"On-Farm Conservation"

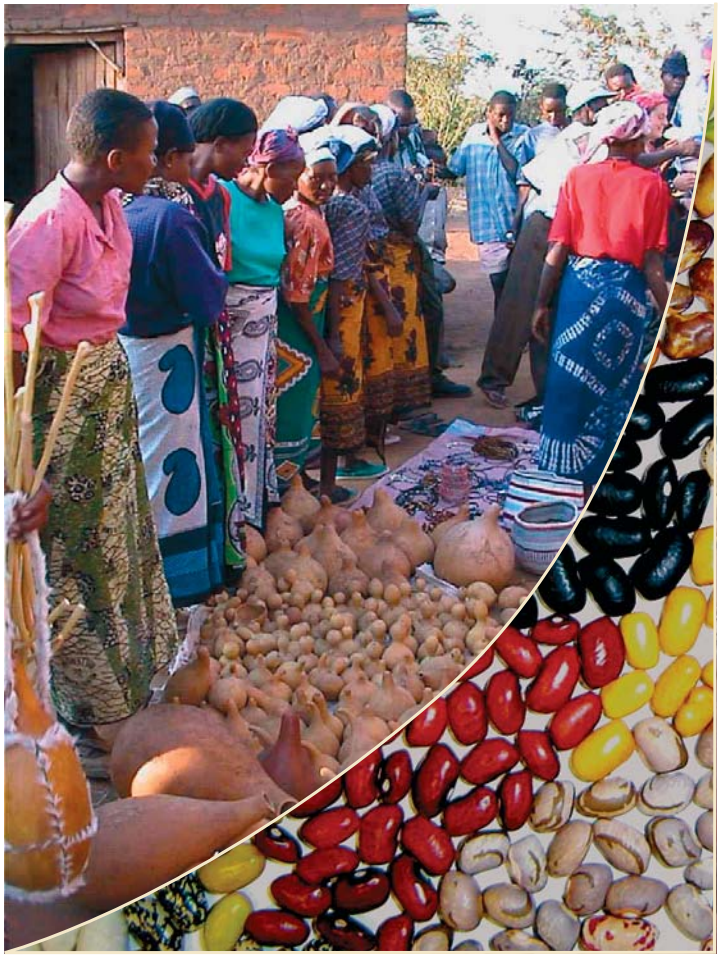
Introduction

Knowledge of South Africa's wealth of biological resources in general and plant genetic resources in particular is critical for poverty alleviation, sustaining food security and agricultural economic prosperity. Conservation of agricultural biodiversity remains a pillar to attaining these objectives.

The conservation of plant genetic resources can be achieved through two broad approaches, namely in situ and ex situ, which involve the conservation of plant genetic resources within or outside their natural habitats respectively.

Smallholder farmers and indigenous communities have developed viable agricultural practices and maintained numerous traditional plant varieties or landraces over millennia. Landraces or traditional varieties are therefore primitive crop varieties that traditional farmers have selected from wild populations and adapted into modern day crop species through selection pressure evolving from a combination of natural and human influences. Characteristics that could have contributed to selection may range from adaptation to changing environmental factors such as disease or pest resistance, drought tolerance, etc. Such heritage is under threat of being lost forever owing to many factors, including adoption of modern crop varieties, lack of formal support structures, and so forth.

There is an emerging concept called on-farm conservation, which aims at rejuvenating production and conservation of traditional crop varieties on farm through traditional farming systems and cultural norms.



What is on-farm conservation?

On-farm conservation is the in-situ conservation of landraces through the selection and management of local crop populations using indigenous farming systems and agricultural practices.

What is a landrace?

A landrace is a farmer's variety that is exemplified by heterogeneous crop populations. Farmer's varieties usually have a reduced geographic range, are diverse within particular types and adapted to local conditions

or

A variety developed over time in traditional farming systems, usually variable and adapted to local conditions, therefore more or less dependent on continuous natural as well as human selection.

Why on-farm conservation?

Key elements of genetic resources cannot be captured and stored off-site. Crop genetic resources do not only include alleles and genotypes but also **wild and weedy crop relatives, predators, diseases** and the **systems of agricultural knowledge and practice** associated with genetic diversity.

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Advantages of on-farm conservation

1. CONSERVATION OF INDIGENOUS KNOWLEDGE
- Maintaining IK about farming systems and agricultural practices that retain diversity and the knowledge about the direct uses of that diversity.

2. CONSERVATION LINKED WITH USE
- On-farm conservation is closely linked to the direct use by the farmer for food or sale. Other uses such as character usage in advanced breeding programmes require development and monitoring.

3. ENVIRONMENTAL VARIATION
- Landrace crop populations have survived centuries because of their ability to cope with variable environments.
- Farmers have also selected them for resilience and stability though modest productivity.

4. DIVERSITY AT GENETIC LEVEL
- On-farm populations have the capacity to support a much greater number of and different genotypes than accessions in gene banks.

5. SPECIAL ADAPTATIONS
- The in-situ strategy conserves a unique constellation of germplasm, particularly for marginal or stress environments.

6. LOCALISED DIVERGENCE
- In theory the in-situ conservation conserves genetic variation down to the individual fields.

7. CROP EVOLUTIONARY PROCESSES
- On-going evolution, particularly in response to environmental changes and pathogen and pest pressures fluctuating in numbers and genetic composition.

8. REGENERATION OF GERMPLASM
- An enormous challenge for ex-situ collections.

9. HUMAN INVOLVEMENT
- Effort is shared among many stakeholders in on-farm and not the commitment of any single institution.

10. CONTROL AND BENEFIT SHARING
- Local control and access to landraces can ensure that any benefits also accrue to farmers.

Mapping

During the collection of seeds, comprehensive data with regard to taxonomy, ecology and geographical location are collected, including the subsequent collection of biodiversity data through characterisation. A Geographical Information Systems Programme, DIVA GIS, jointly developed by the International Potato Centre, Peru and the International Plant Genetic Resources Institute, Colombia is used for the analysis of the biodiversity data.

Why do farmers grow landraces?

Traditional varieties are valued for specific attributes such as more economic or more reliable access to seed and planting material and restoration of cultural heritage. Loss of traditional varieties e.g. conflict, drought, and research and extension campaigns promoting modern varieties.

Some of the other reasons for planting landraces are:

- Landraces have cultural or aesthetic appeal.
- Commercial varieties may not be affordable.
- Landraces have diverse uses, e.g. sorghum varieties for: porridge, beer, coffee substitute, fencing (stalks), chewing (sweet stalks) and marketing.
- Their compatibility to farming systems such as adaptation to inter-cropping and staggered harvesting.
- Their by-products are useful, such as for forage and building materials.

Providing what farmers want:

Successful projects support on-farm conservation by providing services that farmers want, such as:

- Additional knowledge on production techniques, e.g. integrated pest management, organic production, quality production. Traditional techniques are not enough on their own and may have been a factor in traditional farmers' varieties falling into disuse as was the case for example with durum wheat in Ethiopia, where traditional techniques were inadequate for combating rust.
- New crops to respond to new market opportunities, changing weather conditions, especially shorter growing seasons, or to provide better nutrition and livelihoods.
- Market channels by providing inputs, selling produce and obtaining services. Relying on traditional channels is not sufficient.

How do we measure success?

By the number of farmers within a target area who maintain local crop populations and manage these populations according to local criteria and practices.

Providing incentives

There has to be an incentive for farmers to maintain and use agricultural biodiversity on-farm. These are some of the ways in which this can be achieved:

Market incentives - economic or market incentives are of most interest to farmers, e.g. marketing channels and value addition toobtain higher prices. The chance to sell seed, for example to community seed banks, is good for individual farmers (providing cash income) as well as the entire community (increasing the local availability of seed).

Nonmarket incentives - educational or promotional campaigns to increase yields and reduce costs. Increased use of local crop resources through prizes. Prizes tend to encourage a few specialists, not wider uptake. Community seed banks, seed fairs and food festivals to help change culinary habits and tastes of urban people, and farmers' participation in crop breeding as well as improvement programmes.

International initiatives

The loss of genetic resources has become a major source of concern for the global community. It has led to the establishment of several international agreements, notable the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) which was adopted by consensus at the FAO conference, November 2001.

- **Convention on Biological Diversity (CBD)**

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components as well as the fair and equitable sharing of the benefits arising from the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

National initiatives and subregional initiatives

- **National Plant Genetic Resources Centre – (Gene bank)**

The NPGRC was established in 1995 and actively embarked on collection, conservation, enhancement and documentation (including associated IKs) of PGR within its mandate of crops for food and agriculture. These are in line with the three broad principles of the CBD namely, Conservation of biodiversity, Sustainable utilization and Fair and equitable sharing of benefits. These principles have also been mirrored within the Biodiversity Act.

The FAO Global Plan of Action identifies the conservation of crop species on-farm as one of the key components of a national genetic resources programme. At present there are no formal on-farm conservation activities undertaken in South Africa. The Directorate Genetic Resources Management aims to implement a pilot on-farm conservation project in 2005 towards the in-situ conservation of indigenous crop species. In order to achieve this a baseline survey and sensitisation of the small-scale farmer communities is necessary.

Other initiatives and relevant websites:

There are many institutions and interested groups that promote the conservation and sustainable use of plant genetic resources for food and agriculture. For further information visit the following websites:

http://www.fao.org
http://www.iplant genetic resourcesi.cgiar.org
http://www.biodiversity.org
http://www.futureharvest.org
http://www.singer.cgiar.org

For further information please contact:

The Curator
National Gene Bank
Directorate Genetic Resources Management
Private Bag X973
Pretoria 0001

Tel: (012) 808 5393
Fax: (012) 808 5383
E-mail: pgrc@nda.agric.za

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