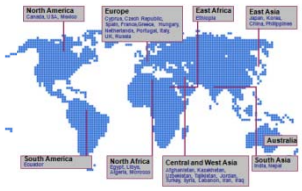
GENEBANK: THE SOLE STATE OF THE ART BIODIVERSITY CONSERVATION FACILITY IN PAKISTAN

Agro-ecological diversity coincides with rich plant biodiversity

National Genebank of Pakistan at IABGR, NARC, Islamabad

Grapes Clonal Repsoitory



International acquisition of Germplasm

Our Global partner: Svalbard Global Seed Vault, Norway

PARC helped rehabilitate the flood affected areas

Challenge

- Food security is a national and global subject. It heavily relies on use of plant biodiversity for development of improved varieties to harness high yields even in stresses conditions of diseases, salinity, drought and climate change.
- Pakistan is blessed with a vast biodiversity existing in different agro-climatic ecologies extending from below sea to K2.
- Natural calamities and human interventions are depleting biodiversity at an alarming rate, thus, threatening the food security.
- Traits developed by plants over a long period of time cannot be created artificially. Therefore, conservation of biodiversity at national level is required to feed National Agricultural Research System (NARS) with germplasm.
- International linkages for Cross-border germplasm exchange are required for improvement of existing genetic stock by incorporating desirable traits.
- Introduction of new plant species from overseas is also required to enhance food security by exploiting full potential of diverse agro-ecological zones.

Interventions

- In 1972, PARC started to develop the **genebank** through systematic collection and conservation under PL480 “Collection of rice germplasm”.
- In 1978, PARC initiated a program “Exploration, Collection, Conservation and Evaluation of Plant Genetic Resources” and established a small genebank at NARC.
- In 1993, Japan International Cooperation Agency (JICA) assisted Pakistan in establishing a state of the art facility for germplasm storage and associated research.
- So far, 99 expeditions collected indigenous PGRs and acquired exotic PGRs from >75 places around the globe (through USDA, ICARDA, ICRISAT, JICA, IRRI, AVRDC, INIBAP, CIMMYT).
- Since 2009, indigenous PGRs have been conserved as safety duplicates at Svalbard Global Seed Vault (Norway), IRRI (Philippines) and ICARDA (Syria/Tunisia).
- In 2013, clonal repositories of apple, peach, almond, pecan nut, plum, guava, grapes, pomegranate and herbal species were established.

Outcomes

- National Genebank currently houses >30,000 accessions of 400 plant species, to conserve indigenous and exotic plant biodiversity. This treasury is being distributed (~7,000 accessions per year, free of cost) to breeders and researchers in NARS for utilization in crop improvement programs.
- **Evaluation of crops for different traits**

Crop	Traits
Wheat	yield components, drought tolerance, rust resistance. HMW Glutenin
Rice	plant type, short duration, yield components and grain characters
Maize	short duration
Pulses	short duration and yield components
Brassica	yield components, aphid resistance, protein and oil content, erucic acid, oleic acid and glucosinulates
Peas	yield components, powdery mildew resistance, lodging tolerance and use for vegetable, grain or split dhal
Tomato	yield and salinity tolerance
Radish	short duration
Carrot	root shape and size, juice and sugar content
Chilies	yield and hotness
Spinach	Yield
These elite germplasm lines have been used for the crop breeding for productivity improvement.	

- 5,000 accessions of wheat, barley, rice, chickpea, lentil and grasspea have been deposited as safety duplicate at Svalbard Global Seed Vault (Norway), IRRI

Powdery mildew resistant, lodging tolerant, high yielding and low water requiring cultivar of pea

Screening of tomato germplasm for salinity tolerance

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(Philippines) and ICARDA (Syria/Tunisia).

- PARC's preparedness enabled disaster mitigation by providing germplasm of vegetable & cereals crops and seed testing services to IDPs and flood affectees and NGOs in Khyber Pakhtunkhwa, Sind and Punjab.
- PARC also provided PGRs to those NARS partners which lost their research material due to disasters for resumption of R&D.
- In 1975 PARC established **National Herbarium** and acquired Stewart collection (~50,000 specimens) from Gordon College Rawalpindi. It is regularly curated & updated for nomenclature and houses >12,000 species from Pakistan, India, Afghanistan, Iran and Central Asia.

Way forward

- Strengthening the acquisition, collection, conservation and distribution of PGRs to meet future challenges to food security
- Strengthening the clonal repositories of other crops
- Stepping up the preparedness to address future challenges
- Strengthening the collaboration with international stakeholders
- Enhancing the deposits of safety duplicates with global seed vault
- Upgrading the seed testing services.
- Undertaking and diversifying the detailed evaluation of PGRs