

Savouring diversity: first steps in implementing a strategy to support community seedbanks in South Africa's smallholder farming areas

Report of follow up field visits to Limpopo and Eastern Cape

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The Department of Agriculture, Forestry and Fisheries (DAFF) is a national sphere of the South African government responsible for implementing the laws and policies decided by the South African parliament. It specifically derives its core mandate from section 27 (1) (b) and (2) of the South African Constitution which is to: “...take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of the...right (of everyone) to have access to sufficient food.” Within the DAFF and more specifically the Agricultural Production, Health and Food Safety Branch of the DAFF, the Directorate Genetic Resources is mandated to regulate and provide an integrated national management system in support of the conservation and sustainable use of genetic resources for food and agriculture. This involves the development and implementation of policies, legislation, strategies and norms and standards on the management of genetic resources for food and agriculture, the regulation and promotion of propagating material of genetic resources for food and agriculture and to provide for a risk mitigating system in support of agricultural biodiversity.

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Front cover (dishes displayed at the Mutale and Sterkspruit food fairs) and inside photos: Ronnie Vernooy.

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Table 1: Field research activities

1. Introduction

Seed systems under stress

Conservation of plant genetic resources in a genebank is an approach adopted globally to secure seed resources for future food and agricultural purposes. For centuries seeds of landraces and farmers' varieties were collected from local farmers and conserved *ex situ* without clear utilization plans. In South Africa, apart from maintaining a small *ex situ* conservation facility, the government has recently started to implement an *in situ* conservation strategy as a way of utilizing conserved resources in the national genebanks. Conserved seeds and resources in the genebanks and related field genebanks are being repatriated to farmers' fields in different parts of the country to encourage natural and human selection and continued evolutionary breeding and adaptation to changing conditions.

Rural farmers maintain their diversity through applying indigenous knowledge acquired from their ancestors. For ages, farmers have maintained their local seeds using local knowledge. Farmers select, plant, harvest, clean and store their seeds to feed their families and keep some for the next planting season. Seeds are usually maintained by individual farmers but they exchange seeds with other farmers through a variety of practices. This strategy of seed exchange keeps the circulation of seeds effective and reliable. Farmers share their seeds with their neighbours, friends, extended families, church members, etc.

These practices have come under stress however. South Africa, like so many other countries, is experiencing a decline in crop diversity as a result of stresses caused by climate changes and human activities. Factors such as heat, drought and poverty continue to deteriorate food crop production, especially in marginal areas where smallholder farmers predominate. The young generation has lost interest in agriculture and in maintaining the local seed systems and related indigenous knowledge. Instead, they have chosen to pursue the cultivating cash crops and use of modern varieties. Many farmers have moved to a practice of seasonally purchasing seeds from the market. Modern varieties, although costly to purchase, are, in general, quick to mature and have become the preferred option. Although some traditional seed practices and indigenous knowledge are still maintained, it is practiced by a decreasing number of farmers.

The majority of South African researchers, those working in extension services as well as plant breeders have neglected the local seeds systems and classified them as being made up of “old-fashioned practices”. However, not all researchers share this view. The Department of Agriculture, Forestry and Fisheries (DAFF), through the Directorate Genetic Resources and in collaboration with Bioversity International, has initiated a community seedbank strategy to support local smallholder communities to revive and improve their traditional seed-saving practices for the sake of food security and sustainable agriculture at the local level and conservation of the country’s agricultural biodiversity at the local and national levels. This is especially important in areas where farming systems are subsistence oriented, deeply connected to local food culture and situated in complex, risk-prone low-input environments. In a community seedbank, local varieties are collected and the related indigenous knowledge documented. Then, they are stored, multiplied and shared. A community seedbank represents a simple community-based solution for improving access to and availability of plant genetic resources and safeguarding these in case of adversity. Community seedbanks can make important contributions to local seed security when the following criteria are met: they are managed effectively and efficiently; they are responsive to local needs; there is a continuous flow of seeds and information between community seedbanks and other stakeholders; and there is an enabling policy/legal environment (Vernooy et al. 2014).

Sites

Two important farmer smallholder areas of Limpopo and Eastern Cape provinces were selected for the field study: Mutale and Sterkspruit. Farmers in both regions live and work under tough conditions including: low rainfall levels in both sites, cold and windy weather conditions in the mountainous areas in Eastern Cape (see photo 1), and poor accessibility to and distance from major markets in both sites. Yet, they still manage to make a living. They produce food mostly for subsistence but also succeed in producing small surpluses for marketing locally. Crop and varietal diversity combined with diverse animal husbandry practices (cattle, sheep, goats, etc.) is central to their farming systems and to survival. However, in the last few decades, several crops and crop varieties have disappeared and/or seeds have become hard to obtain. Increasingly fewer options are available to cope with environmental variability (Vernooy et al., 2013).

In both regions farmers rely on different combinations of a few major crops grown in large areas by most households (white and yellow maize, white sorghum, millet and groundnut in Limpopo) and on a larger number of crops grown in small areas (pumpkin, squash, beans, cowpeas, potatoes, melon, calabash, tobacco and many fruits and vegetables in Limpopo). The major reasons for maintaining diversity given by farmers (women and men) are: good taste and nutrition-dense (the word farmers used is “powerful”); easy to combine in the preparation of traditional dishes; drought resistant; resistant to pests and diseases; short growing cycle; low input; long-term storage capability; heritage; and intercropping. In Limpopo, some farmers have been able to purchase simple drip irrigation technology to produce vegetables for the market (see photo 2).



Photo 1: Mountains surrounding Sterkspruit. Photo 2: Tomato cultivation in Gumbu village, Limpopo

Follow up research

In 2013, during the first research carried out in both sites by the DAFF/Bioversity International team, farmers (women and men) in both regions expressed interest in having a community seedbank. The research team endorsed this interest and recommended establishing one pilot community seedbank in each site and developing an initial three year management and monitoring plan. Other recommendations were:

- Create mechanisms to recognize farmers’ great efforts to maintain traditional crop and variety diversity (national, provincial and municipal levels), through for example awards and incentives.
- Improve access to materials at the village and municipal levels through seed fairs (municipal level, village level, inter-provincial exchanges and access to national genebank materials) and through the establishment of community seedbanks.

- Increase availability of seeds through improved seed management (selection, cleaning, storage) and seed production, e.g. through diversity kits, participatory variety selection, crowd-sourcing, village-based seed production and marketing (Vernooy et al., 2013).

Based on the results of the 2013 study, DAFF, in collaboration with Bioversity International, arranged this 2014 follow up mission with the following objectives:

- Understand the existing household and community practices of seed storage and identify their strengths, weaknesses and opportunities for improvement.
- Discuss with farmers how to organize an effective and sustainable community seedbank.
- Celebrate local crop diversity through the organization of a food fair.
- Identify an appropriate physical structure for the planned community seedbank in Sterkspruit.

Schedule and activities

Field work was undertaken by officials of the National Plant Genetic Resources Centre (NPGRC), where the national genebank is housed, in collaboration with Bioversity International officials and local agricultural advisors. This took place in Limpopo (Mutale) 28 July-1 August 2014 and in Eastern Cape (Sterkspruit) 4-8 August 2014. The team included: Nkat Lettie Maluleke (NPGRC Plant Collection Officer), George Phora (NPGRC Scientific Technician), Percy Moila (NPGRC Scientific Technician), Angeline Dibiloane (Information Officer), Ronnie Vernooy (Bioversity International Genetic Resources Policy Specialist) and Bhuwon Sthapit (Bioversity International Plant Breeder). Limpopo Department of Agriculture officials were: T.P. Nyamande, T.J. Mavhungu, K.A. Netswera, Murovhi, Nevhudzholi K. and Ms Matshonyonga M.G. (Limpopo Department of Agriculture Manager). Eastern Cape Department of Agriculture, Rural Development and Agrarian Reform officials were: Mr. M.W. Ngqola, Ms. N. Ndlebe, Mr. M.W. Mdladlamba, P. N. Zingitwa, Mr. Manxhamani and Mr. Quinana.

Table 1 overleaf shows the activities that were carried out together with extension agents of the Mutale municipality in Limpopo and Joe Ngcabi municipality (where Sterkspruit is located) in Eastern Cape.

Table 1: Field research activities

Activity	Mutale	Sterkspruit
Debriefing session with officials and planning of field work	6 extension officers including the office manager	6 extension officers
Seed systems SWOT analysis	40 farmers; 6 extension officers	22 farmers; 4 extension officers
Organizational development session	40 farmers; 6 extension officers	22 farmers; 4 extension officers
Storage methods monitoring	2 farmer households; 20 farmers; 4 extension officers	3 farmers households; 10 farmers; 4 extension officers
Food fair	27 farmers displaying dishes; 40 farmers in total	27 farmers displaying dishes

2. Findings

Analysis of existing seed systems

An analysis was made of the existing seed systems through the use of SWOT (strengths, weaknesses, opportunities and threats) with farmers and extension agents in both sites. SWOT analysis is a participatory tool used to understand existing situations and develop suggestions and recommendations for action based on the outcome of the analysis (see photos 3-5). A 4x4 matrix is drawn on paper to distinguish strengths, weaknesses, opportunities and threats and collective group answers are gathered.

SWOT analysis in Mutale

In Mutale, participating farmers were divided randomly into groups. The findings demonstrated that these farmers consider the main strength is their efforts to conserve their seeds for the next planting season (thus reducing input costs) although in parallel they receive modern varieties from their local agricultural offices. Opportunities to market their local crops are very limited and no efforts are systematically made to improve marketing. This discourages farmers from continuing to cultivate these crops. A major weakness identified is that yields of most crops usually are low, most produce is consumed at home and only a small part is available for marketing. A major threat is that although farmers still have indigenous knowledge of storage practices and facilities, these have increasingly been neglected due to the introduction of modern agricultural practices. Factors such as floods, droughts and pest infestations have placed a serious threat to the local seed system.

SWOT analysis in Sterkspruit

In Sterkspruit, farmers were grouped according to villages and their analysis was similar to the one in Mutale. Farmers observed that by using their own seeds every planting season input costs are reduced and this is a major strength. A weakness is that many farmers have abandoned their traditional seed storage strategies due to modern agricultural practices and technologies. They also remarked that government support is limited in encouraging them to continue their local seed storage practices. Instead, they are regularly requested to adopt modern practices. Although farmers identified that there are some market opportunities in the region and, in general, they do not suffer from hunger, agricultural production is affected by droughts, high temperatures, heavy rains and pests. Farmers

observed that extension services seem to be more focused on promoting modern storage facilities, some of which are not always effective.



Photos 3-5: SWOT analysis in Mutale (left, centre) and Sterkspruit (right)

Organizational development of community seedbanks

Organizational development of a community seedbank has two central dimensions: governance and management. Governance is a process whereby a group of individuals work as a collective to ensure the health of an organization. It usually includes moral, legal, political and financial aspects. The way in which accountability is dealt with is central to governance. Apart from proper management of infrastructure and finances, accountability is most clearly expressed through the rules and regulations concerning the use of seeds maintained in the community seedbank. Management refers to the day-to-day coordination, execution and monitoring of key tasks required to maintain a community seedbank in the short and long term. It usually involves human resources, as well as technical, administrative, organizational and financial elements. Technical tasks include, in particular, the management of seeds from collection to distribution.

These governance and management issues were discussed in interactive sessions to develop the capacity of the local farmers of Mutale and Sterkspruit. In both sites the farmers expressed preference for the community seedbank to be situated near local government offices so that they can easily be assisted by the extension services. In order to keep the rich crop diversity in Mutale alive, farmers there indicated their interest in

conserving **all** their local food crops in a community seedbank. They clearly expressed their preference for their community seedbank to be located at the premises of the Mutale agricultural offices, where all the farmers would have open and safe access to the collection. In Sterkspruit, where diversity is more limited and more threatened than in Mutale (according to the analysis carried out in 2013), farmers attending the session, expressed a preference for their community seedbank to be situated in the town of Sterkspruit.

Farmers, in both sites, showed a keen interest in learning from experiences elsewhere about different modalities for the depositing and withdrawing of seeds. The community seedbank organizational management strategy favoured in both areas is through the election of an operational committee, formal membership affiliation, a seeds borrowing system for members based on non-monetary payments (“seeds for seeds”) and sales of seeds to non-members. In Sterkspruit, farmers are ready to proceed with the organizational development of a community seedbank. Farmers there are already organized and they put forward the proposal that their community seedbank be structured along the lines of an existing farmers’ committee. They will soon proceed to elect a committee for their community seedbank and draft a governance document. They would gladly accept the involvement of the local extension services as well as the national genebank as technical advisors.

Sterkspruit: Selection of a community seedbank site and structure

Following the session in Sterkspruit, DAFF and Bioversity International officials and a farmers’ representative, Mr. Mafantiri, visited three sites and structures in Sterkspruit town identified by the Department of Public Works for the establishment of a community seedbank. The identification and preparation of an appropriate physical structure and site are part of the government’s commitment to support the implementation of the national *in situ* conservation strategy. According to government procedures, the Department of Public Works is responsible for coordinating the technical process. The assessment of the three sites had a clear “winner” (see photo 6). A recommendation from DAFF was submitted to the Department of Public Works to enable the start of the formal procedure to turn the current structure and site into a community seedbank. In order not to hold up the wishes and readiness of the farmers to begin with the community seedbank, the team also visited an existing old security room at the farmers’ centre in Sterkspruit to see if this could serve

as a temporary community seedbank. It was agreed that with some minor improvements, this room could be used (see photo 7).



Photo 6: Proposed permanent CSB facility. Photo 7: Temporary CSB facility (in front)

Seed management

The recent popularity of community seedbanks raises the question of whether seedbanks are able to address the technical issues inherent in their operations, considering the specific local contexts in which they are located. From experience, it is known that community seedbanks which are set up without proper understanding of the complexities of seed management may have a short lifespan (Sthapit, 2013). Through interactions with farmers in the field and during the events organized in the district towns, the team introduced the minimum set of technical criteria and the issues that must be addressed by those who wish to operate community seedbanks. To some degree, the technical issues depend on the type of community seedbank that will be established (whether it is solely conservation focused or broader in scope to include access and availability), but many are relevant to all community seedbanks.

Technical issues emerge throughout the cycle of seed management, from the early stage of selecting which crop species and varieties to keep (noting that selection may change over time) to the documentation of the collection and its use. The basic requirements for seed management are that the seed: be physically and genetically pure; be free from diseases, pests and weed seeds; be able to germinate and establish quickly; and be accompanied by useful information and knowledge. During the field visits the team investigated how farmers

are managing seeds. Custodian farmers identified by the communities were visited in the villages in order to understand different crop storage systems¹.

The exercise helped the team understand the current storage practices for different crops in both sites.

Seed selection

Seed selection is a process whereby farmers select quality seeds for the next planting season during or following the harvest. In Mutale, maize seeds are selected according to seed size. Cobs with large grains are conserved for the next planting season. In Sterkspruit, farmers explained that they discard the upper and lower end of the cob and use only the middle part with large grains for seed. For millet, the compacted head is set aside for planting. Farmers do not seem to use specific criteria for the selection of cowpea and other crops. In Sterkspruit, some farmers indicated that in recent times, they use as seeds whatever remains available at the end of the winter season rather than specifically selecting quality seeds. This practice is an indicator of how traditional seed systems are being lost. It also suggests that there are opportunities to improve traditional plant and seed selection practices with minimal costs.

Seed drying

Drying is the reduction of moisture content to a specific level without compromising seed viability. In both sites, farmers continue to use traditional seed drying practices. For crops such as sorghum and maize farmers sun-dry the harvested grains on the roof top or on the floor. Crops are turned frequently and monitored daily for dryness. In order to test moisture reduction level in sorghum, the crop is beaten against the ground and if the grains are easily removed then the seeds are dry. With maize, one cob is rubbed against another or grains are removed by hand. In the case of cowpea, a stick is used to thresh against the pods and the seeds are removed. A car tyre is used to thrash Jugo bean pods (Bambara groundnuts) by sitting on the tyre and gently moving over the bean pods exposed on the floor.

¹ Custodian farmers are those farmers (men and women) who actively maintain, adapt and disseminate agricultural biodiversity and related knowledge, over time and space, at farm and community levels and are recognized by community members for it. Often, custodian farmers are actively supported in their efforts by family or household members.

Watermelon, melon and pumpkins seeds are sun dried and rubbed between the hands to verify dryness.

Seed storage

Seed storage can be defined as a conservation process of seeds or vegetative materials in the field or under a specific temperature for future use. In Mutale, farmers store their maize in the traditional kitchen where they make a fire and the smoke is used as a pest repellent. They regard this method as the most reliable way of controlling weevils. Cowpea, sorghum, millet, pumpkin, calabash (Luffa) seeds are stored in various types of containers and buckets without any pest repellent. Farmers commented that a thatched house is good for the inside storage of seed. The room temperature is warm in winter and cool in summer resulting in low relative humidity. The most popular storage method is using recycled plastic containers (e.g. a soft drinks bottle) that are stored on the house floors. Applying chemicals has also become popular in the communities. It seems that the traditional method of using clay pots has vanished.

In Sterkspruit, maize is kept under the traditional (thatched roof) kitchen ceiling with the maize heads facing downwards without any treatment. According to farmers, seeds can be stored for up to five years this way. Some farmers store their seed under the corrugated roof using special wild branches of certain plants which have a strong odour to protect their seed against pests. Pumpkins are stored outside and covered with maize stalks to protect them from hot and cold temperatures. Cowpea, millet, calabash and sorghum are stored in buckets and gunny bags under the traditional (thatched) roof of the kitchen. In one case, a farmer had stored her maize in a steel drum but the kernels started to germinate inside the drum due to high moisture content. Chemical application has also become popular in the communities and is mostly applied to modern varieties purchased by farmers. One farmer added dried orange peels or branches of a particular wild herb to beans conserved in a glass jar to keep away insects. Photos 8-11 show examples of farmers' practices.



Photos 8-11: Examples of farmers' traditional seed storage practices in Mutale and Sterkspruit.

Germination test

Only one farmer in Sterkspruit tested seeds for germination using an indigenous method. Maize or sorghum seed are soaked in water for three days and then drained. The drained seeds are then covered allowing them to sprout as an indicator of germinability. A germination rate can then be estimated and used as an indicator of the overall viability of the seed stock.

Food fair

A food fair is a participatory tool used to celebrate traditional crop diversity and culinary practices of farmer communities. It also allows communities to measure the diversity levels in their community; it encourages exchanges of recipes, crops and seeds; and it promotes marketing of crops. Food fairs were organized both in Mutale and Sterkspruit and the farmers were requested to prepare dishes using (as much as possible) traditional crops (thus, not modern varieties or hybrids). In Mutale, 40 farmers, mostly women, from the previously visited villages of Mapakoni, Gumbu, Manenzhe, Phalama, Dzimauli, Pile and

Muswodi took part in the food fair (see photos 12-14). In Sterkspruit, 27 farmers (women and men) from the villages of Pelandaba, Qhobosheani, Ndofela and Duiwelshoek took part (see photos 15-16). At both fairs, farmers proudly displayed their dishes which were labelled according to local vernacular. All farmers and dishes were photographed with the intent to produce a recipe book in English, Venda and Xhosa for distribution to the farmers and others interested in learning about local and traditional culinary practices.

At both fairs, facilitators from DAFF, extension services and Bioversity International judged the dishes according to the following categories: most diversity, tastiness and presentation. Prizes were awarded to all farmers in appreciation of their efforts to conserve local seed management practices and for sharing their indigenous knowledge. After the jury had done its work and farmers had received their awards, everyone else attending the fairs was invited to have a bite. Farmers commented that they enjoyed the activity very much.



Photos 12-14: At the Mutale food fair



Photos 15-16: At the Sterkspruit food fair

3. Conclusion

Farmer seed systems in South Africa are under stress causing a decline in crop diversity and food diversity. To safeguard these important resources and related knowledge, an action plan is needed. Researching farmers' seed systems, documenting traditional and novel practices and sharing information are some of the activities that DAFF, Bioversity International and partner agencies are undertaking. The establishment of community seedbanks is another activity allowing farmers to collectively store local crop diversity and encourage the exchange of seeds. The activities of community seedbanks can be further strengthened through participatory crop improvement. Improved varieties of crops can be shared amongst farmers through events such as food fairs. DAFF's National Plant Genetic Resources Centre, as a conservation centre for farmers' seeds, is committed to partner with farmers and local extension services to assist with repatriation and restoration programmes. NPGRC is collecting a number of crops in different areas of South Africa to characterize, conserve and multiply them. It is the mandate of the NPGRC to repatriate and restore "lost" crops back to the communities and to contribute to making the public aware of the importance of farmers' traditional crops for food and agriculture in South Africa.

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