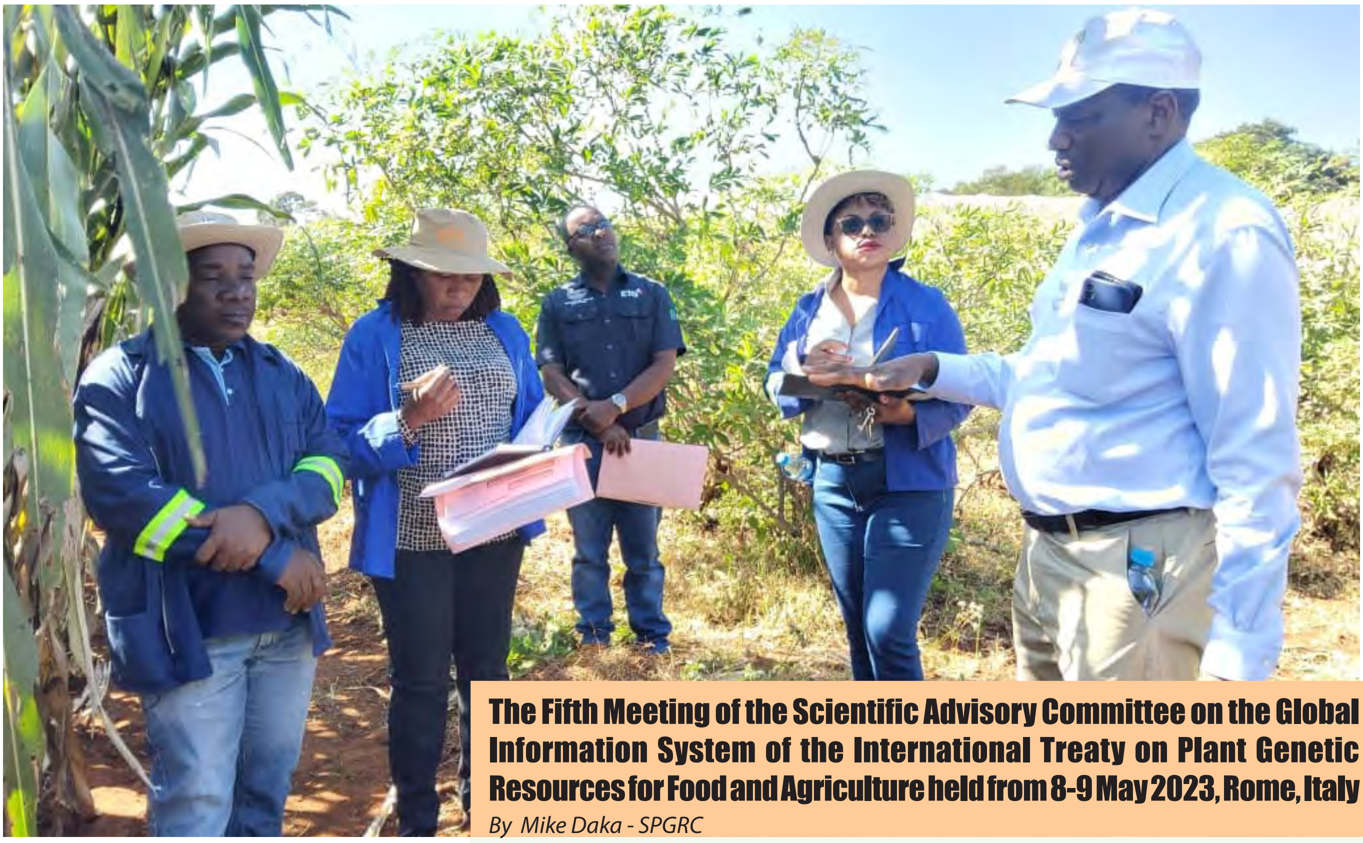
SADC PLANT GENETIC RESOURCES CENTRE
"Safeguarding plant diversity for sustanable livelihoods
Network News
Newsletter - Mid-Year Issue - 2023

ICRISAT Collaborates with SADC Through the Zambian NPGRC to Build Capacity



By Dorcas Kabuya Chaba -NAIS , Zambia

With climate change posing threats to agricultural productivity, preserving sorghum and pearl millet has become paramount for securing food availability and maintaining biodiversity.

Recognising the crucial role that these genebanks play in preserving agricultural genetic diversity, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has been actively collaborating with national governments and institutions to strengthen their capacity in implementing best practices.

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The Fifth Meeting of the Scientific Advisory Committee on the Global Information System of the International Treaty on Plant Genetic Resources for Food and Agriculture held from 8-9 May 2023, Rome, Italy

By Mike Daka - SPGRC

1. **INTRODUCTION/BACKGROUND**

The fifth meeting of the Scientific Advisory Committee (Committee) was held in hybrid format on 8 and 9 May 2023, in Rome, Italy. Mr Kent Nnadozie, Secretary of the International Treaty on Plant Genetic Resources for Food and Agriculture, welcomed the participants to the meeting, noting that the agenda and the presentations scheduled would help to provide an overview of the work of the Secretariat and also of the relevant activities by the partner organizations.

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Plant Genetic Resources for Food and Agriculture: The Cornerstone of Global Agriculture

Using plant genetic resources for food and agriculture in crop improvement remains the cornerstone of resilience and adaptation breeding. Owing to the change in climatic conditions, many breeders have had to resort back to landraces to introduce adaptation, amongst other important traits, during the development of unique and novel varieties that are accustomed to the changing times.

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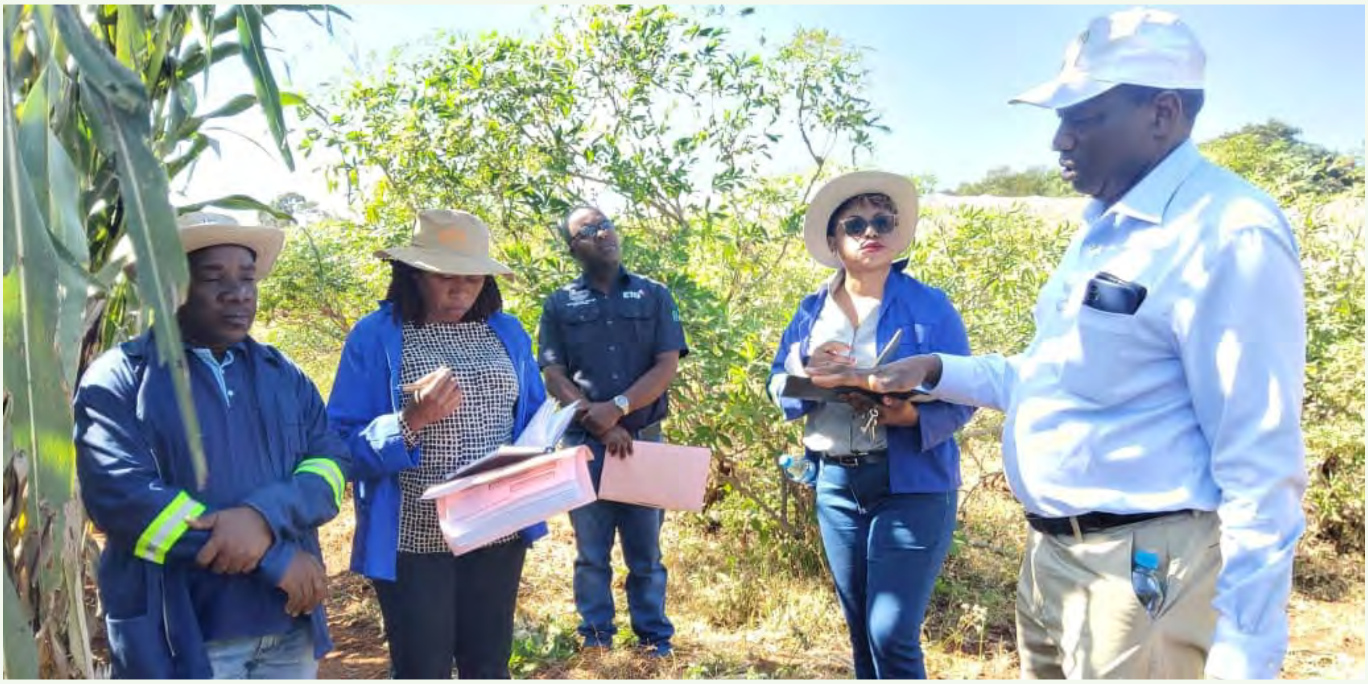
ICRISAT Collaborates with SADC Through the Zambian NPGRC to Build Capacity



Zambia Agricultural Research Institute (ZARI) genebank staff were privileged to receive training on the preservation of sorghum and pearl millet by ICRISAT with a special focus on characterisation and regeneration.

The training was funded by Crop Trust, an organisation that plays a critical role in conserving traditional crops by partnering with national and regional institutions.

ICRISAT Genebank Africa Manager, Professor Falaou Hamidou, visited the National Plant Genebank Resources Centre (NPGRC) to build capacity of staff in preserving and conserving the climate resilience crops.

Professor Hamidou hinted that with the growing threats of climate change, ICRISAT has been at the centre of strengthening National Genebanks in preserving cross pollinated crops such as Sorghum and pearl millet.

"Regeneration and characterisation are some of the key route activities of any genebank. Regeneration helps the genebank to maintain accessions, germplasm under the ideal condition in order to distribute to any requester. characterisation also helps the genebank to know which kind, type of germplasm accession that they are conserving," he explained.

Professor Hamidou noted that it is important that NPGRC equally recognises the significance of conserving non-staple food crops such as Sorghum and pearl millet that contribute to food security in unique and important ways.

Professor Hamidou also emphasised on the implementation of efficient genebank management practices, focusing on protocols for seed processing, storage and regeneration.

And Zambia Agricultural Research Institute (ZARI), Principal Agricultural Research Officer, Graybill Munkombwe, who is Head at the National Genebank, noted that the training and backstopping came at the right time.

"NPGRC serves as a crucial repository for diverse plant species. These genetic resources hold immense potential for developing resilient and high-yielding crops that can withstand the challenges posed by climate change," echoed Mr. Munkombwe.

He underscored that the visit by ICRISAT Genebank Manager to impart valuable knowledge and skills to the genebank staff was a huge milestone.

"Genebank staff play a vital role in maintaining and safeguarding the seed collections. Imparting knowledge and skills to genebank staff, particularly in the areas of regeneration and characterisation, yields invaluable benefits for the preservation and sustainable use of crop genetic resources," he highlighted.

One of the trained staff who is responsible for regeneration, Sumini Sampa, disclosed that the expertise gained during the training are necessary to ensure the viability, purity, and genetic integrity of the seeds.

"Without proper regeneration techniques, seed collections may become depleted or lose their genetic diversity, undermining their value as a resource for future agricultural needs," she explained.

The training workshop covered a wide range of topics, including the principles of germplasm characterisation, data management, writing and developing Standard Operating Procedures commonly known as SOPs.

Sorghum and pearl millet are food security crops which must be preserved at all cost.

The Fifth Meeting of the Scientific Advisory Committee on the Global Information System of the International Treaty on Plant Genetic Resources for Food and Agriculture held from 8-9 May 2023, Rome, Italy

2. OBJECTIVES OF THE MISSION

To advise the Secretary on:

- General recommendations on the development and deployment of the Global Information System and its components as adopted by the Governing Body;
- The discovery of new areas of work with potential impact on the System;
- The selection of pilot activities for the Global Information System and, upon request of the Secretary, other initiatives and actions to sustain the operation of the Global Information System, and the further update of the Programme of Work.
- To review, as may be required, the Programme of Work on GLIS for the consideration of the Governing Body at its Ninth Session;
- To continue considering scientific and technical issues of relevance to DSI/GSD, and considering national legislation, as appropriate.

3. EVALUATION OF MEETING

3.1 Election of the Co-Chairpersons

The Committee thanked the former Co-Chairpersons for their guidance and leadership and elected Mr Theo VAN HINTUM (the Netherlands) and Mr Dickson NG'UNI (Zambia) as Co-Chairpersons for the fifth meeting.

3.2 Adoption of the Agenda

The Committee adopted the agenda and timetable and thanked the Secretary for the preparations and the documentation for the meeting.

3.3 Organization of Work

The Secretariat provided an overview of the mandate and previous work of the Committee, the structure and content of the Programe of Work for the Global Information System (2023-2028), and the requests made by the Governing Body through Resolution 5/2022.

4.0 DETAILS OF SPECIFIC MEETINGS

OPERATIONS OF THE GLOBAL INFORMATION SYSTEM AND IMPLEMENTATION OF THE PROGRAMME OF WORK.

4.1 Support to Contracting Parties and other users with PGRFA information exchange

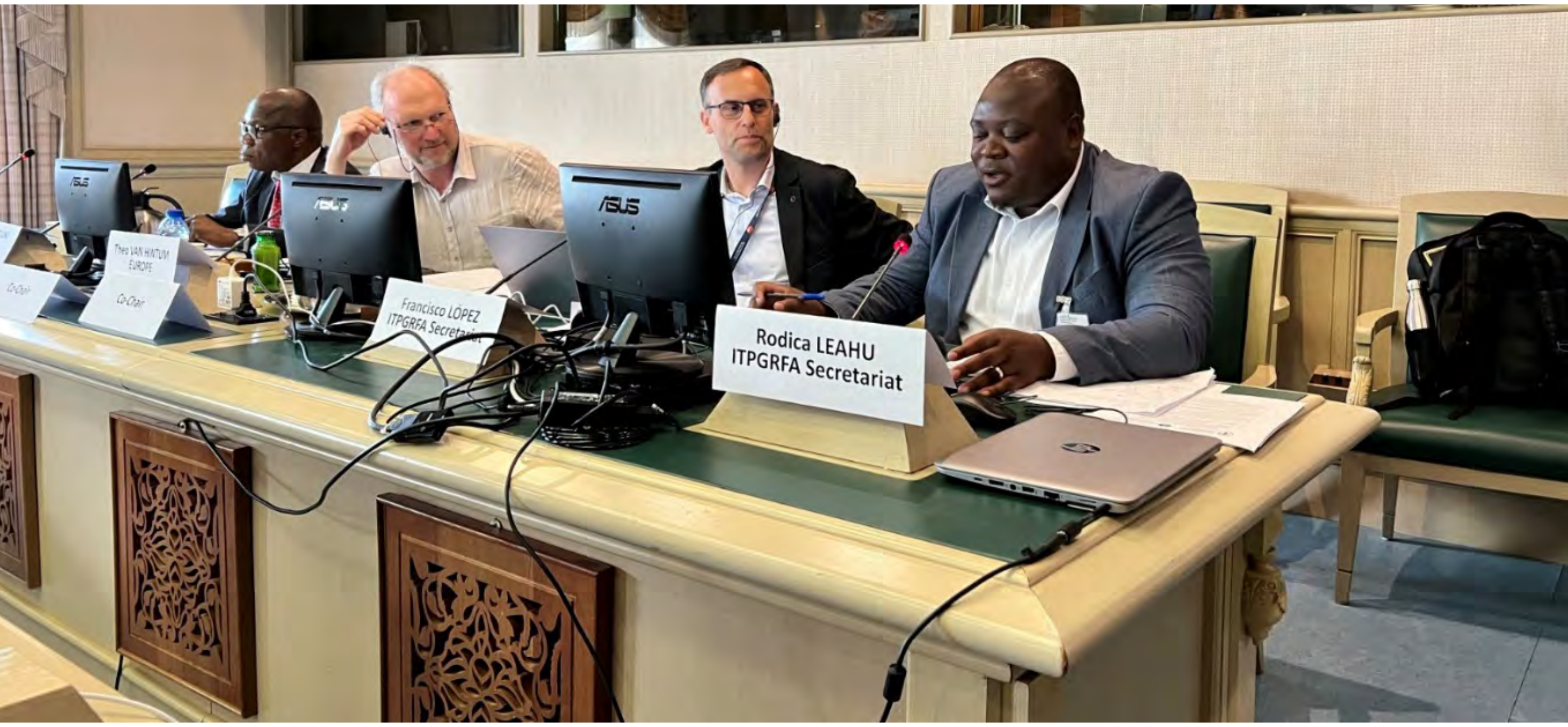
1. The Secretariat introduced the document, IT/GB-10/SAC-5/23/3.1, *Report on the Operations of the Global Information System and Implementation of the Programme of Work*, and provided an update on the support provided to users to make the plant genetic resources they hold more visible through the Global Information System (GLIS) in relation to objectives of the Programme of Work.

2. The Committee recalled that the aim of the GLIS was to bridge the gap in communication between the institutions serving as sources of plant genetic resources for food and agriculture (PGRFA), conducting research and added-value activities and those using PGRFA to develop products. The Committee noted the mandate of GLIS to create a directory of links to existing PGRFA information sources and develop mechanisms to connect them.

3. The Committee noted the progress made with the promotion and use of Digital Object Identifiers (DOIs). The Committee noted that holders of PGRFA had voluntarily assigned more than 1.4 million DOIs, so far. It also invited the Secretary to continue reporting at future meetings on the metrics related to the use of DOIs. In this context, the Committee recommended that the Secretary to improve the reporting about the use of the GLIS Portal, for example, by using additional metrics such as the 'returning users'.

4. The Committee welcomed the integration of the *Toolbox for Sustainable Use of PGRFA* into the GLIS Portal, resulting in an increase of 1600 new records in the directory of links. It also noted the plans of the Secretariat to explore the possible inclusion of the Inventory of national measures, best practices and lessons learned from the realization of Farmers' Rights, in the future. The Committee further noted that some of the information in the link directory could be relevant for other portals and information systems, including the CBD ABS Portal, and invited the Secretary to explore interoperability with other systems to make these datasets available for further use and publication.

5. The Committee appreciated the ongoing collaboration with WIEWS, Genesys, Web-SDIS and EURISCO, and the



CGIAR Genebank Initiative on *ex situ* documentation and advised the Secretary to continue the collaboration with these entities and systems.

6. The Committee recalled the importance of the directory of links of GLIS and reiterated that it would be helpful to increase the number of links to national databases. For this purpose, it invited the Secretary to expand the global landscape of databases referenced.

7. The Committee noted the development of a module in the GLIS Portal for the documentation of PGRFA conserved *in situ*, based on the content of the Crop Wild Relatives Descriptors, and invited the Secretariat to publish and promote it with users, and also to provide and support training and capacity development, as may be needed and subject to the availability of financial resources.

8. The Committee noted the presentation by the Global Biodiversity Information Facility (GBIF) Secretariat and the potential areas of collaboration regarding the mobilization of datasets at the national level, the improvement of access to crop wild relatives information, the promotion of data standards and the use of crop ontologies. The Committee also noted the ongoing negotiation of a letter of intent between the Secretariats of the International Treaty and GBIF to advance on these matters.

9. The Committee noted the presentation delivered by the INCREASE Project and the opening of the third round of the citizen science experiment. One component of the project focused on the enhancement and utilization of omics, the improvement of genomic predictional analysis tools and building strong relationships between genotype and phenotypes. Another component focused on the role of citizens and stakeholder groups in evaluating and distributing material for direct use, as complementary to the role of the genebanks. The Committee noted that the documentation of the activities and the results of the project could become a useful resource or use case for the further consideration of the Committee in the future.

10. The Committee noted the information provided by the Secretary on the use of the descriptor "country of provenance" in the GLIS Portal and noted that the descriptor was very useful for the PGRFA users. In this context, the Committee advised the Secretary to further promote its use through capacity development and awareness raising-activities.

4.2 PGRFA Documentation and Descriptors

11. The Secretariat presented the document, IT/GB-10/SAC-5/23/3.2, *Support to the documentation of PGRFA and the development of crop descriptors lists,* and provided an update on the third phase of the project "Development of globally agreed list of descriptors for *in situ* crop wild relatives documentation".

12. The Committee welcomed the progress made by the project, particularly on the adoption of the CWR descriptors at the national level in target countries. The Committee also welcomed the development of the CWR Descriptor Tool v.1 and recommended the Secretary to further promote its use.

13. The Committee emphasised the value of connecting *in situ* and *ex situ* information and noted that it would be valuable for the Governing Body to reiterate its invitation

to Contracting Parties to consider developing national inventories of CWRs and call on potential donors and stakeholders to support these processes and initiatives.

14. The Committee also noted the presentations by invited speakers on the development and use of crop list descriptors. In this context, it welcomed the recent development of crop list descriptors for various tropical fruit trees and forage legumes. The Committee also welcomed the process for the development of other crop descriptors in collaboration with the European Cooperative Programme for Plant Genetic Resources (ECPGR), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), ICAR-National Bureau of Plant Genetic Resources of India, and other partners.

15. The Committee reiterated the invitation to the Secretary to look for alternative ways to create and managing crop descriptor lists, for example in the form of ontologies, in collaboration with other partners, and to promote their use and raise awareness about their importance. The Committee invited the Secretary to provide relevant updates to the Governing Body or the Sixth Session of the Committee on this matter.

4.3 Developments Regarding Digital Sequence Information/Genetic Sequence Data

16. The Secretariat introduced the document, IT/GB-10/SAC-GLIS-5/23/3.3, *Developments Regarding Digital Sequence Information / Genetic Sequence Data*. The document contained a synthesis of DSI/GSD-related outcomes arising from the adoption of the Kunming-Montreal Global Biodiversity Framework by the Fifteenth Conference of the Parties to the Convention on Biological Diversity (CBD COP 15), including the Monitoring Framework, of relevance to the GLIS PoW. The Committee noted the presentation delivered by Mr Pankaj Jaswal, in which pilot technical interoperability solutions to link genetic resources information systems to downstream uses of PGRFA-associated information, including DSI/GSD, were discussed.

17. The Committee welcomed the presentations and expressed its appreciation for the scientific collaborations promoted under GLIS to facilitate the implementation of the relevant PoW components related to DSI/GSD.

18. In recalling that the Governing Body, at its Ninth Session, used the term "digital sequence information" interchangeably with "genetic sequence data", without any prejudice to the possible definition of terminology by the Governing Body, the Committee noted that CBD COP 15 agreed on the continuing use of the term "digital sequence information" for further discussions. The Committee also noted that the lack of a definition of the term would limit the ability to consider technical and scientific issues of relevance.

4.4 PARTNERSHIPS, COLLABORATION AND CAPACITY DEVELOPMENT

The Committee reiterated the importance of collaborations and partnerships for the effective implementation and coherent development of GLIS and advised the Secretary to continue enhancing collaborations.

The Committee noted the collaboration with the SADC Plant Genetic Resource Centre on the documentation and information management of PGRFA materials through the assignation of DOIs and joint capacity building and training activities organized in the region. The Committee noted that the network of 16 countries is using Web-SDIS for the documentation of CWR material through a specific module.

The Committee acknowledged the new approach to information and knowledge management adopted by the Benefit-Sharing Fund (BSF) and noted with appreciation that the information generated by the projects supported by the BSF are made publicly available within one year from project completion, and that similar conditions will apply to the projects to be funded under the Fifth Cycle.

The Committee noted with appreciation the ongoing collaboration with Genesys and advised the Secretary to collaborate with the Crop Trust on the promotion of GRIN-Global Community Edition, which facilitates, besides the management of the PGR collection, the reporting on the distribution of SMTAs and assists with the assignation of DOIs to PGRFA mate36rial.

The Committee noted the relevance of the information contained in the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS) for the elaboration of the Draft Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture. The Committee also noted that the draft report will also be submitted to the Governing Body at its Tenth Session, for comments.

5.0 BENEFITS OF THE MISSION

The SADC-PGRC participation at the 5th session of the Scientific Advisory Committee (SAC) of the International Treaty enabled its contribution on the development and deployment of the Global Information System and its components as adopted by the Governing Body in the line with article 17 of the Treaty.

The SAC also enabled the SPGRC to meet with several ICPs to discuss areas of possible collaboration in Information management development and enhancing data exchange of PGR that could benefit the SADC region.

COLLECTION AND CONSERVATION OF CASSAVA ACCESSIONS (*Manihot esculenta*) IN NATIONAL PLANT GENETIC RESOURCES CENTRE, SOUTH AFRICA

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Introduction

The Second Global Plan of Action (GPA) stipulates "*Supporting targeted collecting of plant genetic resources for food and agriculture*" as one of the 18 priority activities (GPA 2010). The Department of Agriculture, Land Reform and Rural Development (DALRRD) through the National Plant Genetic Resources Centre (NPGRC) of South Africa, developed a National Plan for the conservation and sustainable use of PGRFA, in response to the implementation of the Second GPA. One of the activities expressed in the National Plan based on the Second GPA is the "*Selection of targeted taxa for gap filling and expansion of PGRFA collection*". In implementing the National Plan, the NPGRC of South Africa identified a gap in the genetic diversity of cassava (*Manihot esculenta*) in its collection.

Cassava is a perennial root crop that is native to South and Central America which belongs to *Euphobiaceae*. It can grow up up to approximately 2, 4 m height depending on the variety and grows mainly in the tropics and sub-tropical areas (Allem, 2002). It is a vegetatively propagated crop that is cultivated through stalk cuttings and seeds as sexual propagation.

According to FAO 2013 cassava is cultivated for human consumption, animal feed and as industrial raw material because of its starchy root with valuable source of calories and high content of dietary fibre (Allem, 2002; Mapayi *et al*., 2013). It is a staple root crop for millions of people in the tropics and sub-tropic regions. The storage root provides considerable amounts of carbohydrates compared with other root crops but has lower protein and fat contents. It contributes towards food security and income generation in agriculture, both in subsistence and commercial farming (Guira et al, 2017).

Information captured during collection

To initiate the collection process, farmers were visited either individually at their homes or gathered in one central place for interviews to be conducted (Figure 1). According to these farmers, cassava is sown around November/December and harvested around April/May. Most of these farmers cultivate cassava in a wet and sandy-loam soil together with amadumbe (*Colocasia esculenta*). During harvest the best crop in terms of taste (sweetness) and texture are selected for consumption.

The collection form entailed questions with general wild, cultivated species and indigenous knowledge information.

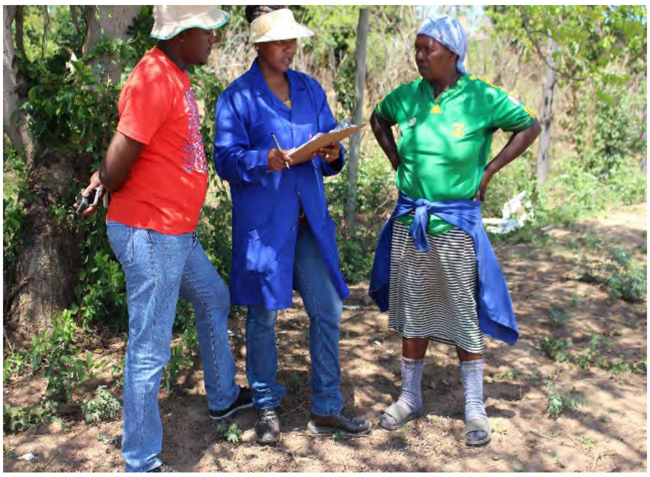

Figure 1:Briefing session with farmers and completion of collection forms, Photo credit: G Phora and MT Manamela

Figure 2: Cassava stakes prepared for collection, Photo credit: NL Maluleke

Collection of cassava

Cassava accessions conserved in the National Gene bank were collected from Mpumalanga Province in Ehlanzeni district and Kwazulu-Natal, King Cetshwayo District in collaboration with the Mpumalanga Department of Agriculture and Rural

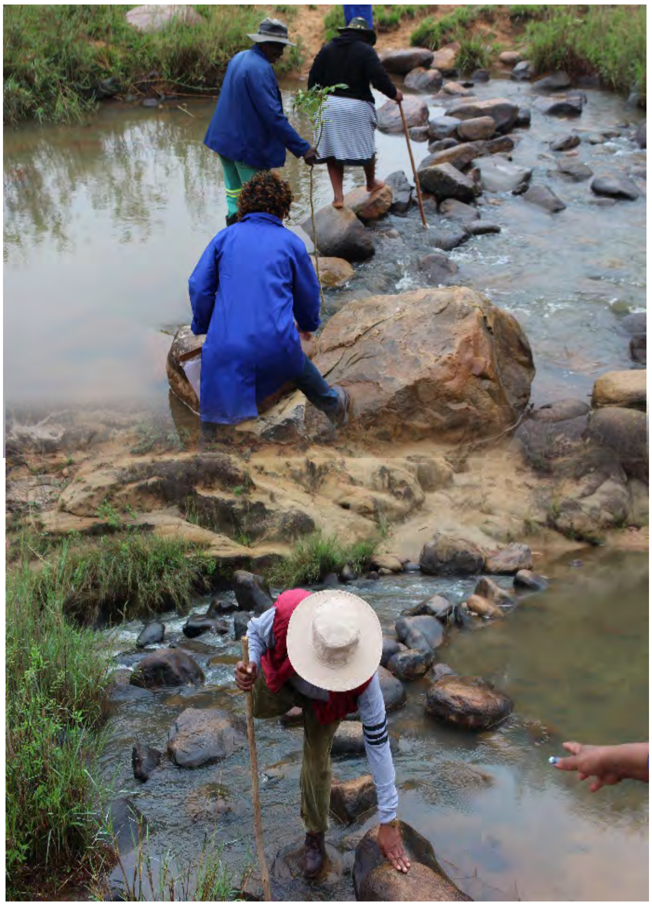

Figure 3: Farmers crossing the river to access their cassava fields, Photo credit: NL Maluleke

Development and KZN Department of Agriculture and Rural Development. On average, about 10 stakes per accessions (Figure 2) were collected per farmer in all the explored areas both in Mpumalanga and KwaZulu Natal.

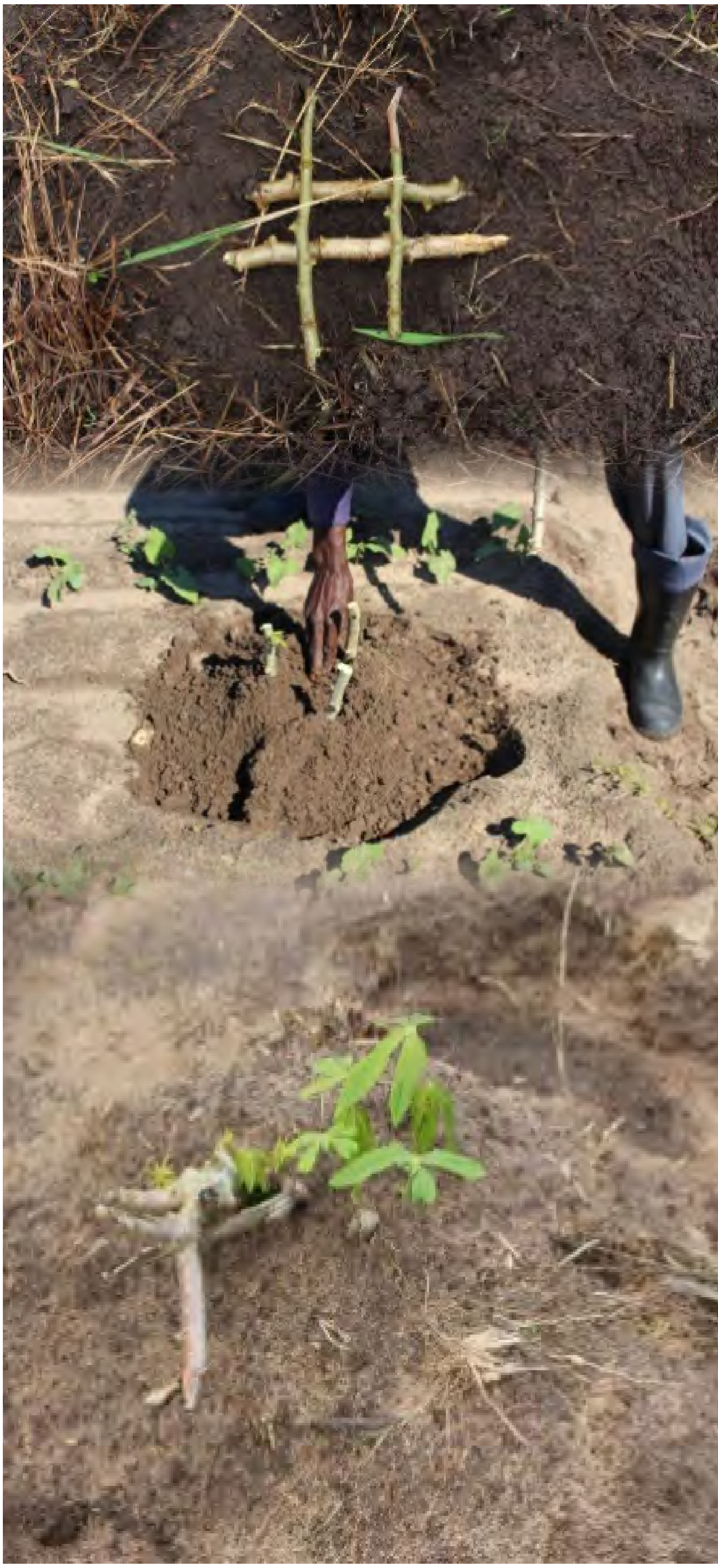

Figure 4: Different planting methods used by farmers Photo credit: MT Manamela

The areas in both district where the collection was made are mountainous, hilly and slippery; making it difficult to access the field especially during rainy seasons. In some instance, rivers had to be crossed to access the fields as indicated in Figure 2. This situation, at times threatens the farmers and their community's food security if their harvest from the previous planting was not sufficient to cater for their current needs.

Conservation of cassava

- *Farmers*

Farmers conserve their cassava plants in the fields until they reach maturity and produce tubers. Harvesting of the tubers can be done as and when needed between 6-18 months after planting, however longer growing periods are recommended as they produce higher bigger roots with higher starch yields. Once they are matured, tubers are harvested and without damaging the plant. It is during harvesting that the plant stakes are cut and transplanted using different methods according to each farmer's preference (Figure 4).

In the first method, about four or five stakes are planted vertically in the soil with two nodes with axillary buds above the ground. The disadvantage of this method according to other farmers was the production of low quantity of tubers. The second method entails planting four stakes of cassava horizontally, two across each other and completely covered with soil. This had more advantage in producing a higher number of tubers. In the third method, two stakes of cassava are planted by slanting them opposite each other (Figure 4).

- *National gene bank*

At the gene bank collected stakes of cassava are planted inside the planting beds in the shade house to represent field conservation method. The gene bank has thus far collected a total of 13 accessions which are recorded on SADC Documentation and Information System (SDIS).

Conclusion

Eight of those collected are conserved in tissue culture and the remaining once will be included in the future trials and maintained in shade house, as field gene bank. Future collection missions will target other areas where cassava was not collected; for gap filling as well as to have an overall representation of cassava germplasm in the gene bank collection for all localities cultivating cassava.

Acknowledgements

The Department of Agriculture, Land Reform and Rural Development is acknowledged for providing the resources utilised for the success of this mission. The staff of the NPGRC is appreciated for providing technical assistance for this collection mission as well as inputs and comments in this article.

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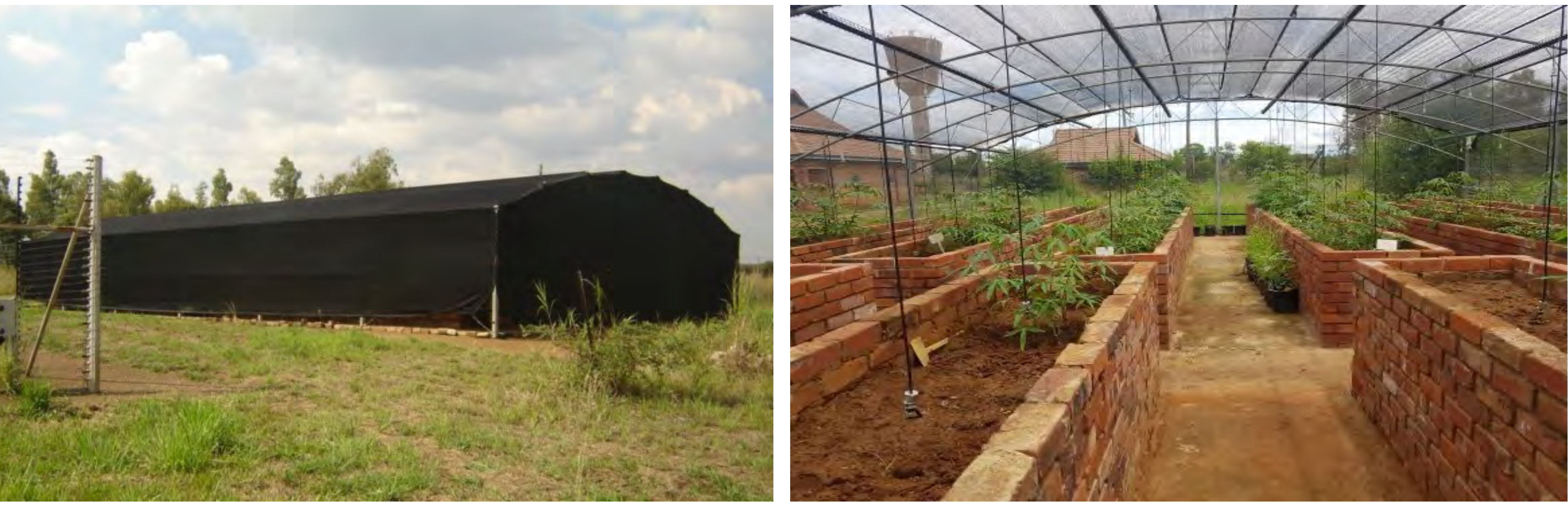

Figure 5: Shade house and cassava plants in planting beds: Photo credit MT Manamela and ML Mokoena

Plant Genetic Resources for Food and Agriculture: The Cornerstone of Global Agriculture

By Tanyaradzwa M. Tenesi, Prof. Hamidou Falalou and Dr. Kuldeep Singh

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ICRISAT plays a fundamental role in the efficient conservation of Plant Genetic Resources for Food and Agriculture (PGRFA) from various regions across the world. In particular, ICRISAT's Eastern and Southern African (ESA) Genebank, a medium-term storage facility located in Bulawayo, Zimbabwe, conserves over 10,000 unique accessions of dryland crops, namely sorghum, pearl millet, finger millet, chickpea, pigeon pea, and groundnut. These accessions were collected from over 50 countries, are held in trust, on behalf of the international community, and are freely accessible by anyone on request.

These accessions can be used for various purposes, which include research and development by researchers and academia, as well as crop improvement for variety development. They can also be used to cater to farmers' preferences as well as be re-introduced into cropping systems following natural disasters or extinction.

Viability monitoring at ICRISAT ESA Genebank

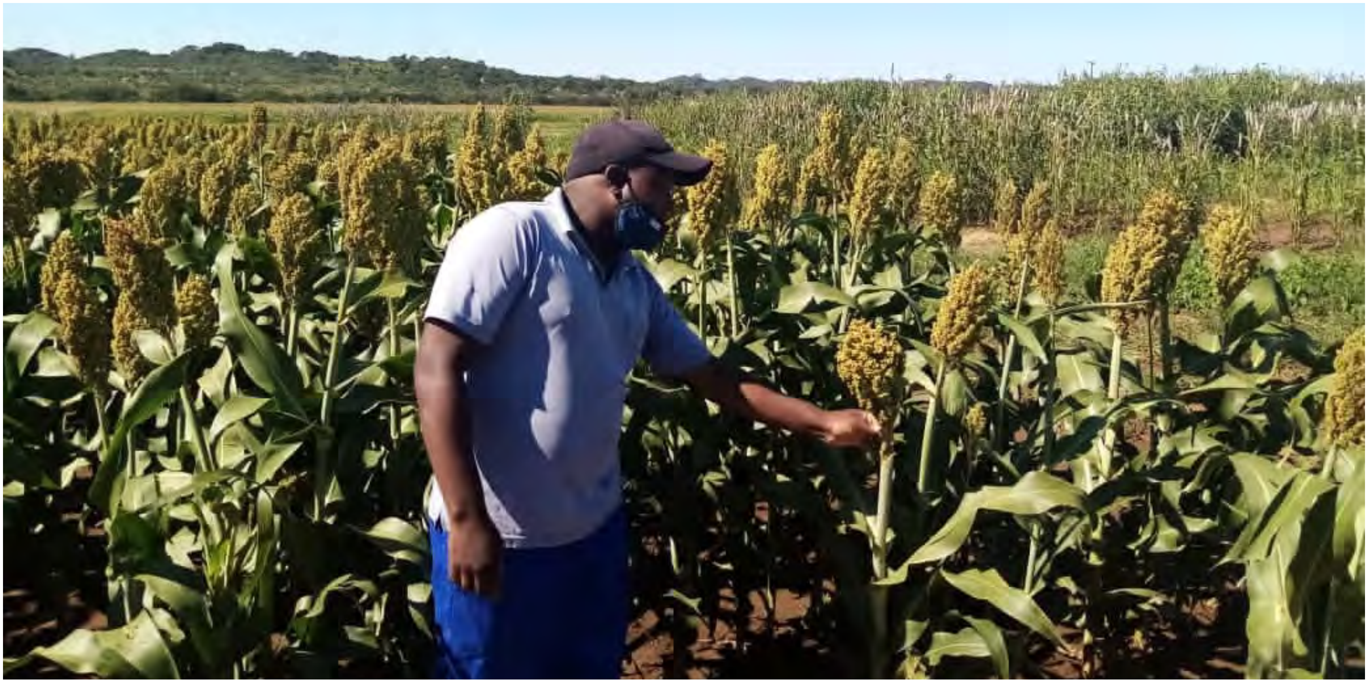
Because of the critical role that PGRFA play in the global agricultural sector, it is of utmost importance for them to be managed with great efficiency and precision, as any irregularities in storage conditions as well as seed physiology may lead to an accession's extinction. The idea behind effective conservation is to halt the physiological processes within a seed such that even after 25-100 years when it is removed from conservation, its growth resumes as though a biological pause has never been experienced. In order for this to take place, a delicate balance between moisture content, temperature, and oxygen content must be achieved. ICRISAT has developed a set of standard operating procedures which are to be followed in order to ensure that this balance is met and accessions are conserved in the best possible state and under the best conditions with respect to the facility. At the ICRISAT ESA Genebank, all accessions are kept at temperatures between 0-5°C at a relative humidity of not more than 60%. Prior to storage, the moisture content of all accessions is also reduced accordingly with respect to the crop species to ensure that they do not germinate while under storage.

In addition to these conditions, other external factors also come into play to ensure efficient conservation. These factors include storage materials and inventory management. Accessions must be stored in containers made of inert material that does not break down over time or under adverse conditions to ensure seed viability, and periodic inventory management must be carried out to ensure that the accessions under storage remain up to the standard. The ICRISAT ESA Genebank makes use of aluminum canisters for storage of the various accessions under conservation.

Of particular emphasis is the need for scheduled viability monitoring and regeneration activities. All accessions with a germination percentage of less than 80% are regenerated and replenished to ensure that requisitioners always obtain accessions with good viability in order to reduce any yield-reducing factors. This would then entail that routine viability monitoring is conducted on all accessions in order to identify any reductions in viability which may occur over time, thus identifying accessions that require regeneration.

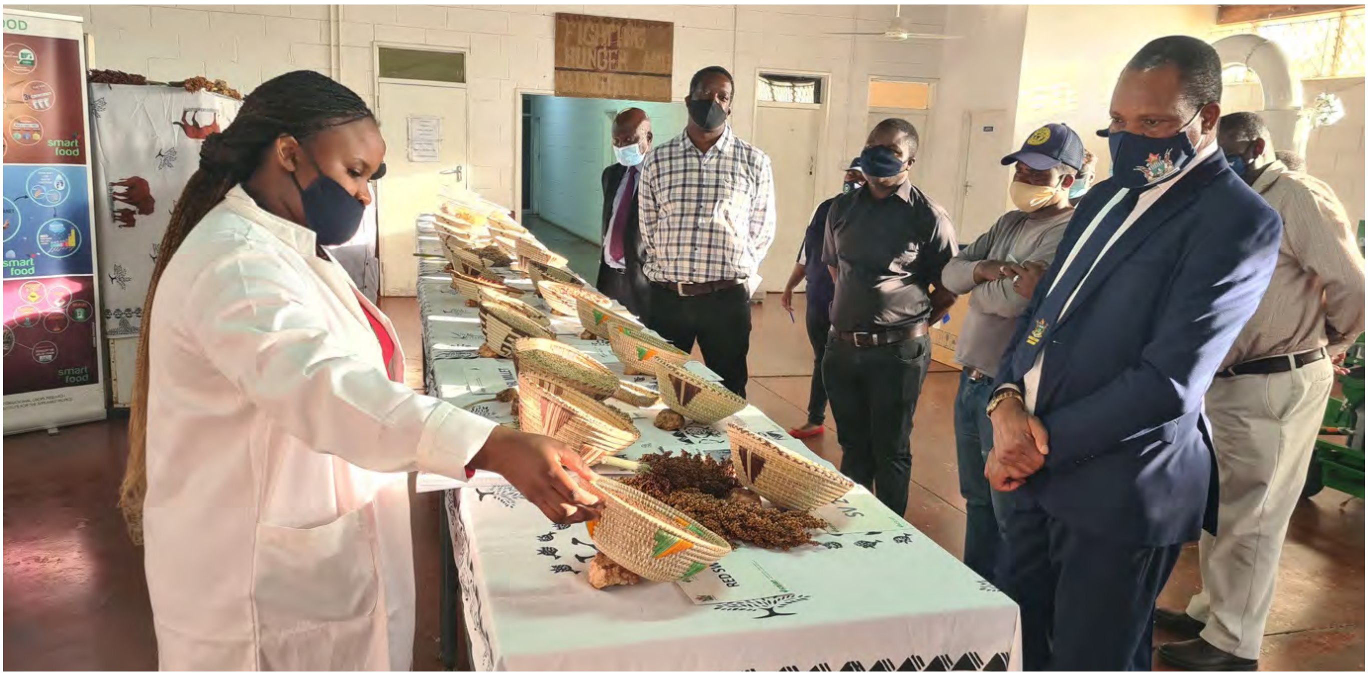
Regular collection and acquisition missions are also carried out within the ESA region in order to ensure that diversity is conserved and preserved. This is usually done through National Agricultural Research Service partners, partners/stakeholders, and/or directly from farmers' fields. On collection, a detailed list of information is captured in order to establish the uniqueness of the accession in question, as only unique accessions are conserved in the Genebank. Therefore this data collection prevents the duplication of materials in the Genebank. In order to support the latter, all accessions also undergo characterization in order to ascertain the uniqueness of each accession. The information that is generated at the collection as well as characterization is of utmost importance for the requisitioner as it informs them of the character traits that each accession possesses, thereby informing their selections.

In order to provide the requisitioners with more information, multi-location evaluations of the accessions are also conducted in order to establish the performance of each accession under different conditions. This also informs the requisitioner of the ability of a particular accession of interest to adapt to varying climatic conditions, which may be useful in resilience breeding/ variety development as well as re-introduction.



Field characterization monitoring by ESA Genebank staff member.

The ICRISAT ESA Genebank ensures all of these procedures are carried out with the utmost efficiency and precision in order to provide requisitioners high-quality accessions. The accessions under conservation continue to be of great impact within the region as they continue to contribute to variety development and resilience breeding. In 2022, the collaboration between



Exhibition of ESA Genebank diversity to Zimbabwe's Minister of Lands, Agriculture, Fisheries, Water, Climate and Rural Development, Hon. Anxious J. Masuka by a Genebank staff member.

ICRISAT-Zimbabwe and SeedCo led to the release of two new food and brewing sorghum hybrid varieties, namely SCHX 101 and SCHX 102. The development of these two hybrids was through the SeedCo Global Research and Development Company under the innovative research done through the ICRISAT-led Sorghum and Pearl Millet Hybrid Parents Research Consortium (SPMHPRC), with the base material having been obtained from the ICRISAT-ESA Regional Genebank. This partnership resulted in the release of two brewing and food sorghum hybrids, the white-seeded SCHX101 and brown-seeded SCHX102.

The ICRISAT ESA Genebank also plays an active role in providing capacity building within the region. Over the last year, it has aided different organizations, in the private and public sectors, in developing and strengthening the operations, processes, and resource management strategies that organizations and communities need in order to survive, adapt, and thrive in a fast-changing world.

Collaborative work between ICRISAT and the National Agricultural Research Systems (NARS) remains at an all-time high as the ESA Genebank continues to work with the Genetic Resources and Biotechnology Institute of Zimbabwe. This collaboration has since led to the provision of support to the NARS through collaborative characterization and regeneration procedures in a bid to assist the institute in achieving Zimbabwe's Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development's mandate to generate enough germplasm for back-up conservation in the Svalbard Global Seed Vault.

The ICRISAT Genebank also extended support to the Cotton Research Institute of Zimbabwe for establishing their first seed storage unit. The support rendered included all aspects related to the effective and efficient conservation of plant genetic resources for food and agriculture, ranging from training on germplasm acquisition and maintenance to ideal storage facility infrastructure. The staff from the Institute were also trained on the best practices to ensure the longevity of germplasm viability and seed health as well as technical know-how on ideal conditions for storage and regeneration processes.

The Genebank also collaborated with the Community Technology Development Organisation (CTDO) in providing base material for the 'Seeds for the future' project, a donor-funded project being conducted in Masvingo, Chiredzi and Mwenezi, which aims to improve access to climate-resilient crop varieties in vulnerable communities. This initiative also saw the

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Plant Genetic Resources for Food and Agriculture: The Cornerstone of Global Agriculture

ICRISAT Genebank in Bulawayo providing technical backstopping to the project as it conducted a training workshop for CTDO staff that focused on standard operating procedures for characterization and regeneration; and the reasons behind these operations in support of effective germplasm conservation at community level (community seedbanks).

These efforts have since seen the rise of new partnerships with CTDO as well as other big organizations such as SADC Plant Genetic Resources Centre (SPGRC), who have since been drawn to the work that is being carried out by ICRISAT's ESA Genebank. The SPGRC also expressed interest in embarking on a collaborative germplasm collection within the region in a bid to combat genetic erosion. The increase in the ESA Genebank's capacity-building activities, within both the private and public sectors will provide a better platform for all other stakeholders to get access to information which is related to germplasm characterization, regeneration, and conservation. These activities also increase visibility of the fundamental work that is carried out at the facility.

The ICRISAT ESA Genebank remains committed to providing technical support to all NARS partners within the region, with respect to the conservation and documentation of PGRFA, as well as efficient conservation and utilization of PGRFA on behalf of the international community, freely accessible to all. The Head of the ICRISAT Genebank aims to ensure that all of ICRISAT's genebanks maintain work class standards and are always ready to support the agricultural and research systems on the global fora. ICRISAT's goal is to provide exceptional germplasm for research and development while preserving the global biodiversity of the world's most resilient yet highly nutritious food crops in supporting the fight against food insecurity within the region.

Meet New SPO Doc & Info

By Mike Daka

The SPGRC is glad to welcome Mr. Kasonde Mubanga (left), a Zambia National, as Senior Programme Officer – Documentation and Information. Mr. Mubanga joined the SPGRC on 3rd April 2023.

Prior to joining the SPGRC, Mr Kasonde Mubanga worked for 17 years at Seed Control and Certification Institute - Ministry of Agriculture (Zambia) and at Bayer Crop Science (Zambia) in various capacities focusing on seed regulation, row crops production, production research, seed quality testing, quality management and systems development; and process improvement.

Mr Mubanga holds a Master of Science in Sustainable Agriculture and Food Security from the Royal Agricultural University in the United Kingdom and a Bachelor of Agricultural Sciences from the University of Zambia. He is also a certified Quality Systems Management Auditor and Six Sigma Green Belt.

Mr Mubanga's interests include reading and watching football.

BIODIVERSITY, CLIMATE CHANGE AND FOOD SECURITY

By Kasonde Mubanga

The Southern African Development Community (SADC) joined the rest of the world on 22nd May 2023 in commemorating the 2023 International Day. In December 2000, the United Nations (UN) declared 22nd May as the International Day for Biodiversity (IDB), to commemorate the adoption of the Convention on Biological Diversity (CBD) on 22nd May 1992; and raise awareness on biodiversity issues. The CBD seeks to address all threats to biodiversity. Each year, the SADC region faces more and more drastic weather events such as floods and droughts which severely impact food production of major crops and thereby affecting food availability and access due to production losses and high food prices. The impact of this is food insecurity in the region. Approaches aimed at building more resilience in food systems in the region therefore need to implemented to mitigate risks posed by climate change. The Plant Genetic Resources for Food and Agriculture (PGRFA) conserved in the SADC region are uniquely placed to contribute significantly to increasing the resilience food production systems against effects of climate change and thereby ensure food security.

SADC promotes the conservation of PGRFA in these genebanks ensures that the SADC region has a strong foundation for food security, now and in the future, while also protecting crucial genetic diversity against genetic erosion and biodiversity loss, which is now being exacerbated by climate change. Climate change has the potential to wreak havoc on food production systems in the region and this can cause increased levels of hunger. Concerted efforts must be taken to create more climate change resilient food production systems and genebanks in the SADC region are well placed to play a critical role in this by being sources of the required crop diversity for breeding more resilient crops. The Crop Trust (2023) supports this by correctly discussing that genebanks are treasure troves of agricultural biodiversity. They bring together and safeguard a vast array of varieties of many different crops and ensure access to valuable diversity regardless of the challenges posed by a changing climate. With the world population projected to reach 8.6 billion people by 2030, there is going to be more demand for food requiring doubling the current global food production capacity against the effects of climate change. Effects of climate change on food and nutrition security will negatively impact 70% of the population in Africa, Asia, and Asia-Pacific, should the current debilitating trajectory persist (SADC, 2020). This clearly indicates that achieving food security will become even more difficult in the times ahead if interventions are not put in place for more resilient food production systems.

To achieve this, genetic resources biodiversity maintence, conservation and utilization must be prioritised as it underpins the productivity that will be required to meet the projected demand for global food security. The increased demand for food will come against the intensifying effects of climate change, such as droughts, floods and crop diseases

Maize (*Zea mays* L.) | Maize (*Zea mays* L.) | Maize (*Zea mays* L.) | *Pennisetum glaucum* | *Lablab purpureus*

Sunflower (*Helianthus annuus*) | Common bean (*Phaseolus vulgaris*) | Cabaça (*Cucurbita* sp.) | Pumpkin (*Cucurbita* sp.) L.)

A Collection of indigenous and resilient varieties in Lohamue (Namibe 2023) Angola

all of which will be increasingly putting enormous pressures on the stressed food system and on maintenance of plant biodiversity, on which the very same food system relies.

Effects of climate change have undoubted capacity to affect food production systems for the crops that are main sources of food like maize due to increased disease outbreaks. (FAO, 2020). The results of this are reduced food availability and access at national and individual levels, respectively. This is especially so in the SADC region where a crop like maize is a staple in many countries. As discussed earlier, food production systems in the SADC region must build more resilience against the effects of climate change by prioritising increased diversity in the production systems. Increasing diversity within production systems will help spread risks that can be created by individual crop failures. This can be done in many ways, one of which is by increasing the use of materials that are themselves genetically diverse (FAO, 2015). The plant genetic resources for food and agriculture conserved in genebanks across the SADC region provides a strong foundation for increasing the diversity needed for building resilience in regional food production systems. This is possible because the materials in genebanks have inherent characteristics that could be useful when breeding for tolerance to the effects of climate change.

SADC appreciates the importance of biodiversity in its various forms to sustain people's livelihoods and works with Member States to ensure biodiversity conservation and its sustainable utilization. This led to the creation of the SADC Plant Genetic Resources Centre (SPGRC) as a Unit under the Food, Agriculture and Natural Resources (FANR) Directorate of the SADC Secretariat. The SPGRC works with national plant genetic resources centres (NPGRCs) in each of the SADC Member States to coordinate the conservation, documentation and promote the utilisation plant genetic resources for food and agriculture (PGRFA) in the region. Through collaboration genebanks in the SADC region hold a total of 63,000 diverse plant genetic resources for food and agriculture. Of these, 18600 materials are duplicated by Member States at the SPGRC regional genebank in Lusaka, Zambia for long term storage.

The inherent properties in the conserved diverse genetic resources in the region, which have been exposed to environmental stress in their habitat, presents an opportunity which must be taken advantage off to breed crops that can tolerate effects of climate change and ensure food security needs for the present and future are met. Promotion of utilisation of the conserved genetic resources is therefore critical in the region. However, despite the existence of diverse crops and their varieties, only seven crops (rice, wheat, sugarcane, maize, soyabean, potatoes and sugarbeet) account for about 55 percent of the energy intake of the world's population (FAO, 2017), narrowing the diversity the current situation demands and consequently presenting a threat to human food needs in the future, as focus on few crops may result in the loss of biodiversity of and reduced resilience of food systems to effects of climate change.

To achieve maximum benefit from the conserved PGRFA, the SADC region must ensure that: - conservation, characterisation and documentation efforts are enhanced with materials duplicated to regional genebank at the SPGRC. This will maintain and safeguard the genetic diversity of materials needed to de-risk food production systems from effects of climate change and support livelihoods. Winge (2016) discusses that changes in climate are affecting and will continue to affect crop genetic resources and crop genetic diversity. Hence the more reason for the region to maintain biodiversity. This is affirmed by Nnadozie (2023) who correctly deliberates that **we live biodiversity, we eat biodiversity, and we are biodiversity. Without it, our world would be lifeless**. The food production systems must always therefore endeavour to tap into more genetic resources variability that may help build resilience to the effects of climate change. This view is also supported by the FAO (2020) who affirmed that the genetic material in each variety of species is unique, precious, ensures agricultural biodiversity and gives different species the ability to cope with changes, whether it be climate change, new pests and diseases, drought and even flooding. A lot of deliberate actions will therefore need to be taken to ensure the potential of plant genetic resources is tapped into to improve the resilience of the food production systems.

In conclusion, without biodiversity, there is no food security.

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