

## EXECUTIVE SUMMARY

I. OUTLINE OF THE PROJECT	
<b>Country:</b> Islamic Republic of Pakistan	
<b>Project Title:</b> Genetic Resource Preservation and Research Laboratory	
<b>Issue/Sector:</b> Agriculture	
<b>Cooperation scheme:</b> Technical Cooperation	
<b>Division in charge:</b>	
<b>Total cost:</b> 216.4 million yen (PTTC 179 + A/C 37.4 million yen)	
<b>Period of Cooperation</b>	June 1993- May 1998 & August 2001-August 2003
	<b>Partner Country's Implementing Organization:</b> Pakistan Agricultural Research Council, Islamabad. Pakistan.
	<b>Supporting Organization in Japan:</b>
<b>Related Cooperation:</b> Grant Aid Project "Establishment of Genetic Resource Preservation and Research Laboratory" (1,567 million yen).	
<b>1.1. Background of the Project</b>	
<p>Pakistan is located in Central Asian Region, which is one of the centers of biodiversity. The climate and topography of this country is ideal for a variety of crop species that need to be preserved and that is why germplasm conservation is of critical importance.. Therefore Pakistan is well known as one of the most important country for research of genetic resources.</p> <p>On the other hand, under the dynamic agricultural growth policy of Government of Pakistan, high yield crops and improved varieties have been given a priority as indigenous species including potential high value varieties that are extinguishing rapidly.</p> <p>Based on such situation, in 1989 the Government of Pakistan requested the Government of Japan to support the facilities and technologies for collection, preservation and evaluation of plant genetic resources to be used as material in breeding improved varieties. In 1993, the facility for Genetic Resource Preservation and Research Laboratory that is now called "Plant Genetic Resources Institute (PGRI)" was established by the Government of Japan in collaboration with the Government of Pakistan. This was followed by a 5 year (1993 to 1998) project-type technical cooperation that was later on by implementation of as aftercare technical cooperation to (August 2001 to August 2003) in order to transfer technologies for the management of genetic resources of food crops. Government of Pakistan aims to increase agricultural growth rate to 4.7% by use of high yielding varieties and strengthening the research organization and facilities of the NARC including conservation of Plant genetic resources on priority basis.</p>	
<b>1.2. Project Overview</b>	
<p>JICA carried out a comprehensive technical assistance programme for the project and provided technical training to Pakistani counterparts in Japan and on the job in Pakistan also through JICA experts. All equipment required for six laboratories and experts to build the in house capacity of staff of the project (PGRI) were supplied by Government of Japan under the Grant Aid scheme. The key activities carried out included germplasm collection, preservation and evaluation, multiplication, documentation and distribution to national research institutes/ organizations as breeding and research material for development of improved varieties.</p>	

### Overall Goal

• To develop new high yielding varieties with insect and/or disease resistance and stress tolerance in order to increase crop production in Pakistan

### Project Purpose

• Activities of PGRI are strengthened in order to serve crop breeders and researchers in Pakistan

### Outputs

1. More plant genetic resources are allocated and conserved in the gene bank.
2. More useful characters are evaluated by agronomical and bio-chemical analysis.
3. More genetic resources are multiplied for conservation and distribution.
4. Data management system is improved.
5. Plant Genetic Resources Management Manual is published.
6. Coordination with national breeders and researchers is strengthened.
7. PGRI activities are improved.

### Inputs

Japanese side

Input	PTTC Period	After care Period
Long term Experts	6	1
Short Term Experts	22	4
Trainees (in Japan)	16	5
Equipment	140 million yen	20 million yen
Local cost	39 million yen	17.4 million yen
<b>Total Cost</b>	<b>179 million</b>	<b>37.4 million</b>

Pakistani Side

Counterparts	23	22
Equipment	NA	NA
Land and facilities	Land was provided by Government of Pakistan and facilities were established under Japanese Grant Aid Scheme.	

### II. EX-POST EVALUATION TEAM

Members of the Evaluation Team	Mr. Takao Kaibara / Team Leader
	Mr. Abdul Razzaq Saleemi / Consultant Team Leader, Evaluation & Analysis
	Mr. Nisar Ali Khan / Consultant Expert
	Mr. Sohail Ahmed / Management of the evaluation
	Mr. Shinsaku Fukazawa / Management of the evaluation
Period of Evaluation	December 1, 2007 to February 5, 2008

### III. PROJECT PERFORMANCE

#### 3.1 Performance of Project Purpose

As a result of fact-finding analysis of farmers and 10 relevant organizations, it was found that the project achieved the purpose to strengthen activities of PGRI in order to serve crop breeders and researchers in Pakistan at all levels in the project area with satisfaction of such crop breeders and researchers. The evaluation team also observed its high relevancy, prospect of positive impacts, efficiency, and sustainability of the project based on the discussions with concerned officials, counterparts, and crop breeding research institutions.

#### 3.2 Achievement related to Overall Goal

PGRI distributed 1,286 germplasm per year for breeders and researchers to contribute developing new varieties. More than 50% of crop varieties (131 varieties) have been developed after the establishment of PGRI, which is a result of its regular and assured distribution of plant germplasm to breeders for evolution of crop varieties. All the varieties released after the establishment of PGRI have been approved by the competent committee and recommended for commercial planting. Farmers were enjoying the good harvest of the crop through by using these new and approved varieties.

#### 3.3 Follow-up of Recommendations by Terminal Evaluation Study

Terminal evaluation team recommended that PGRI should employ a permanent system engineer or out source the work in order to implement the expanding tasks of PGRI like preparation and up-dating of website etc., effectively. Director, PGRI during his interview informed that there is a centralized system in PARC and website of PARC is being up-dated regularly. PGRI has put its data on the same website thus no extra system engineer was recruited.

### IV. Results of Evaluation

#### 4.1 Summary of Evaluation Results

##### (1) Impact

PGRI is playing its due role in the national efforts by providing 1,286 germplasm per year and technical guidance to the national research institutes and university students as one and only special institute of plant genetic resources preservation and research. The contribution of germplasm can easily be assessed after reviewing the Table 1, which reveals that more than 50% varieties have been developed after the establishment of PGRI.

**Table 1: Comparison of Total Varieties Developed So Far and After the establishment of PGRI**

Period	Wheat	Maize	Rice	Oilseeds	Pulses
Total varieties developed so far since 1933	107	21	40	33	47
Varieties developed after establishment of PGRI after 1993.	56	7	13	18	37

Source: Seed certification and registration department, GOP.

**Table 2: Crop yields of Pakistan**

Crop yields (kg/ha)

Crop	1993-94	2004-05	% Increase
Wheat	1894	2586	36
Maize	1380	2849	106
Rice	1626	1994	23
Chickpeas	393	794	102

Source: Agric. Statistics GOP, 2004-05

imilarly, Table 2 reveals that highest increase from 1993-94 to 2004-05 in crop yields was observed in maize crop (106%) followed by 102% increase in chickpeas. Wheat yield increased by 36% while rice crop yield increased by 23% in the same period . Unexpected positive impact is "Contribution to the world wide plant genetic resources research frameworks"

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## ***(2) Sustainability***

### **Organizational Sustainability**

PGRI is one and only special institute of plant genetic resources preservation and research in Pakistan. The status of PGRI has been enhanced substantially as the importance of genetic resources has become widely known. A high degree of dedication and commitment among the professional staff was found, which indicates good applicability of the knowledge gained during the project period. Another evidence of the good use of the training is that the germplasm recipients are quite satisfied with the germplasm they receive and the facilities they avail at the PGRI.

There was 20 technical staff at the completion of project in 2003. Currently there are only 16 staff member on the strength of PGRI. The Existing staff is though overburdened but because of staff was well trained in Japan and is much motivated to work in laboratories and in the fields. This deficiency of shortage of staff is also being met by implementing new projects on different aspects of Plant Genetics Resources where contractual staff is hired for 3-5 years period. At present, 8 scientists have been recruited under these development projects. Some of the staff will be hired on permanent basis after the contract is completed.

No change has been made in the mission, system and structure of PGRI after completion of the project.

### **Technical Sustainability**

Out of the 17 persons who received training in Japan there are only 12 who are currently working in PGRI. Two have retired and three have left the job. Any further loss of technical strength could threaten the project's sustainability.

The equipment received during the PTTC and aftercare project is in working order except some of the equipment received earlier during project period has become out of order. PGRI staff is capable of carrying out routine operational maintenance of equipment but in case of major repair or replacement of any part, it is dependent on the original manufacturers abroad. As most of equipment was supplied in 1993 and those models are presently out of production. PGRI is facing difficulty in obtaining the spare parts even from the original manufacturers.

In order to foster young researchers, PGRI is training young scientists and university students in diverse disciplines of conservation of plant genetic resources and their utilization.

Moreover, some of the universities have started offering regular courses in plant genetic resources to graduate and post graduate students. Yet there is no syllabus/regular training module developed for on-job training of the young scientists in the area of plant genetic resource conservation but PGRI staff along with university staff is preparing the outlines of such courses. Thirteen intern staff are also attached with PGRI.

### **Financial sustainability**

The total annual budget has increased from Rs. 1.179 million in the year 1994-95 to Rs. 14.666 million in the year 2006-07. An amount of Rs. 3.49 million annually is being spent on the operational cost. Other than the budget available with PGRI from federal government an additional support (US\$)33.33 million) is received from other projects sponsored by Agricultural Linkages and other programmes. The availability of budget under different such development projects is a significant sign of its financial sustainability.

## **4.2 Factors that have promoted project**

### **(a) Impact**

The population of Pakistan is increasing 2.8% annually (1975-2005, UNDP) and in order to support such a rapid

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growth in population, the country requires new varieties of all crops to meet the dire demand of not only cereals but oil seeds also. This situation creates pressure on the government to carry out development of new varieties.

(b) Sustainability

The reputation of PGRI is attracting researchers/organizations from all over the Pakistan. All research institutes recognize the germplasm storage facility of PGRI with the result that the germplasm distribution load is increasing day by day. The general awareness among the agricultural scientists too has compelled them to store their elite germplasm at PGRI. It is also helping a number of students to complete their research and theses and also providing post-graduate training to candidates aspiring to specialize in Biotechnology or molecular genetics. Thus PGRI is working as an important institution to assist universities. This factor adds to the prestige of the PGRI and contributes to the sustainability.

#### 4.3 Factors Inhibiting Sustainability

A careful study and discussion with staff and other nation building institutes which have benefited from PGRI informed that there was no factor that should inhibit its sustainability.

#### 4.4 Conclusion

This project made a substantial contribution to the overall goal, "to develop new varieties of crops to increase field crop yields in Pakistan". That is evidenced by the number of newly developed varieties after the establishment of PGRI. More than 50% of developed varieties have been developed after the establishment of PGRI.

PGRI is playing its due role in the national efforts by providing 1,260 germplasm per year and technical guidance to the national research institutes and university students as one and only special institute of plant genetic resources preservation and research in Pakistan.

The scope of the PGRI is not limited to providing germplasm to other relevant organizations only but also to extend facility of research work to various institutions. The PGRI has also created linkages with international research institutes to exchange germplasm and storage facility. The establishment of such activities has enabled Pakistani government to recognize the importance of PGRI and as a result the total annual budget has increased to a large extent.

#### 4.5 Recommendations

- Efforts should be made to replace the few old models of equipment, which are not repairable and are going to be obsolete. (Cooling Units of Genebank).
- To further enhance and strengthen cooperation among scientists the regular exchange of scientist should continue.  
Any incentive system needs to be devised for retention of the trained staff.
- Keeping in view the importance of Plant Genetic Resources in crop improvement and sustainable agriculture, the Government of Pakistan should give top priority to financial and human resources to this important field.

#### 4.6 Lessons Learned

1. The sustainability of projects involving germplasm collection, preservation techniques, evaluation and distribution, use of germplasm by the provincial institutes for developing high yielding cultivars require a good understanding among all stakeholders. This is only possible with high class trained manpower, sufficient operational funds, and state of the art building and equipment.

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2. Support from short-term experts to improve the technical skills of trainers through counterpart training, provision of state of the art equipment, and overseas training of the staff of the implementing agency are excellent tools that would ensure a strong foundation for the project to sustain its benefits in the future.