



Feed the Future Tanzania Kilimo Tija Activity

Technical Bulletin: Hybrid Seeds and Improved Varieties

INTRODUCTION

Agriculture is a vital sector and main source of livelihood for a majority of Tanzanians. Over 70 percent of the population depends on smallholder farming for food and income generation. However, low productivity due to reliance on traditional farming practices, poor soil fertility, and pests and diseases remain major challenges. Transitioning to high-quality seeds, particularly hybrid and improved varieties, has the potential to dramatically elevate yields, fortify resistance against pests and diseases, and enrich nutritional content. Furthermore, these advanced seed varieties equip farmers with the means to adeptly respond to evolving environmental scenarios like droughts, floods, and rising temperatures.

This technical bulletin provides guidelines on the effective use of hybrid and improved seeds for key crops grown by smallholder farmers in Tanzania. The content covers seed classifications, their inherent advantages, concerns about their use, recommended practices for maximum productivity, and sources of quality seeds.



Figure 1: A farmer in Unguja holds up onion grown from Balton Tanzania's Neptune F1 improved seed variety.

TYPES OF SEEDS

There are three main types of seed used in Tanzania:

1. **Local varieties** – These are traditional seeds selected and saved by farmers over generations. They are well adapted to local climate and growing conditions but have low yield potential and are susceptible to pests and diseases.
2. **Improved seeds** – Are seeds developed through selective breeding or genetic modifications to enhance specific desired traits such as yield potential, nutritional value, or resistance to environmental and biological stressors. Examples of improved seed are tomato varieties like Tengeru 97 and Tanya, cabbage hybrids like Glory of Enkhuizen and Copenhagen Market, and others such as Yoro Wonder sweet pepper, Bombay red onion, and Loshuu kale.



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- Hybrid seeds** – Are seeds produced through the controlled pollination of two different parent plants. This is done to combine the best traits of both parents. The offspring, or hybrids, usually demonstrate heightened vigor, greater yields, and enhanced resilience against diseases and pests. Common hybrids used in Tanzania include the following: tomato (Ansali FI, Mkombozi FI, Asila FI, Dhahabu FI, Rafanao FI, Bawito FI, SVTE, Imara FI, Firenze FI); sweet pepper (Indra FI, Candete FI); Chinese cabbage (Kidari FI); cabbage (Tropicana FI, Escasú FI, Chaka FI); cucumber (Darina FI); okra (Crimson spineless, Kijani FI); watermelon (Fahari FI, Kipato, Sukari FI, Sugar queen FI); and onion (Russet FI, Neptune FI).



Figure 2: A farmer in Unguja displays broccoli grown from Balton Tanzania's Green Star FI seed variety.

Photo: Fintrac Global Inc.

BENEFITS OF HYBRIDS AND IMPROVED SEEDS

Hybrid and improved seed varieties have several advantages over traditional seeds:

- **Higher yields** – Improved seed varieties can produce significantly higher yields (~15-25 percent) than traditional varieties, leading to increased profits and food security for farmers.¹
- **Disease/pest resistance** – Improved seeds can be bred to be resistant to pests and diseases such as Tomato Yellow Leaf Curl Virus, Fusarium wilt, and bacterial wilt², which results in reduced need for chemical pesticides.³
- **Superior quality** – Improved seed varieties often produce better quality fruits and vegetables than traditional varieties, resulting in produce more desirable to buyers and consumers and potentially attracting higher market prices.

¹ PMC - NCBI. Farm family effects of adopting improved and hybrid sorghum seed in the Sudan Savanna of West Africa. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5815090/>

² <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/disease-resistant-vegetable-varieties/disease-resistant-tomato-varieties/>

³ MDPI. Open-Pollinated vs. Hybrid Maize Cultivars. <https://www.mdpi.com/2071-1050/3/9/1531>



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- **Efficient input response** – Improved seeds are bred to optimally utilize fertilizers and irrigation compared to local seeds.
- **Improved nutritional content** – Hybrid seeds can be bred to have improved nutritional content, which can benefit both farmers and consumers.⁴
- **Adaptability to different conditions** – Improved seed varieties are often bred to be adaptable to different agro-ecological conditions, such as drought, salinity, or high temperatures. This means that they can be grown in a wider range of areas, giving farmers more options.



Figure 3: A representative from Seed Co. displaying tomato grown in Kilosa from the Mkombozi F1 hybrid seed variety.

Photo: Fintrac Global Inc.

CONCERNS USING HYBRIDS AND IMPROVED SEEDS

There are also some challenges associated with these seed varieties that must be mentioned:

Economic Considerations

- **Higher costs** – Due to the specialized breeding and rigorous testing they undergo, hybrid seeds often carry a heftier price tag compared to traditional seeds. This can pose a financial hurdle for smallholder farmers.⁵
- **Increased dependency** – The production of hybrid seeds is frequently monopolized by large seed corporations. This situation can potentially bind farmers to these firms for recurrent seed procurements, creating a cycle of dependency.⁶
- **Recurring Investments** – Since hybrid seeds are not designed to be saved and replanted for the subsequent season – the next generation may not inherit the favorable traits of the parent

⁴ Frontiers. Genetically engineered crops for sustainably enhanced food production systems.

<https://www.frontiersin.org/articles/10.3389/fpls.2022.1027828>

⁵ FAO, DRK/10/004//01/99. Project: Improved Seed Production for Sustainable Agriculture. [PDF]

<https://www.fao.org/3/az465e/az465e.pdf>

⁶ New African Magazine. Sustainable hybrid seed sector key to Africa's Green Revolution.

<https://newafricanmagazine.com/17746/>



plant – farmers find themselves in a loop of purchasing fresh seeds each season, escalating operational costs.

Ecological and Biological Factors

- **Diminished genetic diversity** – Hybrid seeds result from the crossing of two distinct plant varieties, inherently limiting their genetic diversity in contrast to open-pollinated seeds. Such limitation might enhance their vulnerability to diseases and pests.
- **Flavor Trade-offs** – An often-cited critique is that hybrid produce might compromise flavor. Since the breeding focus leans heavily towards attributes like yield and disease resistance, flavor sometimes takes a backseat, leading to potentially less palatable produce.

Cultural Implications

- **Heritage Concerns** – As newer varieties gain prominence, there's a risk of sidelining or even forgetting heirloom seeds. These traditional seeds often carry cultural, local, and historical significance, which could be overshadowed by the new entrants.

RECOMMENDED PRACTICES FOR MAXIMUM PRODUCTIVITY

To achieve optimal results from hybrids and improved seeds, farmers should follow certain good agronomic practices:

Planting Guidelines

- **Spacing and Density** – Since improved seed varieties usually result in a denser plant population, adhering to recommended spacing is crucial. Proper spacing ensures adequate access to sunlight, moisture, and nutrients.
- **Sowing Depth and Placement** – To ensure uniform and optimal germination, follow the sowing depth and placement guidelines detailed on the seed package. Too deep or too shallow planting can affect germination and seedling establishment.

Nutrient Management

- **Balanced Fertilization** – Provide plants with a balanced diet by combining both organic (like compost or manure) and inorganic fertilizers. Correct dosages prevent nutrient burn and ensure optimal plant growth.
- **Regular Soil Testing** – To understand soil health and nutrient levels, regular soil tests are beneficial. Based on these results, appropriate fertilizer application can be determined.

Water Management

- **Consistent Moisture** – Especially in regions with erratic or insufficient rainfall, it is essential to have a supplementary irrigation system in place. Hybrids and improved varieties might have specific water requirements for optimal growth.

Weed Management

- **Timely Interventions** – Weeds are not only competitors for nutrients but can also harbor pests and diseases. Regular manual weeding or judicious use of herbicides can ensure crops are not outcompeted.

Pest and Disease Management

- **Regular Monitoring** – Conduct regular checks on the crop for signs of pests or diseases. Early detection often results in easier management.
- **Integrated Pest Management (IPM)** – Consider an IPM approach, combining cultural, biological, and chemical measures to effectively manage pests and diseases while minimizing environmental impacts.



Biodiversity Maintenance

- **Varied Planting** – Even when maximizing the use of hybrid or improved varieties, maintaining plots with traditional varieties is strategically important. This not only acts as a buffer in case of disease outbreaks but also helps in preserving biodiversity.

Seed Storage

- **Optimal Conditions** – Preserve the vitality of seeds by storing them in conditions that are cool and dry. Proper storage ensures good germination rates and reduces the risk of diseases.

SOURCES OF QUALITY SEEDS

Farmers can access certified and hybrid seeds from:

1. Local Agro-dealers and Seed Companies

- **Specialized Seed Companies** – Businesses such as the East African Seed Company and Suba Agro specialize in providing quality certified seeds for strong performance.
- **Advantages** – Established companies guarantee seeds that have been thoroughly tested and proven in local conditions and provide training and agronomic support.

2. Agricultural Research Institutes

- **Research-based Varieties** – Agricultural Research Institutes including the Selian Agricultural Research Institute, AVRDC Hort Tengere, Uyole, Makutupora, Kibaha, and Ukilugulu Institutes, conduct rigorous research and development to produce seed varieties tailored to Tanzanian climates and soils.
- **Advantages** – Seeds from these institutes are a result of scientific research, ensuring they are adapted to local challenges such as drought or disease resistance.

3. Farmer Cooperatives and Associations

- **Community-based Approach** – Many farmer cooperatives and groups are involved in seed production and marketing. They often produce and sell seeds that have been selected for local conditions.
- **Advantages** – These seeds are typically more affordable and accessible, with the added benefit of supporting local farming communities.

4. Non-Governmental Organizations (NGOs)

- **Supporting Seed Initiatives** – In addition to the Kilimo Tija Activity, various local and international NGOs and programs focus on agricultural support and often run seed distribution or subsidization programs to enhance food security.
- **Advantages** – NGOs may provide seeds at subsidized costs or even for free, especially in regions affected by food insecurity or following natural disasters.

5. Governmental Support

- **Public-Private Partnerships (PPP)** – The Tanzanian government often collaborates with private entities to enhance seed accessibility, ensuring farmers get quality seeds at affordable prices.
- **Seed Fairs** – Organized by government agencies, these events allow farmers to access a variety of seeds and learn about new farming technologies and practices.

CONCLUSION

The adoption of hybrid and improved crop variety seeds is a proven transformative, cost-effective approach to increase productivity for Tanzanian smallholder farmers. Leveraging the genetic advantages of these seeds, when combined with implementing good agronomic practices, has the potential to markedly amplify yields. This not only elevates food security but also boosts the economic well-being of farming communities that adopt these techniques.