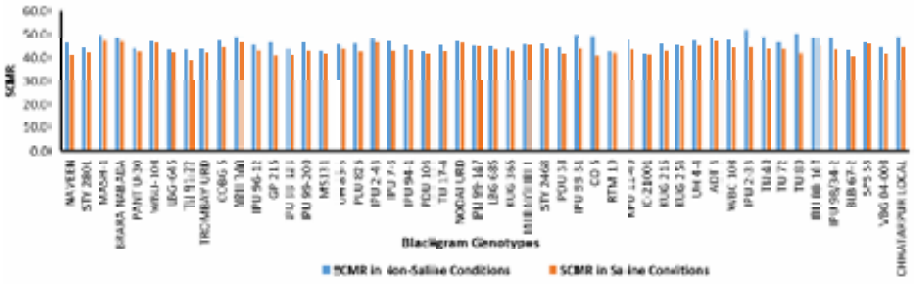
Contrasting nodule pattern in mungbean genotypes

accumulation was highest in CHAMU 4, followed by IPM 30-7. It was observed that although some of the genotypes had low nodule number, but they accumulate biomass *at par* with genotypes with more nodule number. The rhizobia isolated from each genotype will be further subjected to biochemical and molecular characterization.

Borase Dnyaneshwar, Senthilkumar M, Paulraj S, Amrit Lamichaney, Ambreesh Kumar Shukla and Jagdish Singh

Variation in SCMR of Blackgram Genotypes under Salinity Stress

Fifty blackgram genotypes were grown under saline and non-saline conditions in pots. The saline treatment was applied as a mixture of NaCl, $CaCl_2$, and Na_2SO_4 in 2:1:1 ratio, resulting in Na^+/Ca^{+2} and Cl^-/SO_4^{-2} in 4:1 ratio. The mixtures of salts were applied through nutrient solution at the time of sowing, equivalent to 0.8 g/kg of soil. SPAD chlorophyll meter reading (SCMR) was recorded at 30 days after sowing from saline and non-saline conditions in all the genotypes. Lower SCMR values were recorded under saline condition in all the genotypes. However, 12 genotypes showed less reduction in SCMR over control. Comparatively less reduction (0.5 to 2.5%) in SCMR value was recorded over non-saline condition in tolerant genotypes *viz.*, Jalpaiguri 1, SPS 39, KUG 253, NODAI URD, IC 21001, RTM 10, WBU 108, IPU2-43, Brara Nabada, PDU 103, IPU 99-147 and KUG 365, whereas, the SCMR value was high (11.5 to 17.3%) in Co 5, TU 80, IPU 2-33, GP 215 and IPU 99-31. The study revealed genetic variation in SCMR under salinity in blackgram.



Effect of salinity on SCMR of blackgram genotypes

S. K. Meena, Gurumurthy S, P. S. Basu and Jagdish Singh

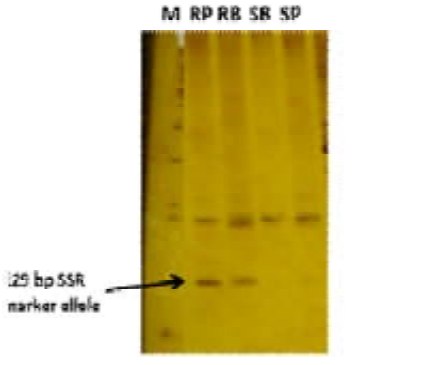
Photoperiod Sensitivity Study in Mungbean Genotypes

Sixteen mungbean *(Vigna radiata)* genotypes were evaluated during *kharif* and in summer season at IIPR under irrigated condition. The photoperiod sensitivity of these genotypes was studied on the basis of earliness in flowering in summer season compared to the time of flowering in *kharif* season. Five mungbean genotypes *viz.,* PDM 54, PDM 288, PDM 02-03, PDM 02-14 and IPM 03-3 showed lower magnitude of photoperiod sensitivity (4.35-8%) indicating that these genotypes are insensitive to photoperiod. Also these photoperiod insensitive genotypes showed less yield reduction (32.25-46.08%) as compared to sensitive genotypes *viz.*, IPM 03-02, Co 7 and IPM 03-02-2 which recorded higher photoperiod sensitivity (64-84.2%) and higher yield reduction (50-90%).

Vijay Laxmi and Rinki Devi

Tagging Gene for Rust Resistance in Lentil

The bulk segregant analysis (BSA) was used to tag the rust resistant gene with molecular markers in a mapping population (Pant L 02 x Precoz) comprising of 130 RILs. During February 15 to March 5, 2014, high humidity (66-95%), rainfall (45.1 mm) and cloudy weather resulted in heavy infestation of rust. Therefore, rust reaction was recorded on these RILs under natural condition. The susceptible parent (Pant L 02) showed 100% infestation of rust. Based on rust reaction, resistant and susceptible bulks were prepared from 10 highly resistant and susceptible RILs, respectively. Total 150 SSR were screened on these bulks along with resistant parent (Precoz) and susceptible parent (Pant L 02). Among these SSR markers, one SSR marker ALD 40 amplified an allele of 129 bp in resistant parent (Precoz) and resistant bulk, while its null allele was observed in susceptible bulk and susceptible parent (Pant L 02) indicating association of this marker with rust resistant in lentil.



Association of SSR marker ALD 40 with rust resistance gene in lentil on basis of bulk segregant analysis. M: 100 bp ladder; RP: Resistant parent; RB: Resistant bulk; SB: Susceptible bulk; SP: Susceptible parent

Jitendra Kumar, Sunanda Gupta and Syed Mohd. Quatadah

Customized Fertilizers Improve Efficient Nutrient Use

A field study was carried out to find out the variation in leaf area index (LAI) and SPAD Chlorophyll meter reading (SCMR) in urdbean+maize and soybean+maize intercropping system due to application of straight fertilizers including micronutrient

(120:26:50:30:5:3:1) and customized fertilizer prepared as per nutrient need of maize including maize formula (6:5.4:10:6.0:1.0:0.6:0.2, prepared locally). Application of maize formula substantially improved LAI and SCMR in urdbean (2.3 and 48.1) and soybean (2.6 and 43.5) indicating that urdbean and soybean plant adjusted their light harvesting efficiency under maize shading condition which might be the influence of balanced supply of majority of essential nutrients to the plants. Higher concentration of chlorophyll content and leaf area index due to application of maize formula even under maize shading condition leads the scope for transformation of source to sink. This could also be treated as a trait for efficient nutrient use by the plants.

Ummed Singh, Lalit Kumar, C.S. Praharaj, S.S. Singh and P.S. Basu

Identification of resistant sources against Fusarium wilt in chickpea

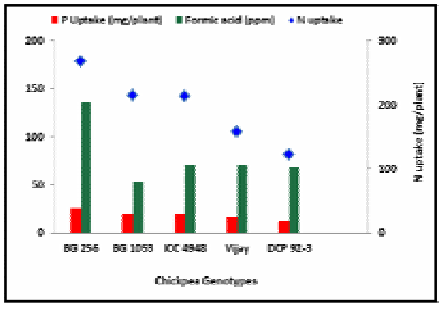
Field view of Fusarium wilt affected plants

Total 118 chickpea advanced breeding lines were screened in wilt sick-field during *rabi* season of 2012-13, 2013-14 and 2014-15. Each accession was planted in 1 row of 4 m length with row spacing 30 cm and plant to plant spacing of 10 cm in two replication. A highly susceptible cultivar JG 62 was included as check. Out of 118 elite breeding lines, 6 *kabuli* lines *viz*., IPCK 2012-154, -258, -306, IPCK 2013-182, -194, -209 and IPCK 2013-248 and 22 *desi* lines *viz*., IPC 2005-19, -45, IPC 2007-04, -28, -36, -50, IPC 2009-66, -153, IPC 2010-03, -05, -71, -78, -121, -123, -128, -173, IPC 2011-28, -31, -76, -94, IPC 2012-198 and IPC 2013-37 were found resistant for 3 years. This information will be of great value for plant breeders for development of resistant varieties.

P.R. Saabale, S.K. Chaturvedi and R.K. Mishra

Organic Acids Profiling of Chickpea Genotypes Exhibiting Differential P Uptake

A study was conducted to evaluate the nutrient uptake of chickpea genotypes in relation to organic acid exudations with four chickpea cultivars *viz.,* BG 256, BG 1053, ICC 4948 and DCP 92-3 under P stress (<10 PPM Olson's P). Increased P uptake was concurrent with increased N uptake in all the genotypes at vegetative stage. Root exudate analyses of these genotypes revealed the presence of oxalic acid, citric acid, malic acid, succinic acid and formic acid. Formic acid content was high, followed by succinic acid content in all the genotypes. Highest nutrient content was recorded in BG 256 and lowest in



BG 1053, which was also reflected in formic acid secretion. Increased nutrient uptake of genotypes exhibited enhanced amount of formic acid indicating the role of organic acids in enhancing plant P as well as N content. Exploring organic acid exudation profiling of chickpea genotype(s) could be useful to pinpoint the genotype exerted variation in P acquisition which in turn increases BNF under low P stress.

Swarnalakshmi K, Vijay Pooniya, Surender Singh and Anil Kumar Saxena
Indian Agricultural Research Institute, New Delhi

Field Resistance to Phytophthora Stem Blight in Pigeonpea

To identify the sources of resistance against Phytophthora stem blight (PSB) caused by *Phytophthora deshleri* f. sp. *Cajani*, about hundred genotypes of short and medium duration pigeonpea were screened in the sick field under natural epiphytotic condition during 2013-14, 2014-15 and 2015-16. Based on three years observations, seven pigeonpea lines *viz.*, IPAC 3-2, IPAC-42, IPAC-79, IPAC 66-7, IPAC 66-9, IPAPB 7-2-1-7 and WD 5-4 were identified as resistant to PSB showing disease incidence between 0-10%. These lines may be exploited for developing PSB resistant varieties of pigeonpea.

Initial symptoms of PSB (a) Black lesion on stem (b) Breaking of stem at severe infestation (c)

R. K. Mishra and Naimuddin

प्रौद्योगिकी हस्तांतरण

कृषि प्रदर्शनी में सहभागिता

दिनाँक 20-21 अगस्त, 2015 को बिहार के मोतीहारी जिले के पिपरा कोठी में ''राष्ट्रीय किसान मेला सह कृषि प्रदर्शनी'' का आयोजन किया गया। माननीय कृषि एवं किसान कल्याण मंत्री श्री राधा मोहन सिंह इस अवसर पर मुख्य अतिथि थे। डा. एस. अय्यप्पन, सचिव डेयर एवं महानिदेशक आई.सी.ए.आर., डा. बी. बी. सिंह, सहायक महानिदेशक (दलहन एवं तिलहन) आई.सी.ए.आर., नई दिल्ली भी इस अवसर पर उपस्थित थे। प्रदर्शनी के दौरान पोस्टर, चार्ट, डाइग्राम, फोटो आदि के माध्यम से दलहन उत्पादन की उन्नत प्रौद्योगिकी को विस्तृत रूप से प्रदर्शित किया गया। संस्थान के स्टाल पर अतिथियों/ पदाधिकारियों और किसानों के सम्मुख दलहन की विकसित प्रजातियों के उन्नत बीजों का जीवन्त प्रदर्शन भी किया गया। प्रदर्शनी में परिषद के संस्थानों, कृषि विश्वविद्यालयों, राज्य कृषि विभाग, निजी कम्पनियों एवं स्वयं सेवी संगठनों द्वारा प्रायोजित 85 स्टाल लगाए गए और उपस्थित लोगों ने इसमें विशेष रुचि ली। प्रतिभागियों को संस्थान द्वारा तैयार किया गया साहित्य भी उपलब्ध कराया गया। प्रदर्शनी में डा. हेमन्त कुमार, श्री पी. आर. साबले एवं श्री राधाकृष्ण ने संस्थान का प्रतिनिधित्व किया।

Personnel

Transfers

Name	Designation	From	To	W.e.f.
Dr. Ranjan Kumar Srivastav	Sr. Technical Officer	ICAR-IIVR, Varanasi	ICAR-IIPR, Kanpur	14.7.2015

Retirement

Name	Post held	Date of retirement
Mr. Ved Ram	Asstt. Chief Technical Officer	30.6.2015
Dr. (Smt.) Hem Saxena	Principal Scientist	31.8.2015
Dr. R.P. Srivastav	Principal Scientist	31.8.2015
Mr. Deo Mani Pandey	Technical Assistant	30.9.2015

कृषक प्रशिक्षण का आयोजन

संस्थान में दिनाँक 11-13 अगस्त, 2015 को मध्य प्रदेश के सिवानी जिले की एटीएमए (आत्मा) योजना के अंतर्गत ''खरीफ की दलहनी फसलों के लिए उत्पादन प्रौद्योगिकी'' विषय पर तीन दिवसीय कृषक प्रशिक्षण का आयोजन किया गया। दिनाँक 11 अगस्त, 2015 को डा. एन.पी. सिंह, निदेशक ने प्रशिक्षण कार्यक्रम का उद्घाटन किया। निदेशक महोदय ने संस्थान एवं ए.आई.सी.आर.पी. द्वारा विशेषतौर पर मध्य प्रदेश के लिए विकसित की गई प्रौद्योगिकियों पर संक्षेप में प्रकाश डाला।

उन्होंने किसानों को सुझाव दिया कि वे खरीफ में अरहर की खेती एकल एवं सोयाबीन के साथ मिश्रित रूप से करें। प्रशिक्षण के दौरान सहभागिता के आधार पर तैयार किए गए बीजों पर विशेष रूप से चर्चा हुई। प्रशिक्षण कार्यक्रम के दौरान फसल उत्पादन, फसल सुरक्षा, पश्च कटाई प्रबन्धन, उपयुक्त प्रजाति जैसे महत्वपूर्ण विषयों पर वार्तालाप आधारित व्याख्यान दिए गए। संस्थान के वैज्ञानिकों ने कृषकों की समस्याओं को सुना एवं उसका समुचित समाधान सुझाया। कार्यक्रम के अंतर्गत प्रक्षेत्र भ्रमण का भी आयोजन किया गया। जिसके माध्यम से व्यावहारिक खेती पर विकसित प्रौद्योगिकी के प्रभाव को प्रदर्शित किया गया। किसानों को सम्बन्धित साहित्य भी उपलब्ध कराया गया। प्रशिक्षण में 26 किसानों एवं दो प्रसार कर्मियों ने भाग लिया। उक्त प्रशिक्षण कार्यक्रम का समन्वयन डा. एस.के. सिंह प्रधान वैज्ञानिक, कृषि प्रसार ने किया।

आई.आई.पी.आर. क्षेत्रीय केन्द्र, धारवाड़ की कृषि मेला में सहभागिता

दिनाँक 27-30 सितम्बर, 2015 को कृषि विज्ञान विश्वविद्यालय, धारवाड़ में कृषि मेला 2015 के अवसर पर आयोजित कृषि प्रदर्शनी में आई.आई.पी.आर. क्षेत्रीय केन्द्र सह ऑफ सीजन नर्सरी, धारवाड़ के वैज्ञानिकों ने सहभागिता की। इस कृषि प्रदर्शनी का विषय था *''फारमर्स सेल्फ एस्टीम-फार्म स्टेब्लिटी''*। इस अवसर पर कर्नाटक के माननीय मुख्य मंत्री श्री सिद्दरामैया एवं कृषि राज्य मंत्री माननीय श्री कृष्णा बाइरेगौडा उपस्थित थे। इस कार्यक्रम में करीब बारह लाख लोगों ने भाग लिया। डा. वेंकटेश एम एस, प्रधान वैज्ञानिक (मृदा रसायन) एवं डा. रेवेनप्पा एस बी, वैज्ञानिक (पादप प्रजनन) ने उक्त मेले में सहभागिता की और उन्होंने आई.आई.पी.आर. द्वारा विकसित प्रजातियों और दलहन उत्पादन प्रौद्योगिकी को चार्ट, फोटो, आदि के माध्यम से प्रदर्शित किया। प्रदर्शनी में आए हुए किसानों ने आई आई पी आर द्वारा विकसित दलहन की विभिन्न प्रजातियों में विशेष रुचि दिखाई।

किसानों का संस्थान भ्रमण

दिनाँक	प्रतिभागियों की संख्या	जिला	प्रदेश
13/7/2015	29 (तीन महिला कृषक)	शिवपुरी	मध्य प्रदेश
8/8/2015	30 (पाँच महिला कृषक)	अनूपपुर	मध्य प्रदेश
9/8/2015	42	भिण्ड	मध्य प्रदेश
9/8/2015	60	अनूपपुर	मध्य प्रदेश
8/9/2015	10	दमोह	मध्य प्रदेश
9/9/2015	90	अनूपपुर	मध्य प्रदेश
12/9/2015	30 (सात महिला कृषक)	धौलपुर	राजस्थान
21/9/2015	46	दतिया	मध्य प्रदेश

Director's Desk

Dear Readers,

For enhancing production of pulses in North Eastern Hill (NEH) states of India - Assam, Meghalaya, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Tripura and Sikkim and making them self-reliant, renewed efforts have been made by all the stake holders coherently and consistently. However, there was relatively lower inherent growth in pulse production in NEH states due to many intricate factors right from soil/climate related constraints to technological and extension oriented tribulations. The poor soil health is attributed to soil acidity (high rainfall causing leaching of most of the cations), aluminum toxicity, undulated topography and sloppy terrains. The low soil pH, heavy rainfall and flood are the main abiotic constraints, while pests and diseases are major biotic constraints in the region affecting adversely the production of pulses. Pulses are grown in these states covering about 2.57 lakh hectares of area and annual production of 2.15 lakh tonnes with average productivity of 836 kg/ha. Among pulses, peas, lentil, lathyrus and rajmash are major ones in *rabi,* while urdbean, mungbean , ricebean and pigeonpea are important crops in k*harif*.

There is tremendous scope for increasing pulses production and productivity in the region through area expansion, developing varieties suitable for high acidity, popularization of short duration varieties both under normal and late sown conditions and appropriate agro-technologies for *rabi* crops especially pea, lentil and lathyrus. Different strategies have been formulated for cultivation and popularization of different pulses in NEH region. Research programmes are now focused on developing/evaluating performance of high yielding varieties with resistance to major biotic stresses for normal as well as late sown conditions, developing cultivars for rainfed areas and development of short duration varieties suitable for late planting in rice-chickpea system. In this context, improved agronomy plays a pivotal role. Successful amalgamation of appropriate agronomic management inclusive of supplementary irrigation management, resource conservation and RCT, efficient inter- cropping systems, input/weed/tillage management both under normal condition and rice-fallows and a suitable variety, is key to stability in yield of pulses. There is a need to devise suitable low cost agro-technologies such as conservation

agriculture involving zero tillage, seed priming and pre+post emergence herbicides for effective season long weed control. Use of suitable farm implements/ machines for promoting farm mechanization especially under high slopes of NEH is also important for enabling farming enterprise remunerative through low cost of cultivation.

For acceleration of R&D in pulses, many important key considerations need to be undertaken on a regular basis so as to elevate the existing cropping intensity in NEH. Research efforts are required to bridge yield gap through adoption of suitable high yielding varieties with appropriate agronomic practices including replacement of old varieties, area expansion through pigeonpea in hilly slopes (mono/ intercrop and as mixed crop in *jhum),* mungbean in spring/pre-*rabi,* urdbean in late *kharif*/pre-*rabi* seasons, lentil/ lathyrus as *utera* after *kharif* rice and intercropping of rajmash with vegetables, emphasis on local underutilized pulses like rice bean, broad bean *etc*., appropriate technological intervention suiting the region and incorporation of pulses in farming system approach (watershed based). Therefore, there is a need to build up a concrete Road Map for promotion of research and development in pulses in NEH states.

This also needs supplemented with a desired thrust in research backup for making rice-pulse system viable and remunerative by exploring new possibility of growing pulses (*viz*., pigeonpea) in hill terrains/high slopes *etc*. and developing appropriate pulse genotypes suitable to NEH states. For this, we need to develop a good farmers' friendly seed chain of popular and suitable pulses varieties across the NEH states through participatory seed production programmes/ Government agencies/AICRP centres. Solving storage issues through adequate modern innovations so as to get rid of high humidity and transport problems normally inherited by the NEH states throughout the year needs to be strengthened. Besides these, above all we need to work as much cohesively with all the stakeholders to cater to the pulses demand of NEH states especially in presence of agricultural diversity and climate extremities. Evaluation of pulses varieties and other technologies have been carried out at different centres of NEH region during 2014-15 and planned for 2015-16. Seeds of different popular/ released varieties were sent by ICAR-IIPR to concerned centres in NEH region to evaluate their performance under local conditions. Besides varietal evaluation, seeds have also been sent to the region for its multiplication for further use.

The potentials of NEH region are little explored. Rainfall pattern in this region is often normal, therefore, water as critical input for agricultural productivity will perhaps never be a constraint. The entire region is being projected as the possible area for introducing second Green Revolution and if some breakthrough is at all expected, only this area can make a further turning point in increasing the agricultural productivity and self-sufficiency in pulses production.

(N. P. Singh)

Published by Dr. N.P. Singh, Director, ICAR-Indian Institute of Pulses Research, Kanpur-208 024
Tel. : 0512-2570264; EPBAX Lines : 0512- 2572464, 2572465; Fax : 0512-2572582
E-mail : director@iipr.ernet.in ; npsingh.iipr@gmail.com; Website; http://www.iipr.res.in

Printed at Army Printing Press, 33, Nehru Road, Sadar Cantt., Lucknow-226 002. Tel. : 0522-2481164, 6565333