Status of Rice Germplasm – Its Collection and Conservation in India

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The cultivated rice of Asia (*Oryza sativa* L.) is supposed to have originated in the South and/or South-East Asia. India forms a major part of this region. Thus, it is traditionally rich in the diversity of rice including the wild progenitors of cultivated rice.

During the first quarter of the twentieth century and more specifically in the years between 1910 and 1920 Madras Presidency, Bengal and Central Province initiated collection of rice germplasm in the country. At the same time (in 1911) the first Agricultural Research Station devoted to rice research, was established in Dacca (now in Bangladesh) and the Paddy Breeding Station was established in Coimbatore in 1912. Subsequently, more and more research stations were established in different agro-climatic zones of the country. These rice research stations collected traditional rice varieties from their respective localities, practiced pure line selection to identify higher yield potential lines and recommend them for general cultivation.

The Central Rice Research Institute was established at Cuttack in the year 1946 with Dr K Ramiah as its first Director. He brought with him a duplicate set of about 2,000 accessions of rice germplasm, which was being maintained at Coimbatore at that time. This became the starting point of the national genebank for rice at CRRI. Subsequently, many explorations, collection, introduction and exchange activities have helped to enrich this genebank.

The Institute undertook its first planned exploration and collection mission of rice germplasm in the Jeypore tract (now Koraput District of Orissa) during 1955-60.

Govindaswami and Krishnamurty explored about 27,000 sq km area during this mission and a total of 1,745 accessions were collected. During 1956, Dr RH Richharia initiated the exploration and collection of rice germplasm from Manipur. This mission was spread over and period of five years and a total of 874 accessions were collected.

Simultaneously, a PL-480 project on collection of rice germplasm was operative during 1967-72 with Dr MS Swaminathan and Dr SVS Shastry. In this programme, during a period of five years, Dr SD Sharma and his associates collected a total of 6630 accessions from all the districts of Arunachal Pradesh, Nagaland, Manipur, Tripura, Meghalaya, and only North Lakhimpur, Guwahati and Goalpara districts of Assam. This collection is popularly known as Assam Rice Collection (ARC). During 1970-79, a special programme was undertaken to collect rice germplasm from all the rice growing districts of Madhya Pradesh by Dr RH Richharia. He covered 42 districts and collected a total of 19,226 accessions.

In 1975, a comprehensive exploration and collection programme was drawn for the whole country especially for the traditional rice growing areas of Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal and Orissa covering 30 districts. This programme resulted in collection of 1,038 accessions.

During 1978-80, a collaborative programme was operative in CRRI with the Agricultural Universities, State Department of Agriculture and ICAR centres for collection of rice germplasm all over the country. The materials were collected from all 100 districts of 14 States and a total of 6,349 accessions were collected.

During 1986-89 a total of 3,697 accessions of cultivated rice and 167 accessions of four wild species of rice were collected from Northern Orissa, South Bihar, West Bengal, Sikkim and Mizoram.

At present, the NBPGR has been coordinating the exploration and collection of rice germplasm from all over the country and is also supporting operational facilities for the explorations. In 1984, a Division of Genetic Resources was established in CRRI to look after all the aspects of rice germplasm. This is recognized as the National Active Collection Centre by the NBPGR. With the introduction of a mission mode NATP project on plant Biodiversity (by the NBPGR as its lead centre), a new thrust has been applied on the exploration and collection of rice germplasm with special reference to wild rice. Now, the total number of rice accessions maintained by various Research Stations in the country might exceed 80,000.

During the maintenance, germplasm may lose their identify because of random and non-random processes of sampling. Also, loss due to unforeseen natural calamity of the type of super-cyclone that affected Orissa during the year 1999 or devastating flood, which destroyed all the germplasms, maintained at Chinsurah, West Bengal in the year 2000, can not be ruled out.

Realizing the potential danger of such genetic erosion, the effort of developing a medium-term cold storage system for rice germplasm was initiated at CRRI in 1984. During 1986, it was decided by Dr RS Paroda, the then Director, NBPGR and Dr SD Sharma, the then Head, Genetic Resources Division, CRRI to accommodate all the germplasm of CRRI at the genebank of NBPGR. Since then, a total of 22,137 accessions had been deposited in the long-term storage of the NBPGR. These materials in a small quantity were deposited as a stop-gap arrangement, till the development of a dependable storage system at CRRI. Under the Indo-USAID collaborative project a cold module was installed in the CRRI, which has been operative since 1998 and found to be rather dependable.

Thus, now a stage has come to streamline and systematize the conservation of rice germplasm in the country. In this endeavour, the first step would be to assign a National Accession Number to all these collections. This has to be followed by seed increase in sufficient quantity for further deposit in the long-term storage and also in the medium-term storage of the active collection site in a phase-wise manner. At the same time they need to be characterized. Further evaluation and utilization has to be followed up for the purpose of crop improvement.

In the past, the scientists involved with genetic resources undertook the evaluation and characterization of germplasm. However, in the absence of a National Numbering System and proper conservation of such evaluated materials, the information generated often suffered from deficient identification and thus under-utilization of such information.

Farmers and Breeders – Better Partners for Management of Plant Genetic Resources

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Development of locally adapted varieties and conservation of plant genetic resources play a key role in augmenting agricultural productivity especially when Intellectual Property Rights are introduced in the areas of new plant varieties and genetic resources. Besides the agro-ecological factors of each locality, social and economic factors also decide the acceptability and adaptability of new varieties. Many of the HYVs of crops evolved from centralized breeding programmes are poorly accepted by the farmers. Jayathy (Ptb 47) a HYV of rice released in Kerala was poorly accepted by the farmers even though the variety was the best genotype in the International Rice Testing Programme (IRRI, 1984). Contrary to this, many of the local rice cultivars, not released and notified as varieties had attained higher level of acceptance and spread in the rice growing tracts. This situation had motivated the concept of Farmer Participatory Plant Breeding (FPB), and in Kerala a FPB programme was launched to evolve rice varieties suited to specific agro-ecological situations of Palakkad – the rice granary of Kerala. The project was implemented as the research component of GALASA (Group Approach for Locally Adapted and Sustainable Agriculture), a programme for the development of locally adapted technologies and their demonstration utilizing indigenous knowledge and local manpower. Palakkad District Panchayath is providing financial support to the project, whereas State Agricultural University, State Department of Agriculture and the farming communities of Palakkad district collaborate in the project with technical know-how.

In FPB, farmers demanded for a spectrum of rice varieties to cater the needs of home consumption and