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The ICAR/NBPGR and DRDO Initiative for a National Permafrost Facility

Dr S. Ayyappan, Secretary, DARE and Director General, ICAR, visited Leh and Chang La (Jammu and Kashmir) during 13-15 September. The purpose of the visit was to identify the site for expansion of the existing prototype of a 'National Permafrost Facility' (NPF) in collaboration with Defence Research and Development Organization (DRDO), New Delhi, for cost-effective conservation of plant genetic resources (PGR). The National Genebank (NGB) at NBPGR has nearly 400,000 accessions of PGR conserved in the form of seeds at -20°C; the NGB ranks as the third largest genebank in the world. The NPF will act as the 'safety duplicate' site for unique accessions from the NGB, as per international genebank standards.

Dr S. Ayyappan along with scientists, engineers from ICAR and DRDO

Senior officials from DRDO, a team of engineers of DRDO and Indian School of Mines, Dhanbad visited the site along with Dr Ayyappan. Dr R.K. Tyagi, Head, Divison of Germplasm Conservation, NBPGR, also accompanied the Secretary, DARE and Director General, ICAR.

Dr S. Ayyappan discussing the conservation experiment being conducted by NBPGR using prototype facility at Chang La

Dr Ayyappan appreciated the efforts of DRDO for developing existing prototype of the NPF. A hill location was identified at Chang La (34°3'0" N; 77°55'60" E; ~5,216 m above sea level) as the most suitable site for expansion of NPF, as it has permafrost conditions, is easily approachable, safe from avalanche, and for other safety reasons. The NPF would ensure storage of elite germplasm at -20°C ± 2°C temperature with 3-7% moisture. A Memorandum of Understanding was signed between ICAR and DRDO for developing this facility on August 23, 2011. It is expected that the NPF would be built over a period of four years, with a cost of approximately over Rs. 200 Crores. Efforts for preparation of a detailed project report are presently underway. Currently, only one permafrost storage facility exists in Norway, the 'Svalbard Global Seed Vault' which is managed in partnership by the Government of Norway, the Nordic Genetic Resource Center and the Global Crop Diversity Trust which became operational in February 2008.

Selected permafrost site at Chang La for expansion of National Permafrost Facility

Plant Exploration and Germplasm Collection

Collection of *Rabi* landraces from West Bengal

Based on gap analysis, an exploration was undertaken by NBPGR, New Delhi, areas of West Bengal for collection of landraces of rabi crops. A total of 34 accessions comprising *Triticum aestivum* (11), *Hordeum vulgare* (3), *Cajanus cajan* (2), *Lens culinaris* (3), *Brassica rapa* var. yellow sarson (6), *B. rapa* var. *toria* (6) and other crops (3) were collected from Malda, Dakshin Dinajpur and Uttar Dinajpur districts. Variability was observed in landraces of wheat mainly for plant height, grain colour, shape and size. Distinct types in chickpea, linseed and pea were collected during the exploration.

Collecting barley landrace from Dakshin Dinajpur, West Bengal

Germplasm Exchange

Import

A total of 10,821 accessions of different crops were introduced from 24 countries.

Promising introductions

Durum Wheat (EC786580), **USA**: Alien disomic substitution 1E (1B) line.

Durum Wheat (EC787007-787013), **UK**: Improved varieties.

Maize (EC787045), **USA**: Inbred parental lines expressing events DP-32138 and NK 603.

Paddy (EC786448-786452), **China**: Disease and shattering tolerance.

Paddy (EC786581-786834), **France**: T-DNA insertion or transport mediated 326 rice mutant lines developed by using *Agrobacterium tumefaciens* carrying binary vectors p4956G, p4978, p4984, p4987.

Tomato (EC779308), **AVRDC, Taiwan**: Heat tolerance, late blight homozygous for resistance, grey leaf spot homozygous for resistance, late blight susceptible allele, race 1 of the fusarium wilt pathogen *Fusarium oxysporum* f.sp. *lycopersici* susceptible allele, tomato yellow leaf curl virus disease susceptible allele, resistance to tobacco mosaic virus conditioned by Tm2a gene homozygous for resistance, shoulder uniform, fruit shape globe, fruit color red.

Cotton (EC785689), **USA**: Transgenic lines incorporating cry1Ac, cry2ab, Vip3Aa19 and cp4 epsps genes (events MON 15985 x COT102 x MON 88913.

Cotton (EC785690), **USA**: Transgenic lines incorporating cry 1Ac, cry1Ac, cry2ab and Vip3Aa19 genes (events MON 15985 x COT 102).

Export

Wheat lines (261) to Kenya and Ethiopia for Ug99 screening; Paddy (5 accessions) to IRRI, Philippines.

Plant Quarantine

A total of 5,104 samples of imported germplasm accessions (including 345 transgenic samples) as well as trial material of various crops were processed for quarantine clearance at NBPGR, New Delhi. Of these, 268 samples were infested/infected (including 9 transgenic samples) with insects (64), fungi/bacteria (172), nematodes (30) and weeds (2). Amongst the infected/infested samples, 217 were salvaged through physico-chemical methods viz., fumigation, X-ray radiography, hot water treatment (HWT), pesticidal treatment, mechanical cleaning and growing-on test. A total of 42 samples were rejected comprising 30 of *Oryza sativa* from Vietnam and China due to *Tilletia barclayana*; three of *Capsicum annuum* from Taiwan and one of *Solanum lycopersicum* from Netherlands due to *Fusarium solani*; two of *Zea mays* from Mexico and USA and fore from Thailand due to *Bipolaris maydis* and one of *Glycine max* from Japan due to *Peronospora manshurica* which is not yet reported from the country. A total of 60 samples of exotic germplasm comprising *Glycine max* (5), *Vigna* spp. (25) and *V. unguiculata* subsp. *sesquipedalis* (30) were grown in PEQN for virus indexing. Four post-entry quarantine inspections (PEQI) were undertaken.

Out of the 2,499 samples received from Division of Germplasm Conservation for seed health testing, 425 samples were screened. A total of 112 samples were rejected as they could not be salvaged.

A total of 527 samples were processed for export of which 3 infected samples were salvaged and 3 Phytosanitary Certificates were issued.

At NBPGR, R/S, Hyderabad, a total of 11,907 samples of import germplasm were processed for quarantine. Of these, 9,609 samples were released to the consignees after necessary mandatory treatments. During processing, *Ascochyta pinodes, Rhizoctonia solani* and *Stemphylium* sp. on sunflower from France; *Rhizoctonia solani* on pearl millet from Ghana; *Drechslera sorghicola, Rhizoctonia bataticola, Sporisorium cruentum, Sitophilus granarius*, *Cryptolestes ferrugineus* and *Tribolium castaneum* on sorghum from Ghana, *Tribolium castaneum* and *Sitophilus* oryzae on sorghum from Australia; *R. solani* on maize from France and *Pestalotia macrotricha* on maize from Mexico; *Rhizoctonia solani*; *Sitophilus granarius* and *Rhizopertha domnica* on maize from Thailand; *Rhizoctonia solani* on maize and chilli from Thailand and Taiwan, respectively; *Cercospora* sp. on tomato from USA was the major pests intercepted.

Germplasm Characterization and Evaluation

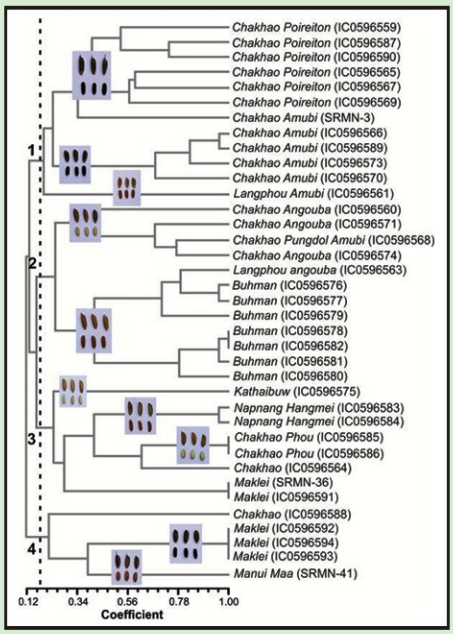
Germplasm Evaluation at Shimla

Accession EC200817 (cv 'Red Chief') of apple found superior for high TSS, pulp texure, and shelf life

Germplasm comprising accessions of grain amaranth (350), buckwheat (216), kidney bean (681) and temperate fruits (147) were characterized for various descriptors. Early maturing accessions identified were IC005527 and IC007220 in grain amaranth, IC026583 and IC026755 in buckwheat. In kidney bean, high no. of seeds/pod were recorded in EC398591and EC398587 high no. of pods/plant in EC400398 and IC500365. In temperate fruits, wide range of variability was recorded for traits like fruit colour, shape, size, quality and productivity. In apple, EC200817 cv 'Red chief' was found superior for high TSS, pulp texure, and shelf life while EC732226 cv 'Arctic fantasy' of nectarine has attractive colour, good taste, high TSS and productivity/plant.

Characterization of genetic diversity within scented rice ('Chakhao') germplasm of Manipur

Genetic diversity of 37 'Chakhao' rice accessions collected from Manipur was analyzed based on genotyping with 47 genome-wide microsatellite markers, at NBPGR, R/S, Shillong. The genetic diversity analysis revealed clear distinction among different cultivar types. Around 31% of the total genetic variation was found among cultivar types (FST = 0.443), while the differentiation among the accessions of valleys and hills (FST = 0.138) was narrow. Genetic structure analysis grouped the 37 accessions into six clusters which largely correlated with the cultivar types: 'Poireiton', 'Amubi', 'Angouba', 'Buhman', 'Maklei' and other 'Chakhao'.



Genetic relatedness among 'Chakhao' rice landraces of Manipur

REGISTRATION OF GERMPLASM

Plant Germplasm Registration Committee (PGRC) Meeting

The XXVIIth Plant Germplasm Registration Committee (PGRC) meeting was held at NBPGR, New Delhi, on 31 July under the Chairmanship of Dr J.S. Chauhan, ADG (Seed), ICAR, New Delhi. In this meeting a total of 123 proposals (89 new and 34 revised) were considered for registration. Finally, 25 (21 new and 4 revised) proposals belonging to 14 species were approved for registration.

Germplasm Registered by NBPGR

Plant (Botanical name)	INGR No. (Alternate ID)	Developing Institute	Developers	Novel Unique Feature(s)
Maize ***(Zea mays)***	13054 (MCM-11/1)	NBPGR, Shillong	A.K. Misra, R.S. Rathi, S. Roy, S.K. Singh and D.C. Bhandari	3-4 cobs per plant and early maturing
Pearl millet ***(Pennisetum squamulatum)***	13056 (NSS-7809)	NBPGR, New Delhi	Jyoti Kumari, Sushil Pandey, S.K. Jha, S. Chauhan, G.K. Jha, C. Tara Satyavathi, N.K. Gautam and M. Dutta	Popping trait
Black gram ***(Vigna mungo)***	13057 (BAR-062)	NBPGR, R/S, Hyderabad	Babu Abraham, K.S. Varaprasad, M. Vanaja, N. Sunil, N. Sivaraj, V. Kamala and S.K. Chakrabarty	Photosensitive line (flowers only in post rainy/*Rabi* season)
Chickpea ***(Cicer arientinum)***	13058 (IC486088)	NBPGR, New Delhi	Mohar Singh, O.P. Dahiya, Neeta Singh, A. Nizar, M. Dutta, R.K. Tyagi, P.N. Harer, L.B. Mahase, N.P. Singh and K.C. Bansal	Upright podding behaviour
Spiked Ginger Lily ***(Hedychium spicatum)***	13069 (NKO-24)	NBPGR, R/S, Bhowali	K.S. Negi, S.S. Koranga, S.N. Ojha, A.K.S. Rawat and S. Srivastava	Bold seeded, early emergence and late senescence
Pea ***(Pisum sativum)***	13075 (NKG 134)	NBPGR, R/S, Shimla	J.C. Rana, D.K.Banyal, N.K. Gautam and K.D. Sharma	Resistant against four isolates viz. rangway, trilokinath, stingri, kangra of powdery mildew (Erysiphepisi)

Maize (INGR13054)

Pearl millet (INGR13056)

Ginger lily (INGR13069)

Pea (INGR13075)

FOUNDATION DAY CELEBRATION

Foundation Day of NBPGR Celebrated

Prof. K.C. Bansal, Prof. S.K. Datta, Dr R.S. Rana, Dr J.S. Chauhan and Dr R.K.Tyagi during the 37th Foundation Day of NBPGR

The 37th Foundation Day of NBPGR was celebrated on August 3. Dr R.S. Rana, former Director and currently Chairperson, Research Advisory Committee (RAC), NBPGR, was the Chief Guest. Prof. S.K. Datta, DDG (CS), Chaired the function and Dr J.S. Chauhan, ADG (Seed) was the Guest of Honour. Prof. K.C. Bansal, Director, NBPGR, in his welcome address highlighted the major achievements of the Bureau. He also described briefly the important plans for future activities at the Bureau. During the Foundation Day Lecture, Dr R.S. Rana gave an excellent account on the historical perspective and achievements of NBPGR. Many retired and former staff of NBPGR graced the occasion and Mr Ram Nath, Former Head, Division of Plant Quarantine, Mr P.P. Khanna, Former Head, Division of Germplasm Conservation and Mr Bishamber Nath, former PA to Director, reminesced about their past experiences at NBPGR.

Mr Ram Nath, Mr P.P. Khanna and Mr Bishamber Nath speaking on the Foundation Day Celebrations

On the occasion, awards were given by the dignatories to encourage and motivate the staff. Best Worker Awards were given to Ms G. Dhakar, NBPGR, R/S, Shillong from Administration; Mr A.K. Dheka, NBPGR, R/S, Shillong and Mr Paras Ram, NBPGR, R/S, Shimla from Supporting Staff. Certificates of Appreciation were conferred to Mr Ram Nandan, NBPGR, New Delhi and Mr S.N. Sarmah, NBPGR, R/S, Shillong from Technical staff; Mr P. Suleman, NBPGR, R/S,

A view of the audience

Hyderabad, from Administration; Mr Girish Chander, NBPGR R/S, Bhowali, Mr Umesh Kumar, NBPGR, New Delhi, and Ms Manju Devi, NBPGR, New Delhi from Supporting Staff.

Mr Paras Ram, Supporting Staff, NBPGR, R/S, Bhowali, receiving Certificate of Appreciation from the Chief Guest, Dr R.S. Rana

All the dignitaries conveyed their wishes to the staff of NBPGR for their commendable contribution to NBPGR activites. Dr R.K.Tyagi, Head, Division of Germplasm Conservation proposed the vote of thanks. The celebrations culminated with a cultural programme jointly presented by the staff of NBPGR and artists from the Punjabi Academy, New Delhi.

Folk dance presented by the artists from Punabi Academy

MEETINGS, TRAININGS AND FAIRS ORGANIZED

Regional Initiation on Improvement of Pulses and Adaptive Trials in SAARC

Dr S. Ayyappan addressing the delegates during the inaugural session

An inception meeting on 'Regional Initiation on Improvement of Pulses and Adaptive Trials in SAARC Countries' was organized by SAARC Agriculture Center (SAC), Dhaka, in collaboration with ICAR at NBPGR, New Delhi during 12-13 July. Delegates from six SAARC countries namely, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka participated in the meeting. At the outset Prof. K.C. Bansal, Director, NBPGR and Ms. Nasrin Akter, Coordinator, SAC welcomed the dignitaries and briefed the delegates about the importance of the meet. Dr. S. Ayyappan, Secretary, DARE and DG, ICAR while inaugurating the inception meeting, emphasized that germplasm resource conservation is the key to enhance the productivity of pulses in the SAARC region. Guest of Honour, Shri Arvind Kaushal, Additional Secretary, DARE and Secretary ICAR highlighted the importance of SAARC countries cooperation in agricultural research and development for achieving food security in the region. Prof. S.K. Datta, DDG (Crop Science) in his Chairman's address highlighted the need of strong collaboration among the SAARC countries. The technical programme on adaptive trials on important pulse crops with varietal contribution from various countries was finalized during the meeting.

Research Advisory Coommittee Meeting

The XXVth meeting of the Research Advisory Committee (RAC) was held at NBPGR, New Delhi on 23-24 July, under the Chairmanship of Dr R.S. Rana. Members of RAC who attended the meeting included Drs A.K. Tyagi, P.N. Mathur, K.D. Srivastava, J.S. Chauhan, K.C. Bansal and I.S. Bisht (Member Secretary). The meeting was also attended by all the Heads of Divisions/ Units/ Cells at the main campus and the Officers-in-Charge of the Regional Stations. Prof. K.C. Bansal, Director, NBPGR, made a comprehensive presentation highlighting the Bureau's significant accomplishments during 2012-13 and some recent new initiatives. He also briefly mentioned Bureau's proposals under the 12th Plan drawing attention to the two Consortia Research Platforms (CRPs), one on Agrobiodiversity and the other on Genomics.The RAC gave some very useful recommendations on the emerging issues related to germplasm exploration, trait-specific gemplasm identification, core sets and pre-breeding, repatriation of local germplasm in disaster effected areas, networking with NAGS, holistic conservation (*in situ* and *ex situ)*, domestic quarantine and increased thrust on policy matters related to PGR.

Training on PGR Management

Faculty and trainees of the national training programme on PGR Management

As a prelude to the implementation of Consortium Research Programme (CRP) on Agrobiodiversity (PGR component), a training on 'Management of Plant Genetic Resources' was organized at NBPGR, from 16-25 September. Dr S.K. Datta, DDG (Crop Science) inaugurated the programme in the presence of Dr J.S. Chauhan, ADG (Seed). The dignitaries appreciated the progressive efforts made by NBPGR in PGR management and requested the trainees to give due priority to germplasm management in their respective institutes. Thirty participants from 21 organizations, including ICAR institutes (10) and State Agricultural Universities (11) participated in the programme. The training schedule included 28 lectures and nine practical sessions on all aspects of PGR management. A special interactive session was held under the chairmanship of the Director, NBPGR along with all HoDs/Unit Incharges, wherein Director briefed the participants about the specific activities under

the Platform and the basic guidelines that need to be followed. The training concluded with a valedictory session, chaired by Dr H.S. Gupta, Director, Indian Agricultural Research Institute, New Delhi.

Training for Community Seed Bank

Trainees and faculty of national training programme on Community Seed Banks

A two day workshop cum training programme on 'Linking Community Seed Banks with National Gene Bank: A Novel Approach to Ensure Dynamic Conservation' for nodal farmers of Community Seed Bank, was conducted at NBPGR, New Delhi during 30-31 August. The training was attended by 25 nodal farmers from Udaipur and Chamba districts. This programme was executed under the NAIP-GEF-funded project entitled 'Harmonizing biodiversity conservation and agricultural intensification through integration of plant, animal and fish genetic resources for livelihood security in fragile ecosystems'.

Rice Field Day

Breeders' inspecting the field during rice field day at Bhowali

A rice field day was organized on 20 September at NBPGR, R/S, Bhowali, and 23 scientists from VPKAS, Almohra;, DRR, Hyderabad; GBPUA&T, Pantnagar and its centre from Majhera and Jeolikote; IARI, New Delhi and SKUAST, Kashmir, J&K participated. The germplasm screening was done under the Chairmanship of Dr B.C. Viraktmath, Director, DRR, Hyderabad. A total of 1,018 accessions of paddy was sown and more than 60 accessions of trait-specific germplasm like blast resistant, high yielder, fine rice etc. were selected by different breeders scientists.

Tribal Biodiversity Fair

A Tribal Biodiversity Fair was organized by the NBPGR R/S, Akola, in the tribal dominated Narvati Village, Dharni Taluk of Amravati District of Maharashtra on 15 June. More than 200 participants belonging predominantly to the Korku tribal community participated in the fair. An exhibition displaying the seed/fruit variability in different accessions of millets, pulses, vegetables, oilseeds and their wild relatives was organized along with the fair. The importance of maintaining and conserving the traditional native variability was explained to the tribal community by the Station Scientists/Officers. A booklet on 'Korku Agricultural Vocabulary' (Korku Krishi Shabdakosh) published by the NBPGR R/S, Akola, in collaboration with the Agricultural Technical School, Dharni of Dr Punjab Rao Deshmukh Krishi Vidyapeeth, Akola was also released on the occasion. The book contains 464 names in Korku (Tribal), Marathi, Hindi and English languages.

Dr A. Nizar, OIC, NBPGR R/S, Akola, releasing a booklet on 'Korku Agricultural Vocabulary'

Agri-Tech Investors Meet

An 'Agri-Tech Investors Meet' was held on 19 July at NASC, New Delhi. NBPGR participated in the meet and showcased its technology of GMO detection in rice and other GM crops.

Prof. K.C. Bansal and Dr A. K. Gupta, Director, Basmati Export Development Foundation, APEDA, New Delhi, exchanging MoU on GM detection technology in the presence of Prof. K. Kasturirangan (Member Planning Commission) and Dr Gurinder Jit Randhawa, (developer of technology)

PERSONNEL NEWS

Deputations Abroad

Dr Pratibha Brahmi attended the '3rd High Level Round Table on the International Treaty on Plant Genetic Resources for Food and Agriculture' and the 'International Conference on Biodiversity, Climate Change and Food Security' at Bandung, Indonesia, from 2-4 July.

Drs Rekha Chaudhury and **Sandhya Gupta** attended 2nd ISHS International Symposium on 'Plant Cryopreservation' and visited National Centre for Germplasm Resources Preservation (NCGRP) at Fort Collins, USA from 11-14 August. They made oral presentations entitled, 'Implementing cryotechniques to plant germplasm: Storing seeds, embryonic axes, pollen and dormant buds' and 'Cryopreservation of germplasm through encapsulation-dehydration technique', respectively.

Dr V. Celia Chalam participated and presented a paper entitled 'Biosecuring Indian agriculture from plant viruses: Role of serological and molecular diagnostics' during '10th International Congress of Plant Pathology', held at Beijing, China, from 25-30 August, 2013.

New Appointments

Dr S.P. Singh, Senior Scientist, joined Division of Plant Quarantine, NBPGR, New Delhi w.e.f. 2 September, 2013.

Transfers

Dr D.C. Bhandari, Head, Division of Plant Exploration, NBPGR, New Delhi transferred to CAZRI, Jodhpur, w.e.f 3 July, 2013.

Dr Anirban Roy, Senior Scientist, Division of Germplasm Evaluation, NBPGR, New Delhi transferred to IARI, New Delhi, w.e.f. 31 July 2013.

Dr Monender Grover, Senior Scientist, Division of Genomic Resources, NBPGR, New Delhi transferred to IASRI, New Delhi, w.e.f. 16 August 2013.

Dr R.S. Rathi, Senior Scientist, NBPGR, R/S, Shillong transferred to NBPGR, R/S, Ranchi, w.e.f. 23 September 2013.

Retirements

Dr Charan Singh, T-7-8, (Assistant Chief Technical Officer) Division of Plant Quarantine, NBPGR, New Delhi, superannuated on 31 July, 2013.

Dr (Mrs) Manju Lata Kapoor, Principal Scientist, Division of Plant Quarantine, NBPGR, New Delhi superannuated on 31 August, 2013.

Dr Ranbir Singh, Principal Scientist, Division of Germplasm Evaluation, NBPGR, New Delhi superannuated on 30 September, 2013.

ICAR Sports Meet

NBPGR won two medals in ICAR's Central Zone Sports meet held at CIAE, Bhopal, during 24- 28 September. **Mr. Soyam Chiten,** Scientist, Division of Plant Exploration and Collection, NBPGR, New Delhi, won a **gold medal** in **high jump** and a **silver medal** in **200m race.**

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