



PULSES Newsletter



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International Conference on Grain Legumes

To commemorate the Silver Jubilee of IIPR, a three-day International Conference on "Grain Legumes : Quality Improvement, Value Addition and Trade" (ICGL 2009) was held at the Institute on 14-16 February, 2009. The Conference was inaugurated on February 14, 2009 by Bharat Ratna Dr. A.P.J. Abdul Kalam, Former President of India. The Conference was jointly organized by Indian Society of Pulses Research and Development (ISPRD) and Indian Institute of Pulses Research.

In his inaugural address, Dr. Kalam congratulated the scientists for the strides made in enhancing food production and ensuring nutritional security. He advocated for a separate mission on pulses. Dr. Kalam expressed concern on the declining per capita availability of pulses and exhorted

the scientists to increase the productivity by tailoring varieties and technologies for different agro-ecological regions as well as to ensure the quality enhancement



and value addition. Stressing upon the need for promoting organic farming, integrated nutrient management, technology development for resistance to abiotic and biotic stresses, post-harvest management and value addition to end products, Dr. Kalam called upon the scientists for adopting a synergistic approach towards developing such technologies which go hand in hand with nature and the

stakeholders. He also stressed upon creation of cooperatives and inclusion of pulses in PDS.

The inaugural session was presided over by Dr. Mangala Rai, Secretary, DARE and Director General, ICAR. In his presidential address, he underlined the need for an integral approach combining conventional and non-conventional methods for breeding high yielding varieties insulated against major biotic and abiotic stresses. Dr. Rai emphasized that development of transgenics and molecular breeding for improvement of traits in pulses have tremendous scope for revolutionizing the agricultural production and farmers' income. Dr. S.P. Tiwari, Deputy Director General (CS & Edn.) advocated the role of ICAR in promoting pulses research in the country. He specifically highlighted programmes on transgenic development, wilt management, development of hybrid pigeonpea and extra-large seeded *kabuli* chickpea. Dr. Masood Ali, Executive Chairman of the Organizing Committee and Director of the Institute, while welcoming the dignitaries and participants, highlighted the efforts made by the Institute in developing technologies for increasing pulse production. Eminent scientists were honoured for their outstanding contributions in pulses



research. The Chief Guest released publications of the Institute such as 25 Years of Pulses Research at IIPR and Milestones in Food Legume Research on this occasion. Dr. Sanjeev Gupta, Organizing Secretary proposed the vote of thanks.

Over 400 scientists across the country and abroad (USA, Canada, Australia, Germany, Netherlands, South Africa, Denmark, Syria, Nepal and Bangladesh) attended the Conference. During the Conference, scientific deliberations were held in eight sessions *viz.*, nutritional security and human health, climate change, genomics, biodiversity and genetic enhancement, integrated crop management, post-harvest management and value addition, *etc.* Plenary and invited lectures were delivered by the eminent scientists, besides poster presentations. More than 250 posters were displayed during various sessions.



New Infrastructure at IIPR

Under National Food Security Mission, IIPR has been identified as nodal centre for capacity building and breeder seed production and has been provided Rs. 5.0 and 10.0 crore, respectively, during 11th Five Year Plan. Under this programme, a Communication and Training Centre and Advance Seed Technology Laboratory shall be created.

Dr. Mangala Rai, Secretary, DARE and Director General, ICAR laid foundation stone of these buildings on February 14, 2009 in presence of Dr. S.P. Tiwari, Deputy Director General (CS & Edn.). The Communication and Training Centre will have a large training hall, an audio and exhibition hall, four mini-group discussion rooms and training hostels.

Grow more pulses for agricultural sustainability and nutritional security

Brainstorming Meeting on Drought Tolerance

A Brainstorming Meeting on “Strategies and methodologies for drought tolerance” was organized by IIPR, Kanpur in collaboration with ICRISAT, Patancheru on March 24, 2009 at the Directorate of Maize Research, New Delhi. The ICAR/ICRISAT mandate crops such as chickpea, pigeonpea, groundnut, sorghum, pearl millet and maize predominantly cultivated under dryland rainfed conditions were discussed at length and reviewed thoroughly about constraints limiting their productivity. About 35 participants from different organizations attended the meeting. The meeting was chaired by Dr. S.N. Shukla, Assistant Director General (Food Crops). Dr. V.D. Patil, ADG (O&P), Dr. Masood Ali, Director, IIPR, Dr. C.L.L. Gowda, Global Theme Leader, ICRISAT, Dr. Mike Butterfield, Global Theme Leader Biotechnology, ICRISAT, Dr. Sain Dass, Director, DMR and Dr. N. Seetharama, Director, NRC on Sorghum were the key persons present in the meeting. During the deliberations in the technical sessions, it was felt that high priority should be attached to characterize target environments. A network may be established for developing efficient breeding methods for drought tolerance. The genomic research on drought and marker-assisted selections were emphasized. Efficient screening techniques for drought tolerance need to be standardized.

Gigas Mutant in Lentil

While studying the range of morphological variability in a set of 1776 germplasm accessions of lentil (*Lens culinaris*) in augmented design during *rabi* 2008-09, a natural gigas mutant with broad leaves, thick stem and extra large seeds was isolated from germplasm accession IC 428727. The leaves of the mutant were abnormally large and were very broad. The mutant which had

like number of leaves per rachis, number of branches, seeds per pod, plant height were same as in normal plants. The spontaneous occurrence of mutant may be the result of numerical or structural changes at the chromosomal level or due to occurrence of unique allelic/gene interactions. The identified mutant is selected for inheritance study to find out the reasons for varied expression.



pigmented stem was found to be late than the normal plant by about twenty days for days to flowering, pod initiation and days to maturity. The mutant was highly vigorous with spreading growth habit having thrice the biomass of normal plant. It also had large seeds than the normal plant. Whereas, the traits

Leaf size, seed size, biomass are important traits affecting yield in lentil, and therefore, the identified mutant may be exploited for development of lentil varieties with improved plant type.

*Jitendra Kumar, R.K. Solanki,
S.K. Singh, P.S. Basu and Shiv Kumar*

IIPR - A Lead Centre of Network Project on *Fusarium*

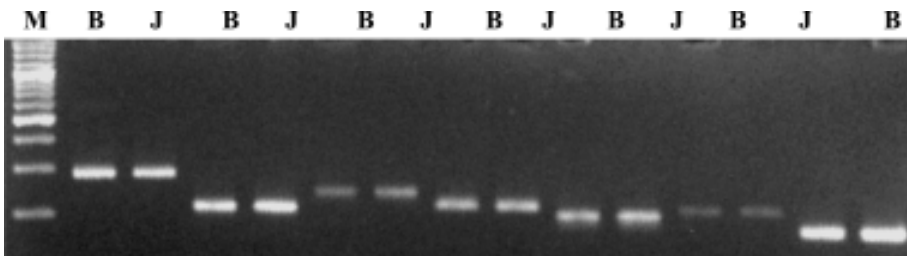
Network project on *Fusarium*, *Phytophthora* and *Ralstonia* under outreach programme of Indian Institute of Spices Research, Calicut was launched on February 23, 2009 by Dr. H. P. Singh, Deputy Director General (Hort.), ICAR. Under this project, IIPR Kanpur is the lead centre for studies on wilt of pigeonpea and chickpea with a budget of Rs. 56.85 lakhs. The

project duration is 4 years (2009-12). The major programme includes diversity analysis in pathogen populations, development of diagnostics for species and variants, development of markers for virulence and host resistance, seed/soil health management, biological control and development of integrated management of wilt disease.

Development and Validation of Chickpea EST-SSR Markers

Chickpea has a limited availability of genomic resources, especially the expressed sequence tag (EST)-based markers. This has prompted to large scale development of EST sequences and identification of PCR based microsatellite markers. In addition to their suitability for genetic diversity

sequences were searched for presence of microsatellite motifs using WEBTROLL software. A set of 35 EST sequences is submitted to NCBI databases (www.ncbi.nlm.nih.gov) under accession number GE 213101 to GE 213135. Total 15 SSR primer pairs having perfect repeat motifs comprising trimer and pentamers



*Amplification pattern of EST-SSR isolated from chickpea
Lane M: 100 bp ladder, Lane B: BG 256, J: JG 315*

analysis, the high rates of transferability make them very useful for comparative genomics studies. In order to increase the marker availability and map density, microsatellite loci were identified from EST clones of wilt resistant chickpea cultivar JG 315. The cDNA synthesized from total RNA was cloned in pJET/1.2 blunt vector and plasmid DNA of positive clones was sequenced. Nearly 200 cDNA clones were sequenced and

were designed. Amplification pattern of these STMS primer pairs was studied in two cultivars of chickpea (BG 256 and JG 315). Total eight primer pairs amplified the expected fragments ranging from 151 bp to 342 bp. Fifteen primer pairs amplified single locus producing one allele per locus.

*Mayank Kashyap,
Prasoonpal Gupta and S.Datta*

Pulses Production Technology through AIR

An innovative programme “*Dalhan Kisano Ke Liye*” was jointly implemented by IIPR and All India Radio, Kanpur. Total 40 episodes (30 minutes each) were broadcast from 3rd September, 2008 to 25th March

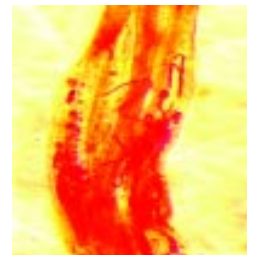
2009 on weekly basis. Varietal aspects, production, protection, post-harvest management and out-reach programmes of the Institute were covered for the benefit of farming community.

Lesion Nematodes Infecting Chickpea in Bundelkhand Region

Survey conducted in Bundelkhand region for nematode problems in chickpea showed that the lesion nematodes (*Pratylenchus* sp.) are major nematodes infesting chickpea. Root-knot nematode which is most important was not observed in any of the chickpea fields. Lesion nematode infection was present in 53% of the root and soil samples collected from Sumerpur and Modaha of

Hamirpur District. Lesion nematode is a migratory endo-parasite.

It lays eggs singly in the cortical region of the roots. All the stages of the nematode infect the roots. Due to feeding and migration of the nematodes, black spots and lesions are formed on the root which enlarge to become bigger necrosis. This leads to yellowing and sparse growth of plants. These lesions also act as the entry points of secondary infection of fungi and bacteria. As symptoms produced by lesion nematodes on the root are black spots and not the galls as produced by root-knot nematode, the lesion nematode infection is usually overlooked.



Root infested with lesion nematodes

Bansa Singh

Tospovirus in Rajmash

Rajmash (*Phaseolus vulgaris*) is cultivated in *rabi* season in North-East plain zone. During *rabi* 2008-09, a viral disease of rajmash was noticed at IIPR. Characteristic symptoms included chlorotic spots with irregular margins in leaf lamina (Fig. a-d). Margin of the spots often turned necrotic giving leaflet a

shriveled look resulting into twisting of leaf lamina (Fig. b-c). Necrosis of stem (Fig. d) and veins (Fig. e) was also noticed. Plants infected at early stage of growth remained stunted (Fig. f). Disease incidence was only 4-5% in two varieties (Amber and Utkarsh) of rajmash. The field symptoms were indicative of involvement of *Groundnut bud*

necrosis virus (GBNV), a tospovirus. The causal virus was sap transmitted upon inoculation from field infected plants to healthy plants of rajmash and to cowpea cv. Pusa Komal and produced the characteristic symptoms. Further, the virus was confirmed by reverse transcriptase-polymerase chain reaction (RT-PCR) using primers targeting NSm and NP genes of GBNV. In agarose gel electrophoresis, amplified products yielded DNA fragment of 800 bp and 900 bp corresponding to NP and NSm genes of GBNV, respectively. For the first time GBNV infection in rajmash has been noticed in central plains.

Mohd. Akram and Naimuddin

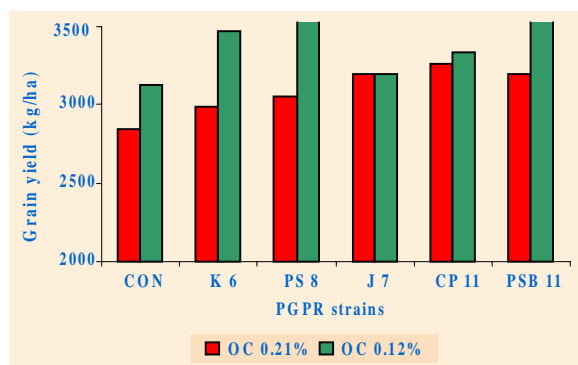


Response of PGPR Inoculation in Chickpea under Field Conditions

Growth responses to inoculation with beneficial microorganisms termed as PGPR (Plant Growth Promoting Rhizobacteria) are highly variable under field conditions. Soil organic carbon content is one among the several factors influencing performance of PGPR in fields. A field trial was carried out to evaluate the efficiency of selected strains under soils having two different levels of organic carbon (0.12 and 0.21 %). Inoculation with PGPR strains increased nutrient uptake and grain

yield of chickpea in both types of soil. Highest increase in N (79%) and P (59%) uptake was observed with PSB 11 in soil with organic carbon of 0.12%, followed by CP 11, K 6 and PS 8 at 60 DAS, whereas under soil with organic

carbon of 0.21%, PS 8 recorded an increase of 38% and 33% of N and P, respectively, followed by J 7 and CP 11. Grain yield of 3125 kg/ha and 2847 kg/ha was observed in uninoculated control in soils having organic carbon content of 0.12% and 0.21%, respectively. Strain PSB 11 recorded highest grain yield of 3819 kg/ha, followed by PS 8 (3541 kg/ha) and K 6 (3472 kg/ha) in soil with 0.12% carbon, whereas strain CP 11 produced 3263 kg/ha grain yield, followed by J 7 and PSB 11 (3194 kg/ha) in soil with organic carbon of 0.21%.



Effect of PGPR inoculation on grain yield of chickpea in soils with different organic carbon

K. Swarnalakshmi and
Mohan Singh

Transfer of Technology

National Training Programme Organised

A three-day national training programme on “Improved production technology for *kharif* pulses” under NFSM-P was organised at the Institute on 16-18 March, 2009. Total 10 extension officers from four states viz., Orissa, Haryana, Madhya Pradesh and Andhra Pradesh participated in the training. The aspects covered in the training included



region specific improved varieties of *kharif* pulses and their characteristics, agronomic management, integrated nutrient management, management of pests and diseases and use of bio-fertilizers. In addition, processing aspects of pulses were also covered in the training.

Exposure Visit of Farmers at ICRISAT

IIPR organized exposure visit of farmers at ICRISAT during 11-17 January, 2009. Total 21 farmers from Kanpur Dehat and Fatehpur district along with one project personnel visited ICRISAT under Model Seed System(s) project. Farmers visited various sites of experimentation of ICRISAT.

Field Days Organised

To demonstrate the performance of seed production programme of chickpea and pigeonpea under ISOPOM project and also to create informal contact and learning among the farmers, field days were organised on 8th March, 2009 at Kurmi Kheda village of Kanpur Dehat and on 15th March, 2009 at Godbrauli village of Fatehpur district. On this occasion, Dr. Masood Ali, Director, IIPR emphasized for adoption of pulses technologies in Integrated Crop Management (ICM) mode and production of quality seeds for



enhancing pulse production. Various technological aspects viz., quality seed production, agronomic management, disease and insect pest management and storage were thoroughly discussed. A question-answer session was also held. Members of Chaudagra Kisan Samiti, Fatehpur briefed about progress of the programme as well as status (budget) of the Samiti. Total 164 farmers including 14 farm women took active part in Kanpur Dehat and 176 farmers participated in Fatehpur district.

Farmers' Trainings Organised

- Six training courses were arranged for farmers from Rajasthan during January-March, 2009 at IIPR. Total 218 farmers from Jhalawar, Pali, Dausa, Bhilwara, Tonk and Dhaulpur districts participated in training programmes.
- A two-day training course (20-21 February, 2009) was held for farmers of Samastipur district (Bihar) under Agriculture Technology Management Agency (ATMA) scheme. Total 20 farmers were trained on production, protection and post-harvest management aspects of major pulses.
- Three training courses for farmers of Baitul, Jhabuwa, Chhindwara and Tikamgrah districts of M.P. were organised during February-March, 2009. Total 148 farmers were trained on pulse production, protection and post-harvest components on the principle of “Learn to Listen and Listen to Learn”.
- Nine training programmes of two days duration each were held for farmers of U.P. during January-March, 2009. Total 627 farmers including 46 farm women from Ambedkar Nagar, Jhansi, Banda, Lakhimpur, Farrukhabad, Varanasi, Allahabad, Raebareli and Kanpur took active part in the trainings.

Eminent Pulse Scientists Honoured

The Indian Society of Pulses Research and Development (ISPRD) Awards 2009 were given to eminent pulse scientists on the occasion of International Conference on Grain Legumes held at Indian Institute of Pulses Research, Kanpur on February 14-16, 2009. These awards were presented to 10 eminent scientists in recognition of their excellent and outstanding contributions in pulses



research and development. The ISPRD Life Time Achievement Award was given to Dr. Mahmoud Bachir El- Solh, Director General, ICARDA, Syria and Dr. William D. Dar, Director General, ICRISAT, Patancheru. Prof. K.H.M. Siddique, University of Western Australia, Dr. R.S. Malhotra,



K.H.M. Siddique

ICARDA and Dr. S. B. Sharma, University of Western Australia were presented ISPRD Gold Medals for their contributions in Crop Production, Crop Improvement and Crop Protection, respectively.



R.S. Malhotra



S. B. Sharma

These Awards were presented by Dr. A.P.J. Abdul Kalam, Former President of India during Inaugural Function of the Conference.

Dr. William Erskine, Director, CLIMA, Australia presented the ISPRD Recognition Awards to Dr. B.B. Singh, IIPR, Dr. J.S. Sandhu, PAU, Dr. Guriqbal Singh, PAU, Dr. Suresh Pande, ICRISAT and Dr. R.G. Chaudhary, IIPR.

Personnel

Our New Colleagues

Dr. C. Chattopadhyay has joined the Institute as Head, Division of Crop Protection on 12.1.2009.



Dr. Shiv Kumar, has been appointed as Head, Division of Crop Improvement at the Institute and has joined on 13.01.2009.

Dr. J.P. Mishra has joined the Institute as Sr. Scientist (Agronomy) on 20-03-2009.



- Dr. S.S. Ali has joined as Emeritus Scientist (CSIR) under the project "Scale up production and development of cost-effective formulation of entomo-pathogenic nematodes (EPN) based bio-pesticide for the pod borer of chickpea".

Obituary

Dr. S.C. Pramanik, Principal Scientist (Agronomy) left for his Heavenly abode on January 18, 2009. IIPR family is grieved by his untimely demise. May his soul Rest in Peace.

HRD

- Drs. Jitendar Kumar, Sr. Scientist and R.K. Solanki, Scientist, Division of Crop Improvement were deputed for 12 days training on "Marker assisted selection : Theory, practice and application" at ICARDA, Aleppo, Syria during Feb. 22 to March 5, 2009.
- Dr. Khela Ram Soren, Scientist (Biotechnology) was deputed for 21 days training on "Understanding the physiological and molecular basis of plant adaptations to drought" at University of Agriculture Sciences, GKVK Campus, Bangalore during 2-22 March, 2009.

Director's Desk

Dear Readers,



Global trade in pulses has been on upswing from 3 million tons in eighties to 10.5 million tons per annum at present, a three-fold increase during the period. This was mainly because of the widening demand supply equation in the developing countries where about 70% of pulses are used for food. The main exporters are Canada, Myanmar, China, France, Australia and USA, while India, Spain, Egypt, Italy and Bangladesh are the main importers. On an average, India used to import pulses to the tune of 0.50 million tons during 1991-95, which has subsequently rose to 2.04 million tons during 2003-08. Presently, it is the top importer (2.47 million tons) with 17% share of the global import. Dry pea is the major imported pulse, followed by pigeonpea, urdbean, chickpea and mungbean. India is also the largest pulses processor as the major pulses exporting nations such as Myanmar, Canada and Australia do not have adequate pulses processing industry as these countries do not have domestic consumption of pulses and, therefore, they have never attempted for developing domestic processing industry. Their focus has always been to export

whole grains. This has put India in an advantageous position, by developing its niche in processing and value addition which can cater to the needs of large number of non-resident Indians and cash on the opportunities emanating from the recent euphoria of vegetarian diet across the globe.

Recently, prices of pulses in the country have increased significantly as compared to other food crops, pushing pulses out of the reach of poor masses. Declining per capita availability of pulses indicates that pace of technological development could not commensurate with the rising demand. Wide fluctuation in pulses production particularly in developing countries including India remains a big challenge and this necessitates critical analysis of the factors contributing towards instability in productivity. A holistic approach to develop improved varieties, production technologies and cropping systems for different agro-ecological regions is imperative. This requires efforts in consortium mode to foster the necessary framework of knowledge and materials that will result in major scientific breakthroughs. The socio-economic dimension of pulse production and the analysis of factors influencing the acceptance of novel technologies also need to be addressed through appropriate agencies.

Pulses are at risk with sharp upswing in prices in the wake of declining

area under pulses and increase in demand due to increasing population. For example, while the normal acreage for *kharif* pulses in India is over 10 million ha, this is estimated to decline to 7 million ha this year. However, favourable climatic conditions during the winter season are expected to compensate the area loss in *kharif* season. All domestic markets are closely related to international food markets, which influence the prices in domestic and international markets. Although domestic policies of food and agriculture emphasize only on national objectives and concerns, these policies impact the international agriculture including production, consumption and trade.

In view of the fact that India is deficient in meeting its own demand of pulses, Government of India has been quite liberal in its import policy. Since pulses are under Open General License category, this allows private import without the government permission. Such legal status still continues, but the Government intervention in the form of subsidy policy has had a major impact on the pulses trade by private importers. The organization of International Conference on Grain legumes with focus on trade and value addition by ISPRD and IIPR has been a milestone in this direction.

(Masood Ali)

Published by Dr. Masood Ali, Director, 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; mali@iipr.ernet.in; Website; <http://www.iipr.res.in>

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