PHOTO: NEIL PALMER

Strengthening Crop Diversity and Resilience through Germplasm User Groups in Zambia

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Introduction

Zambia's smallholder farmers face mounting challenges from climate variability, land degradation, and limited access to diverse crop varieties. Despite the presence of the Zambia National Plant Genetic Resources Centre (NPGRC) (Box 1) and its extensive genebank, awareness and use of conserved germplasm have remained low. To address this, the Seeds for Resilience initiative (Box 2) established germplasm user groups (GUGs) (Box 3) in agro-ecological regions I and II to promote on-farm trials, enhance farmer knowledge, and increase access to resilient crop varieties. This brief examines the impact of GUGs on smallholder farming practices, comparing outcomes for participating and non-participating farmers.

SUMMARY

Germplasm user groups (GUGs) in Zambia have improved smallholder access to diverse, climate-resilient crops through partnerships with the national genebank. A study of 265 farmers found GUG members adopted more resilient varieties, used sustainable practices, and accessed better training and seed networks. Most received genebank seed directly. While market and accessibility challenges remain, GUGs have enhanced farm resilience and awareness of genebank resources.

Methodology

This impact assessment draws on a sample of 265 farmers in four districts across Zambia's agro-ecological regions I and II: Kazungula, Chirundu, Rufunsa, and Lundazi. Quantitative surveys and qualitative interviews were used to compare GUG participants and non-participants (non-GUGs) in terms of crop diversity, agricultural practices, resilience and access to genebank resources. Statistical methods included ANOVA and chi-square tests to assess differences across groups.

BOX 1 Zambia National Plant Genetic Resources Centre (NPGRC)

The Zambia National Plant Genetic Resources Centre (NPGRC), established in 1989 under the Zambia Agricultural Research Institute (ZARI), is dedicated to conserving the nation's plant genetic diversity. Located at Mount Makulu Research Centre near Lusaka, it maintains over 6,500 accessions of crops like sorghum, millet, cowpea, and cassava. NPGRC collaborates with farmers, researchers, and international partners to promote sustainable agriculture and food security. Through initiatives like Seeds for Resilience, it enhances germplasm conservation, supports community seed banks, and contributes to global efforts by duplicating collections at the Svalbard Global Seed Vault.

PHOTO: NEIL PALMER/CROP TRUST

BOX 2 About Seeds for Resilience

The Seeds for Resilience project, led by the Crop Trust since 2019, works to strengthen national genebanks in Ethiopia, Ghana, Kenya, Nigeria and Zambia. These genebanks conserve the crop diversity that is essential for developing climate-resilient, nutritious and productive crops. A key feature of the project is its collaboration with farmers, who evaluate and select varieties best suited to local needs. This farmer engagement helps prioritize seeds that are most useful for improving food security. By enhancing genebank operations and connecting them with farming communities, the project supports agricultural resilience across Africa. The goal is to make a wider range of climate-resilient seeds available to farmers, supporting sustainable agriculture and benefiting those most affected by climate challenges, particularly women, who play key roles in African farming systems.

Key Findings

Crop Diversity and Adoption of Resilient Varieties

GUG participants showed significantly higher engagement in cultivating diverse and resilient crops such as sorghum, millet, Bambara groundnut, and cassava—priority crops identified by NPGRC for food and nutrition security. Nearly 86% of GUG members had received seeds directly from the genebank, compared to less than 1% of non-GUGs (Table 1). This access translated into greater crop diversification and improved perceptions of farm resilience.

Fertilizer and Pesticide Use

GUG farmers were more likely to use both organic and inorganic fertilizers (49% vs. 34%) and organic or mixed pesticide regimes. These practices reflect increased awareness of sustainable agriculture, likely influenced by training and peer learning within the GUG framework.

Farm Management Training and Information Sources

A majority (91%) of GUG members received farm management training, compared to 67% of non-GUGs. Extension agents were the most cited source of agricultural information among GUG farmers, indicating the effectiveness of integrating extension services with genebank outreach.

Access to Credit and Financial Services

GUG participants had slightly higher access to microfinance and cooperative-based credit. While overall credit use remains low, GUG membership appears to facilitate better access to financial resources for agricultural investment.

Community Participation and Seed Networks

GUG farmers reported greater membership in crop producer associations (63% vs. 28%) and familiarity with community seedbanks. While genebank visits remain rare across both groups, GUG members reported more frequent interaction with seed distribution and community-based conservation initiatives.

Perceptions of Genebank Utility and Impact

GUG members exhibited greater knowledge of what a genebank is and higher satisfaction with seed quality. They were more optimistic about future crop diversity in their communities, often citing improved access to seed and knowledge as reasons for this outlook.

Table 1. Farmers' perceptions and attitudes towards genebanks and agricultural practices

	GUG	Non-GUG
Have you received seeds directly from the genebank?		
No	14.3%	99.4%
Yes	85.7%	0.6%
Difficulty in accessing seeds from the genebank		
Difficult	14.3%	99.4%
Easy	5.1%	0.6%
Extremely difficult	44.9%	0.0%
Extremely easy	1.0%	0.0%
Moderate	26.5%	0.0%
Satisfaction with the quality of seeds from the genbank		
Dissatisfied	14.3%	99.4%
Extremely dissatisfied	1.0%	0.0%
Extremely satisfied	1.0%	0.0%
Neutral	34.7%	0.0%
Satisfied	37.8%	0.6%
Perception of changes in crop diversity in the past five years		
Don't know	2.0%	9.6%
Increased	41.8%	27.5%
Reduced	43.9%	26.3%
Same	12.2%	36.5%
Future crop diversity expectations		
Don't know	5.1%	5.4%
Increased	54.1%	35.9%
Reduced	30.6%	25.1%
Same	10.2%	33.5%

BOX 3 Germplasm User Groups

Germplasm user groups (GUGs) are locally organized farmer collectives designed to foster collaboration, knowledge sharing and access to crop diversity in partnership with national genebanks. Developed with support from the Seeds for Resilience project, GUGs facilitate mutual learning and seed exchange tailored to local contexts. Their flexible structure allows adaptation to diverse social and agroecological conditions, making them effective conduits between genebanks and smallholder farming communities.

BOX 4 The Genebank Impacts Fellowship | Natasha Mwansa

It has been an incredibly eye-opening journey to have been a national fellow on the Seeds for Resilience project. One important lesson I learnt was the significance of engaging farmers directly in varietal evaluation. In all four districts, farmers actively assessed varieties based on traits important to their local conditions such as maturity period, taste and yield potential.

An important takeaway was the rich indigenous knowledge on the forgotten and almost extinct crop varieties that once existed in the particular villages surveyed. At the end of the survey, I realized the need for a more robust linkage between the Zambian national genebank and the other arms under the Ministry of Agriculture. Furthermore, feedback from farmers must be considered when enforcing new agriculture policies in order to adopt farmer-preferred varieties at an affordable price.

This project has potential to open more opportunities for deeper collaborations between the genebank and

policy makers which is essential for Zambia to achieve its National Development and Sustainability Agenda which then feed into the 2063 Agenda. Being part of the Seeds for Resilience project as a fellow has deepened my appreciation for community engagement.

This experience has shaped my professional vision which resonates to supporting climate-resilient and inclusive agricultural development in Africa.

Implications for Policy and Practice

Expand GUG Coverage

The positive impacts observed among GUG members underscore the importance of scaling this model to new regions. Priority should be given to underserved communities in agro-ecological zones III and beyond.

Strengthen Extension-Genebank Collaboration

Extension agents played a pivotal role in GUG success. Formalizing partnerships between the Ministry of Agriculture and NPGRC for joint extension services can enhance outreach, training and seed distribution.

Photo 1. Women GUG members at the Mwachilele camp in Rufunsa

Photo 2. Farmer group discussion at Kaitinde camp in Lundazi

Support Market Development for Traditional Crops

Farmers remain hesitant to adopt some resilient varieties due to limited market demand. Targeted efforts are needed to link GUG outputs to buyers, cooperatives, and institutional markets (e.g. school feeding programs).

Incentivize Local Seed Multiplication

Community seed banks and local multipliers should be supported with grants, training, and infrastructure to scale access to genebank material.

Improve Genebank Accessibility

While awareness of the genebank improved among GUG farmers, physical access remains limited. Satellite seed distribution points or mobile seed banks could enhance reach.

Institutionalize Monitoring and Learning

Establishing a full system that includes farmer feedback and tracks seed performance can help refine GUG operations and genebank responsiveness.

Conclusion

Germplasm user groups in Zambia have demonstrated measurable benefits in terms of promoting crop diversity, sustainable farming practices, and resilience to climate shocks. While challenges remain—particularly in scaling access, addressing market barriers, and integrating support services—the GUG model offers a replicable pathway for harnessing genebank resources in service of smallholder livelihoods and national food security.

Additional details can be found in the overview paper: Heaton et al., 2025

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