PULSES
NEWSLETTER
ICAR-Indian Institute of Pulses Research, Kanpur

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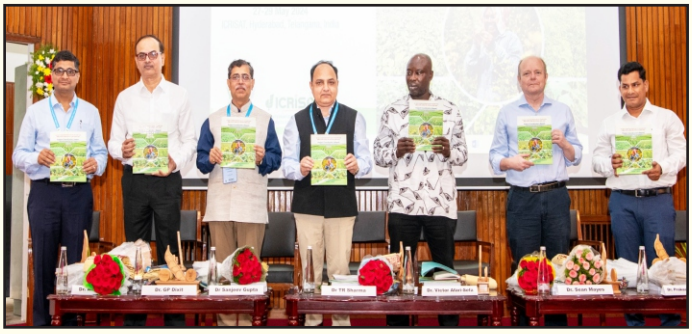
Annual Group Meet- *Kharif* Pulses organized at ICRISAT, Hyderabad

The Annual Group Meet of AICRP on *Kharif* Pulses was organized at the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad during May 27-29, 2024 in the presence of Dr.T.R. Sharma, DDG (CS), ICAR; Dr. Victor Afari Sefa, DDG, ICRISAT; Dr. Sanjeev Gupta, ADG (O&P),ICAR; Dr. G.P. Dixit, Director, ICAR-IIPR; Dr. Sean Mayes, Global Lead, Pulses, ICRISAT; Dr. Aditya Pratap, Project Coordinator, *Kharif* Pulses and about 180 scientists representing NARS, ICRISAT and private seed industries from all over the country.



Dr. T.R. Sharma Chaired the session and appreciated the long standing collaboration between ICAR, ICRISAT and NARS and desired that all stakeholders join hands for achieving the target of net zero pulses import by 2027. He emphasized on need of strategized planning, efficient technology demonstration, deployment of ICT tools and use of exotic and wild germplasm in multi-parent crossing, genomics technologies and molecular tools in pulses research and development to reduce the existing yield gap of 30% across different pulses. Dr. Victor Afari-Sefa, Chief Guest of the occasion, highlighted the new facilities available at ICRISAT (genomics labs, speed breeding facility, *etc.*) and offered all support for collaborations with NARS and ICAR partners. Dr. Sean Mayes highlighted the outcomes of the ICAR-ICRISAT collaboration in *Kharif* Pulses. Dr. Sanjeev Gupta stressed on need to focus on demand-driven research. He mentioned that new initiatives on bio-stimulants, PGPR, *Rhizobium* and bio-film coating of legume seeds should be the future line of research. Dr. G.P. Dixit, Director, ICAR-IIPR highlighted the upward trend of pulses production in the last decade and emphasized upon deploying research strategies *viz*., integration of MABC in pigeonpea, biofortification, pigeonpea transplanting for yield optimization.

Dr. Aditya Pratap presented the Project Coordinator's Report and elaborated the achievements made in the research and development of *Kharif* Pulses, status of germplasm, development of new breeding materials, seed production programme and demonstration of new technologies including that of hybrid pigeonpea. Dr. Prakash Gangashetty, Senior Scientist, Pigeonpea, ICRISAT was Organizing Secretary of the AGM. Two handbooks on field level disease identification in *Kharif* pulses were also released besides a booklet on speed breeding protocol developed by ICRISAT. This was followed by presentation of progress reports by Principal Investigators of various disciplines, formulation of technical programme and Centre presentations. Seven special lectures on the emerging areas of agricultural sciences and technology were also organized. The AGM ended with a resolution to work dedicatedly for the upliftment of *Kharif* pulses.

INSIDE

Seminar on IP and the SDGs: Building our common future with innovation and creativity

To commemorate the 'World Intellectual Property Day', the Institute organized a one day Seminar on 30th April, 2024 on the theme 'IP and the SDGs: Building our common future with innovation and creativity'. The programme was chaired by Dr. G.P. Dixit, Director, ICAR-IIPR, Kanpur and he highlighted the achievements of the institute in the area of IPR and challenges faced by the research community to achieve success in the opportunities of IPR. He emphasized the importance of fostering human minds through innovative ideas, securing

rights for researchers and innovators, and challenging oneself for new ideas to generate more number of IPs. Dr. S.R. Kulkarni, Pr. Scientist & Coordinator (IPR & International Relation), CSIR-Central Drug Research Institute (CDRI), Lucknow delivered an invited talk on IPR and their mechanisms and briefed about all rights associated with indiscernible assets owned by a person or company to protect against any unauthorized use or misuse and how IP rights can help generate business through licensing, royalty and commercialization of technologies. Further, he motivated all young minds and urged them to come out with more innovations and help the country increase its ranking in global innovation index. Dr. R.K. Mishra, (In charge), ITMU convened the seminar and proposed the vote of thanks. A total of 200 participants attended the event.

Research Highlights

Multilocation evaluation of chickpea genotypes for tolerance to heat stress

With the aim of identifying chickpea lines exhibiting enhanced and consistent yields under heat stress conditions, we conducted evaluations of various phenological, yield, and yield-related traits across four locations: ICAR-IIPR, Kanpur; ICAR-IARI, New Delhi; PAU, Ludhiana (Punjab), and ICAR-IIPR-RRS, Phanda, Bhopal (Madhya Pradesh) using a set of 25 advanced chickpea breeding lines, including three checks (ICCV 92944, KWR 108 and GNG 2207). Under heat stress conditions, stability analysis revealed genotypes IPC 2015-66, IPC 2014-99, IPC 2014-90, and IPC 2021-168 to be stable performers. Similarly, the "which won where" criterion highlighted genotype IPC 2019-02 as the top performer in Bhopal and Delhi locations under heat stress environment. Punjab and Delhi were identified as the most representative locations under heat stress conditions.

Uday Chand Jha, Yogesh Kumar, Shailesh Tripathi, Shayla Bindra, Nidhi Kumari, S.K Grhitlahre, Dibendu Datta, Pardeep Katiyar, Girish Prasad Dixit

Early pigeonpea-wheat-mungbean : A pulse-based intensive cropping system for diversification of rice-wheat system in IGP

An experiment was conducted on evaluation of pigeonpea (IPH 15-03 and Pusa 2018-4) - wheat (Unnat Halna and HD 2967) system for higher productivity and profitability under irrigated conditions under conventional tillage (CT) and conservation agriculture (CA) systems in comparison to conventional rice-wheat system for two consecutive years (2022-23 and 2023-24) with fertilizer management (100% NPK and 75% NPK) and summer mungbean cultivation.

Under CA-based system, zero-tilled flat bed (ZTFB) pigeonpea (cultivar IPH 15-03) – ZTFB wheat (Unnat Halna) + 100% NPK + residue gave wheat yield comparable with conventional tilled rice-wheat system + 100% NPK without residue. Amongst mean yield of varieties among all treatments, IPH 15-03 had higher average yield (1.50 t/ha) than Pusa 2018-4 (1.33 t/ha). For wheat yield, HD 2967 had yield of 5.01 t/ha (in rice-wheat system) and Unnat Halna had 4.10 t/ha. Average of system indicated a pigeonpea yield of 1.50 t/ha in raised bed and 1.40 t/ha in flat bed (non-significant), however, wheat yield was higher in flat bed. The ZTFBP (IPH 15-03) – ZTFB wheat (Unnat Halna) + ZTFB summer mungbean (ZTFBSMb; cultivar Virat) + 75% NPK + R (1.73 t/ha) resulted in 41% higher pigeonpea yield over CT pigeonpea (IPH 15-03) – CT wheat (Unnat Halna) + 100% NPK without residue (1.22 t/ha).

System productivity (WEY) was higher under ZTFBP (IPH 15-03) – ZTFB wheat (Unnat Halna) + ZTFBSMb + 75% NPK + R (14.3 t/ha) over conventional rice-wheat system (PTR – CTW + 100% NPK – R; 7.99 t/ha). Pigeonpea provided an additional net income of ₹ 29,516.00 over rice (mean of treatment).

This study indicated that technology including early pigeonpea (cultivar hybrid IPH 15-03), short duration wheat (cultivar Unnat Halna) and summer mungbean cv. Virat can be a promising cropping system for sustainable intensification in IGP.

C.P. Nath, Narendra Kumar, Asik Dutta and Namrata Laskar

Optimization of seed chipping method for simultaneous ODAP quantification and generation advancement in grasspea (*Lathyrus sativus* L.)

Grasspea being an often cross-pollinated crop, maintenance of genotypes with low ODAP content is a challenge. *A priori* information of ODAP content facilitates the genotype selection on field. We had optimized a cost effective, single seed chipping method in grasspea for testing the seeds for ODAP estimation before planting them in the field. Seeds of grasspea were chipped on sandpaper (Araldite SANDX P120) by holding the laterally compressed surface of the seed and rubbing the distal end on the opposite side with respect to the embryonic position (Fig. 1 c, d). The seed was rubbed initially slow till the distal end etched against the sandpaper, followed by firm rubbing till approx. half seed volume retained (Fig. 1e). About 18-20 mg seed powder obtained from chipped seeds of

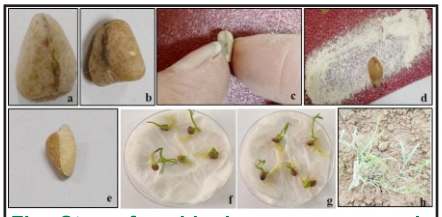


Fig. Steps for chipping grasspea seeds and their establishment in the field. a) Whole seed before chipping, b) Whole seed showing embryo region, c) Holding seed for chipping in sand paper, d) Fine seed powder from the half chipped seeds, e) Remaining half of the chipped seeds with intact embryo for sowing, f) Chipped seeds showing signs of germination 3-4 days after sowing, h) Established plants in the field from germinated seeds after transplanting.

grasspea without disturbing the embryonic axis. The obtained seed powder from the chipped seeds was used for ODAP estimation using spectrophotometer assay. The ODAP content from the chipped seeds was found comparable in quantity to the ODAP from whole ground seeds. The remaining half of the chipped seeds was tested for germination. Among the 10 genotypes tested, majority of the genotypes exhibited >90% germination in both chipped and whole seeds (Fig. 1 f,g) except Nirmal, Prateek and IPLa210, which showed germination in the range of 70-80% in the chipped seeds. The germinated seeds could be easily established in field after transplanting. The established chipping method in grasspea has potential to utilize in screening of mutant population for ODAP content and genotyping.

Neetu Singh Kushwah, Prity Kushwaha, Archana Singh, Salba Jamal, Biswajit Mondal, Meenal Rathore

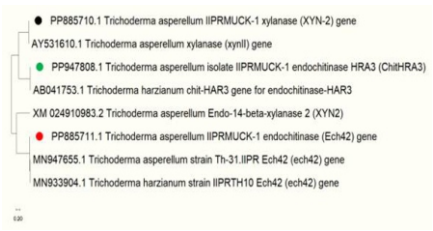
Identification and physiological characterization of urdbean genotypes for heat tolerance

Heat tolerant urdbean genotypes were identified by screening 56 germplasm lines in an augmented block design field experiment during 2023-24 based on morpho-physiological characters. Based on relatively reduced yield reduction (7.3 - 12.6% in Bhopal and 2.3 -12% in Kanpur), the urdbean lines PGRU 95016, PGRU 95014, IPU 30 and IPU 2K-22 were categorized as heat tolerant. The genotypes HUP 120, PKGU 1, VBU 04-004 and PL 446 showed yield reduction in the range of 1.9 to 44% in Bhopal and 13.92 - 27% in Kanpur and were identified to be moderately heat tolerant. Genotype IPU 94-31 showed yield reduction of 74.3% at Bhopal, 87% at Kanpur and genotype IPU 99-79 had yield reduction by 87% at Bhopal and 43.8% at Kanpur and were identified as heat sensitive genotypes.

Vijay Laxmi, T. N. Tiwari and Gitanjali Sahay

Mycoparasitism related genes expression of *Trichoderma asperellum*, IIPRMUCK-1 to evaluate its biological control potential

The identification of new isolates of *Trichoderma* spp with high exploitive activity against *Fusarium oxysporum* f. sp. *ciceris* is an appropriate and sustainable approach to avoid the excess use of chemical pesticides. In this study, presence of mycoparasitic genes in *T. asperellum* isolate IIPRMUCK-1 were studied. The presence of genes encoding chitinases (ech42 & chit-HRA3) and Xylanase (xyn-2) and their



respective *in vitro* enzymatic activities were measured. Dual plate confrontation assays of the isolates against *F. oxysporum ciceris* were also tested. In this work, the *T. asperellum* isolates (IIPRMUCK-1) showed the greatest mycoparasitic potential against *F. oxysporum ciceris* which could lead to improved biocontrol potential of this most devastating soil borne phyto pathogen.

R.K. Mishra, Shailesh Dixit and Sonika Pandey

Development of a genetic stock of pigeonpea for short height with indeterminate growth habit

Plant height of pigeonpea is associated with growth habit. Determinate (DT) genotypes are short in height as compared to indeterminate (NDT) accessions and, therefore, act as potential source of dwarfness. However, the DT genotypes are highly prone to *Maruca vitrata* damage which is why they are neither preferred as a variety nor as trait donor in a crossing programme unless due to scarcity of suitable donor. Wild derivatives emanating from cross between cultivated pigeonpea and *Cajanus scarabaeoides* were evaluated for various agronomic and host-resistance traits which exhibited wide variability for different traits *viz*. seed size, pod shattering, seeds per pod, pod branching length and plant height. WD 108, an indeterminate wild derivative, was consistent for short height over the year and location, based on the evaluation in replicated trials conducted at Bhopal over two years. In *Kharif* 2023, the average plant height of WD 108 was 101.5 cm and statistically at par with two dwarf determinate genotypes namely, WD 19 (90.3 cm) and Pusa Arhar 16 (97.6 cm). WD 108 was characterized for agronomic and morphological traits and documented as short height NDT genotype. Dwarfing genes from WD 108 may be transferred into breeding lines without impacting the indeterminate growth habit of recombinants arising from a good agronomic base in segregating generations.

Genotype	PH (cm)	GH	DM	100 SW (g)	Y/ha (kg)
Pusa Arhar-16	97.6	DT	141	7.4	862
TJT -501	176.8	NDT	173	8.2	2155
WD -108	101.5	NDT	170	5.2	1009
WD -19	90.3	DT	181	5.7	881
CD at 5%	18.1	-	7.8	1.3	289
CV	7.3	-	2.8	11.9	13.5

PH-Plant height, GH-growth habit, DM-days to maturity, SW-seed weight and Y-yield/ha.

S.K. Ghritlahre, D. Datta, S.J. Satheesh, A. Bohra, I.P. Singh, Nidhi Kumari, G. Sahay and G.P. Dixit

प्रौद्योगिकी हस्तांतरण

Licensing (MoA) of eighteen pulse varieties

Licensing (MoA) of eighteen pulse varieties was done with four seed companies recently:

- Eleven different varieties of pulse crops, chickpea (IPCK 2013-163,Samrudhi, ICP 2005-62 & IPCK 2009-145), pigeonpea (IPA 15-02, IPA 15-06, IPH 9-05 & IPH 15-03) and urdbean (IPU 13-1, IPU 17-1 & IPU 17-2) with M/s Vishwas Agri Seeds Ltd., Ahmedabad, Gujarat.

- Pigeonpea (IPA 15-06), urdbean (IPU 13-1), and mungbean (Virat and Shikha) with M/s Foragen Seeds Pvt. Ltd., Hyderabad.

- Mungbean (Soorya & Virat) with M/s IFSA Seeds Pvt. Ltd., Sri Ganganagar, Rajasthan on June 07, 2024.

- Licencing of an early variety of Pigeonpea (IPA 15-06) with M/s Prasad Beej Farms Pvt Ltd., on June 07, 2024.

Dalhan Pathshala on AIR, Kanpur: An initiative for addressing information needs of farmers

Need based radio programmes have also been used as a complementary tool for extension that complements the existing agricultural information systems. For addressing the information needs of farmers and knowledge intermediaries related to pulse cultivation, a radio programme– *Dalhan Pathshala* has been initiated by ICAR-IIPR, Kanpur, covering a range of topics and integrate scientific information on pulse production technologies. The programme was designed and coordinated by Dr. Uma Sah, Head, Division of Social Sciences.

Successful Experiences of Farmers' on-farm experimentation with improved production technology of pigeonpea

Broadcasting is a traditional and the most commonly followed method of sowing seeds in *Kharif* season in Fatehpur district. It is considered as the easiest and cheapest method that requires minimum investment on labour charges. Contrary to this, the recommended Line sowing method is an improved technique that ensures better germination, optimizes seed rate and facilitates intercultural operations. Shri Ranbir Singh is a progressive partner farmer from Khadra village of Fatehpur district under the Farmer FIRST Programme, who experimented with the traditional (broadcasting) and improved method of sowing of long-duration pigeonpea variety (IPA 203) as a part of on farm intervention.

Uma Sah, Rekha Rani C.P. Nath, Sujyanand G.K., R.K. Mishra and Vikas Maurya

Successful introduction of spring mungbean varieties leads to better farm returns

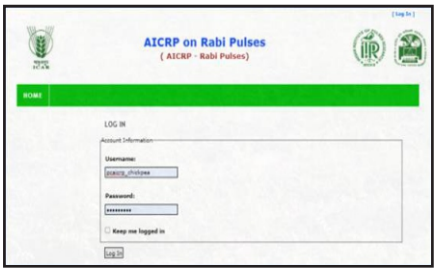
Cultivation of spring mungbean is commonly practiced by farmers for additional income and better soil fertility in Kanpur Dehat district. Prevalence of non-descript mungbean varieties and limited uptake of plant protection technologies were observed to be the major challenges for reaping higher yields from spring mungbean cultivation in *Kandhi, Kandhi Ki Madaiya, Korawa* and *Ingwara* villages of Kanpur Dehat district under Model Pulse Village project.

During spring 2024, high yielding and disease resistant improved varieties of mungbean *viz.*, IPM 207-5 (Virat) and IPM 410-3 (Shikha) were successfully introduced in 75 ha in these project villages. A total of 148 farmers participated in these efforts. The farmers fetched an average yield of 12.20 q/ha from demonstrations plots against 9.75 q/ha from control plots, leading to higher income from demonstrations plots (₹ 1,04,864.60 q/ha) as compared to control plots (₹ 83,440.5 q/ha).

Uma Sah, Hemant Kumar, C.P. Nath, Anup Chandra and Vikrant Singh

Online module for AICRP *Rabi* Crops

Online module for data submission and retrieval of AICRP *Rabi* crops has been hosted at the IASRI web server with link https://aicrp.icar.gov.in/ chickpeaform. Demonstration of the module to AICRP *Rabi* team was done and validation of chickpea trial data submission is in



progress. Layout of IVT trial of *desi* chickpea in alpha design has been sent through this module and other trials of IVT, AVT 1 and AVT 2 of AICRP chickpea crop in RBD design were inserted in the module.

Hemant Kumar and Devraj

Rabi interventions led to higher profits in Hamirpur district

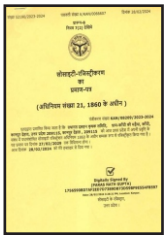
Farmer FIRST project is being implemented in Kanauta danda, Gimuha & Badanpur villages of *Kurara* block of Hamirpur district since September, 2023. During the baseline survey, the prevalence of non-descript varieties of chickpea, lentil and old varieties of wheat (HW 147) was observed. Lack of awareness about the insect and disease management of chickpea led

to sub-optimum yields. Technological interventions on chickpea (var. IPC 06-77), lentil (var. IPL 315) and high yielding wheat (var. DBW 327) were implemented in 7.8 ha, 1.67 area and 0.6 ha, respectively in partnership of 47 farmers. The intervention led to 4.86 q/ha yield enhancement in the demonstration field as compared to the control fields (10.40 q/ha).

Uma Sah, Rekha Rani, C.P. Nath, Sujyanand G.K., Vikas Maurya and Baboo Singh

Leveraging farmers' collectives for diffusion of pulse production technologies in Model Pulse Village

Partner farmers were mobilized to form two farmers' collectives in form of registered societies in Kandhi village of Kanpur Dehat. The societies '*Tathagat Dalhan Krishak Samiti*, Kandhi, Kanpur Dehat' and '*Satnam Krishak Samiti*, Kandhi Kanpur Dehat' were formed under Model Pulse Village project being implemented by Division of Social Sciences in these project villages. Each of these societies has about 11 members farmers. These societies are partnering the efforts



for diffusion of recommended pulse production technologies among larger farming community in and around their villages as well as strengthening the pulse seed system in the above said Model Pulse villages.

Uma Sah, Hemant Kumar and Vikrant Singh

Farmers' Trainings and EDP Organised

- Two five days long Entrepreneurship Development Programme on 'Bio-Fertilizer Production' and 'Seed Production of Pulses' were organized by Agri-Business Incubation Centre, ICAR-IIPR, Kanpur during June 24-28 and July 1-5, 2024 respectively attended by Mr. T.P. Parth Sarrthi, an entrepreneur from Bengaluru, Karnataka. EDP on 'Seed Production of Pulses' covered aspects of pulses seed production, varietal options, seed processing of seeds, seed standards, seed testing and other business avenues in seed production. Dr. P.K. Katiyar, HoD, Crop Improvement was mentor for the programme.

- A five days farmers training programme on 'Improved Proved Pulse Production Technologies was organised during June 25-29, 2024 for 21 innovative farmers and 04 officials of Agriculture Department. A total of 04 lectures and 02 field visits were scheduled. Dr. Uma Sah, HoD was Training Course Director and Dr. Ashis R. Udgata, Scientist was Training Coordinator.

- A five days farmers exposure-cum-training programme was organised during July 1-5, 2024 sponsored by Organization of Rural Development & Economic Research (ORDER), Cuttack, Odisha. Total 45 participants from different districts of Odisha state participated in this training. The said training was customized according to the pulse production scenario of Odisha state and accordingly included 15 lectures and 2 field visits. Dr. Uma Sah, HoD, Division of Social Sciences was Course Director and Dr. Devraj was the Course Coordinator of the training programme.
- A farmers' training programme titled, 'Improved Pulse Production Technologies was organized during July 16-20, 2024 with the involvement of Dr. Uma Sah, HoD Social Sciences Division & Course Director and Dr. Devraj, Principal Scientist as "Training Coordinator" under Project Director, ATMA Scheme, Samastipur, Bihar. Total 29 farmers participated in the training programme. The said training programme included 15 lectures and 2 field visits.

Supporting Farmers under Schedule Caste- Sub Plan

- Distribution of quality seeds of Mungbean (cv. *Shikha*) to 300 SC farmers of Kanpur Dehat, Unnao, Hardoi, Raibarelly, Fatehpur and Auraiya districts.
- Distribution of Agricultural Tool Kits to 200 SC farmers of Kanpur Dehat, Unnao, Hardoi, Raibarelly, Fatehpur and Auraiya districts.
- Distribution of Micro-Nutrients Packets to SC farmers of Kanpur Dehat and Unnao districts.

Foreign visits

Director IIPR & Scientists visited Belgium

Dr. G.P. Dixit, Director, Dr. Gitanjali Sahay, Principal Scientist IIPR, RS, Bhopal and Dr. Neetu Singh Kushwah, Senior Scientist, Plant Biotechnology Division visited Ghent, Belgium during 02-04 June, 2024 to attend the First International Lathyrus Day that was hosted by the Fernand Lambein Fund, in memory of Prof. Fernand Lambein, a renowned researcher in the field of *Lathyrus sativus*. The purpose of the event was to bring together scholars and professionals devoted to *Lathyrus sativus* research to foster connections, share knowledge, and cultivate collaborations across the globe. Researchers from more than 18 countries attended the event and showcased their research in the form of poster presentations, oral presentations and keynote speaker talks. A visit to Science Park and ILVO at Ghent was also organized.

संस्थान में अन्तर्राष्ट्रीय योग दिवस मनाया गया

अन्तर्राष्ट्रीय योग दिवस 21 जून, 2024 को भारतीय दलहन अनुसंधान संस्थान के प्रांगण में बड़े उत्साह के साथ मनाया गया। प्रातः 6:30 बजे आयोजित इस योग कार्यक्रम में संस्थान के वैज्ञानिकों, तकनीकी व प्रशासनिक वर्ग के कर्मचारियों ने भाग लिया। इस अवसर पर संस्थान के निदेशक डॉ. जी.पी. दीक्षित ने जीवन में योग के महत्व पर प्रकाश डाला। उन्होंने कहा कि आज के इस प्रदूषित वातावरण में योग को जीवन में अपनाकर ही स्वस्थ रहा जा सकता है और तनावमुक्त जीवन जिया जा सकता है। योग क्रियाएं, आयुष मंत्रालय के *प्रोटोकाल* के अनुरूप पूर्ण करवाई गईं, बताया गया कि कौन से आसनों का नियमित अभ्यास करके कौन से रोगों से मुक्ति पाई जा सकती है। इस अवसर पर संस्थान के वरिष्ठ पदाधिकारी, परियोजना समन्वयक, विभागाध्यक्ष, वरिष्ठ प्रशासनिक अधिकारी, वरिष्ठ वित एवं लेखाधिकारी आदि मौजूद थे।

PERSONNEL

Appointments, Promotions, Transfers, *etc.*

Appointments

Sl.	Name	Post	Date of joining
1	Mr. Anuj Gupta	Technician	22.04.2024
2	Mr. Sanjay Kumar	Technician	26.04.2024
3	Mr. Deepak Kumar	Technician	29.04.2024
4	Mr. Prashant Singh Pal	Technician	29.04.2024
5	Mr. Prashant Gupta	Technician	30.04.2024

Transfers:

Sl.	Name	Designation	From	To	Date
1	Dr. Pankaj Kumar	Chief Administrative Officer (SG)	ICAR Headquarters	IIPR, Kanpur	10.06.2024
2	Dr. Krishna Kumar	Pr. Scientist (Plant Pathology)	RPCAU, Pusa, Bihar	IIPR, Kanpur	12.06.2024

Retirements:

Sl.	Name	Post held	Date of retirement
1	Dr. Bansa Singh	Pr. Scientist	31.05.2024
2	Mr. Gulab Chandra Sharma	AAO	30.06.2024
3	Mr. R.S. Mathur	CTO (T-9)	30.06.2024
4	Mr. Surendra Singh	SSS	30.06.2024
5	Mr. Madan	SSS	30.06.2024

Obituary:

Sl.	Name	Post held	Date of retirement
1	Mr. Kamar Mehandi	SSS	12.06.2024

Director's Desk

Dear Readers,

Committed to continue efforts for sustaining pulse production, the Institute is focused to improve the pulses genome and developing better varieties. With a gigantic increase in anthropogenic activities and reducing arable land, the need to produce more and nutrient dense food using limited resources has now become inevitable. Though a large number of varieties have been developed by the Institute, the available narrow genetic base in legumes has been a major constraint in its improvement.

Of several reasons leading to low genetic diversity in pulses, selection for specific traits during domestication may be an important cause. Also, focus on certain traits like increased yield, synchronous maturity, reduced shattering, *etc*., during breeding, practice of monocropping, small breeding stocks, *etc*., are other reasons contributing to the narrow genetic base in pulses. When genetic diversity is low, entire population may become susceptible to specific pests and diseases and may have limited adaptability to changing environments leading to crop failures and have significant impacts on food supply, especially in regions reliant on these crops for nutrition.

The genetic base can, however, be gradually broadened by integrating traits from wild relatives of legumes. This involves identifying and developing new germplasm that can be used in conventional and molecular breeding programmes. By utilizing wild relatives and landraces, prebreeding aims to introduce desirable traits that may not be present in elite lines. The Institute is actively engaged in prebreeding of legumes for

harnessing desired traits. Scientists at the regional centres and stations have conducted explorations, characterized landraces and wild relatives for valuable traits, conserved them and then shared potential germplasm for use in breeding. International organizations also carry out Focused Identification of germplasm Strategy (FIGS) with robust geographical datasets that has enabled identification of adaptive traits and made available to NARS partners for discovering responsible genes and deploying them for pulses improvement. Wide hybridization is difficult and interspecies crossing incompatibility restricts the use of such germplasm. Embryo rescue is an option, but demands skill, infrastructure, experimenting and patience.

The Pre-breeding garden established at IIPR consists of wild accessions of different pulse crops including chickpea, pigeonpea, lentil and *Vigna* that are routinely maintained and utilized for making crosses to be used in breeding programmes for trait transfer.

Recent advancements in genomics, biotechnology, and informatics have revolutionized pre breeding efforts. Available genome sequence information enables SNP identification for phenotype association amongst germplasm and further use for validation and use in prebreeding. Collaboration and networking plays an important role, all in effort to be able to capture globally available genomes to harness alleles of interest and broadening the genome base. The complexity of pulses genome, however, does not permit smooth transfer of desired alleles. Pre breeding with the help of genomics can enable targeted transfer of desired alleles and also overcome the associated linkage drag. There is need to strengthen pre breeding efforts to be able to improve pulses and enhance agricultural resilience in the face of climate change.

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