

The Role of National Plant Genetic Resources Centres (NPGRCs) in the SADCC Regional Gene Bank (SRGB) Programme

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Abstract

The genetic diversity of the plant heritage of the Southern African Development Coordination Conference (SADCC) region is vulnerable to erosion and the introduction of improved varieties to subsistence farmers who are the custodians of variability through their agricultural practices. The SADCC Regional Gene Bank for Plant Genetic Resources is a programme which was set up to address these issues and ensure scientific plant genetic resources management in the region through a network of National Plant Genetic Resources Centres (NPGRCs). The activities of the NPGRCs are coordinated by National Plant Genetic Resources Committees (NPGRCComs). The NPGRCComs are also responsible for coordinating national plant scientists to develop national plans of action for plant genetic resources and to form crop working groups and subcommittees responsible for training and funding proposals. NPGRCs carry out exploration and collection in familiar territory and carry out multiplication, regeneration and evaluation in or near the collection sites. They also manage active collections and can supply germplasm to local scientists without delay.

Background

The SADCC Regional Gene Bank for Plant Genetic Resources (SRGB) is a long-term programme which was set up to ensure exploration, collection, conservation, documentation and utilization of wild and cultivated plant genetic resources of the Southern African Development Coordination Conference (SADCC) region. The programme was initiated by the Southern African Centre for Cooperation in Agricultural Research and Training (SACCAR) with financial support from the Nordic

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countries. The executing agency of the programme is the Nordic Gene Bank (NGB) and the International Board for Plant Genetic Resources (IBPGR) and other International Agricultural Research Centres (IARCs) provide technical assistance. The regional genebank at Chalimbana, near Lusaka in Zambia, coordinates a network of National Plant Genetic Resources Centres (NPGRCs) of the SADCC member states. The programme relies heavily on the relative advantage of the NPGRCs to carry out plant genetic resources (PGR) activities in the member states.

The SADCC Region

The SADCC region is made up of eight tropical and two subtropical countries which lie between 1° and 31° south of the equator: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe. These countries share more-or-less similar rainfall patterns, natural vegetation and agro-ecological zones which support a rich diversity of wild and cultivated plant species utilized for food, feed, timber, fuel, medicine, soil amelioration and various social and commercial purposes. The similarity of agro-ecological zones also encourages regional efforts in agricultural and related research.

The region is a reservoir of wild relatives of cultivated crop plants (Rhoades, 1991) and parts of it are global centres of plant diversity (IUCN, 1990). It is rich in indigenous wild and cultivated plants and is a centre of diversity of several cultivated species. It also hosts a wide variety of exotic species some of which were introduced as far back as the 5th and 15th century A.D. by the Arabs and the Portuguese respectively (Murdock, 1959).

Through SACCAR, the SADCC region is investing considerable effort to increase agricultural production and ensure food security in the region (Devres Inc., 1985). This effort will be highly dependent on the availability of adapted plant genotypes for the development of improved varieties. A parallel effort is necessary to ensure the conservation of the genetic resources of the region for dissemination to plant breeders and to sustain agricultural production for posterity.

Genetic Erosion in the SADCC Region

Over the last hundred years the SADCC region has suffered environmental deterioration due to deforestation for hardwood timber and to make way for commercial, large-scale farms. Traditional, subsistence farmers were relocated on marginal land on which human and livestock pressure also led to massive deforestation and erosion. The indigenous crops on which agriculture was historically based in the region were gradually marginalized by higher yielding introductions especially those from the

New World. Most of the indigenous species are now grown on a small scale mainly to maintain tradition and are in danger of extinction.

There is a lot of variability in some of the introduced species in the SADCC region. Landraces which are well adapted to the local environment are widespread. As farmers are encouraged to grow high yielding varieties and hybrids, these landraces are now also threatened with extinction.

The US Agency for International Development recommended a 20-year strategy for agricultural research in order to increase agricultural input and output in the SADCC region (Devres Inc., 1985). The successful implementation of this worthy recommendation will replace most of the cultivated species and varieties in the rural areas with higher yielding, improved cultivars. The role of subsistence farmers as custodians of variability will be highly reduced. A positive effort is necessary for conservation of the plant genetic resources of the region for posterity.

Plant Genetic Resources Activities in the SADCC Region

The biodiversity of relatively large areas of the SADCC countries is well conserved and protected in forest reserves, national parks and game parks. In addition, the botanic gardens of the individual countries have custody to numerous genera found in the region. Unfortunately, very little effort has been invested in the conservation of the genetic diversity of crop plants and their wild and weedy relatives and other indigenous wild plants with economic potential.

Until the late '70s there were no germplasm collections of trees and crop plants in the SADCC region except breeder's collections. Germplasm collection started in the late '70s focusing on cultivated plants. Most of the collection trips were coordinated by the IARCs and carried out in collaboration with local scientists. Despite these efforts, most of the region is still not explored and some of the collection missions covered relatively small areas. Although the IARCs left duplicate samples of their collections in the host countries, most of the material deteriorated due to lack of storage facilities and attention.

At the end of 1990, there were no storage facilities for *ex situ* conservation in the SADCC member states besides those for breeders' collections and those provided by the IBPGR to two countries. There was also a shortage of trained scientists in plant genetic resources. At the end of 1990, only eleven SADCC nationals were trained on the IBPGR/FAO sponsored M.Sc. course in 'Conservation and Utilization of Plant Genetic resource' at the University of Birmingham. Only six people were trained on the concurrent short courses and eleven people known to IBPGR were trained elsewhere. It is therefore not surprising that at the end of 1990, only Botswana, Tanzania and Zambia had full-time scientists working on plant genetic resources.

The SADCC Regional Gene Bank (SRGB)

In 1986 SACCAR and IBPGR had a consultation in Lusaka, Zambia (IBPGR, 1986; SIDA, 1989) which recommended the establishment of a regional genetic resources centre for the SADCC countries. It was also recommended that SADCC, through SACCAR should seek financial assistance from Nordic and other donor agencies and technical assistance from IBPGR and other IARCs. The programme would be a long-term commitment over a twenty year period during which donor funding would be phased out over the last ten years. The SADCC Regional Gene Bank (SRGB) would be located near Lusaka, Zambia from where it would coordinate the genetic resources activities of the region.

The objectives of the SRGB are to:

- a) "establish over a 20-year period a SADCC Regional Gene Bank and network of local germplasm programmes to support plant research in the region;
- b) conserve indigenous plant genetic resources and crop genetic resources; and
- c) train plant genetic resource personnel for the region" (SIDA, 1989).

These objectives can only be successfully achieved through strong and effective NPGRCs which are formed and coordinated by National Plant Genetic Resources Committees (NPGRComs).

National Plant Genetic Resources Committees (NPGRComs)

NPGRComs are made up of a group of plant and other interested scientists from National Agricultural Research Systems (NARS) including government research services, educational institutions, parastatal bodies and non-governmental organizations (NGOs). The chairman of the NPGRCom of each SADCC member state sits on the Board of SRGB which is chaired by the director of SACCAR.

The major activity of the NPGRCom is to ensure the establishment of a National Plant Genetic Resources Centre (NPGRC) that is adequately staffed and equipped to carry out the plant genetic resources activities of the member state with assistance from the SRGB programme. The activities of the NPGRC are coordinated by the NPGRCom which develops a detailed national plan of action indicating human resources, infrastructure, training and equipment requirements and prioritising national PGR activities.

There is a lack of trained human resources in PGR in the SADCC region. The SRGB programme supports several training activities ranging from short certificate courses to M.Sc. degrees. These are carried out in the region, the Nordic countries and the University of Birmingham in the United Kingdom. Whilst priority is currently given to candidates who are earmarked for working in the NPGRCs, suitable

candidates working in areas related to PGR will be considered. The NPGRComs are responsible for forming training subcommittees which consider applicants and recommend candidates for these courses in good time.

Limited funds are available from the SRGB programme for PGR projects proposed by scientists who are employed by relevant institutions. The SRGB also solicits funds from donors for PGR projects and activities in the region. The NPGRComs should form subcommittees responsible for project proposals which will ensure that proposed projects are scientifically sound and of national interest before the projects are submitted to SRGB for funding or to seek suitable donors. All proposals should be submitted to the NPGRCom Chairman.

The NPGRCom is responsible for the formation of Crop Working groups (CWGs) made up of scientists who will focus on individual crops or groups of crops of national importance (Proposed crop working groups include those for cereal crops, grain legumes, fodder and forage, vegetable crops, fruits and nuts, ornamentals, medicinal plants, forest trees, under-utilized plants, root and tuber crops, oilseeds and industrial crops). The CWGs will then develop strategies and set priorities for PGR activities necessary for their crop and make recommendations of action to the NPGRC. The CWGs should coordinate the work carried out by the NPGRC on their crop to ensure that international scientific standards are observed. Regional crop working groups (RCWG) will be formed from some members of national CWG to play a similar role at the regional level.

National Plant Genetic Resources Centres (NPGRCs)

The NPGRCs are the national counterparts to the regional genebank. They should be recognized commodities or sections under the Ministry of Agriculture, Research Division with their own staff complement and budget. NPGRCs carry out and coordinate all plant genetic resources activities in the member states including the management of the active collection and ensuring that samples are sent to SRGB for the base collection and the duplicate collection.

The objectives of the NPGRCs are:

- to gather, through exploration and collecting expeditions carried out in the different ecological zones of the countries, information and material of plant genetic resources first of all of endemic and indigenous plants with a possible national evolution history which are cultivated or used or with potentiality for cultivation or use together with wild relatives of such species;
- to characterize, evaluate, rejuvenate, multiply and document indigenous and exotic plant genetic resources material under coordination of and by appointment from or agreement with the Regional Gene Bank;

- to hold short term active collections of indigenous or adapted plant genetic resources material under coordination of and by appointment from or agreement with the Regional Gene Bank;
- to handle the *in situ* conservation (field genebanks and reserves) in collaboration with the Regional Gene Bank;
- to serve directly plant breeding and plant research in the country with indigenous or adapted plant genetic resources material from the Regional Gene Bank and from the Active collection of the NPGRC;
- to work in close collaboration with national plant breeding institutions for effective utilization of plant genetic resources (SIDA, 1989).

The SRGB programme recognizes the comparative advantage of the NPGRCs for organizing exploration and collecting expeditions in their countries. The NPGRCs have comparative advantage for characterizing, evaluating, rejuvenating and multiplying germplasm in environments which are similar to or near the original collection site. Short-term collections will also be held by the NPGRCs to ensure that national plant breeding and research activities are directly attended to. The NPGRCs will also handle *in situ* conservation.

In order to carry out these activities, the NPGRCs should be adequately staffed and funded. Each NPGRC should have a curator who will be in charge of the centre and seed handling activities, a collector and *in situ* officer, an agronomist to handle rejuvenation, multiplication, characterization and evaluation, and a documentation officer all of whom should be at least M.Sc. level would be desirable. These scientists should be supported by one or two B.Sc. level officers each and the centre should have adequate support staff. The staff members should be government appointments. Where necessary the SRGB programme will sponsor the training of appointed staff members to achieve the required academic level.

Conclusion

The SRGB programme is a network activity for plant and other interested scientists in the region. The strength of the programme lies in its network of national plant genetic resources programmes which are coordinated by National Plant Genetic Resources Committees (NPGRCs) and run their activities at National Plant Genetic Resources Centres (NPGRCs). The success of the NPGRCs relies heavily on strong NPGRCs which should form relevant committees and groups to coordinate national plant genetic resources activities.

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