PULSES Newsletter

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Dr. Sanjeev Gupta	Member
Dr. M.S. Venkatesh	Member
Mr. Naimuddin	Member
Mr. D. Upadhyaya	Member Secretary

Prof. Swapan Datta Takes over as Dy. Director General (CS)

Prof. Swapan Datta, an eminent scientist has assumed the office of Deputy Director General (Crop Science), ICAR on June 18, 2009.

Born in 1953 at Sirajganj (Bangladesh), Prof. Datta obtained his B.Sc. (Hon.) degree from Presidency College and M.Sc. and Ph.D. from Calcutta University, Kolkata. Prof. Datta, an internationally recognized rice scientist has contributed enormously to research and development in golden indica rice, high-iron rice, development and field management of *Bt* rice, *X*a-1 rice and *PR*-rice for plant protection in several countries including India.

Prior to his joining the present position, Prof. Datta was serving University of Calcutta as Rashbehari Ghosh Chair Professor. He has served as Associate Professor at Vishwa Bharti University during 1979-86, DAAD Fellow at Germany in 1986, Research Manager at ETH-Zurich from 1987 to 1993 and PBGB and HarvestPlus Rice Crop Leader at IRRI, Philippines from 1993 to 2005.

Prof. Datta is recipient of several awards and recognitions including Tata Innovation Fellowship from the Govt. of India and Fellow of the National Academy of Agricultural Sciences and National Academy of Science. His vast and rich experience in research management, molecular biology and international exposure will provide an impetus in reorientation of crop science research to make the nation surplus in food production.

IIPR welcomes the new Deputy Director General.

Brainstorming Meeting on Pulses

A Brainstorming Meeting on "Issues and strategies for increasing production and productivity of pulses" was held on 9-10 June, 2009 at NASC, New Delhi. Seventy participants representing DAC, ICAR, SAUs, ICRISAT, ICARDA and seed agencies attended the meeting. The meeting was chaired by Dr. Mangala Rai, Secretary, DARE and DG, ICAR. Dr. Masood Ali, Director, IIPR made a brief presentation on status of research and development in increasing the productivity and production of pulses. This was followed by crop specific presentations. Various cross- cutting issues related to seeds, resource conservation, price and marketing intervention were also discussed. Need was felt for institutionalizing the scrutiny of breeder seed indent at DAC and ICAR level. Advance seed planning at state level with rolling plan for inclusion of more and more newly released varieties was emphasized. Since pulses are generally grown in rainfed areas, greater efforts are required for rain water harvesting and its recycling. Efficient machines for planting, harvesting, inter-cultivation, threshing *etc*., were considered necessary for timely operations and reducing the post – harvest losses. Rice fallows of eastern India were recognized as a potential niche for horizontal expansion of *rabi* pulses. A pilot project was also proposed on chickpea and pigeonpea in major pulse producing states of the country.

Institute Research Council Meeting Held

The Institute Research Council meeting was held under the chairmanship of Dr. Masood Ali, Director on 17-19 June, 2009. In his introductory remarks, the Chairman apprised the house about major events, new research initiatives, human resource development and international collaborations since last meeting. The results of on-going projects were presented by respective scientists which were critically reviewed. The technical programmes for 2009-10 were discussed and approved. Five new research projects were also discussed and approved.

Group Meet on Long Duration Pigeonpea

Group meet on long duration pigeonpea was held at IIPR on June 26, 2009. About 30 participants representing eight AICRP Pigeonpea centres and KVKs participated in this meet. The group meet was chaired by Dr. R. P. Katiyar, Director Research, CSA University of Agriculture and Technology, Kanpur and co-chaired by Dr. N.D. Majumder, Project Coordinator (Pigeonpea). Chairman emphasized the importance of pigeonpea and highlighted various issues for required progress in development of appropriate technology for farmers. He stressed upon development of diseases and insect pest resistant /tolerant varieties. Dr. N.D. Majumder presented the results of varietal evaluation trials. Respective PI's of different disciplines presented the progress made during the previous year. Technical programme for the coming season was finalized.

Attachment Training Programme

Twenty nine M.Sc. students are undergoing specialized training in different disciplines, *viz*., biotechnology, microbiology, bioinformatics, physiology and biochemistry. Dr. (Mrs.) Hem Saxena is Coordinator of the Attachment Training programme and Dr. (Mrs) Vijay Laxmi and Dr. Subhojit Datta are Nodal Scientists.

Research Advisory Committee Meeting Held

The 14th meeting of the Research Advisory Committee of the Institute was held on 13 May, 2009 under the Chairmanship of Dr. S.C. Modgal, Former Vice-Chancellor, GBPUA&T, Pantnagar. The meeting was attended by Dr. V.D. Patil, ADG (O&P), Dr. Shanker Lal, Consultant, NFSM, Dr. O.P. Dubey, Ex-ADG (PP), Dr. Masood Ali, Director, IIPR and Dr. C. Chattopadhyay, Member Secretary. All Heads of Division and Sectional Incharges also participated in the meeting. Dr. Masood Ali apprised the house about the recent research and developmental activities including human resource development, creation of infrastructure, new research projects, *etc*. The Chairman called upon the scientists to develop research programmes on crop adaptation to climate change and monitoring the pest scenario. He also suggested to invite noble laureate Dr. R. K. Pachauri for extra -mural lecture and discussion at the Institute, which will help in setting the new research agenda in relation to global warming. Dr. Shanker Lal stressed the need for reviewing the rolling seed plan for higher seed replacement rate. Dr. V.D. Patil urged the scientists to demonstrate proven technologies at farmers' fields and make sincere efforts in developing CMS based hybrids in pigeonpea. Dr. O.P. Dubey emphasized the need to promote raised-bed technology, use of *Tagetes* in management of root-knot nematodes and conservation of soil flora and fauna. The RAC highly appreciated the progress made in research programmes and developmental activities.

Annual Group Meet on *Kharif* Pulses

The Annual Group Meet on *kharif* pulses was held at UAS Dharwad from 25 to 27 May, 2009. The group meet was inaugurated by Dr. S.P. Tiwari, DDG (Edn. & CS), ICAR. Dr. J.H. Kulkarni, Vice-Chancellor, UAS Dharwad presided over the function. Dr. Masood Ali, Director, IIPR presented the scenario of *kharif* pulses during 2008-09 and new initiatives in research and development.

Dr. S.P. Tiwari emphasized the need for development of efficient plant types to enhance the yield potential of crop. He stressed upon generating information and sound basis for selection of parents and to develop mapping populations for various traits. He desired that crop management strategies should be focused for reducing the cost of cultivation. Dr. Tiwari called upon the scientists to monitor the changing climatic conditions and come out with the technologies which can cope–up with such changes. Dr. J.H. Kulkarni emphasized the importance of soil biota and micro-nutrients in improving productivity of pulses.

Dr. B.B. Singh, Project Coordinator (MULLaRP) and Dr. N.D. Majumder, Project Coordinator (Pigeonpea) highlighted the major achievements of respective crops. The results of *kharif* 2008 were discussed and the technical programme for 2009 was finalized. TNAU, Vamban and BARC, Mumbai were recognized as best research centres for outstanding contribution made during 2007-09 in mungbean/ urdbean and pigeonpea, respectively. Three varieties of mungbean *viz.*, Pusa 0672, AKM 9904 and IPM 02-3 and one variety of urdbean KU 99-21 were identified during the meet for various agro-ecological regions.

New Varieties

Four new high yielding varieties of different pulse crops were notified by Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops during its 53rd Meeting on 26 June, 2009.

IPCK 2002-29 (Shubhra): This *kabuli* chickpea variety has been developed by IIPR through hybridization (L 144 x H 82-2) followed by selection. It is recommended for cultivation in Madhya Pradesh, south Rajasthan, Maharashtra, Gujarat, Chhatisgarh and Bundelkhand

tracts of Uttar Pradesh. This variety with yield potential of 2041 kg/ha has given more than 20% higher yield over the checks JGK 1 and 24% over KAK 2 and has large seeds (34 g/100 seed wt.). This is moderately resistant to *Fusarium* wilt.

TJT 501: This early duration pigeonpea variety has been jointly developed by BARC and Zonal Agricultural Research Centre, Khargone. The variety with yield potential of 1860 kg/ha has given 34.5% higher yield than the check UPAS 120 and 30% higher than zonal check ICPL 87. The variety has large seeds with attractive seed colour. It is recommended for cultivation in Central Zone consisting of Maharashtra, M.P., Chattisgarh and Gujarat.

IPM 02-03 : This mungbean variety has been developed by IIPR from the cross IPM 99-125 x Pusa Bold 2. It gives an average yield of 994 kg/ha in North West Plain Zone with yield superiority of 11.2% over the best check ML 818 and is resistant to MYMV disease. The variety is recommended for *kharif* cultivation

in Rajasthan, Punjab, Haryana, Delhi, plains of Himachal Pradesh and Uttarakhand and Jammu region of J&K.

IPU 02-43: This urdbean variety has been developed by IIPR from the cross DPU 88-31 x DUR 1. It yielded 911 kg/ha in South zone and showed yield superiority of 17% over the check Pant U 30. It possesses resistance to MYMV and powdery mildew. The variety is recommended for *kharif*

cultivation in South zone comprising the states of A.P., Karnataka, Tamil Nadu and Orissa.

Research Highlights

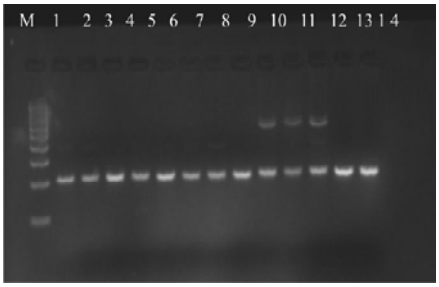
Status of Diseases and Insect Pests in Mungbean and Urdbean in Farmers' Fields

Status of disease and insect pests was recorded in fields of spring / summer mungbean and urdbean in catchment area of Sharda Canal in Takia (Bangarmau), Unnao District and Makran Nivada and Makhan Nivada villages (Bilhaur) in the third week of May, 2009. No fungal foliar disease was observed. However, viral diseases like yellow mosaic, leaf curl and leaf crinkle were recorded in urdbean. In mungbean only yellow mosaic and leaf curl were seen. Their incidence was less than 5% in all the fields observed. In case of insect pests, whitefly (*Bemisia tabaci*) and thrips (*Megalurothrips distalis*) were observed in all the fields. Whitefly population was more in urdbean (3.76 to 13.04 per plant) than in mungbean (1.72 to 1.88 per plant), whereas thrips population was more in mungbean (2-7 per 25 flowers) than in urdbean (0-3 per 25 flowers). Bihar hairy caterpillar (*Spilarctia obliqua*) caused 2.4% plant damage in one field of urdbean crop approaching maturity in Makhan Nivada village (Bilhaur). Severe incidence of aphid (*Aphis craccivora*) was seen in patches in one mungbean field at Sherpur village.

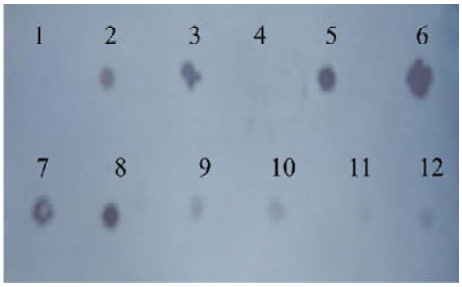
Naimuddin, Mohd. Akram and P. Duraimurugan

Bioengineering of Fieldpea for Nematode Resistance

Root-knot nematodes are the most important group of plant parasitic nematodes which cause economic losses in almost all food crops. Use of RNA interference technology for targeted silencing of genes involved in nematode parasitism is being attempted at IIPR. In this process fieldpea was transformed with dsRNA expressing constructs for *Meloidogyne incognita* genes through *Agrobacterium* mediated method using embryo axes slices explants. Genotypes HUDP 15 and IPF 99-25 were transformed using dsRNA constructs for *Integrase* and *AF531170* gene with neomycin phosphotransferase *(nptII)* as selection marker. The cocultivated explants were regenerated on medium containing 50 mg/l kanamycin as the selection agent. The elongated shoots were established in the green house through micro-grafting. The mean time from *Agrobacterium* treatment to micro-grafting onto the pre-existing root stock averaged 120 days. The presence of transgene was confirmed by polymerase chain reaction (PCR) analysis and Dot blot analysis using biotin labeled probe.



PCR amplification using primer for CaMV 35S Lane M: 100 bp ladder, 1-11: transformed plants, 12 & 13 : positive control (Plasmid DNA), 14 negative control (non-transformed plant)

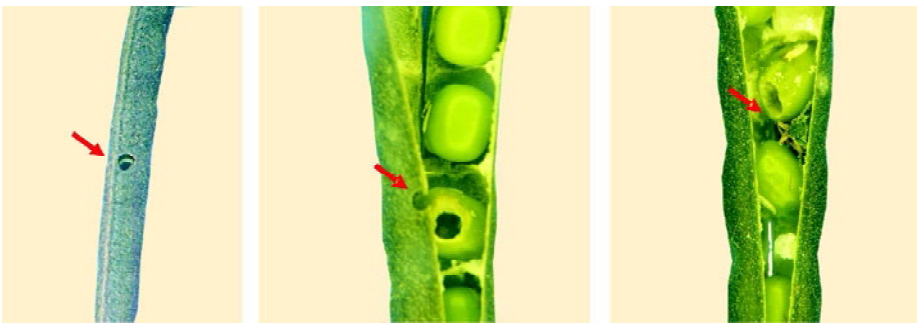


Dot blot analysis using biotin labeled probes Promoter 1.Negative control (non-transformed plant), 2.positive control (plasmid DNA) 3-12. PCR positive plants

Nandeesha P., Indu Singh Yadav, Shamee Kausar and Bansa Singh

Field Infestation of Bruchids in Mungbean and Urdbean

Among the important insect-pests of stored grain, bruchids or pulse beetles (*Callosobruchus* spp.) are most serious for pulses. Attack of these beetles starts in the field, from where the infestation is carried over to the storage. Even an extremely low bruchid population at field level can result in total destruction of the seeds within a period of 4-6 months. A field experiment was conducted with five varieties of mungbean and two varieties of urdbean. The pod samples were collected at the time of harvesting and examined for bruchid infestation on pod and grain basis. The field infestation of bruchids on different varieties of mungbean ranged between 0.75 to 4.25% with an average of 2.45% on pod basis. The grain infestation of bruchids on different varieties of mungbean ranged between 0.16 to 0.56 % with an average of 0.40%. Among the urdbean varieties, the infestation of bruchids ranged between 0.25 % to 1.63 % with an average of 0.94% on pod basis and 0.06% to 0.35% with an average of 0.21% on grain basis.



Damage and emergence holes of bruchids in mungbean pods

P. Duraimurugan and S.K. Singh

First Report of *Endotokia matricida* Desiccation Stage in EPN *Oscheius amsactae*

For the first time, presence of a desiccation stage in EPN, *Oschieus amsctae* was reported under unfavourable condition. Some EPNs like *Steinernem*a and *Heterorhabditis* have been reported to resist unfavourable condition for their survival through special process of desiccation known as *Endotokia matricida*. In this phenomenon EPN juveniles hatch within the mother's body to protect themselves from unfavourable stress and desiccation, condense together and make clumps under the skin of mother's body till the return of favourable conditions. This stage can be exploited for use of EPN based biopesticide against storage pest and also other insect pest of crops including pulses. The shelf-life of EPN based biopesticide can also be increased for an appreciable period through this phenomenon. *O. amsactae* kills *Helicoverpa*, bruchids and other lepidopteron insects, very efficiently and in a shorter period of time.

Stereomicroscopic view

Enlarged view

Endotokia matricia in Oschieus amsactae

R. Ahmad, S.S. Ali, A. Shaheen, M. Asif, M. H. Akhtar

Personnel

Deputation Abroad

- Dr. Masood Ali, Director participated in the Second Annual Tropical Legumes I (TL 1) Project meeting and Chickpea Initiative Workshop held at Lilongwe, Malawi on 16-21 April, 2009. The meeting was attended by world's top scientists engaged in genetic resources and Marker Assisted Selection in legumes.

- Dr. Shiv Kumar, Head, Division of Crop Improvement of the Institute joined ICARDA as Lentil Breeder on deputation on May 2, 2009.

- Under ICAR-ICARDA collaborative programme, Dr. Masood Ali, Director visited ICARDA, Aleppo on 17-21 May, 2009. Dr. Ali interacted with food legume scientists, visited field and laboratory facilities and discussed about future collaboration in chickpea and lentil research.

Our New Collegues

- Dr. Rajesh Kumar has joined as Principal Scientist (Agricultural Extension) at IIPR on June 1, 2009.

- Dr. Alok Das has joined as Scientist (Plant Bio-technology) at IIPR on June 16, 2009.

Retirements

Dr. R. Ahmad	Principal Scientist (Entomology)	31.05.2009
Dr. Ravi Kumar	Principal Scientist (Agronomy)	30.06.2009
Mrs. Angoori	SSG	30.06.2009
Mrs. Krishna	SSG	30.06.2009

Obituary

Shri Hem Raj Dhanuk, SSG, left for his heavenly abode on 24.4.2009. May his soul rest in Peace.

Economic Empowerment of Pulse Farmers through Seed Growers' Association

To ensure quality seed sufficiency of pulses at village level, IIPR has taken an innovative initiative to form Seed Growers' Association in Kanpur Dehat and Fatehpur districts. *Chaudgra Kisan Sewa Samiti* has been formed in Fatehpur district and registered. The *samiti* is managed by farmers and caters to the multi-dimensional agricultural requirements of the farmers from the cluster of ten villages which have been covered under participatory seed production programme. Currently, 21 farmers including President, Vice - President, Secretary, Treasurer and Auditor of *Samiti* have been identified by the farmers themselves as core executive team of society. The member farmers have also formed three important sub-committees *viz*; input management committee, knowledge management committee and marketing management committee for smooth and effective execution of various activities. Similarly, in Kanpur Dehat, recently two more Seed Growers' Associations have been formed and registered as the *Krishak Beej Vikas Samiti,* Kuitkheda and *Barhapur Kisan Sewa Sameti,* Barhapur. In each *Samiti,* there are 21 core members who have deposited membership fee in each *Samiti.* All the three *samitis* operate their separate bank accounts which have been opened jointly in the name of President and Treasurer. The major objective of making registered grower association is to evolve the sense of working together in a participatory mode among farmer community so that each category of farmers may get full liberty to participate in seed production programme and derive maximum dividend out of it. *Samiti* (*s*) are primarily responsible for procurement of quality seed from research stations, production of quality seeds, their processing, storage, bagging, labeling and marketing in the same or neighboring villages and districts.

With the consistent persuasive efforts of IIPR, both the registered seed grower association of Kanpur Dehat have planned to undertake participatory long duration pigeonpea seed production during *kharif*, 2009. *Chaudagra Kisan Sewa Samiti* has undertaken seed production of short duration pigeonpea in 20 ha area and long duration pigeonpea in 20 ha in Fatehpur district.

S.K. Singh, S.K. Dubey, A. Yadava and Ashok Kumar

Participatory Seed Production of chickpea and pigeonpea

Under Model Seed System (s) project, participatory seed production of chickpea was undertaken in 40 ha area among 193 farmers of nine villages in Fatehpur district, during *rabi* 2008-09. To make it more participatory, payment of 50% of the cost of seed was made by the partner farmers. In addition, registration fee @ Rs 10/ kg was also paid by the farmers. In Kanpur Dehat district seed production of chickpea was undertaken in 27.1 ha by 123 farmers of six villages. DCP 92-3 and J G 16 varieties of chickpea were used under seed production in both the districts. Total 1271 quintals foundation seed of chickpea was produced. Out of this, National Seed Corporation procured 663 quintals @ Rs 3100/ q. Farmers obtained net benefit of Rs 1000 per q as compared to the prevailing market rate. Remaining quantity of the seed has been kept for use by the farmers in next season. National Seed Corporation purchased 15 quintals seed of UPAS - 120 variety of short duration pigeonpea and 56 quintals of Narendra Arhar 1 of long duration pigeonpea in Fatehpur. Farmers kept 130 q seed of Narendra Arhar 1 for sowing during rainy season 2009. Farmers of adjoining districts *viz.,* Hamirpur, Kanpur Nagar and Banda districts have purchased 6.35 q seed of Narendra Arhar 1 from both the project locations. Considering the current prevailing rate of pigeonpea in nearby market, farmers have decided to cultivate pigeonpea on large scale during current *kharif* 2009.

S.K. Singh, S.K. Dubey, A. Yadava and Ashok Kumar

Director's Desk

Dear Readers,

Over past three decades, concerted efforts have been made for the genetic enhancement for yield, adaptation, resistance to biotic and abiotic stresses and exploitation of heterosis in pulse crops. However, the yield of crops like lentil, mungbean and urdbean has remained on a plateau for the past 15 years, while chickpea and pigeonpea observed only a marginal increase in yield during the period. Among various constraints, narrow genetic base of the released cultivars has been the most important one for low productivity.

In recent years, wild species have been recognized as invaluable wealth for agronomically important traits, generally absent in cultivated species. These wild species can be a source of genes for resistance to biotic and abiotic stresses and quality traits. The identified sources need to be further examined and utilized in improvement programmes more extensively. Enormous variability is available both within the primary species of interest and among their wild relatives in almost all the pulse crops. Pedigree analysis of released cultivars of different pulse crops in India revealed that a very few accessions were utilized in breeding programme which is a small part of the germplasm accessions conserved in various gene banks. Moreover, few lines were more frequently used in breeding programme. For example, 31% varieties of chickpea have IP 58 and C 1234 as ancestors in their pedigree. Similarly, T 9 and T 1 appeared in more than 64% and 35% varieties of urdbean and mungbean, respectively. This explains how the genetic base of pulse crops is narrow and needs immediate corrective measures by using untapped germplasm accessions, exotics and wild relatives in varietal improvement programmes.

Introgression of useful genes from exotic or distant wild sources requires more time. Therefore efforts are needed to transfer the desired gene to a background first so that it can be used as a parent in cultivar development. Further, in a germplasm collection, a very few accessions hold merit for direct use as parent in the crossing programme. The process of pre-breeding should be linked with breeding programme. Need for pre- breeding efforts has been greatly emphasized in XI plan. International Conference on Grain Legumes 2009 organized by IIPR & ISPRD at Kanpur on 14-16 February 2009 reaffirmed the urgent need of enhancement of genetic resources through exploitation of wild species and their use in breeding programmes.

IIPR, Kanpur, SD Agricultural University, S.K. Nagar, Agricultural Research Station, Vamban and Punjab Agricultural University, Ludhiana have already taken a step forward in this direction by establishing pre-breeding hybridization garden not only to ensure availability of promising exotic and wild sources, but also to pre-bred, useful and adapted genetic stocks for further improvement of pulses. I am confident that these efforts will go a long way in increasing the productivity of pulses.

(Masood Ali)

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