WELCOME

Plant Genetic Resources Centre
Bangladesh Agricultural Research Institute
ROLE OF BANGLADESH’S PLANT GENETIC RESOURCES CENTRE FOR CONSERVATION USE AND EXCHANGE OF NATIVE AND LOCAL SEEDS

Presented by
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Plant Genetic Resources Centre
BARI, Gazipur
Introduction

- Plant genetic resources are the basic raw materials for present and future crop improvement program.
- Bangladesh belongs to tropical and sub-tropical environments, which provides favourable condition for numerous agri-horticultural crops.
- It is the abode of about 7,000 species of vascular plants and is the secondary centre of origin of a good number of crop plants.
- Considering its rich reserve of PGR, Bangladesh is still in preliminary phase in the use of these resources.
In Bangladesh cultivation of HYVs began during late 1960s without taking any initiative for collecting and conserving the available landraces except rice.

A substantial number of landraces have already been replaced by HYVs.

Moreover, Bangladesh is one of the most vulnerable countries to climate changes, which will directly affect the country’s biodiversity.

This will also promote new insect pests and diseases.

Landraces and wild relatives of cultivated crops possess resistance against biotic and abiotic stresses, which can be exploited developing HYVs to mitigate the adverse effect of climate change.

PGRC is mandated to collect, conserve and manage the landraces and wild relatives of different cultivated crops still available in the country.
**Country Profile**

**Area:** 147569 sq km  
**Geographical Location:** Latitudes 20.5 to 26.5°N and Longitude 88.0° to 92.6°E.

**Topography and Soil:**  
- Flood plain: 79%  
- Hilly areas: 12.6%  
- Terrace soils: 8.3%  
- Soil pH: 4.0 to 8.4.

**Climate:** Temperature ranges from 4°C in winter to 42°C in summer and average temperature is 27°C. Annual rainfall varies from 1110 mm in the west to 5690 mm in the northeast.
Bangladesh Agriculture

- Agriculture is the most important sector playing a significant role in the overall economic development of Bangladesh.
- It contributes 17.22% to the national GDP and provides employment for 45.6% of the labour force.
- Success in the agriculture sector has been achieved through introduction of modern crop varieties and production technologies.
- Rice, jute, sugarcane, tea, cotton, wheat, maize, potato, pulses, oilseeds, and vegetables are the principal crops grown in Bangladesh.
<table>
<thead>
<tr>
<th>Crops</th>
<th>Area (million ha)</th>
<th>Production (million M. ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice (3 cropping season)</td>
<td>11.43 (78%)</td>
<td>33.83</td>
</tr>
<tr>
<td>Wheat</td>
<td>0.42</td>
<td>1.25</td>
</tr>
<tr>
<td>Maize</td>
<td>0.24</td>
<td>1.55</td>
</tr>
<tr>
<td>Jute</td>
<td>0.68</td>
<td>7.61</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>0.11</td>
<td>4.45</td>
</tr>
<tr>
<td>Tea</td>
<td>0.06</td>
<td>0.14</td>
</tr>
<tr>
<td>Pulses (10 crops)</td>
<td>0.28</td>
<td>0.27</td>
</tr>
<tr>
<td>Oilseeds (9)</td>
<td>0.41</td>
<td>0.80</td>
</tr>
<tr>
<td>Vegetables (40 crops)</td>
<td>0.37</td>
<td>3.07</td>
</tr>
<tr>
<td>Spices (6 crops)</td>
<td>0.41</td>
<td>1.82</td>
</tr>
<tr>
<td>Potato</td>
<td>0.46</td>
<td>8.33</td>
</tr>
<tr>
<td><strong>Total (including other crops)</strong></td>
<td><strong>15.09</strong></td>
<td></td>
</tr>
</tbody>
</table>
**Plant Genetic Resources Centre**

- PGRC is playing leading role in conservation, management, utilization and promotion of PGR in Bangladesh.
- It is one of the seven crop research centres of BARI, the largest multi-crop research institute in the country.
- BARI is conducting research on more than 200 crops.
- Actually, the institute deals with all the crops grown in the country except rice, jute, sugarcane, cotton and tea.
- The prime responsibility of PGRC is to survey, collect, regenerate, characterize, conserve, utilize and promote genetic resources of all the BARI mandate crops.
PGRC has been created in 1987 at BARI, Gazipur with facilities of long term (-20°C) and medium term (+4°C) conservation for 20,000 accessions of orthodox seeds.

Overtime, the centre has expanded activities

A GoB funded project entitled “Strengthening PGRC” has been executed during 2003-08.

Under the strengthening project, Functional building of PGRC at Gazipur, 5 regional stations and 3 clonal gene banks has been established.
Plant Genetic Resources Centre

Head Quarter (Gazipur)

Regional Stations
1. Ishurdi, Pabna
2. Jamalpur
3. Burirhat, Rangpur
4. Jessore
5. Khagrachari Hill district

Clonal Gene Bank
1. Jaintapur, Sylhet
2. Rahmatpur, Barisal
3. Binodpur, Rajshahi
Activity 1. Survey, Exploration and Collection of PGR

- Collection is done on area basis
- A Passport Data Sheet is followed during PGR collection
- Passport information is recorded during collection
- A collector’s number is given to each PGR during collection
- Collection of diverse PGRs and supply the same to the plant breeders after characterization and registration in accession book of PGRC
Activity 2. Germplasm Characterization, Evaluation and Utilization

- Seed increase
- Characterization and preliminary evaluation
- Further characterization and details evaluation
- Characterization is done following IBPGR/IPGRI/AVRDC/NBPGR descriptors for each crop
Activity 3. Germplasm Conservation and Regeneration

- *Ex situ* conservation
- *In situ* conservation
- *In vitro* conservation
- Cryopreservation: Cryopreservation has not yet been initiated due to lack of trained human resources and fund
- Monitoring of seed viability and regeneration of germplasm
- Conservation and maintenance of field gene bank
Activity 4. Germplasm exchange and plant quarantine

- No country is self-sufficient in PGR; exchange of germplasm is essential for present and future crop improvement program.
- PGRC has program on germplasm exchange, and received a good number of exotic germplasm, and also gave local germplasm of different crops to other countries.
- At present the scope of germplasm exchange became limited due to poor national and international linkage and lack of proper strategies for national plant genetic resources conservation and utilization.
- We do not have any activity regarding plant quarantine at PGRC.
Activity 5. Biotechnology of PGR Collection, Characterization and Conservation

- Protocol for *in vitro* germplasm conservation techniques
- Molecular characterization and DNA fingerprinting

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Crop name</th>
<th>No. of germplasm</th>
<th>Completion year</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grasspea</td>
<td>25</td>
<td>2009-10</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>Egg plant</td>
<td>85</td>
<td>2009-10</td>
<td>Completed</td>
</tr>
<tr>
<td>3</td>
<td>Maize</td>
<td>24</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>4</td>
<td>Mungbean</td>
<td>42</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>5</td>
<td>Wheat</td>
<td>20</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>6</td>
<td>Chickpea</td>
<td>9</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>7</td>
<td>Lentil</td>
<td>7</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>8</td>
<td>Blackgram</td>
<td>3</td>
<td>2010-11</td>
<td>Completed</td>
</tr>
<tr>
<td>9</td>
<td>Chilli</td>
<td>100</td>
<td>2014-15</td>
<td>On-going</td>
</tr>
<tr>
<td>10</td>
<td>Mustard</td>
<td>25</td>
<td>2014-15</td>
<td>On-going</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total:</strong> 340</td>
</tr>
</tbody>
</table>
Activity 6. Documentation of PGR

- Passport information
- Characterization information
- Conservation information
- Regeneration information
- Exchange and distribution
- Catalogue and Annual report
Activity 7. Capacity building

- Training on people awareness for PGR values and importance.
- Human resources development on PGR management. Seminar, symposium, workshop and training program for BARI scientists, NGO workers and extension personnel.
- Training programs are also organized for newly recruited scientists of PGRC and other centres/divisions of BARI.
Major Users of PGR

- Plant breeders
- Horticulturists
- Teachers
- MS and PhD students of different universities and
- Farmers

Every year a substantial number of germplasm of different crops are being distributed among the stakeholders.

The user can apply to DG, BARI or CSO, PGRC for germplasm collection.

A prescribed requisition form (available in BARI website: www.bari.gov.bd) is being used for distribution of germplasm.
Table 5. Germplasm distribution to the user during 2014-15

<table>
<thead>
<tr>
<th>Crop name</th>
<th>No. of acc.</th>
<th>Crop name</th>
<th>No. of acc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snake gourd</td>
<td>10</td>
<td>Tomato</td>
<td>10</td>
</tr>
<tr>
<td>Country bean</td>
<td>9</td>
<td>French bean</td>
<td>4</td>
</tr>
<tr>
<td>Wheat</td>
<td>100</td>
<td>Brinjal</td>
<td>20</td>
</tr>
<tr>
<td>Lentil</td>
<td>20</td>
<td>Chilli</td>
<td>79</td>
</tr>
<tr>
<td>Chickpea</td>
<td>30</td>
<td>Spinach</td>
<td>10</td>
</tr>
<tr>
<td>Sunflower</td>
<td>20</td>
<td>Mustard</td>
<td>105</td>
</tr>
<tr>
<td>Mung bean</td>
<td>110</td>
<td>Ridge gourd</td>
<td>50</td>
</tr>
<tr>
<td>Blackgram</td>
<td>30</td>
<td>Sponge gourd</td>
<td>40</td>
</tr>
<tr>
<td>Sesame</td>
<td>150</td>
<td>Okra</td>
<td>98</td>
</tr>
<tr>
<td>Sweet gourd</td>
<td>60</td>
<td>Ash gourd</td>
<td>50</td>
</tr>
<tr>
<td>Maize</td>
<td>33</td>
<td>Cauliflower</td>
<td>1</td>
</tr>
<tr>
<td>Cabbage</td>
<td>3</td>
<td>Sub-total (11)</td>
<td>467</td>
</tr>
<tr>
<td><strong>Sub-total (12)</strong></td>
<td><strong>600</strong></td>
<td><strong>Total (23 crops): 1067</strong></td>
<td></td>
</tr>
</tbody>
</table>
## Germplasm conservation status at PGRC up to June 2015

<table>
<thead>
<tr>
<th>Crop name</th>
<th>No. of crop</th>
<th>No. of accession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>12</td>
<td>1727</td>
</tr>
<tr>
<td>Pulse</td>
<td>12</td>
<td>3460</td>
</tr>
<tr>
<td>Oil seed</td>
<td>9</td>
<td>455</td>
</tr>
<tr>
<td>Vegetables</td>
<td>32</td>
<td>3902</td>
</tr>
<tr>
<td>Spices</td>
<td>9</td>
<td>197</td>
</tr>
<tr>
<td>Fruits</td>
<td>1</td>
<td>92</td>
</tr>
<tr>
<td>Others (Sunhemp, sesbania, tobacco, yam bean, jute)</td>
<td>5</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>9891</strong></td>
</tr>
<tr>
<td>Field gene bank</td>
<td>57</td>
<td>194</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>137</strong></td>
<td><strong>10085</strong></td>
</tr>
</tbody>
</table>
Threat to genetic resources

- Advent of modern agriculture is the main threat to PGR in Bangladesh.
- Natural calamities like flood, drought, river erosion, massive deforestation, destruction of habitat, and remarkable socio-economic changes in the country are the major causes of genetic erosion.
- Rate of genetic erosion in Bangladesh is quite high.
- A total of 226 (106 + 120) plant species have been enlisted in two volumes of Red Book published by National Herbarium.
- Twenty two agri-horticultural crops have been enlisted by PGRC as endangered five years back.
Recommendation

- There should be agreement among the South Asian countries regarding PGR exchange and utilization.
- Initiative may be undertaken for technical cooperation among the South Asian countries about human resource development and sharing of technologies.
- South Asian Seed Vault may be established for conserving safety duplicate of PGR.
- Sharing of information about PGR through Internet.
- Development and publication of Descriptors for Minor Fruits and other indigenous crops grown in South Asian countries.

Wood apple, golden apple, Burmese grape, betel leaf, ginger, turmeric etc.
PICTORIAL PRESENTATION
SPGR Sub-Project Completion Report

ON

CHARACTERIZATION OF IMPORTANT PLANT GENETIC RESOURCES: BARI COMPONENT

Duration: December 2011 to June 2014

Executing Organization
Plant Genetic Resources Centre
Bangladesh Agricultural Research Institute
Gazipur-1701

Submitted to
PIU-BARC, NATP: Phase-1
BARC complex Farmgate, Dhaka-1215

June 2014

AFACI-IMPGR Project Completion Report

COLLECTION, CHARACTERIZATION AND UTILIZATION OF RICE, MINOR CEREALS AND CHILLI IN BANGLADESH

November 2014
Mid term conservation unit
Long term conservation unit
Diversity in Melon germplasm
Seed colour variations in foxtail millet

- White
- Cream
- Yellow
- Orange
- Light gray
- Black
Diversity in Litchi
Diversity in Hyacinth bean
Diversity in Bottle gourd
Diversity in pumpkin
Diversity in Chilli
Diversity in Bitter gourd
Diversity in Stem Amaranth
Diversity in Okra
Conclusion

- PGRC is a small unit of BARI
- Other research institutes like BRRI, BJRI, BSRI, and CDB have also germplasm conservation unit
- Due to lack of awareness about importance of PGRFA in farmers, institutional and national level, genetic resources conservation, management and utilization activities did not get priority in the country at all in any level.
- All the PGR management should come under one umbrella
- Present government realized the importance of PGR and has given top priority
- Initiative has been undertaken for establishment of “National Plant Genetic Resources Institute (NPGRI).