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INDIAN INSTITUTE OF PULSES RESEARCH
IIPR
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Newsletter

ICAR-Indian Institute of Pulses Research, Kanpur

VOLUME 32, No. 3 July-September, 2021

Celebration of Foundation Day at ICAR-IIPR

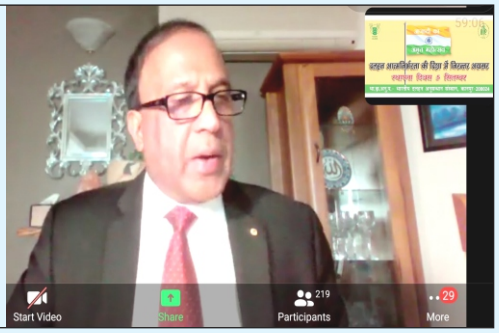
ICAR-Indian Institute of Pulses Research, Kanpur celebrated its **Foundation Day** online on 05th September, 2021. Dr. Trilochan Mahapatra, Secretary, DARE & Director General, ICAR, New Delhi was the Chief Guest of the function. The programme was presided over by Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi. Other esteemed participants were Dr. R.C. Agarwal, DDG (Education), ADG (O&P), ICAR, New Delhi, DDGs & ADGs of ICAR, Hon'ble Vice Chancellors of State Agril. Universities, Dr. N.P. Singh, Director ICAR-IIPR, Kanpur, scientists of ICAR and IIPR, Kanpur and its regional stations, Directors and dignitaries of ICAR Institutes, farmers, and Press and Media.

The Chief Guest praised the achievements of the Institute under the able guidance of Dr. N.P. Singh, Director, IIPR. He congratulated the pulse scientists for achieving the record production of 24 million tonnes of pulses. He stressed on the fact that we have achieved three major goals in this endeavour viz., short duration varieties, hybrid pigeonpea, and biofortified (high Zn, Fe and protein) varieties of pulses. However, in order to achieve our target of 32 MT by 2030, we have a challenge of increasing the production @1-1.5 MT/year. Expressing satisfaction over release of 18 pulses varieties during 2020-21, he stressed upon extending the benefits to the farmers.

The Foundation Day Lecture was delivered by Professor (Dr.) Kadambot H.M. Siddique, Hackett Professor of Agriculture Chair and Director, University of Western Australia, who highlighted strategies for enhancing phosphorus use efficiency (PUE) in pulses especially in chickpea as its availability is becoming limited. He emphasized on development of chickpea core collection which can provide useful genetic resource for improving PUE. He reiterated that novel genes and genetic loci associated with root traits, P acquisition efficiency and PUE could be used in breeding programmes.

Dr. T.R. Sharma, Deputy Director General (CS), ICAR widely applauded the remarkable works and efforts made by the present Director, Dr. N.P. Singh in all round development of the Institute. He justified that the fruits of R & D has also penetrated to the growers in form of seeds of <10 years old varieties in seed chain and production of >18,000 q breeder seed in the country and >1.8 lakh quintals of quality seeds in pulses per year. Earlier, in the welcome address, Director of the Institute, Dr. N.P. Singh highlighted the achievements of the Institute and stressed on the fact that this could be possible due to our collective endeavours leading in >70-80% variety replacement rate (VRR) and >30% seed replacement rate (SRR) along with >32,000 cluster demonstrations on pulses organized by >500 *Krishi Vigyan Kendras* (KVKs) every year.

A virtual inauguration of Technology



INSIDE

Information and Dissemination Centre (TIDC) Building were also held. Besides, three publications and one e-knowledge platform on pulses were also released. On this occasion, farmers' training and visit programmes were also organized at five centres of the institute.

While delivering his remarks, Dr. N.P. Singh, Director, IIPR discussed the research activities and advancements in achieving the self - sufficiency and nutritional security of pulses in the country. He briefed on the research activities going on in the Institute and stressed upon the importance of pulses as a building block for sustaining both crop and human/ animal life on a long-term basis. He emphasized on the fact that research and development activities of the Institute have been further strengthened towards increasing production of pulses, which have resulted in continuous high production & productivity .

Ten progressive farmers belonging to different states were also felicitated on the occasion. During the function, Dr. Aditya Pratap, Principal Scientist was awarded with the Best Scientist Award 2021 in senior category and Dr. Satheesh Naik SJ, Scientist in the young scientist category. Mr. H.N. Maurya was awarded as the Best Technical Officer. Mr. Mayank Mishra was awarded as the Best Worker in administrative category and Mr. Ramesh Chandra was awarded as the Best Worker in supporting staff and Best Team Award was given to pigeonpea team incharge Dr. Abhishek Bohra, Dr. Raj Kumar Mishra, Dr. Satheesh Naik S.J., Dr. Farindra Singh, Dr. Dibendu Datta and Dr. I.P. Singh.

Dr. G.P. Dixit, Project Coordinator (Chickpea) offered vote of thanks. The programme was conducted by Dr. Aditya Pratap & Dr. (Mrs.) Meenal Rathore while the overall coordination was done by Dr. (Mrs.) Uma Sah, Principal Scientist, IIPR, Kanpur.

Brainstorming meeting organized on 'Pulses in North Hill Zone'

One day brainstorming meeting on “Intensification and Sustenance of Pulses in North Hill Zone of India” was organized on 24th September 2021 at CSK Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Palampur. The meeting was organized jointly by ICAR-Indian Institute of Pulses Research, Kanpur and CSKHPKV. It was chaired by Dr. T.R. Sharma, DDG (Crop Science), Co-Chaired by Prof. H.K. Chaudhary, Hon'ble Vice Chancellor, CSKHPKV and attended by eminent pulse researchers including Dr. S.K. Sharma, Chairman QRT, pulses and former VC, CSKHPKV; Dr. Sanjeev Gupta, ADG (Oilseeds and Pulses), ICAR; Dr. N.P. Singh, Director, ICAR-IIPR; Dr. Shiv Sewak, Project Coordinator MULLaRP and Arid Legumes, Deans and Directors of CSKHPKV besides a galaxy of eminent researchers working in pulses research and development across the North Hill Zone. At the outset, Dr. N.P. Singh presented a brief scenario of pulses in the NHZ and highlighted the major constraints towards their growth and development. This was followed by a presentation of Dr. Shiv Sewak who elaborated the role and activities of AICRP on Pulses in the zone.

Dr. T.R. Sharma, Chairman, advised that varieties developed at IIPR should be shared with CSKHPKV as well as other Universities/Institutes in NHZ for their evaluation and suitable varieties, thus, identified should be recommended for cultivation. He emphasized upon developing a visual action plan by including the activity, milestones, output and products and their impact on doubling the farmer's income. He stressed upon identification of trait-specific

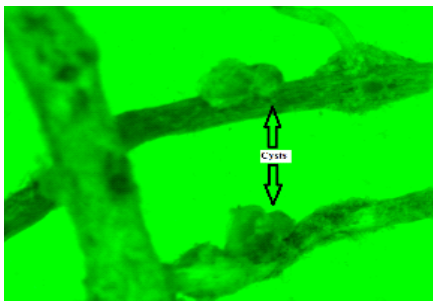
germplasm and need to get it registered with NBPGR. He was optimistic about the scope of pulses expansion in the hills and desired that the 'specialty' and 'organic pulses' should be the catch words to effectively market and promote pulses grown in the hills. He opined that there is a strong need of inter-institution collaboration with a handholding from ICAR-IIPR and therefore, research networks should be formed. Prof. H.K. Chaudhary expressed that farmers need quality seed, feed, farm mechanization, assured marketing and storage. Since *rajmash*, urdbean and horsegram are important crops in Himachal Pradesh, there is a strong need for inter-institutional and multi-disciplinary research. Distant hybridization is necessary for disruptive breeding. He further emphasized that all Institutes should have genetic resource networks and must share their germplasm.

Earlier, Dr. Sanjeev Gupta urged to prepare a roadmap to make the hilly regions self sufficient in pulses by assuring timely availability of quality seed of good varieties having resistance to major diseases, promoting quality seed production and distribution through seed hubs located in NHZ, ensuring safe storage of seeds, developing acidic soil tolerant varieties, cold and frost tolerant varieties, mechanization of post-harvest processes and value addition of pulses. Dr. S.K. Sharma desired that the scientists need to prioritize the pulse crops depending on their production base. He emphasized that there should be separate breeding programmes for hills *versus* other regions and specific centres should be designated for making crosses in particular crops to utilize limited resources. Later brief presentations were made by representatives from different centres across NHZ followed by a detailed panel discussion. The major recommendations included identification of specific lead centres in each state to focus on one or two crops, research prioritization with each centre, generating a large number of crosses deploying trait-specific donors, distant hybridization in all pulse crops and identification of niche specific specialty pulses. Dr. Aditya Pratap, Principal Scientist, IIPR and Dr. R.K. Mittal, CSKHPKV coordinated the programme as Organizing Secretaries.

Research Highlights

Heterodera cajani resistant pigeonpea genotypes identified

Pigeonpea cyst nematode, *Heterodera cajani* is an important nematode pest of pigeonpea causing economic losses. Once established in the field, it is difficult to control as eggs in the cyst remain viable for more than three years. The resistance against this nematode can play an important role in the management of this nematode. Therefore, to identify resistance sources against *H. cajani*, 92 lines were evaluated in 2 x 3 feet cemented pots filled with soil having infestation level of approximately 5-8 cysts/100 cc soil. Each genotype was sown in one line in these cemented pots and was replicated three times. After one month of germination, from each replication, five plants were uprooted carefully along with soil and put in bucket filled with water to take out whole root system with fiber roots and brought to laboratory to access



the cysts on the plant roots under stereoscopic microscope. Based on the scale, No cysts= highly resistant; 1-5 cysts= resistant; 6-25 cysts= moderately resistant; 26-50 cysts=susceptible; >50 cysts= highly susceptible, 5 genotypes were identified as highly resistant, 10 as resistant and 27 as moderately resistant. These 42 genotypes showing high to moderate resistance reaction were retested following the same procedure. Two genotypes, WDBCE 4-5-3-9 and WDBCE 9-4-3-1 were identified resistant with no cysts on the roots and three genotypes WD 2019-40-1, WD 2019-40-2 and WD 2019-45-1 were identified resistance with less than 5 cysts per root system over two years evaluation. These genotypes are promising which can be utilized in pigeonpea breeding programme for developing *Heterodera cajani* resistant varieties.

Bansa Singh and Dibendu Datta

Identification of heat tolerant lentil genotypes

Fifty-two germplasms of lentil were screened for heat tolerance during 2017-21 in the field under late sown condition. It was observed that crop vigour, photosynthesis rate, MSI, pollen viability, pod formation at terminal branches, pod development and grain filling rate are the most important parameters which was severely affected when temperature increased beyond 30 ^{o}C on the basis of these parameters, six genotypes IG 3522, IG 4112, IG 2959, IG 2960 and IG 2507 have been identified as heat tolerant.

D.P. Patel, Jitendra Kumar and Vaibhav Kumar

Compatibility between potential strain of nematode BCAs and *Rhizobium*

Use of more than one BCAs with multiple mode of action together as a single product has been received significant attention among plant protection scientists for nematode management. For this purpose, nematicidal potential strain of Actinobacteria [IIPR:KR01:03 *Streptomyces ginkgonis* (accession no: MN966860)] has been identified in this study. A dual plate assay was used in order to identify the co-culturing ability of this strain with already identified potential strains *viz., Purpureocillium lilacinum* (IIPR-

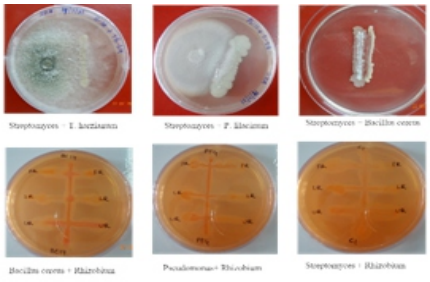


Fig.1. Compatibility between nematode BCAs and rhizobium

PI-11), *Trichoderma harzianum* (IIPR-Th-64), *T. asperellum* (IIPR-Ta-31), *Bacillus cereus* (IIPR-Bc-14) and *Pseudomonas fluorescence* (IIPR-Pf-4). The results showed that all the strains are mutually inclusive and compatible. This study also carried out to test whether all identified strains have any adverse influence on *Rhizobium* of three pulse crops (*viz.*, chickpea, fieldpea and lentil) or not? The results indicated that the strains do not have any antagonism towards *Rhizobium* and they are mutually inclusive.

R. Jagadeeswaran, Krishnashish Das, Jyotirmay Dubey and Sonika Pandey

Identification of drought tolerant lentil genotypes

Forty-five germplasm lines of lentil were screened under drought conditions in rainout shelter. In this study, genotypes with high crop vigour, MSI, NBI and chlorophyll index produced higher dry biomass and grain yield under limited soil moisture Based on these observations, IG 3522, IG2959, IG 2960, IG 2580, IG 2507 and IG 2754, genotypes were identified as drought tolerant.

D.P. Patel, Jitendra Kumar and Vaibhav Kumar

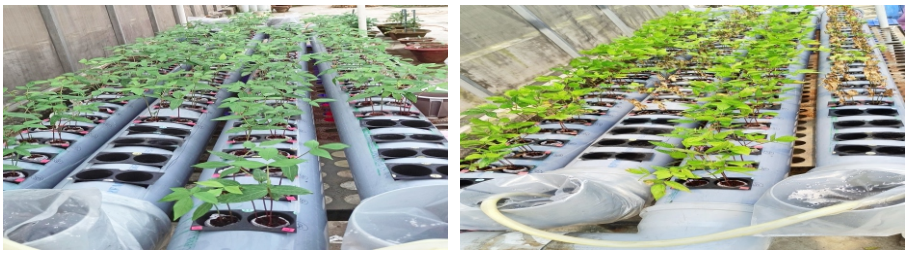
Evaluation of the pollen viability of urdbean genotypes under heat stress condition

Heat stress at reproductive stage causes significant yield loss in urdbean. A large number of urdbean genotypes were screened for heat stress and two genotypes PGRU 95014 and PGRU 95016 were identified as heat tolerant on the basis of high number of primary branches/plant, pod setting and number of filled pods/plant under *kharif* sown condition. Two varieties namely LBG 20, IPU 99-123 were identified as sensitive. Tolerant genotypes further pollen viability analysis showed high pollen viability in tolerant genotypes compared to sensitive ones at 36 ^{o}C temperature. Based on these observations, PGRU 95014 and PGRU 95016 could be identified as potential donor for transferring heat tolerant traits to superior high yielding heat sensitive urdbean varieties.

Vijay Laxmi, T.N. Tiwari, A.K. Singh and D.P. Patel

An efficient, quick and cost effective hydroponics based salinity screening methodology

Soil salinity has dual negative effect on plant as besides being toxic to the cell, high salinity also hinders moisture uptake from soil. For screening salinity tolerant varieties, a hydroponics based salinity screening method was developed that enables efficient screening of large number of genotypes under salinity stress as well as control conditions. Its applicability has been demonstrated in urdbean and is being replicated in other crops. This methodology is rapid, cost efficient and robust and has broad range applicability in other crops.



Demonstration of hydroponics based salinity screening in urdbean
(Plants before treatment are sown in left while 10 days after treatment in right side.

Kuldeep Kumar, Sudhir Kumar, Awnindra Singh, Khela Ram Soren, Meenal Rathore, Malkhan Singh and N.P. Singh

MAGIC population in chickpea for improving genetic gain under abiotic stress

Multi-Parent Advanced Generation Intercross (MAGIC) is a novel breeding scheme for enhancing genetic variability through obtaining novel recombinants by incorporating multipleparental lines in crossing programme. In order to improve genetic gain in chickpea under abiotic stress, eight chickpea parents including JG 11, ICC 96029, JG 130, ICCV 92944, RVG 203, GG 2, ICCV 07110 and GNG 2144 were selected for developing MAGIC population in chickpea. A large amount of phenotypic variation has been captured in F_2 under field condition. This population can be used for future mapping of various traits contributing towards drought and heat stress tolerance in chickpea.

Uday Chand Jha, Yogesh Kumar, Biswajit Mondal, Avinash Srivastava and Narendra Pratap Singh

Molecular characterization of root knot nematode, *Meloidogyne incognita* infecting pulses

Root knot nematode, *Meloidogyne* spp. are biotrophic plant parasites of pulse crops that are cultivated in both *kharif* and *rabi* season. Characterization and maintaining pure culture of various species is prerequisite for nematological research. From infected roots, 10 single egg mass pure cultures of *M. incognita* were developed based on perineal pattern. The genomic DNA from adult female from two populations of *M. incognita* was extracted and characterised on the basis of sequences of the ITS1-5.8S-ITS2 region. The sequence analyses confirmed that population of tolerant nematode under study are belonged to *M. incognita*. The sequences have been submitted with accession numbers (MZ960901, MZ960902) and are being maintained for further research work.

R. Jagadeeswaran, Jyotirmay Dubey and Sonika Pandey

Comparative analysis of phosphorus partitioning in *Rabi* weeds and legume

Competition from weeds, especially in terms of soil nutrients, is one of the important constraints which reduce crop productivity by manifolds. An exploratory study was done to understand the phosphorus (P) acquisition efficiency of *Rabi* weeds and pigeonpea. A total of 10 different weed species were collected from inceptisol of Indo-Gangetic Plains. The weeds were *Hiran Khuri* (*Convolvulus arvensis* L.), Mexican poppy (*Argemone mexicana* L), *Gajri* (*Fumaria parviflora* L.), *Kharabathua* (*Chenopodium murale* L.), *Gehu ka mama* (*Phalaris minor* L.), *Motha* (*Cyperus rotundus* L), *Methi* (*Medicago denticulate* L.), *Jangligajar* (*Coronopus didymus* L.), *Krishna neel* (*Anagalis arvensis* L) and *Bathua* (*Chenopodium album* L.). Among all the weeds, leaf P content was found highest in Jangligajar (0.61%) and lowest in *motha* (0.34%). In comparison to pigeonpea (leaf P content- 0.4%), leaf P content was 34% higher in *Jangligajar*. The overall leaf P content (%) order was *Jangligajar* (0.61)> *Motha* (0.60)> *Gajri* (0.59)>*Hiran Khuri* (0.58)> *Kharabathua* (0.49)> Mexican poppy (0.47)> *Methi* (0.46)> *Bathua* (0.45)> Pigeonpea (0.40)> *Krishna neel* (0.36)>*Motha* (0.34). The study reveals that P acquisition efficiency is higher in weeds as compared to pigeonpea. This study is needed to unfold the crop-weed competition in terms of P acquisition efficiency.

Asik Dutta, Chaitanya P. Nath, Krishnashis Das and Narendra Kumar

Drought tolerant mothbean genotypes under arid environment

Ninteen mothbean genotypes were studied under irrigated and rainfed conditions at ICAR-IIPR, Arid Pulses Research Centre, Bikaner during *Kharif* season 2020-21. Donors for drought tolerance were identified on the basis of chlorophyll content, canopy temperature, dry matter, yield and its attributes. In this study, relative per cent reduction (45-55%) in total biomass was found higher in RMO 4-1 and MBS-821, whereas it was less (17-18%) in RMB-25 and RMO-2251. The highest percentage reduction (77%) in number of pods/plant was observed in MB-50845, whereas it was the lowest (30-36%) in RMO 3-5 and RMB-25. Mothbean accessions RMO-2251 and RMB-25 showed cooler canopies and less reduction in yield and biomass under the rainfed conditions. Therefore, these accessions can be used in mothbean breeding programmes for drought tolerance.

Field view of mothbean accessions

Surendra Kumar Meena, Ram Lal Jat, N.S. Nathawat, Prahalad Singh Dhaka and Narendra Kumar

Promising entries of chickpea screened under *rainfed* rice-fallow condition

Fifteen promising entries of chickpea were tested as sequential crop after harvesting of rice in *rainfed* condition over two years under zero tillage for identifying higher yielding entries. The observations were recorded on above ground crop growth, root length, soil moisture dynamics, relative water content, chlorophyll content, crop phenology, yield attributes and grain yield. The highest grain yield recorded in IPC 2011-92 (1.97-2.30 t/ha) and IPC 2014-55 (1.67-2.17 t/ha) over years. These entries had the lowest maturity duration (128-132 days) compared with other entries and hence few identified useful for cultivation in *rainfed* rice-fallows of Eastern regions of India.

C.P. Nath, Uday Chand Jha, Narendra Kumar, Yogesh Kumar, Farindra Singh and N.P. Singh

Performance of mungbean varieties under CA based rice-wheat system in IGP

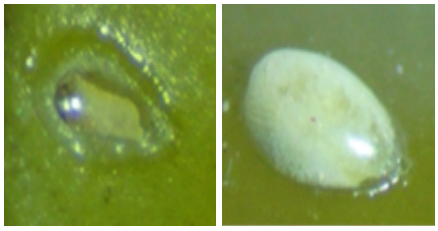
Five cultivars of mungbean viz., *'Samrat', 'Virat'* (IPM 205-7), 'HUM 16', 'IPM 02-3' and 'IPM 2-14' were tested considering their growth habit and crop duration under CA based rice-wheat system for five years. Maturity period of tested cultivars varied between 60 days to 65 days. The increase in grain yield of mungbean was 24.4% under zero tillage (ZT) over conventional tillage (CT). The sequence for grain yield of mungbean varieties was 'IPM 205-7' ('Virat') (1478 kg/ha) > *'Samrat'* (1387 kg/ha) > 'HUM 16' (1288 kg/ha) > 'IPM 2-3' (1277 kg/ha) > 'IPM 2-14' (1227 kg/ha). Residue retention increased mungbean yield by 9.3% than its removal. Thus, 'Virat' emerged as the promising cultivar for sustainable intensification of rice-wheat cropping system under CA in the IGP. The large plot demonstration and scaling to farmers field were undertaken with 550 farmers at Fatehpur district of U.P. which have also shown promising results with >1.0 t/ha yield of 'Virat'.

Performance of 'Virat' under CA

Narendra Kumar, C.P. Nath, Aditya Pratap, K.K. Hazra, C.S. Praharaj and N.P. Singh

Ovicidal activity of plant volatile oil extracts against bruchids

The ovicidal properties of volatile oil extracts derived from *Aegle marmelos, Thuja occidentalis* and *Eucalyptus citriodora* were evaluated against the eggs of *Callosobruchus analis* (F). Legume seeds (*n*=60) bearing single egg (5d old) of *C. analis* were exposed to the vapours of the volatile oil extracts in an airtight fumigation chamber. Treated eggs were incubated for development at 24 hr post-exposure and ovicidal activity was assessed in terms of hatching success. These volatile oil extracts caused more than 80% mortality of eggs depending on the concentrations and further, the egg hatching was totally inhibited at concentrations equivalent to LC_{90}.



Treated egges Untreated eggs

1. Eggs of *Callosobruchis analis* (F.) at 7 days post-exposure to volatile oil vapours

Sanjay M. Bandi, Prastuti Mishra and Revanasidda

Screening of mothbean accessions for abiotic and biotic stresses under arid climatic conditions

Three hundred mothbean accessions were evaluated in augmented design to estimate the presence of genetic variability and to identify suitable donors for breeding cultivars under the hot arid climate. Data were recorded on different agro-morphological traits at different growth stages of the crop. Wide range of variability was observed for days to 50% flowering, plant height, clusters per plant, pods per plant, seed yield per plant and seed weight per plant. The accessions IC-8851, IC-370508, IC-415116, IC-415127, IC-415139 IC-415143 IC-415155, IC-415164 and IC-120963 were identified as early type, whereas IC-402285, IC-11352, IC-315520, IC-329051 and IC-370508 exhibited higher yield over the check varieties. These genotypes might serve as potential donors for the future breeding programme.

Natural field screening of these genotypes showed the highest disease incidence of *Cercospora* leaf spot (5-90%, followed by crinkle leaf disease (10-50%) and yellow mosaic disease (5-80%). The accessions IC-329051, IC-36623IC-415104, IC-415116, IC-415127, IC-415139 and IC-415155 were highly susceptible to *Cercospora* leaf spot and one of the accession (IC-103154) was found highly susceptible to yellow mosaic virus. Two accessions (IC-39734 and IC-39827) have shown absolute resistance to all the three diseases.

Monika Punia, L.K. Rolaniya, R.L. Jat and Narendra Kumar

Transfer of Technology

e_knowledge platform on pulses launched

An e_knowledge platform on pulses was released in public domain by the Honorable Secretary DARE-cum DG, ICAR, on 5th September 2021. It is an interactive and dynamic English website developed for sharing of available knowledge resources with extension personnel and other stakeholders. Knowledge modules on seven major pulse crops *i.e.*, chickpea, pigeonpea, lentil, urdbean, mungbean, pigeonpea and *kabuli* chickpea are integrated on the platform. The information on the website is well categorized including crop production, protection and post harvest handling technologies related to major pulse crops. The website has seven map linked crop specific *Varietal Information Systems* for major pulse crops, wherein user can retrieve information on the recommended varieties with reference to the preferred traits for particular district. The website has integrated video modules, Feedback, Window, success stories and publications on the home page of the website.

Uma Sah

Memorandum of Agreement signed with Mamta Agro India, Kanpur

Institute Technology Management Unit (ITMU) of ICAR-Indian Institute of Pulses Research, Kanpur signed the Memorandum of Agreement (MOA) regarding transfer of technology related to "Protocols for milling of pulses in IIPR Mini *Dal Mill*' with M/s. Mamta Agro India , Kanpur. This was accompanied by signing of another MOA of Agribusiness Incubation Unit, ICAR-IIPR with M/s. Mamta Agro Industries, Kanpur for extending the incubation support to the firm for next six months. Both the MOA were signed by Dr. N.P. Singh, Director, IIPR and Senior Administrative Officer, Mr. Vivek Kumar on behalf of Institute and Mr. Prashast Dheer Saxena on behalf of Mamta Agro India, Kanpur; Dr. Aditya Pratap, PI, ITMU unit; Dr. Uma Sah PI, ABI unit; Dr. Prasoon Verma, Co-PI, ABI and mentor and, Dr. R.K. Mishra, Co-PI, ABI unit were present on this occasion. Dr. Shiv Sewak, Dr. Bansa Singh, Dr. Meenal Rathore, Dr. Narendra Kumar, Mr Jitendra Ojha, Mr Mohit Katiyar, along with Mrs. Mamta Saxena from Mamta Agro-India were also present during the occasion.

Farmer-Scientist Interaction on climate resilient technologies for *rabi* pulses

A "Climate Resilient Agriculture-Farmers' awareness Interaction Meet" was organized on September 28, 2021 at ICAR-Indian Institute of Pulses Research as part of the Honorable Prime Minister's address to the nation *via* video conferencing. Fifty farmers from village Khadra, Fatehpur, Uttar Pradesh visited the IIPR, Kanpur and were exposed to the climate resilient agricultural technologies for *Rabi* pulses developed by the national agricultural research system. A team of scientists from Institute interacted with farmers on *Rabi* pulse production. The interaction meet was coordinated by Drs Uma Sah and Hemant Kumar.

Trainings organized

Online training programme on pulses for human nutrition and health

An online training programme was organized on the theme “Pulses for human nutrition and health” for farmers and farm women on 26th August 2021. A total of 40 participants attended the training from different districts of Uttar

Pradesh. Training sessions were held on pulses as a component of nutritious diet and related to utilization of milling by products for human nutrition. The programme was coordinated by Dr. Hemant Kumar and Dr. (Mrs) Uma Sah.

Online collaborative training programme with MANAGE, Hyderabad

A three days online collaborative training programwas organised with MANAGE, Hyderabad on “Improved Pulse Production Technology for Sustainable Agriculture & Nutritional Security” during September 06-09, 2021.The training programme was attended by 44 extension personnel from across the country. The training emphasized on the pulses as the candidate crop for sustainable agriculture, improved varieties of pulse crops, water resource conservation technologies for sustainable pulse production and pulses for food and nutritional security. The programme was organized by Drs Uma Sah, Devraj and Hemant Kumar.

Farmers training on seed production technologies of *Kharif* pulses organised

A one day farmers' training programme on seed production technologies of *Kharif* pulses was organised at Institute on July 16, 2021. Sixteen farmers from Kanpur Dehat and Hamirpur participated in the training programme. Sessions on improved production technologies including recommended varieties of *kharif* pulses and management of major pest and diseases were organized. Dr. (Mrs) Uma Sah and Dr. P.K. Katiyar organised the training programme.

Exposure visits organized for farmers

Date	Place and Organization	Number of Farmers
September 25, 2021	DDA, Chitrakoot	50
September 26, 2021	DDA, Banda	50
September 29, 2021	DDA, Barabanki	55

Appointments, Promotions, Transfers, *etc.*

Promotions

Sl.	Name	Promoted to	w.e.f.
1	Sh. Radha Krishna, ACTO (T 7-8)	Chief Tech. Officer (T 9)	01.01.2018
2	Smt. Rashmi Yadav, STO (T 6)	Asst. Chief Tech. Officer (T 7-8)	07.01.2018
3	Dr. Rajesh Kumar Srivastava, STO (T 6)	Asst. Chief Tech. Officer (T 7-8)	29.06.2020

Transfers:

Sl	Name	Designation	From	To	Date
1	Dr. C.S. Praharaj	Principal Scientist	ICAR-IIPR, Kanpur	ICAR-DGR, Junagadh	30.09.2021
2	Dr. Rajesh Kumar	Principal Scientist	ICAR-IIPR, Kanpur	ICAR-ATARI-VI, Guwahati	30.09.2021

Retirements:

Sl	Name	Post held	Date of retirement
1	Sh. Ganesh Shankar Sharma	STA (Driver)	30/09/2021
2	Sh. Ram Swaroop Kushwaha	LDC	30/09/2021

Director's Desk

Dear Readers,

Over the past two decades, there has been an increased attention towards development and deployment of genomic resources in major food legumes with an aim of supplementing our conventional breeding efforts towards precise and faster development of newer cultivars. These cultivars will not only be high yielding and multiple stress resistant but also better resilient to climate change. In our quest to develop new genomic resources which started with the two model legumes, *Medicago truncatula* and *Lotus japonicus*, efforts were continued in different food legumes such as chickpea, common bean, soybean, pigeonpea, cowpea, mungbean, lentil and peanut. Subsequently, the genome sequences of chickpea, pigeonpea and mungbean were made available through global research partnerships with a prominent role of Indian scientists while a hunt is still on to develop whole genome sequences in several other crops. The information generated by genome sequencing of different legumes provided greater insight into their gene structure as well as their physical and genetic maps. These efforts led to large scale development of new molecular markers, genetic and linkage maps, expressed sequence tags (EST) database, partial or whole genome sequences, physical and molecular maps, DNA chips and bacterial artificial chromosome (BAC) libraries besides marker trait associations. Nevertheless, with the increasing availability of vast genomic resources and a matching huge investment made in terms of money and time, concerns were always there on the practical utility of the knowledge generated and dividends harvested by us for the welfare of farmers. The scientific research community took all such concerns as a challenge and started working towards a first hand utilization of the available genetic and genomic resources towards trait discovery and delivery of finished products ready to go to farmers fields. Initially started humbly, the researchers emphatically shifted towards marker-assisted breeding towards increasing trait selection efficiency by deploying marker assisted recurrent selection (MARS) and marker assisted back cross (MABC) breeding in crop such as chickpea, pigeonpea, urdbean, common bean, *etc.* Starting with soybean, which perhaps has been the most benefitted crop in terms of use of molecular markers, efforts were gradually spread to many so called 'orphan' and underutilized legumes.

Moving with the times, the Indian Council of Agricultural Research launched a massive research programme on varietal development through MABC with a dedicated fund through Consortium Research Platform on Molecular Breeding which aimed at genetic amelioration of important crops across cereals, pulses, oilseeds and vegetables. This platform mainly aimed at deploying MABC towards development of improved varieties in the background of some of the most popular varieties by trait specific introgression of the deficient characters aided by foreground and background selection through identified molecular markers at each stage. Among pulses, chickpea was the first, where such a programme was undertaken at the ICAR-Indian Institute of Pulses Research, Kanpur; ICAR-Indian Agricultural Research Institute, New Delhi and Punjab Agricultural University, Ludhiana besides many other NARS partners. Simultaneously, among other leading centres ICRISAT, Hyderabad and Egerton University, Kenya also undertook similar pogrammes to accumulate favourable alleles for disease resistance and moisture stress conditions. As a result, several improved varieties were developed in chickpea which included varieties for *Fusarium* wilt resistance (IPCMB 19-3, BGM 20211) and super annigery and drought tolerance (IPCL 4-14) in last two years in the background of some of the most popular varieties of their times. While the above varieties have been released and notified for cultivation, many other advanced breeding lines developed through MABC at different centres are either in multilocation evaluation through AICRP network or are in the advance stages of selection, thereby assuring us that development of such varieties will be a continuous process now on. Fortunately, similar efforts are also underway for developing *Ascochyta* blight resistance as well pyramiding genes for multiple disease and abiotic stress resistance in elite chickpea backgrounds. MABC has also been successfully employed by ICRISAT and other research organizations to introgress Ascochyta blight resistance with double-podding trait in various chickpea cultivars including CDC Xena, CDC Leader, and FLIP98-135C besides a QTL-hotspot containing QTL for root traits and abiotic stress tolerance in JG 11. In peanut, markers linked with root knot nematode resistance were introgressed into cultivated background *via* amphidiploids pathway. More recently, successful introgression of YMD resistance genes has been achieved in urdbean by researchers in Tamil Nadu Agricultural University.

Therefore, it is evident that the vast amount of genetic and genomic resources has been put to judicious use by plant scientists, especially food legume researchers and several useful products have been developed which will have a long lasting impact towards raising the income of farmers and improving their socio-economic status. Nevertheless, there is a need to initiate similar kind of efforts in left-over pulse crops, especially those which are strategically important and where there has been a great success towards development of genomic resources recently. A number of research projects on the similar lines are currently underway at various pulses research organizations including the ICAR Institutes and the NARS partners, ICRISAT and several other Institutes globally which aim to make the integration of conventional breeding and the biotechnology a reality towards achieving the larger goal of food and nutritional security of the masses. I hope that we will have numerous achievements to report in this direction in near future and wish you all a very good luck with your translational research.

(N.P. Singh)

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