



Vol. 32 No. 3

Quarterly

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DR KULDEEP SINGH JOINS AS DIRECTOR, ICAR-NBPGR

Dr Kuldeep Singh joined as the eighth regular Director of ICAR-NBPGR, on August 11, 2016. Hailing from a tiny hamlet in Kashmir, Dr Singh did his B.Sc. (Ag.) from Sukhadia University, Udaipur and M.Sc. & Ph.D. (Plant Breeding) from Punjab Agricultural University (PAU), Ludhiana. He was decorated with 'Sardar Iqbal Singh Dhillon Gold Medal', for securing highest marks during his post-graduation.

He started his career as an Assistant Wheat Breeder at PAU, Ludhiana, in July 1990 and continued till May 1999. During this period he was associated with development and release of three wheat varieties and establishment of basic genetic material and protocols for development of wheat haploids through wheat x maize crosses and for hybrid wheat.

Between April 1992 to October 1995, he joined the International Rice Research Institute (IRRI), Philippines, as a Post-Doctoral Fellow with the World Food Laureate, Dr G.S. Khush, wherein a complete series of secondary trisomics in rice were developed and used for mapping centromere positions in the classical and molecular linkage maps of rice. This led to corrected orientation of the linkage maps and defining positions of the centromeres on the 12 linkage groups in rice and laid foundation for generating correct physical map of rice and the rice genome sequence.

Dr Singh worked as Molecular Geneticist (1999- 2007), Senior Molecular Geneticist (2007-2016) and Director (Nov 2010- Jan 2015) at the School of Agricultural Biotechnology, PAU, Ludhiana and was involved in wide hybridization (wheat and rice, using wild relatives), gene identification and mapping (genes conferring resistance to bacterial blight, blast, brown plant hopper and sheath blight in rice; novel genes conferring resistance to stripe rust, leaf rust, cereal cyst nematode, Karnal bunt and powdery mildew in wheat), molecular breeding (marker assisted selection in rice) and genome sequencing (led the country for sequencing of chromosome 2A of wheat). He raised funds to the tune of more than Rs 50 crores, over a period of 15 years, through 30 externally-funded projects. He has to his credit, 102 research papers in prestigious refereed journals, including Science, Science Communication, PNAS, Genetics, TAG, PLoS ONE, Crop Science, Genome, Heredity, Euphytica, Plant Breeding etc.

As a popular teacher, Dr Singh has taught 13 different courses in Genetics, Plant Breeding and Molecular Genetics and Genomics at PAU, Ludhiana. He established three teaching programmes leading to award of B.Sc., M. Sc. and Ph.D. degrees in Biotechnology. Till date, he has guided 14 M.Sc. and 14 Ph.D. students, of which four students were selected for the prestigious 'Monsanto's Beachell-Borlaug International Scholarship'.

The ICAR-NBPGR family extends a warm welcome to Dr Kuldeep Singh and wishes him the best for all his endeavors!



PGR ACTIVITIES

Exploration and Germplasm Collecting

Drumstick germplasm collecting



Seeds of wild drumstick

A total of 25 accessions of drumstick (*Moringa oleifera*) germplasm were collected by explorers from ICAR-NBPGR, New Delhi, during July 24-30, 2016. Area covered were foothills of Himalayas in the Champawat, Haridwar, Nainital and Udham Singh Nagar districts of Uttarakhand. The collection comprised eight wild and 17 cultivated types, in the form of seeds and cuttings. Variability was recorded in tree canopy, leaf size and pod/seed characters. Information was recorded on local uses of different plant parts viz. leaves, flowers, pods, seeds and bark as food, fodder and medicinal value.

Another collaborative exploration and collecting mission for wild and cultivated *Moringa* spp. germplasm was undertaken by ICAR-NBPGR, Regional Station (RS), Thrissur with Indian Institute of Horticultural Research (ICAR-IIHR), Bengaluru and Horticultural College, Tamil Nadu Agricultural University and Research Institute, Periyakulam from May 26 to June 3, 2016. Areas covered were Salem, Namakkal and Tiruchirapalli districts of Tamil Nadu. A total of 53 samples were collected comprising 52 samples of the targeted cultivated drumstick stem cuttings and one sample of the wild *Citrullus colocynthis* germplasm. Diverse samples of *Moringa oleifera* were collected with small, medium, long and extra-long fruits, both thin and thick, early maturing and late maturing types. Stem cuttings of a high yielding variety 'Alagarsamy Moringa' developed by Pallappatti Alagarsamy of Dindigal, was also collected (NLBM/16-24).

Germplasm Exchange

Import

A total of 7,046 accessions were imported from 22 countries. Promising accessions include:

Rice from Philippines: Submergence tolerance (EC887557), bacterial blight resistance (EC892776 - EC892800) and high yielding (EC891763 - EC891808) accessions.

Improved Cabbage varieties from UK (EC889990 - EC890015) : Red meteor original, Kissendrup, Yates giant red, Rodynda GS, Superstar 528, Dwarf red Dutch, Lumbarda morada, Stockleys giant red, Yates red acre pickling, late purple drumhead, Red dragon, Red pickling drumhead.

Mango Rootstocks from Israel (EC890387-EC890389).

Plant Quarantine

Quarantine at New Delhi

A total of 4,046 samples of imported germplasm including transgenics were processed for quarantine clearance. Out of these samples, 73 were found infected/infested with various pests and were salvaged with suitable treatments. Besides, germplasm samples were subjected to mandatory hot water (266 paddy samples), tri-sodium orthophosphate (71 samples of chilli and tomato), pesticidal dip (675 samples of vegetative propagules) and fungicidal (61 samples) treatment. Major interceptions in imported germplasm were *Uromyces betae* in *Beta vulgaris* from UK, *Rhizopertha dominica* in *Oryza sativa* from Bangladesh, Arabis mosaic virus, Bean mild mosaic virus, Bean yellow mosaic virus, Cowpea severe mosaic virus and Cherry leaf roll virus in *Glycine max* (transgenic) from USA, *Aphelenchoides besseyi* in *O. sativa* from Philippines. In addition, 41 samples were processed for export quarantine and released after EDCT fumigation. Two Phytosanitary Certificates were also issued.

Post-entry quarantine growing/ inspection

A total of 306 samples of exotic *Glycine max* (10) and *Vigna radiata* (296) were grown in post-entry quarantine greenhouses. Virus indexing revealed presence of *Arabis mosaic virus*, *Cowpea mosaic virus*, *Peanut stunt virus* and *Tomato ringspot virus* in *G. max* and *V. radiata*; *Tobacco streak virus* in *V. radiata* imported from AVRDC, Taiwan. A total of 672 samples were observed for

presence of any exotic pest/pathogens during four post-entry quarantine inspections undertaken at indenter's site. The virus indexing revealed the presence of *High plains virus* (not reported from India) in three samples of transgenic corn imported from USA by EI Dupont India Pvt. Ltd., Hyderabad.

Seed health testing for pest-free conservation

Seed health testing of 6,116 samples of various crop germplasm was done for pest-free conservation in National Genebank. Out of these, 1,364 samples were subjected to X-ray radiography. A total of 403 samples were found infected with different pests, of which 382 were salvaged, while 21 were rejected and sent to medium-term storage (MTS).

Quarantine at RS, Hyderabad

At ICAR-NBPGR, RS, Hyderabad, a total of 8,208 samples consisting of import (7,326) and export (882) germplasm were processed for quarantine. Import germplasm (6,150 samples) was released to the consignees after necessary mandatory treatments. Three samples of chickpea infected with gram negative bacteria were not found suitable for export, hence detained. These samples were meant for export to different countries by ICRISAT. In all, 22 Phytosanitary Certificates were issued. The quarantine service was provided to 28 institutions (Public-3; Private-21; ICRISAT, CIMMYT, IRRI and AVRDC). During processing, *Stenocarpella* sp. on maize from Mexico and USA, *Lasiodiplodia* sp. on maize from Thailand; and *Drechslera sacchari* on pearl millet from Niger were intercepted.

Germplasm Characterization and Evaluation

Germplasm characterization at Akola

At ICAR-NBPGR, RS, Akola, 326 accessions of mung bean (25), black gram (35), barnyard millet (45), foxtail millet (59), finger millet (50), winged bean (50) and okra (62) were characterized for morpho-agronomic traits. In mung bean, best performing accessions identified for different traits were IC617817 and IC617819 for days to 50% flowering (35 days), IC617813 for plant height (124.6 cm), IC617798 for 100 seed weight (5.07 g), PTP/DC/AMP97 and PTP/DC/AMP69 for pod length (11.7 and 10.85 cm respectively). In black gram, best performing accessions were IC617772 for days to 50% flowering (35 days), IC617800 for plant height (86.5 cm), PTP/DC/AMP36 (39.2), IC617825 (36.8) and IC617781 (36.05) for no. of pods per plant, PTP/DC/AMP09 (8.9 g), PTP/DC/AMP12 (8.63 g) and PTP/DC/AMP11 (8.57 g) for yield per plant. In okra, high variability was observed for days to 50% flowering (40-90 days), plant height (23.36-102.8 cm), no. of fruits per plant (1-5) and fruit length (5.7-17.9 cm).



A promising black gram accession IC617781 identified for high pod number

Germplasm characterization at Delhi

At ICAR-NBPGR, New Delhi, a total of 9,456 accessions: maize (800), pulses (8,006), vegetables (570) and medicinal and aromatic plants (80) were characterized and evaluated. Trait-specific germplasm were identified in maize for earliness (IC330939, IC280436, IC393088, IC447803) and for prolificacy (EC639238, IC281537, IC281795, TR-2, TR-127, TR-164). A total of 380 pre-breeding progenies of *Vigna radiata* × *V. radiata* var. *sublobata* and 137 of *V. mungo* × *V. mungo* var. *sylvestris* were advanced and evaluated against *Mung bean Yellow Mosaic Virus*.



Maize accession TR164 showing prolific cob bearing

Germplasm characterization at Bhowali

A total of 853 accessions including paddy (37), soybean (605), *Allium* spp. (126) and *Ocimum* spp. (85), were characterized and evaluated at ICAR-NBPGR, RS, Bhowali. Some trait-specific promising accessions identified in various crops included French bean (IC280837, long and broad podded for dual purpose), wheat (IC564103), *Hordeum bulbosum* (EC328175, IC564128), pea (IC208371), vegetable type soybean (IC296814), black seeded soybean (IC548683), rice bean (Naini, Mansa, Chauhamba, BRS-01) and wild

horse gram (*Macrotyloma sar-garhwalensis*) (IC212722). Promising germplasm identified in horticultural crops are Kiwi: ♀ Allision (EC24672), ♀ Hayward (EC64093) and ♂ Tomuri (EC264092). *Citrus aurantifolia* (IC319045), *Diospyros kaki* (IC219062), Hisalu (IC219063), perennial phlox (IC319010, IC319011, IC319012). Promising germplasm of medicinal and aromatic plants include *Rosmarinus officinalis* (IC449513, IC334572, NIC 23416), *Lavendula angustifolia* (IC212822, IC273870), French lavender (IC449512), *Pelargonium graveolens* (IC296494, NIC23413), *Origanum vulgare* (NIC23428), *Aloe barbadensis* (IC353504), *Ocimum basilicum* (EC333788, EC383447, EC387835), *O. kilimanscharicum* (IC449493), *O. citriodorum* (EC338785), *O. sanctum* (IC212802), oregano (IC589087, IC589079), spiked ginger lily (IC573208), Indian valerian (IC573206) and *Stevia rebaudiana* (IC449511) for distribution among the local farmers.

Foxtail millet (59) and barnyard millet (45) accessions were characterized during *kharif* 2016. High variability was found for morphological traits viz., plant height and days to 50% flowering and different qualitative traits.



Purple barnyard millet - a unique germplasm

Germplasm field days

A germplasm field day for okra and *Abelmoschus* was organized at the ICAR-NBPGR, RS, Thrissur on August 9, 2016. A total of 1,045 cultivated okra accessions collected across India and a few exotic lines besides 11 wild species were shown to okra breeders and researchers. Also, amphidiploids derivatives of okra distant hybrids with various wild *Abelmoschus* species were exhibited to 32 scientists and researchers from ICAR institutes and SAUs.

Germplasm field day for Soybean was organized on September 8, 2016 ICAR-NBPGR, RS, Bhowali. Scientists and breeders from various institutes participated and selected germplasm.

Germplasm field day for maize was organized on September 15, 2016 at ICAR-NBPGR, New Delhi. Around 40 scientists and breeders from three ICAR institutes and six SAUs participated and selected germplasm for breeding.



Maize germplasm field day at New Delhi



Soybean germplasm field day at ICAR-NBPGR, RS, Bhowali

Germplasm Conservation

On-farm conservation initiative in Kerala

The ICAR-NBPGR, RS, Thrissur in collaboration with Principal Agriculture Officer, Palakkad district, Kerala, supplied 23 accessions of upland rice landraces to seven different farmers in Alathur and Kavaserry villages as a part of on-farm conservation initiative. The objective was to popularize and bring landraces back to cultivation among the farmers. The landraces supplied were *Chuvanna chitteni*, *Mundakacheera*, *Vellam thangi*, *Chuvanna kuruka*, *Mundavella*, *Aiyiram meni*, *Karutha njavara*, *Chettadi*, *Kuttadan*, *Kattamodan*, *Vellaryan*, *Nayaruvella*, *Njavara*, *Karutha njavara*, *Ulantha*, *Palakkadan matta*, *Kunjukunju*, *Malamutti* and *Thekkan*.

FOUNDATION DAY



Dr J.S. Sandhu, Chief Guest, Dr S.C. Dubey, Acting Director and Dr Ashok Kumar (right to left) during the 40th Foundation Day Function of ICAR-NBPGR

The 40th Foundation Day of ICAR-NBPGR was celebrated on August 1, 2016. The programme started with the lighting of the ceremonial lamp followed by an invocation song by the students of PG School, IARI. Dr S.C. Dubey, Director (Acting) highlighted the achievements of the Bureau and the future targets in his welcome address.

On this occasion, the Chief Guest Dr J.S. Sandhu, Deputy Director General (Crop Science), ICAR, addressed the gathering. He appreciated and highlighted the great strides made by the Bureau over the past forty years in PGR management. He said that the Bureau plays a significant role in the overall management of PGR activities, which are undertaken in a partnership-mode with other ICAR institutes and State Agricultural Universities (SAUs). He emphasized on the role of quarantine in preventing the entry and spread of



Mr Balwant receiving 'Best Worker Award' from Drs J.S. Sandhu and P.N. Mathur

new diseases. National Permafrost Facility being created as a result of joint initiative of ICAR and DRDO at Leh, Ladakh would be useful for conservation of safety duplicates at a very low-cost. He also appreciated the genetic diversity analysis being undertaken using morphological and molecular markers in certain crops. The PGR portal hosted on ICAR-NBPGR website, which is a gateway to information on conserved PGR was greatly appreciated.



Dr S.C. Dubey welcoming the Guest of Honour, Dr J.S. Chauhan

Dr J.S. Chauhan, Assistant Director General (Seed), ICAR, was the Guest of Honour. He congratulated the staff of ICAR-NBPGR, and advised for introspection on the occasion. He emphasized on enhancing national networking on acquisition, conservation, evaluation and utilization, strengthening PGR database and monitoring national and international regulations in PGR policy to ensure efficient management of PGR. Dr P.N. Mathur, Former Regional Coordinator, Central and South Asia, Bioversity International, was also the Guest of Honour. He suggested Bureau to take a leadership role in the South Asian region and offer its expertise to the developing countries of Asia and Africa.

The dignitaries distributed awards and certificates to the staff for their significant contributions during the year. Officers from ICAR, Directors from other ICAR institutes and retired staff members of ICAR-NBPGR also attended the function. Dr Ashok Kumar, Principal Scientist, ICAR-NBPGR proposed the vote of thanks.



Dr J.S. Sandhu distributing 'Best Worker Award' to Mr Vijay Mandal, in presence of Dr P.N. Mathur

PGR FOR FARMERS

Genetic Diversity with Custodian Farmer

Scientists from ICAR-NBPGR, RS, Shillong, visited village Charingia of Jorhat and met Mr Dipen Baruah, a progressive farmer, who is maintaining 105 local rice genotypes very meticulously in the fields. All rice genotypes are distinct from each other, and of long duration. In addition, he is also maintaining several local vegetables and fruits crops



Mr Dipen Baruah showing rice panicle specimens to scientists from ICAR-NBPGR, RS, Shillong

PGR Awareness Programmes for Farmers



As a part of the PGR awareness programme among farmers and to promote on-farm conservation of germplasm, a farmers meet was organized at ICAR-NBPGR, RS, Thrissur on August 18, 2016 to showcase the variability in 1,043 accessions of okra germplasm conserved so far at ICAR-NBPGR. These included both native and exotic accessions with considerable variability in plant and fruit characters. A total of 32 selected farmers from Kottayam, Ernakulam, Thrissur, Malappuram, Kozhikode and Kannur districts of Kerala participated in the programme. The farmers were given

an overview about the PGR activities at the station and they were taken around the okra maintenance plot. They were encouraged to select the germplasm lines having the desired traits of local choice for on-farm conservation. Participants from the adopted *Mera Gaon Mera Gaurav* (MGMG) villages were supplied seed packets of four varieties of Chinese spinach and two varieties of slicing cucumber.

Two other PGR awareness programmes were organized by ICAR-NBPGR, RS, Shimla, for tribals and farming community in selected tribal pockets of Himachal Pradesh. The objective was capacity development for conservation of local diversity of crops using Community Seed Banking, and to facilitate registration of local landraces. The programmes were conducted in village Nichar, district Kinnaur on August 24, 2016 and village Lossar, district Lahual & Spiti on September 1, 2016. Around 384 progressive farmers attended these programmes and seed packets (120-150 g) of pea, French bean and ricebean were distributed to each farmer, along with agronomic information for cultivation of the crops.



Farmers attending PGR awareness programme in Nichar, Kinnaur

Mera Gaon Mera Gaurav – Initiatives by RS, Hyderabad

A preliminary survey for the selection of cluster of tribal dominated villages was undertaken in Ranga Reddy district of Telangana on August 20, 2016. The ICAR-NBPGR team visited Manchal village and interacted with Sarpanch and other farmers. Crops cultivated in this village are mostly rain-fed including cotton, maize, sorghum, pigeon pea, horse gram, green gram, sesame, castor etc. Some of the constraints faced by the villagers include scarcity of water resources, hospital and school facilities. The team sampled sorghum (*pachcha jonna*) and horse gram landraces. Key contacts were established for developing strategies to work together in some of the villages in Manchal Mandal.

TEACHING AND TRAINING

Visit of Accreditation Team to ICAR-NBPGR for PGR discipline



UGC-NAAC Peer Review Team on visit to ICAR-NBPGR

A high level 12-member Peer Team headed by Prof. S.P. Thyagarajan, Former Vice-Chancellor, University of Madras, Chennai accompanied by Dr R.K. Jain, Joint Director (Education) and Dean, PG School, IARI, visited ICAR-NBPGR as a part of overall programme for accreditation of IARI by UGC-NAAC on August 10, 2016. Prof. Rekha Chaudhury made a brief presentation on PG teaching and research activities followed by interaction with Dr S.C. Dubey, Director (Acting) and Head of PGR Division, Heads and Unit-in-Charges of Divisions of NBPGR. The Peer Team visited the institute facilities and gave useful suggestions to faculty and students.



Peer Team headed by Prof. S.P. Thyagarajan accompanied by Dr J.S. Sandhu visiting the labs of ICAR-NBPGR and interacting with PGR students

Fresher's welcome function of PGR discipline

Welcome of Freshers of 1st year M.Sc. and 1st year Ph.D. students, was organized by PGR club of ICAR-NBPGR on September 19, 2016. The function began with a warm welcome to the 11 freshers, followed by a quiz competition amongst the freshers. This was followed by extempore lectures on current affairs. Students demonstrated their talents based on their hobbies. The Judging Committee comprising faculty members adjudged Mr Puneeth as best M.Sc. fresher and Mr Jagdish Goyanka as best Ph.D fresher.

Teacher's Day celebration

Teacher's Day was celebrated at ICAR-NBPGR on September 5, 2016, to commemorate the birth



PGR students, faculties and Director, ICAR-NBPGR celebrating Teacher's Day

anniversary of Dr S. Radhakrishnan, the former President of India. Students paid rich tributes to the faculty and their former teachers in the form of poems, messages and small gifts. Faculty also expressed their gratitude to their teachers.

Training for under-graduate students

Scientists of ICAR-NBPGR, RS, Bhowali, imparted training on PGR awareness to B.Sc. (Agriculture) students (total 63) of GBPUA&T, Pantnagar during their RAWE visit to the station accompanied with Dr R. Srivastava, Prof. & Head (Horticulture) and Dr P.N.Rai, on August 12 and September 19, 2016.



Dr S.K. Verma, OIC, RS, Bhowali imparting training in soybean field to B.Sc. (Ag.) students from GBPUA&T, Pantnagar

MISCELLANEOUS

Parthenium Awareness Programme



Dr Kuldeep Singh, Director, ICAR-NBPGR, discussing methods for weed management during the Parthenium Awareness Programme

A parthenium awareness programme was organized at ICAR-NBPGR, New Delhi, on August 22, 2016. Dr S.C. Dubey, Head, Division of Plant Quarantine, briefed about the introduction of this weed into India, its characteristics

and ill effects. In India, it has assumed serious proportions. Management of this obnoxious weed requires collective and continuous efforts through awareness and adoption of integrated approach. Dr Mool Chand Singh, Principal Scientist (Weed Science), Division of Plant Quarantine, identified the weed and its presence in the campus and subsequently Dr Kuldeep Singh, Director, ICAR-NBPGR along with the staff participated in uprooting of the weed as a component of "Swatchh Bharat Abhiyan" to ensure a Parthenium-free campus. The programme was coordinated by Dr Shashi Bhalla, Principal Scientist and Officer-In-Charge, PME and AKMU, ICAR-NBPGR.

New Project Launched

A new research project entitled "Agri-biodiversity of Telangana: Inventorization and documentation for posterity and sustainable management of crop genetic resources" was launched by Mr B.R. Meena, IAS, Principal Secretary, Dept. of Environment and Forests, Govt. of Telangana, during a function held on September 19, 2016, at Hyderabad. The PI of the project is Dr S.R. Pandravada, Principal Scientist, ICAR-NBPGR, RS, Hyderabad and the project is funded by the Telangana State Biodiversity Board (TSBDB).

PERSONNEL NEWS

Deputations Abroad

Dr Rashmi Yadav, Senior Scientist, Division of Germplasm Evaluation, ICAR-NBPGR, New Delhi visited Tennessee State University, Nashville, Tennessee, USA, and presented research paper "DUS characters and quality traits expression under variable environment in Grain Amaranth" during the Amaranth Conference 2016, August 3-5, 2016.

Dr J.C. Rana, Head, Division of Germplasm Evaluation, ICAR-NBPGR, New Delhi presented a research paper "Germplasm resources of Buckwheat in India - Status and prospects" during the 13th International Symposium on Buckwheat, organized by Chungbuk National University, Chungdae-ro, Seowon-gu, Cheongju-si, Chungbuk 28644, Korea, from September 7-11, 2016.

Retirements

Mr Dayanand, SSS, ICAR-NBPGR, Experimental Farm, Issapur, superannuated on August 30, 2016

Mrs Rita Rani, Assistant Chief Technical Officer, Division of Germplasm Conservation, ICAR-NBPGR, New Delhi, superannuated on September 30, 2016.

Transfer

Dr (Ms) Vimla Devi joined Division of Germplasm Conservation ICAR-NBPGR, New Delhi w.e.f. July 5, 2016, on transfer from ICAR-Central Agroforestry Research Institute, Jhansi.

Promotion

Ms Yashoda Rani promoted as Assistant Administrative Officer w.e.f. July 1, 2016.

Awards and Honours

Dr S.R. Pandravada conferred with the "Outstanding Researcher Award" for his significant contributions in Agricultural Science, during Aufau International Awards-2016 instituted by Aufau Periodicals/ CSRL on June 4, 2016 at Salem, Tamil Nadu.

Dr S.R. Pandravada bestowed with the "Best Researcher Award" during 4th Science and Technology Awards-2016, instituted by EET CRS on June 12, 2016 at Bangalore, Karnataka.

Dr N. Sivaraj received an "Award for Excellence in Research" from Education Expo TV on September 18, 2016.