



SPGRC



SADC PLANT GENETIC RESOURCES CENTRE



BACKGROUND



The Southern African Development Community (SADC) countries have pooled their resources and established the SADC Plant Genetic Resources Centre (SPGRC) in Lusaka, Zambia where base collection for long-term storage are maintained and plant genetic resources activities for the region are co-ordinated; whereas, the National Plant Genetic Resources Centres (NPGRCs) maintain active collections for short-term storage for immediate use in crop improvement.

The SADC Plant Genetic Resources Centre is situated on a 86 ha farm Off the Great East Road, Lusaka, Zambia.

The need for the establishment of the SPGRC network came as a response to the realisation of the need for the region to collect and conserve its rich heritage of plant germplasm and to join the world-wide effort for the maintenance of valuable plant genetic resources, their characterisation, documentation and utilisation.



OBJECTIVES

The SPGRC network programme in its work pursues to achieve the following objectives:

1. develop and maintain regional and national capacity for conservation of plant genetic resources;
2. strengthen coordination and collaboration in the conservation, evaluation, documentation and use of PGR in the SADC region;
3. facilitate accessibility and promote sustainable utilisation of PGR within the region;
4. promote development and harmonization of national and regional policies and legislation consistent with international obligations;

SPGRC as a regional centre and NPGRCs have been established in almost all member states. However, there are limitations in terms of complementary conservation facilities and capacities to enable the conservation of a broader range of germplasm such as vegetatively propagated crop species and those whose seed may not survive the adopted conditions of storage. SPGRC also has no facilities for molecular characterisation though plans are underway to establish a Biotechnology Laboratory.

PROGRAMMES AND FUNCTIONS



Substantial progress has been made in meeting the objectives. Local plant genetic resources have been collected and conserved as active collections by most NPGRCs. About a third of the total germplasm accessions collected across the NPGRCs has been deposited at SPGRC and conserved under the base collection.

However, a large proportion of this is made up of cereals and food legumes, though these can be narrowed down to a handful of crops such as sorghum, millets, maize, cowpea, beans and bambara nuts. The base collection is maintained at SPGRC on behalf of the NPGRCs. SPGRC also makes arrangements for the safety duplication of the base collection.

Some of the NPGRCs maintain field gene banks for the conservation of vegetatively propagated crops such as cassava, sweet potato, bananas and plantains. They also handle *in-situ*/on-farm conservation activities in collaboration with SPGRC.

A lot of progress has been made with respect to the objective of training with an average of three people trained at MSc level per country and several hundreds trained at short course level. The network has lately secured scholarships for PhD studies, yet, a number of officers have acquired PhD degrees using other sources of funding.

Germplasm Collection

Before SPGRC was established, the International Agricultural Research Centres carried out most collections. More than 14,000 accessions were collected from the region and deposited in genebanks outside the SADC region. A reasonable proportion of these accessions are now being repatriated in order to establish active and base collections at the NPGRCs and SPGRC respectively.

Since inception of SPGRC more than 37,000 accessions of different crops have been collected in SADC countries and over a third of the accessions have been deposited in the base collection at SPGRC.

GERMPLASM COLLECTION



EX-SITU CONSERVATION



***Ex-Situ* Conservation**

This activity deals with the establishment of functional seed handling activities at SPGRC and the NPGRCs. This includes processing of seed from harvesting, cleaning, threshing, drying, packaging and storing in freezers. It also includes determination of seed moisture content and germination tests to assess viability of the seed going into storage and periodically, thereafter.

At the moment, about 12,000 accessions from the SADC region have been processed and stored in the base collection. This number is steadily increasing. Seed multiplication has been done on over 6,000 accessions to increase seed sample sizes to the required international standards. Characterisation has been done on over 5,000 accessions. These have been mainly on sorghum, finger millet, cowpea, pearl millet, maize, bean, groundnut and bambara nut.

Field Genebanks

Vegetatively propagated crops that are threatened with genetic erosion have been identified and these are initially conserved in field genebanks in various countries. These crops include cassava, sweet potato, livingstone potato, ground orchids, taro, banana/plantains, sugarcane, coffee, tea, sisal, pineapple and strawberry.

Herbarium

New collections, especially of wild species, are accompanied by voucher specimens, which are maintained in the herbarium to assist in identification of species and monitoring any change in plant morphology over regeneration cycles.

MULTIPLICATION AND REGENERATION

Maintenance of viability and the availability of genebank accessions are considered as the primary and secondary priorities of crop genebanks respectively. It is obvious that due to the ageing process seeds lose viability. The increasing demand and usage of seeds by end-users lead to depletion of germplasm in the genebanks. This necessitates periodic production of fresh seeds, through propagation to maintain their viability and availability, in a regeneration process.

In an effort to safeguard the existing unique and valuable diversity in *ex-situ* collections of plant genetic resources for food and agriculture, the SPGRC network multiplies and regenerates the material so as to improve on the germplasm viability and increase their availability for use by farmers, breeders, crop improvement scientists, while maintaining quality, quantity and genetic integrity.

Specifically, this activity also aims at increasing seed quantities of collections in genebanks for duplication to base collection; and at conserving and providing quality germplasm with relevant information useful in breeding and crop improvement.



CHARACTERISATION AND EVALUATION



Characterisation involves data collection on each accession following a list of botanical descriptors, but may also comprise, for example, molecular (DNA or protein) markers. The descriptors are stably expressed and data hence independent of environments and thus comparable between countries. Collection of such genebank data is for “shelf use” by curators (most often not breeders or users) in order to have documentation, for classification into germplasm groups based on phenotypic similarity, and for deciding whether a new accession is unique and should be accepted or not.



Evaluation is related to useful traits, and depends on the environment, both for expression and relevance. This is information for the breeder/user. In the SPGRC context, such data is carefully coordinated through joint testing for it to be comparable between countries and ecologies.

Both activities are primarily the domain of the NPGRCs, but without such data the SPGRC also fails in its mission.



Characterisation data, information systems and screening for redundant accessions is a tool for providing conscious judgments and choices about what to conserve.

IN-SITU/ON-FARM CONSERVATION

SPGRC continues to co-ordinate and support on-farm and *in-situ* conservation within the network programme involving development of methodologies and guidelines and mobilisation of resources to support implementation of activities by NPGRCs.

In-situ conservation focuses on maintenance of plant genetic resources, particularly wild plants, in their natural habitats and is normally achieved through the establishment of natural reserves targeted at the ecosystem or multispecies occurring in SADC countries.

The existence of wild plant species and the genetic diversity they contain depend on the ecosystem in which they are part. Effective *in-situ* conservation strategies do address the need to maintain balanced functioning of representative ecosystems.

Planning and implementation of on-farm conservation takes into account unique characteristics of the different farming systems in respective local communities and the importance for their conservation depends on the extent at which these activities are integrated into the farming systems.

Conservation and management of local plant genetic resources on-farm is strongly linked to the knowledge of local communities and therefore the strategies include the need to protect, promote and conserve the knowledge of indigenous and local communities.



DOCUMENTATION AND INFORMATION



The standardisation of genebank information for the SADC Plant Genetic Resources Network has been made possible through the development of the SPGRC Documentation and Information System (SDIS) at SPGRC that is installed at all the NPGRCs. The network has adopted international standards of plant genetic resources conservation and documents its information in a standard format on SDIS. The system was developed as a source of information to assist the SPGRC together with its network of NPGRCs in planning and operating the network's genebank activities.

A computerised information system for the documentation of accessions that are stored both at SPGRC and the NPGRCs has been developed for recording information which will facilitate decision making and taking action in genebank activities such as: registration, inventory of genebank collections, collecting priorities, regeneration and multiplication time, production of catalogues, distribution and exchange of germplasm, finding relationships and detecting duplicates.



Publicity materials depicting activities at SPGRC including annual reports and other publications have been produced as part of information dissemination. An SPGRC web page can be accessed through www.spgrc.org where SPGRC discussion forum is hosted.

Increased usage of the available information through training of regional experts on data analysis, interpretation and increased use of materials for breeding, conservation, re-introduction, multiplication, is eminent in order to justify the collections and their conservation. In order to increase usage, SPGRC has deliberate efforts for supporting local seed systems and linking with seed production, recognizing and incorporating medicinal plants and traditional knowledge in her systems, as well as mainstreaming HIV/AIDS.

GERMPLASM UTILISATION



There are a number of success indicators that show some level of achievements of the objectives of the SPGRC and the network programme. This also includes the extent of SPGRC product and service delivery to various beneficiary groups or stakeholders.

SALIENT ACHIEVEMENTS

Some of the notable achievements of SPGRC and the network programme:

1. Establishment of a functional network dealing with conservation and utilization of plant genetic resources;
2. Creation of regional awareness on the importance and the necessity for conserving PGR;
3. Effective participation at international level in discussions leading to adoption of the FAO ITPGRFA;
4. Germplasm distribution for crop improvement trials/purposes;
5. Access to planting material and seed sharing/exchange through on-farm conservation activities;
6. Training of network personnel.

PARTNERS



National Partners

SPGRC collaborates with national PGR programmes mainly through NPGRCs as well as other national institutions in carrying out various technical activities. The national governments through relevant ministries and departments have been important partners of SPGRC in the establishment of the regional network and the National Plant Genetic Resources Centres. Other stakeholders that collaborate with SPGRC at the national level include research institutions, Universities, NGOs as well as individual experts.

These institutions have mainly been used to carry out certain technical activities either directly in collaboration with SPGRC or indirectly through NPGRCs. Others, such as seed services have provided specialised laboratory services in seed viability testing.

Regional and International Partners

SPGRC has been involved in collaborative activities that have entailed working in partnership with various organisations. In general, these partnership arrangements have been informal.

These partnerships have contributed to the recognition of SPGRC and NPGRCs at local and international levels and provide a strong basis upon which further and more effective partnerships may be developed.

Institutions that have been involved in partnerships with SPGRC over the years include Bioversity International, International Rice Research Institute (IRRI), Overseas Development Institute (ODI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Global Crop Diversity Trust, and of late, Millennium Seed Bank Project (MSBP).

SPGRC has participated in some steering committee meetings of the Southern African Botanical Diversity Network (SABONET); the Southern African Biodiversity Support Programme (SABSP); and the SADC Seed Security Network (SSSN).