SADC PLANT GENETIC RESOURCES CENTRE
"Safeguarding plant diversity for sustanable livelihoods
Network News
December 2018

35th SPGRC Board Meeting and the Integration and Harmonization of Plant Genetic Resources for Food and Agriculture (PGRFA) Policy Workshop

2017 SPGRC Board group photo

Introduction

The SADC Plant Genetic Resources Centre (SPGRC) held its 35th Ordinary Board meeting between 22nd and 23rd October 2018 at the Holiday Inn Hotel in Johannesburg, South Africa. The Board Members were later on, joined by senior government officials from Member States to form a back-to-back meeting between 24th and 25th October 2018 that was funded by The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) to discuss issues on the integration and harmonization of Plant Genetic Resources policies in the SADC region.

The meetings were well attended by most Member States except the Democratic Republic of Congo (DRC) and Malawi, which were not represented during the Board meeting. The DRC was not represented during the policy harmonization workshop as well. Both meetings were attended by SPGRC's Head, Senior Programme Officers, Technical Officers, Administration and Finance Officers.

The two events aimed at appraising the SPGRC network's progress report and to take note of regional decisions; such as recommending approval of SPGRC business plan, budget and audit report for submission to SADC structures; and finally, discussing and deliberating on the integration and harmonization of policies on PGRFA in the region.

Board Meeting – Official Opening

The Board Chairperson, Dr. Lefulesele Lebesa, welcomed the members, and recognized the presence of the Director of Food Agriculture and Natural Resources (FANR) of SADC, Mr Domingos Gove, and the South African Guest of Honour. She then requested the board members to introduce themselves. She further thanked SPGRC for organising the meeting particularly the logistical work and the timely circulation of documents. She then called upon the Director for FANR to present his opening remarks.

The FANR Director warmly welcomed everyone and expressed his gratitude to be part of the meeting. He thanked South Africa for hosting the meeting that provided an opportunity to reflect and report on progress made and what was planned. He alluded to the MoU establishing SPGRC and mentioned that the document has aligned SPGRC to the structures of SADC. It clarifies the role of the Technical Committee and the fact that the institution is fully supported by SADC.

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Board Meeting Discussions and Deliberations

The Board Chairperson guided the meeting through the endorsed agenda, spending a while discussing the revised MoU establishing SPGRC. SPGRC Management intervened to clarify some raised concerns of Board Members such as the change of name of the Board to Technical Advisory Committee, *etc*. The meeting reaffirmed continued duplication of material to Svalbard and directed SPGRC to send information to respective countries regarding their material sent to Svalbard.

The FANR Director encouraged Member States to share experiences on how informal seed systems contribute to food security in the region. Regarding staff recruitment for the SPGRC SPOs, a process in which the Board expressed interest in being part of the interviewing panel, the FANR Director advised the Board Chairperson to write to the SADC Secretariat, requesting the same.

SPGRC Board in Session, December 2017

He ended by thanking the SPGRC senior management for their contribution in the coordination of PGRFA in the region. He wished the meeting fruitful deliberations.

The Guest of Honour, Dr Julian Jaftha, who represented the Director General for the Department of Agriculture, Forestry and Fisheries in South Africa; said that the country was currently conducting consultations with the Treaty Secretariat in preparation for acceding to the International Conservation Instrument. He said that the SPGRC network forms a basis and buffer for agriculture and PGR transforms food and nutrition for the people of southern Africa. Plant genetic resources need to be collected and conserved because they are under serious threat of extinction. He challenged SPGRC to show that it is a centre for knowledge and information generation valuable for programmes aimed at preventing loss of plant genetic resources in the region. Besides, the conserved materials ought to be used for the improvement of crops for the benefit of communities. The network needs to fully utilise these resources effectively and sustainably.

In giving a vote of thanks,the Board Member, Ms Carla do Vale echoed her thanks to the Guest of Honour. She also expressed her gratitude for meeting her former Lecturer Mr Domingos Gove who is now the Director of FANR Directorate. Thanking the Guest of Honour for the kind words to the Board, she wished the meeting fruitful deliberations.

Workshop on Integration and Harmonization of PGRFA Policies

The Board Members were joined by at least one delegate from their respective Member States in attending the back-to-back workshop on the Integration and Harmonization of PGRFA Policies. DRC was not represented.

Presentations and video clips were shared, mostly covering the Treaty and Farmers' Rights. It was reported that Botswana, Mozambique and South Africa, which are the remaining countries that have not signed the Treaty, were all, at different levels of preparations, working towards acceding to the Treaty.

As much as most countries have rectified the Treaty, its domestication is still a challenge. The workshop aimed at bringing countries to the same level of understanding the international instrument. From presentations on Farmers' Rights, discussions came mainly from the need to separate Farmers' Rights from Breeders' Rights and

Participants of the SADC/ITPGRFA meeting on integration and harmonization of PGRFA policies Johannesburg, South Africa

countries were reminded to take the interests of smallholder farmers as a priority when dealing with Farmers' Rights. Institutional frameworks need to be put in place particularly for the restoration of lost crops while respecting the cultural diversity associated with local crops; that exist in the region.

During the general discussions, it was raised that policy harmonization starts with a framework, which countries can follow. In response to this point, participants were reminded that in 2008, SPGRC developed Regional Policy Guidelines on PGRFA Conservation and Utilization, which can be used by Member States to start the process.

Resolutions of the harmonization of PGRFA policies workshop

The SADC Member States met to discuss and deliberate on the possible integration and harmonization of PGRFA policies in the region. The workshop agreed on the following resolutions as a basis for moving forward:

1. Having established that the domestication of the Treaty is generally limited among Member States in the region, the meeting recommended the need to review the status of domestication of the Treaty and urged Member States to accelerate the domestication process of the Treaty.

2. It was observed that there are inadequate PGRFA policies and other measures for the effective implementation of required programmes and activities. To address this problem, the meeting recommended that a study be undertaken to assess and establish PGRFA policies and other measures Contracting Parties have put in place. The study shall explore the feasibility of harmonization of PGRFA policies in the region, including identification of main elements around which the harmonization is to be premised.

3. The workshop observed that participation of key stakeholders like farmers themselves on matters dealing with Farmers' Rights was low in the SADC region. Participants resolved that consultations on Farmers' Rights involving all stakeholders including key government ministries/departments, farmers, farmers' organizations, and traditional leaders in the area of implementation of Farmers' Rights be conducted in the region.

4. The meeting noted that existing national Intellectual Property policies and legislations in the SADC Member States do not adequately address PGR issues including area of Farmers' Rights and recommended that a review of national Intellectual Property policies and legislations be carried out to adequately address PGR issues.

5. It was noted that there is insufficient information on the status of conservation and sustainable utilization of PGR in the region and recommended that studies to generate baseline and evidence-based data on the status of PGR be carried out in the SADC region.

6. The meeting acknowledged that there is limited understanding on the subject of PGR conservation and sustainable utilization among policy makers and the general public in the SADC region and recommended that awareness programmes targeting policy makers and the general public on importance and contribution of PGR to food and nutrition security be initiated.

7. There was an observation that what constitutes Farmers' Rights is not properly known in general hence the general inadequate recognition of what constitutes Farmers' Rights and linking it to their needs and priorities. In this view, the meeting recommended that Farmers' Rights be clearly defined and the interests of farmers be well articulated in order to address Farmers' Rights issues in Member States.

Director of FANR Visits the SADC Plant Genetic Resources Centre

Group photo: Director of FANR, Mr Domingos Gove (middle in grey suit) with SPGRC staff

The SADC Plant Genetic Resource Centre (SPGRC), which falls under the Food, Agriculture and Natural Resources (FANR) Directorate, works in collaboration with National Plant Genetic Resource Centres (NPGRCs) in each of the SADC Member States to conserve and use genetic diversity and variability in Southern Africa. The SADC Plant Genetic Resource Centre, and national counterparts, also perform important roles in research, documentation and training, and education in the areas of plant genetic resources (PGR). The Director of FANR, Mr. Domingos Gove, made his maiden visit since joining the SADC Secretariat during the week of 14-18 January 2019, to appreciate the programmes of the institution.

During the visit, he had an opportunity to meet all SPGRC members of staff who briefed him of their professional qualifications and their roles at the institution. The Director commended the Centre's staff for the good work they are doing at SPGRC and in the region, and encouraged staff members working towards upgrading their education to forge ahead, emphasizing that it was the only way to improve the operations of SPGRC and also securing their own future.

The Director of FANR familiarized himself with the core activities of the SPGRC undertaken by different Units and Sections. In addition, he toured the farm and got updates on key infrastructural developments and maintenance programmes, which included ICT infrastructure upgrade, Internet bandwidth upgrade; genebank equipment replacements and security upgrade in the regional gene bank all done through Member States funding.

Mr. Domingos Gove also paid a courtesy visit to two key agricultural institutions of the Republic of Zambia namely the Zambia Agricultural Research Institute (ZARI) which is mandated with spearheading Zambia's research thrust in the area of crop improvement, plant protection, plant nutrition and soil fertility management and the Seed Control & Certification Institute (SCCI) which is Zambia's regulator of crop variety registration and quality seed production. The Director of ZARI, Mr. Mwale briefed him on the operations of ZARI and its aspirations and in response; Mr. Gove informed the ZARI director that FANR was ready to work with ZARI in all areas of agriculture beyond the plant genetic resources conservation. He also informed the Director of ZARI about the Regional Agricultural Policy (RAP) that was developed by SADC in 2014 which resulted into the formulation of the Regional Agricultural Investment Plan (RAIP), which is its implementation arm. He furtherwent on to update the Director on the status of implementation of the RAIP in the region.

On the same day, he also visited the Zambia National Plant Genetic Resources Centre, a member of the SPGRC network, which is conserving over 6,000 plant germplasm accessions collected from across Zambia. He had a guided tour at the International Seed Testing Association (ISTA) accredited Seed Control & Certification Institute (SCCI)

ZARI visit (L-R): B. Kapange (SPO, SPGRC), J. Shava (Head, SPGRC), M. Mwale (Director, ZARI), D. Gove (Director, FANR), G. Munkombwe (Curator, NPGRC)

Inside SPGRC Genebank: Briefing the FANR Director on the setup, safety and challenges

whose Director, Mrs. Mable Simwanza briefed him about its role in Zambia. The SCCI Director indicated that Zambia was already domesticating the Regional Harmonized Seed Regulatory System and explained the role that the SCCI was playing in the implementation of the SADC Harmonized Seed Regulatory System and demonstrated their preparedness for the role.

The Director of FANR also visited another key partner in the implementation of the SADC Seed Harmonised Seed Regulatory System, the Feed the Future Southern Africa Seed Trade Project (USAID) offices. He met the Chief of Party, Dr Itai Makanda who gave updates on the status of implementation of the Harmonized Seed Regulatory System and the establishment of the SADC Seed Centre. It was stressed that contacts between the Seed Project and SPGRC had to be enhanced since the SADC Seed Centre will be housed in the SPGRC premises. The parties also emphasized the need to streamline the SADC Seed Centre into the SADC structures to ensure its long-term sustainability.

Towards the end of his visit, the FANR Director paid a courtesy call to the Ministry of Agriculture where he met the Acting Permanent Secretary, Mr. Peter Lungu who was in the company of Mr. John Kalumbi, Director of Policy & Planning in the Ministry. He updated them of the FANR Directorate's regional programmes and those centered in Zambia such as the SPGRC, the Harmonized Seed Regulatory System and the SADC Seed Centre programmes.

The Director of FANR also informed the Permanent Secretary that the SADC Secretariat has continued sharing information regarding work done on transboundary diseases control activities that include Avian influenza, the Foot and Mouth Disease (FMD), and Rabies. They also discussed the devastating effects of the Fall Army Worm (FAW) and Red locust infestations in the region whose control by pesticides has proved costly and environmentally unfriendly and the efforts being made by the SADC Secretariat to find cost effective management approaches for the pests.

Meeting the PS, Agriculture (L-R): B. Kapange (SPO, SPGRC), J. Kalumbi (Director, Policy & Planning), J. Shava (Head, SPGRC), P. Lungu (Acting PS, Agriculture), D. Gove (Director, FANR)

The Natural Regeneration of Woody Plants on Abandoned Fields in North-Eastern Namibia

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Abstract

The study aimed at determining the potential of woodlands to recover naturally after deforestation, and the optimal conditions for this recovery on fallow agricultural fields. The duration of fallowing did not have a significant effect on species diversity of the aboveground woody plants and the soil seed bank amongst the agricultural fields under fallowing. However, the results showed that methods of ploughing resulted in a significant difference in species diversity of the aboveground woody plants on fallow fields. The fallow fields ploughed using traditional methods were found to be more diverse, compared to mouldboard ploughs. This could have attributed to the minimal disturbance to the plants and the soils structure, when compared to mouldboard ploughing.

Key words: fallow fields, species diversity, aboveground vegetation, soil seed bank, seed viability.

1.0 Background

Heavy reliance on natural resources and agricultural practices pose a threat to plant species populations the latter of which have been found to disturb the natural regeneration process of plants in north-eastern Namibia (Pröpper *et al.* 2010).

Woodland studies have become an important topic for Namibia as the country is faced with the challenge of finding balance between resource uses and population increases. The Namibian government through the Forest Strategic Plan for 2011-2015 has called for more research on the natural regeneration of woody species that are commercially exploited, especially *Pterocarpus angolensis, Burkea africana, Guibourtia coleosperma* and *Baikiaea plurijuga* (Ministry of Agriculture, Water and Forestry 2011).

This study was conducted in Mashare Constituency to establish if woodlands naturally regenerate and recover after land clearing. The Constituency forms part of the Kavango Woodlands, of which most inhabitants around the area depend on subsistence agriculture for a living. The rural farmers practice subsistence farming on a permanent cropping basis with short term (1-2 years) to long term (5=/> years). During the fallow period the woody species may naturally regenerate provided that the environmental conditions are conducive. This study focused on the potential of natural regeneration of woody plant species on the fallow

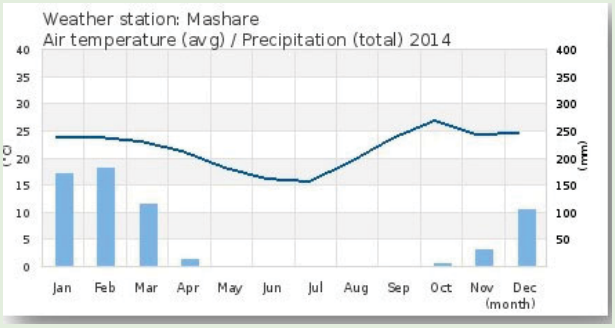

Fig. 1: Rainfall and air temperature recorded in 2014 for the Mashare area

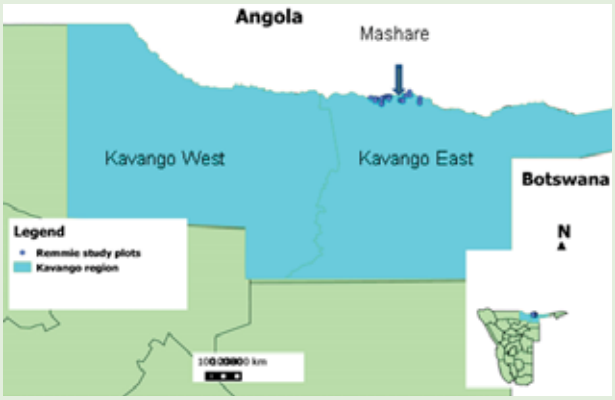

Fig. 2: The Kavango West and East regions of north-eastern Namibia

fields, considering target variables such as species diversity, growth forms (seedlings, coppices, shrubs and trees), species composition, seed densities and seed viability.

2.0 The Aim and Objectives

The aim of this study is to determine the potential of woodlands to recover naturally after deforestation, and the optimal conditions for this recovery on fallow agricultural fields in the Kavango East region of north-eastern Namibia.

3.0 Literature Review

3.1 The Importance of Subsistence Agriculture for Livelihood

Apart from crop farming, the rural communities of the Kavango regions also heavily depend on the woodlands for the natural resources for food, fire wood, poles for construction and carving (Strohbach and Petersen 2007), as well as grazing for their domestic animals.

The impact of high demand on natural resources for subsistence farming in the woodlands were found to have caused loss of biodiversity (Benayas *et al.* 2007a, Pröpper *et al.* 2010). The loss of biodiversity is expected to continue with population increase which will further lead to more land clearing, especially in the Kavango east region (Pröpper *et al*. 2010), implying the woodland species composition will continue to be affected by human activities.

3.2 Human Activities Affecting the Natural Regeneration of Woody Plants

Natural regeneration is important for the ecosystems and the livelihood of the people. Although the woody resources are needed by the communities as a means of survival, the unsustainable harvesting of woody resources has an impact on the species and site class distribution (Graz 2004). In some cases, disturbances play a pivotal role in maintaining natural communities and species diversity, but it depends on the severity of the disturbances. Research by Fenner and Thompson (2005) found that moderate disturbances promote species diversity as it reduces strong dominant species and as a result, reducing competition. The extreme disturbances were found to reduce the renewal of longer-lived species, which reduces species diversity (Fenner and Thompson 2005).

3.3 Management Interventions

Agroforestry is one of the conservation agriculture methods used to encourage farmers to integrate important trees that aid in achieving good production. The reintroduction of tree species that are important to the people of the Kavango regions can be planted and managed by the communities themselves assisted by interested researchers. Tree integration with crop farming improves soil fertility through organic matter inputs. The trees improve the microclimate thus weakening radiation, air temperature, wind speed and evaporation into the air (Bakhoum *et al.* 2012). Species such as *Faidherbia albida* are good species that can be used for soil fertility. Other tree species are used as fodder for browsing by animals. Therefore, agroforestry increases productivity and product diversification.

The study targeted selected fallow fields and remnant forest vegetation in the Mashare area. It focused on only one hectare of the farmers' fields as it has been done in previous studies (Esmailzadeh *et al.* 2011, Neelo *et al.* 2013b). The sites chosen indicated no signs of active cultivation. Within these one hectare areas, five quadrats each measuring 2m x 2m were outlined, in which soil seed bank data were collected. Additionally, these quadrats were overlapped with circles measuring 5.6m radius (fixed radial distances) for aboveground vegetation data sampling. Although Esmailzadeh *et al*. (2011) used four quadrats on their one hectare fields this particular study outlined five quadrats per hectare. The same procedure was followed to survey the remnant sites, though only two quadrats and two circles could be sampled, mainly because most remnants encountered in this study were merely a narrow strip of natural vegetation surrounding the fields. In total, forty six (46) fallow fields and thirteen (13) remnants were sampled, totalling 256 quadrats and 256 circles.

Sampling of the soil seed bank was conducted in the $4m^2$ quadrats at each site. The seeds and fruits of woody plants present in each soil sample were separated through sieving. The seeds were stored in a paper bag, which was assigned a unique reference number, reflecting the respective sub-quadrat. The seeds were then transported to the National Botanical Research Institute (NBRI) where they were stored in the cold room at 15 ^{0}C. At the NBRI, the seeds and fruits were cleaned before further tests and processing were carried out.

5.0 Data Analysis

The study targeted selected Fallow fields and remnant forest vegetation in the Mashare area. Various statistical analysis packages were used to explore the data for suitable statistical tests, namely: Statistical Package for the Social Sciences (SPSS) version 23, the Multi-Variate Statistical Package (MVSP) version 3.22, PC-Ord version 6 and R Project for Statistical Computing, version 3.22.

The Shapiro-Wilk Normality Test in SPSS was used to test

Layout of sub-quadrats showing position of where the soil cores (colourful markings) were taken

the species diversity data for normality. The data was not normally distributed hence a non-parametric test, the Mann-Whitney U test was used to compare significant differences in species diversity of woody plants, at alpha 0.05 between fallow fields and remnant forest vegetation. The Nonlinear Mixed-Effect Model (NLME) was used to test for significance effect on the duration of fallowing to species diversity of the aboveground woody vegetation and the soil seed bank.

6.0 Results

6.1 Species Diversity of the Aboveground Vegetation

A total of 58 woody species from 20 families were recorded across all abandoned agricultural fields, including the remnants. The Fabaceae family dominated the woody plants recorded, with 44% of the total individuals recorded, followed by the Combretaceae family with 41%.

6.1.1 Effect of Duration of Fallow on Species Diversity

A Non-linear Mixed-Effect Model (NLME) analysis showed that fallow had no effect (p=0.444) on species diversity of the woody plants on the fallow fields.

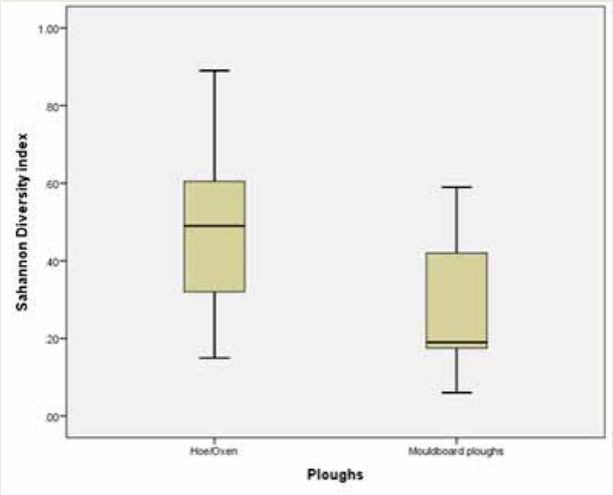

Fig. 3: The ploughing methods used in the agricultural fields in relation to woody plant species diversity. Category 1=fields ploughed with hoes, oxen, oxen/hoes (n=23) and Category 2=fields ploughed with mouldboard ploughs on tractors (n=7), where n = number of fields

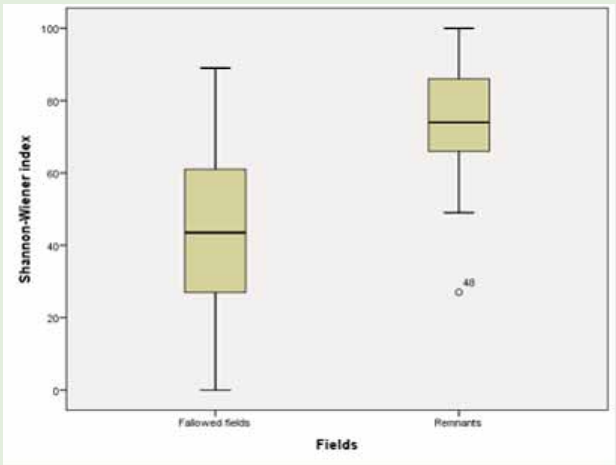

Fig. 4: Comparison of species diversity of the aboveground vegetation on fallow fields (n=46) and Remnant forest vegetation (n=13), where n=number of fields

6.1.2 Effect of Ploughing Methods on Species Diversity

Species diversity of woody plants was significantly different (Mann-Whitney test, p=0.037) when different cultivation methods were used.

6.2 Soil Seed

A total of 221 seeds of woody plants were collected from the 59 fields under study including remnants. A total of 19 species from 6 families were recorded from the soil seed bank in both the fallow fields and the remnants. Combretaceae dominated the number of seeds recovered from the soil bank with 45%, followed by Fabaceae at 30%, while the Rhamnaceae family was the least represented with 0.5%.

6.2.1 Species Diversity of the Soil Seed Bank

A mixed effect model analysis (NLME) showed that the duration of fallowing had no effect on species diversity of the soil seed bank of woody plants on the fallow fields.

6.2.2 Seed Densities among Fallow Fields (Agricultural Fields)

A Non-linear Mixed-Effect Model (NLME) analysis showed that fallowing had no effect (p=0.565) on seed densities of the woody plants on the fallow fields.

6.2.3 Species Diversity of Soil Seed Bank Compared Between Fallow Fields and Remnants

The Mann-Whitney analysis revealed no significant difference (p=0.767) in the species diversity of woody plants represented in the soil seed bank of fallow fields and remnant forest vegetation.

7.0 Conclusion

This study found that the woody species diversity of the aboveground vegetation and the soil seed bank on fallow fields of the Mashare Constituency were not affected by the duration of fallowing. However, ploughing methods affected species diversity of the fallow fields and the traditional methods were found to favour species diversity. This may have resulted from the minimal impact the traditional methods have on plants and the soil structure. The remnant forest vegetation plots were found to be more diverse than the fallow fields and this could be due to the different microsites and the diversely matured woody plants that can facilitate the growth of other plants.

The seed density of woody species of the soil seed bank of fallow fields was also not affected by the duration of fallowing. In addition, there were also no significant differences found in woody species diversity when the soil seed bank of remnant and fallow fields were compared. This could be attributed to low seed production over the last couple of years as a result of the low rains received in the region. Fallow fields support the regeneration of woody plants. The concern remains with the important species that are over-exploited for timber, as these species were not prominently showing regeneration ability.

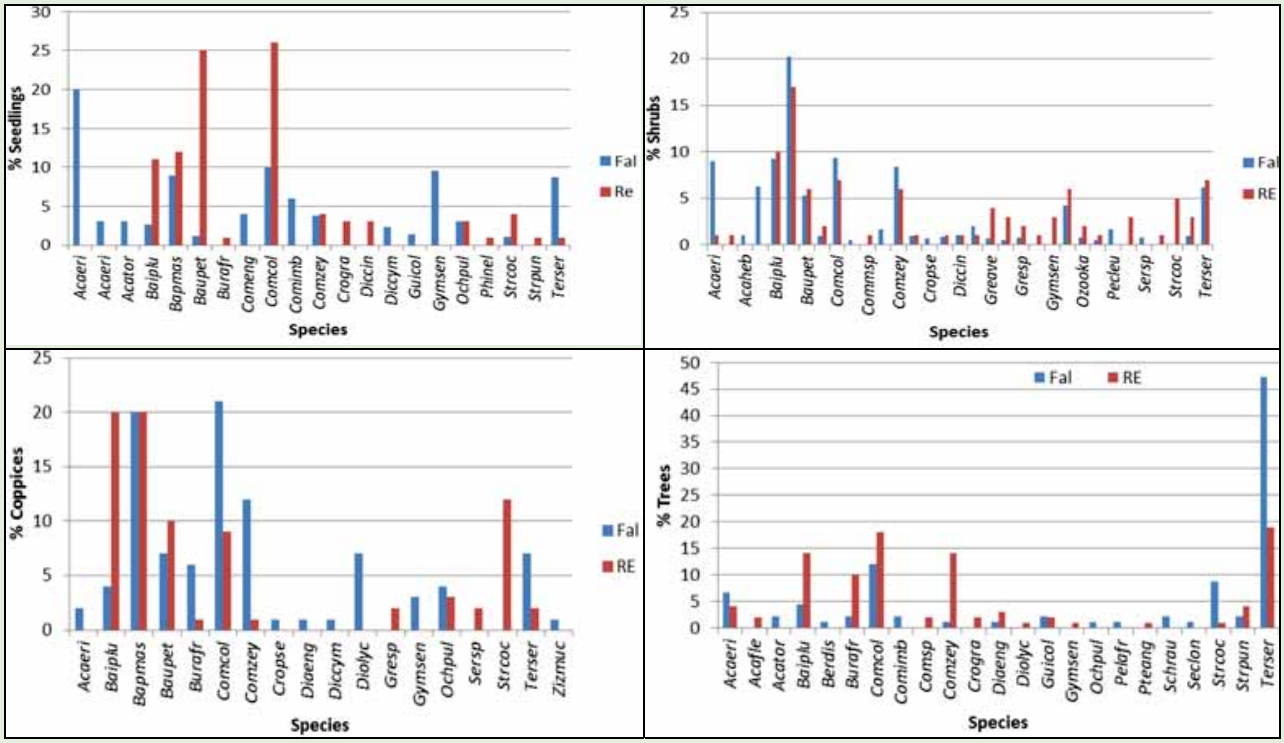

Fig. 5: The species recorded per growth form, with the Y-axis representing the percentage of woody plants calculated per fallow fields (AF) or Rem nant forest vegetation (RE)

8.0 Recommendations

The Ministry of Agriculture, Water, and Forestry (Namibia) together with institutions of higher learning can collaborate and identify farmers that are willing to try assisted regeneration of woody species that are important to them. Furthermore, studies on more fallow fields are recommended to confirm the findings of this study. Moreover, floating or germination of recovered seeds is recommended to test viability of seeds instead of the Tetrazolium Tests that can be costly. Studies can also include fruiting phenology of the woody plants so that fruiting times can be documented for seed collections.

Yam Diversity and Its Contribution to Food Security and Health Improvement among the Rural Communities in Southern Tanzania

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Abstract

This study conducted in selected southern districts of Tanzania aimed at improving food security and nutrition by improving productivity, coordinated distribution, and increasing consumption of food products with good nutritive quality, partly through improved conservation and sustainable use of yam diversity thanks to its adaptation to climate change. The study revealed abundant yam diversity in the study area that augments great potential in the livelihoods of the community even though the resources are facing threats due to underutilization. Though there was a noted genetic erosion; potential of indigenous knowledge in enhancing livelihood among the communities through enhanced diverse uses of farmers varieties, increased resilience of the system, and optimized uses of diverse on farm resources can play a critical role for enhanced and continued exploitation of the yams that contribute to food and nutrition security.

1. Introduction

Food insecurity and malnutrition are the major problems faced by the rural communities in Sub Saharan African continent. The named problems are caused by lack of food due to low productivity, poor distribution, as well as consumption of food products with low nutritive quality. Regardless of the wealth of plant genetic resources in Tanzania and globally, to date, the overall food requirement is dependent on few crop species such as wheat, maize, rice and potatoes (Ondigi *et al*. 2008). Introduction of these crops in many traditional farming systems in the country resulted into the displacement of local crop. In many areas, especially in marginal and semi-arid areas, these improved varieties succumb to the changing environmental conditions hence fail to contribute to the anticipated overall food and nutritional needs of the local communities. On the other hand, local crop genetic resources including yams are acknowledged for their ability to adapt to the changing environmental conditions and for their richness in the amount of nutrients required by the body as well as medicinal properties (Kim *et al*., 2005). There is therefore an urgent need of generating more information and create awareness of their importance among the policy makers and the community at large for improving their conservation and stepped-up use.

This study was conducted with the aim of contributing to the improvement of the conservation and sustainable use of yam diversity for improved food security, nutritional quality, and adaptation to climate change in Southern Tanzania.

2. Methodology

2.1 Study Sites

The field survey to document indigenous knowledge on yams was conducted in Lindi (Liwale district), Mtwara (Mtwara rural and Newala districts), Ruvuma (Mbinga district).

Table 1: Actual field survey and germplasm collection areas

Region	District	Village
Lindi	Liwale	Mkundi
		Mpengere
Mtwara	Mtwara Rural	Mbawala
		Lilido
	Newala	Nambali
Ruvuma	Mbinga	Mpepai

2.2 Sampling Strategy and Data Collection

The study regions and districts were selected based on availability of high diversity and threats to the selected Neglected and Underutilized Crop Species (NUCS), identified during the previous studies (Hamisy 2003, 2004, 2006; NPGRC 2003).

Multi-stage sampling strategy was adopted to generate the required information, followed by semi-structured interviews with the District Agricultural and Livestock Development Officers (DALDO), District Extension Officers (DEO), and village leaders. Key informants were identified using village register (Martins, 1995). A total of thirty farmers were selected in each study village while maintaining a balance between gender and age groups. Focused group description analysis was used to generate data and information on the indigenous knowledge in management and conservation of the yams as described in Grum, *et al*. (2010). The germplasm (tubers) were collected from the participants and passport data recorded in the collection form generated by the SADC Plant Genetic Resources Centre (SPGRC) and characterized using morphological characters.

3. Results and Discussions

3.1 Yam Crop Diversity and Distribution

The study revealed considerable yam diversity (18 landraces) identified by their local names, occurring throughout the study villages at varying numbers. The diversity (richness) was higher in Nambali village in Newala district (8) compared to other village such as Mbawala (6) and three in Mpepai (Table

2). During the study, it was observed that the communities identifies and named yam landraces according to their morphological features and attributes of the landraces such as thorniness (Vinyamilwa), tuber length (Mkonga wa nembo), persistence (Hamandeki), *etc*. Vinyamilwa which is called Imbelete in other areas were the widely ddistributed landraces recorded in five locations out of six, followed by Zambala/ Nlangilangi (in 3 sites).

Farmers from Mkundi and Mpengere participating in yam evaluation

Table 2: Distribution of yam landraces in the study villages

Varieties	Villages					
	Mkundi	Mpengere	Lilido	Mbawara	Nambali	Mpepai
Katuli	1	1	0	0	0	0
Nkwanda	1	1	0	0	0	0
Mambitapita	1	1	0	0	0	0
Imbelete	1	1	0	0	0	0
Vinyamilwa	0	0	1	1	1	0
Nkonga wa nembo	0	0	1	1	0	0
Hamandeki	0	0	1	1	0	0
Zambara/ Nlangilangi	0	0	1	1	1	0
Hangadi	0	0	1	0	1	0
Mng'oko	0	0	0	1	0	0
Matu	0	0	0	1	1	0
Nyati	0	0	0	0	1	0
Ihumihumi	0	0	0	0	1	0
Mnyuvele	0	0	0	0	1	0
Vitundi vimahe	0	0	0	0	1	0
Viporoto (Vyekundu)	0	0	0	0	0	1
Vyamsopi/ Lihuhu	0	0	0	0	0	1
Njano	0	0	0	0	0	1

Yam Landraces in pictures

Matu

Mambitapita

Ihumihumi

Nnyuvele

Mean values for the seven qualitative traits measured on 15 yam landraces indicated the existence of 2 spinous yam landraces, three bushy types and one landrace which forms aerial tubers (Matu). Tuber structures ranged from those that are not or are slightly branched (12) to those that are highly branched (3). Tuber length which is an important character in productivity also varied among the landraces with 9 landraces having tuber length less than 20cm, and one had tuber length more than 40 cm (Ihumihumi). Small number of landraces (5) had no or few roots on the tubers while 10 had numerous roots (Table 3).

Table 3: Mean value based on qualitative agro-morphological traits on 15 yam landraces

Landrace/	SP	PT	AT	TB	TL	RT	TH
Vinyamilwa	1	3	0	3	1	7	2
Nyati	0	3	0	7	2	7	1
Matu	0	3	1	3	1	3	1
Mnyuvele	0	3	0	3	2	3	1
Nlangilangi	0	2	0	3	1	7	2
Vimahe	0	2	0	3	1	7	3
Hangadi	0	3	0	7	1	7	1
Ihumihumi	0	3	0	3	3	7	1
Nkwanda	0	3	0	3	2	3	1
Vimbelelte	1	3	0	3	1	7	2
Zambala/ Buluu	0	2	0	3	1	7	2
Mng'oko	0	3	0	7	1	7	1
Hamandeke	0	3	0	3	2	3	2
Mambitapita	0	3	0	3	2	3	1
Katuli	0	3	0	3	1	7	2

Notes:
SP – Spine, PT – Plant type, AT – Aerial tubers, TB – Tuber branching, TL – Tuber length, RT – Roots on tubers, TH – Number of tubers per hill.

Yam genetic resources provide a number of uses to the communities in the study area, which ranges from food, medicinal, traditional ceremonies and means of income generation. As a potential food crop, yams were reported to produce high yields even in times of rainfall shortage, and some of the landraces could remain in the ground for years. Local communities in the study villages have a tremendous wealth of indigenous knowledge with regards to the use and management (practices) of these resources. The practices vary between study communities, as well as between the landraces of the same plant (Table 4). The communities identified some useful traits among the identified landraces. High yield and drought resistance were among the most important traits preferred by the farmers, others described some types of yams as potential remedies for diabetes as well as male infertility, the named finding is similar to other report which indicates the yams to be grown for medicinal purposes (Kim, *et al*., 2005).

Farmers participating in yam evaluation

Table 4: List of some common yams traditional management practices and traditional uses

Traditional Management Practices	Useful Traits
Inter-cropping	High yield
Planting on soft soils	Good taste and flavour
Tubers buried in the soils to improve storability,	White flesh colour
Early planting	Big tuber sizes
Staking	Drought resistance
Mixing tubers with ashes for long term storage	Easy to peel
Earthing	Dry flesh
	Diseases resistance
	Tolerance to poor soils
	Good storability

3.2 Genetic Erosion

The study observed high rate of genetic erosion to the extent of threatening the genetic resources. Many landraces are grown by few farmers (52 %) in small land area compared to 13% that are grown by many households in large farm areas. The named observation might not pose a serious threat to the yams due to the fact that many traditional varieties exhibit such characteristics. Farmers grow them in small areas for their subsistence. The rate of genetic erosion varies between the landraces within the species.

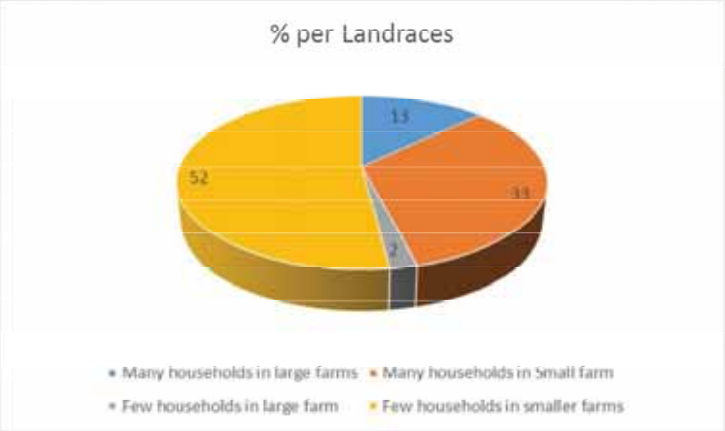

Fig 1: Yams planting pattern

3.3 The role of Indigenous knowledge in enhancing livelihood among the communities

i) Enhance diverse uses of farmers varieties

Different varieties among the species have a number of different uses that force the communities to grow a mix of them to reap the inherent benefits of the species. For example, product wise, some landraces saves as medicinal while others have cultural values.

ii) Optimizing uses of diverse on farm resources

At ecological scale, different yam varieties grow well in different environments, hence enable the species to occupy a wide range of ecological niche. Intercropping, which is a common practice for all the species, enables farmers to save labor and time.

iii) Increasing resilience of the system

Some practices such as early planting enable the crops to adapt to changing climatic condition, intercropping enables farmers to avoid risks in case of crop failures due to drought, insect pests and diseases as well as market fluctuations, seed treatments is a protection against storage pests, drought resistance which is a common feature for the yams enables the crops to adapt to the changing climatic condition hence ideal for climate change adaptation.

4. Conclusion and Recommendations

The study revealed the following:

- Great yam diversity in the study area (both in numbers of accessions and in agromorphological qualitative and quantitative traits);
- The named crops have a great potential in the livelihood of the community which ranges from uses for different purposes, useful traits and environmental resilience;
- However, the resources are facing great threats due to underutilization; and High variations in agro-morphological traits exists among the landraces and in some of them

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SPGRC Efforts of Establishing National Genebanks in Comoros, DRC, Madagascar and Seychelles

Introduction

The SADC Plant Genetic Resources Centre (SPGRC) is the Southern African Development Community (SADC) institution responsible for promotion and coordination of plant genetic resources conservation and sustainable utilization in the SADC region. The Centre islocated in Lusaka, Zambia. SADC Member States realise the importance of plant genetic resources for food and agriculture (PGRFA)both as direct sources of food and nutrition for its approximately 270 million people and a rich reservoir of diversity and a store of novel genes used in crop improvement programmes. In 1989, the region established an *ex-situ* plant genetic resources network based on a hub and spokes model. In this scheme, each of the 16 SADC member states operates a national genebank responsible for conservation work in the country. In turn, regionally, SPGRC operates with the responsibility for the regional conservation of the plant genetic resources working in member states through the national genebanks, commonly known as the national plant genetic resources centres (NPGRCs) in the SADC.

With the SPGRC working in the region through the NPGRCs, the SADC have managed to collect and conserve above 45 000 accessions stored in NPGRCS. The SPGRC holds duplicates of all the accessions from the member countries in a base collection for long term conservation. Although a lot of work has been done to date, there is still genetic diversity in the SADC member states needing collection and preservation. This diversity is being threatened by extinction from climate change effects, extensive infrastructural development, fast growth in the region's population and the introduction of elite crop varieties that are displacing traditional crop cultivars.

Demonstration of collected species at M'Vuazi Research Station in DRC

A visit to a field genebank in Madagascar

Improvised genebanking facility in DRC

Because of differences in the stages of agricultural development in SADC Member States, countries are at different stages of development in terms of their plant genetic resources conservation programmes with some still requiring more work to bring them to levels similar to the advanced ones. In addition, SADC being an intergovernmental organization that is growing its membership, countries join at different stages resulting in those countries joining late falling behind in their plant genetic resources conservation programmes. In this case, four (4) countries (Democratic Republic of Congo, Madagascar, Seychelles and Comoros) in the SADC which joined the block late are still lagging behind in their PGR conservation programmes. In these countries, plant genetic resources conservation programmes are disjointed in that there are no centralised national conservation programmes. The countries lack skills in conservation work and there is no equipment to support the conservation work on the ground.

It is for the above reasons that SPGRC has for the past years been appealing to the regional and international plant genetic resources conservation community for financial and material support to establish national genebanks in the SADC countries of the DRC, Madagascar, Seychelles and Comoros and train staff in plant genetic resources conservation.

A lot of conserved plant genetic resources have been lost through insect and rodent attack because of lack of security as most of the seeds are stored in open wooden cabinets or shelves. Even the accessions still stored at different centres across the countries are still at risk of loss of viability as the storage facilities are makeshift exposing the seeds to the vagaries of weather. The countries, especially DRC and Madagascar, still have wide plant genetic resources diversity in the remote communities requiring rescuing from extinction but because of lack of resources very little has been done. There is need therefore for urgent intervention in these countries to rescue the plant genetic resources diversity from loss by collecting them and centrally conserving them at national genebanks, the SPGRC, and the backing them up at the Svalbard Global Seed Vault so that they are conserved "forever"

The SPGRC is soliciting funding (cash or in-kind) aimed at supporting the plant genetic resources conservation work in DRC, Madagascar, Seychelles and Comoros. The resources sought include freezers, seed drying units, seed packaging materials, capacity building of genebank staff, and initial working capital for seed exploration and collections.

Genetic resources managed with low standards due to lack of facilities

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