Report on High-Value Overlooked Agricultural Value Chains in Tanzania

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Executive Summary

This report identifies and analyzes significant, yet historically overlooked, agricultural value chains in Tanzania, commencing with a comprehensive examination of the wheat sector. Following this, the report provides an in-depth analysis of five prioritized Neglected and Underutilized Species (NUS): Moringa (*Moringa oleifera*), Orange-Fleshed Sweet Potato (OFSP) (*Ipomoea batatas*), Finger Millet (*Eleusine coracana*), Bambara Groundnut (*Vigna subterranea*), and Jute Mallow (*Corchorus olitorius*, locally known as Mlenda). The analysis for each commodity encompasses local markets, with a focus on Dar es Salaam, regional markets within East Africa, and the global market landscape.

Key findings for the **wheat value chain** underscore a substantial domestic production deficit, with Tanzania importing approximately 90% of its annual wheat requirement of around 1 million tons.¹ This reliance on imports incurs a significant bill, estimated at USD 221 million annually.¹ The Tanzanian government has initiated robust measures aimed at boosting self-sufficiency, including earmarking 400,000 hectares for wheat cultivation and mandating that millers source a significant portion of their wheat locally.² Opportunities within the wheat sector are identified in the development of specialty wheat varieties suited to local conditions, extensive value-added processing beyond basic flour milling, and the largely untapped potential of by-product utilization, particularly wheat bran and germ for human food applications.

The five prioritized **Neglected and Underutilized Species (NUS)** present immense, yet largely unexploited, potential. These crops are distinguished by their significant nutritional benefits, inherent climate resilience, and growing demand within niche markets, both domestically and internationally.⁴ However, the development of their respective value chains is currently constrained by several common factors. These include limited public and consumer awareness of their benefits and uses, insufficient investment in research and development tailored to local conditions, fragmented market linkages, and inadequate processing capabilities and infrastructure.⁴

This report emphasizes that unlocking the full potential of both the wheat value chain (particularly its diversification aspects) and the prioritized NUS value chains necessitates a multi-pronged approach. This includes targeted investments in

agricultural research and development, the establishment of supportive and coherent policy frameworks, the enhancement of market infrastructure and information systems, and the fostering of robust public-private partnerships. The "overlooked" status of these crops is not merely an absence of attention but is often rooted in historical agricultural policies that favored staple monocultures, leading to fragmented value chains and insufficient market development efforts for these alternative crops.⁴ Addressing this requires a fundamental shift in agricultural investment priorities and policy direction towards greater diversification, recognizing the profound nutritional and climate resilience benefits these overlooked value chains offer.

High-level recommendations derived from this analysis include strategic policy support specifically for NUS development, substantial investment in breeding climate-resilient varieties and appropriate processing technologies for both wheat and NUS, the development and enforcement of quality standards and certification systems to enhance market access, and dedicated initiatives to improve market linkages and raise consumer awareness for products derived from these high-potential value chains.

I. Introduction: Unlocking Tanzania's Agricultural Potential Beyond the Conventional

Tanzania's agricultural sector is a cornerstone of its economy, contributing significantly to the Gross Domestic Product (GDP) – nearly 30% – and providing employment for approximately three-quarters of the nation's workforce.³ The sector is characterized by a diverse production base, encompassing livestock, staple food crops, and a variety of traditional cash crops. Despite this diversity and its critical economic role, productivity within the sector remains relatively low, with progress in modernization and yield enhancement being modest over recent decades.³ Smallholder farmers, largely dependent on rain-fed agriculture, dominate the production landscape, facing considerable challenges in accessing technology, finance, and stable markets.

In this context, the imperative for agricultural diversification becomes increasingly critical. Moving beyond a heavy reliance on a few traditional cash and staple crops is essential for enhancing national and household food security, improving nutritional outcomes, boosting farmer incomes, and building greater resilience to climate change.⁷ This strategic shift aligns with a growing global consumer demand for a wider array of diverse and nutritious food products. The development of robust value chains for such products offers a pathway for smallholder farmers to transition from

subsistence to more commercially oriented agriculture, thereby improving livelihoods.⁷

The term "high-value" in the Tanzanian agricultural context, as explored in this report, extends beyond mere farm-gate or market price. It encompasses a broader spectrum of attributes, including significant nutritional contributions (e.g., micronutrient density), substantial export potential or import substitution capacity, inherent climate resilience (such as drought or heat tolerance), and positive socio-economic impacts, including the empowerment of women and the creation of employment opportunities for youth.

Concurrently, "overlooked" agricultural value chains refer to those crops, or specific segments within a value chain, that have not received research investment, policy support, or market development attention commensurate with their inherent potential.⁹ This category frequently includes a diverse group of Neglected and Underutilized Species (NUS), which are often well-adapted to local agro-ecological conditions and possess significant nutritional or market attributes but have been marginalized by a historical focus on major commodity crops. The current structure of Tanzania's agricultural support systems—spanning research, extension services, and financial mechanisms—may inadvertently perpetuate this "overlooked" status by continuing to prioritize traditional staples. This suggests that a conscious policy shift and a strategic reallocation of resources towards these overlooked value chains are necessary to realize their full potential, which in turn necessitates a re-evaluation of national agricultural priorities.

The purpose of this report is to provide an expert-level analysis of selected overlooked, yet high-value, agricultural opportunities in Tanzania. The investigation begins with a detailed examination of the wheat value chain, a commodity of national strategic importance due to high import dependency. Subsequently, the report delves into five prioritized NUS: Moringa, Orange-Fleshed Sweet Potato (OFSP), Finger Millet, Bambara Groundnut, and Jute Mallow (Mlenda). For each commodity, the analysis includes an assessment of markets at the local (Dar es Salaam), regional (East Africa), and global levels, aiming to identify constraints and opportunities for sustainable development and investment.

II. The Wheat Value Chain in Tanzania: Addressing Deficits and Exploring Opportunities

A. Current Status: Production, Consumption, and Trade Dynamics

Globally, wheat (*Triticum aestivum L*.) is a leading cereal crop, with production demonstrating a steady upward trend over the past two decades to meet expanding

worldwide demand.¹⁰ In 2022, global wheat production reached 808 million tonnes, with Asia, particularly China and India, accounting for a significant share.¹⁰ Africa, as a continent, is heavily reliant on wheat imports, which constitute approximately 67% of its total cereal imports.¹²

Within this global and regional context, Tanzania's wheat sector faces a significant structural deficit. The annual national demand for wheat, for both domestic and industrial use, is estimated at approximately 1,000,000 tons.¹ However, local production consistently falls short, typically yielding less than 100,000 tons annually. This creates a substantial gap of over 90%, which is met through imports.¹ Wheat is the fourth most consumed staple in Tanzania, following maize, cassava, and rice. Urban and peri-urban areas are the primary consumption hubs, accounting for an estimated 80% of the country's total wheat consumption.² Wheat production is geographically concentrated, with over 90% originating from the Northern Highlands (Arusha and Kilimanjaro regions, predominantly large-scale farms) and the Southern Highlands (Iringa, Mbeya, and Rukwa regions, mainly small-scale farms).²

Recognizing the economic and food security implications of this deficit, the Government of Tanzania has demonstrated a strong commitment to transforming the wheat sector. Key objectives include increasing domestic production to meet consumption requirements, achieving self-reliance in wheat seed production, and significantly reducing the substantial wheat import bill, which stands at around USD 221 million annually.¹ Strategic government initiatives are underway to achieve these goals. These include plans to expand the area under wheat cultivation to 400,000 hectares.² Significant investment is being channeled into research and development through the Tanzania Agricultural Research Institute (TARI), which has been allocated over USD 66 million to develop improved wheat varieties and enhance domestic seed production.² Farmers are also benefiting from subsidized improved wheat seeds.² Furthermore, there are plans to establish new wheat processing factories in key regions such as Dar es Salaam, Mbeya, and Mwanza to bolster value addition capabilities.¹³ A pivotal component of the government's strategy is a directive requiring large-scale wheat millers and other major wheat buyers to source 60% of their wheat requirements from local producers, often at a premium price, starting from the 2021/22 season.³ This local sourcing mandate is intended to create a guaranteed market for domestic wheat farmers, thereby stimulating production. However, the success of this policy hinges on local wheat being competitive in terms of price and quality compared to imports. If locally produced wheat is significantly more expensive or of inconsistent quality, it could lead to increased input costs for millers, potentially affecting consumer flour prices or squeezing millers' profit margins. The

government-miller agreement in 2021 set a minimum price of USD 0.34 per kilogram for raw wheat, a figure that needs continuous assessment against import parity prices.²

Tanzania's heavy reliance on imports means it currently sources approximately 90% of its wheat from international markets.² In the 2021/2022 marketing year, wheat imports reached 1.23 million tons.² Key supplying nations include Russia, which regularly supplies over half of Tanzania's wheat, Argentina, Poland, Latvia, the United States, Ukraine, Canada, and Australia.² Projections indicate that wheat imports are likely to continue rising in the short to medium term, driven by factors such as a low domestic corn supply, increasing household incomes, ongoing dietary shifts towards wheat-based products, and growth in the tourism sector.¹⁶ This sustained and growing underlying demand, fueled by urbanization and rising incomes ², further underscores the economic rationale for bolstering local production capacity.

In terms of exports, Tanzania is not a significant player in the global wheat market, exporting only 1,000 tons in 2021.² More recent data for 2023 shows wheat exports at 1,600 tons, a notable decrease from 4,000 tons in 2022. These limited exports are primarily directed towards regional markets, notably Uganda and Ethiopia.¹⁵

| Metric | Value (Approx.) | Year(s) | Source(s) |
|--------------------|---|---------------|-----------|
| Annual Demand | 1,000,000 tons | Recent | 1 |
| Local Production | <100,000 tons (e.g., 65,000 tons est. for 2022) | Recent / 2022 | 1 |
| Production Deficit | >90% | Recent | 1 |
| Import Volume | 1,230,000 tons | 2021/2022 | 2 |
| | 1,400,000 tons | 2023 | 15 |
| Import Value | USD 221 million (annual bill) | Recent | 1 |

Table 1: Tanzania Wheat Sector Overview (Estimates and Targets)

| | USD 462 million | 2023 | 15 |
|----------------------------------|---|------------|----|
| Key Import Sources | Russia, Argentina, Poland, Latvia, USA, Ukraine, Canada, Australia | 2020-2023 | 2 |
| Export Volume | 1,000 tons | 2021 | 2 |
| | 1,600 tons | 2023 | 15 |
| Key Export Destinations | Uganda, Ethiopia | 2023 | 15 |
| Gov. Cultivation Target | 400,000 hectares | by 2025 | 2 |
| Gov. Production Target | 1,000,000 tons | by 2025 | 13 |
| Projected Imports (MY2025/26) | Increase by 15.4% | MY 2025/26 | 16 |

Note: Data is compiled from various sources and years; "Recent" indicates generally current estimates. MY = Marketing Year.

B. Market Analysis for Tanzanian Wheat

Local Market (Dar es Salaam)

Dar es Salaam, as Tanzania's largest urban center and commercial hub, represents the most significant local market for wheat and wheat-based products. Urban households are the primary drivers of wheat consumption, accounting for an estimated 80% of the national total.² This demand is further augmented by the growing tourism industry ¹⁶ and a general shift in dietary preferences associated with urbanization and rising incomes.²

A diverse range of wheat-based products is popular among consumers in Dar es Salaam. These include staple items like bread (various types), chapatis, and mandazi, as well as processed foods such as pasta, biscuits, breakfast cereals, cakes, and doughnuts.³ Bakeries play a crucial role in meeting this demand. Establishments such as Baker's Paradise offer freshly made white, brown, and wholewheat bread, alongside custom cakes and pastries.¹⁷ Royal Bakers, another key player, provides a wide array of products including various bread types, rolls, muffins, cakes, croissants, cookies, and mandazi, catering to the lake region as well as having a presence indicative of broader urban demand patterns.¹⁸

The wheat milling industry in Tanzania is dominated by a few large players, with significant operations centered in Dar es Salaam. Said Salim Bakhresa & Company Limited (SSB), part of the Bakhresa Group, is a leading miller with its flagship 'Azam' wheat flour brand being highly popular.¹⁹ SSB boasts a substantial wheat milling capacity of 4,370 tonnes per day in Tanzania alone (across its mills in Buguruni, Mzizima, Kipawa, and Zanzibar) and a total wheat grain storage capacity of 220,000 tonnes. The company also exports flour and by-products to regional markets including Kenya and the Democratic Republic of Congo (DRC), as well as to the Middle East and Vietnam.¹⁹ Another major miller is the MeTL Group, through its subsidiary 21st Century Food and Packaging Limited. This entity has a wheat milling capacity of 1,250 metric tons per day and produces popular brands like 'Mo Safi'. MeTL Group also exports wheat by-products such as bran and pollard, primarily for animal feed, to international markets, including the Middle East.²⁰ These large millers are pivotal to the government's strategy of increasing local wheat sourcing.² The concentration of milling capacity within a few large firms, while potentially facilitating coordinated efforts like local sourcing, may also create power imbalances in the value chain. Smallholder farmers could face limited pricing power unless robust farmer organizations or transparent direct contracting mechanisms are established to ensure fair terms. This mirrors concerns observed in Ethiopia's value chain where traders and processors often hold more power than smallholders.²¹

Pricing dynamics in the Tanzanian wheat market are influenced by both local and international factors. In 2021, an agreement between the government and large-scale millers established a minimum price of USD 0.34 per kilogram for locally sourced raw wheat.² On the import side, the average Cost, Insurance, and Freight (CIF) price for wheat imports into Tanzania was USD 338 per ton in 2023, a significant decrease from USD 417 per ton in 2022.¹⁵ Domestic wholesale prices for wheat in Dar es Salaam can fluctuate; however, specific recent wholesale wheat price data for Dar es Salaam was not readily available in the provided materials, with some data points appearing to refer to maize or rice.¹⁶

Regional Market (East Africa)

The East African region, as a whole, is a net importer of wheat, with consumption driven by similar factors as in Tanzania: population growth, urbanization, and evolving

dietary preferences.¹² Countries such as Ethiopia, Kenya, and Uganda are significant wheat consumers within the region.²² Tanzania's role as an exporter to the region is currently limited, with small quantities of wheat and wheat flour primarily going to Uganda, Ethiopia, Kenya, and the DRC.¹⁵

The competitive landscape in East Africa is shaped by large global wheat exporters (e.g., Russia, EU countries) who can often supply at competitive prices. There is also potential for intra-regional competition if countries like Ethiopia, which possesses significant agricultural potential, succeed in substantially boosting their domestic wheat production.²³ Quality and price are the paramount competitive factors in the regional wheat trade.

Global Market

For Tanzanian wheat, accessing the global market for bulk commodity wheat presents considerable challenges due to competition from established, large-scale, and highly efficient wheat-exporting nations. However, niche opportunities may exist if Tanzania can develop and promote specialty wheat varieties. There is a growing global demand for organic wheat, ancient grains, heirloom varieties, and wheat with specific quality attributes catering to artisanal baking and health-conscious consumers.²⁴ For instance, Hard White (HW) wheat is valued for its ability to produce whiter flour and achieve higher extraction rates, and is often grown under contract to ensure specific quality standards are met.²⁷ Spring wheat varieties are also globally popular among farmers due to their shorter growing seasons.²⁸ If Tanzania can cultivate such specialized wheats that meet international quality and certification standards, it could tap into these higher-value global market segments.

| Table 2: Wł | heat Product | Market in | Dar es | Salaam |
|-------------|--------------|-----------|--------|--------|
|-------------|--------------|-----------|--------|--------|

| Category | Details | Source(s) |
|---------------------------------|--|-----------|
| Popular Wheat-Based Products | Bread (white, brown, wholewheat), chapatis, mandazi, pasta, biscuits, breakfast cereals, cakes, doughnuts, cookies | 3 |
| Key Consumer Segments | Urban households (80% of national consumption), tourists, institutions | 2 |

| Major Millers & Brands | Said Salim Bakhresa & Co Ltd (Azam brand), 21st Century Food and Packaging Ltd (MeTL Group - Mo Safi, Mo Poa brands) | 19 |
|------------------------|---|----|
| Major Bakeries | Baker's Paradise, Royal Bakers (examples of local bakeries offering diverse products) | 17 |
| Indicative Prices | Minimum local raw wheat price (2021): USD 0.34/kg. ² Import wheat price (CIF 2023): USD 338/ton. ¹⁵ Retail product prices vary. | 2 |

C. Value Addition and Diversification Opportunities in Wheat

Beyond addressing the domestic deficit in basic wheat supply, significant opportunities exist for Tanzania to enhance the value derived from its wheat sector through diversification into specialty varieties, artisanal and health-focused products, and, crucially, the often-overlooked stream of by-product utilization.

Specialty Wheat Varieties

Tanzania's diverse agroecological zones offer the potential to cultivate a range of wheat types beyond standard commodity wheat.²³ A strategic focus on developing and promoting wheat varieties with specific desirable traits could unlock niche markets. Critical traits include drought resistance, given the reliance on rain-fed agriculture in many producing areas³, and high gluten protein content, which is essential for quality baking applications.² There is also untapped potential in identifying and characterizing local wheat landraces that may possess unique quality attributes or resilience traits.²⁹ The global market shows increasing interest in specialty wheats for artisanal baking and for health-conscious consumers who seek out specific nutritional profiles or production methods (e.g., organic).²⁴ For example, Hard White wheat is favored for its lighter bran color, leading to whiter flour and higher extraction rates, and is often cultivated under contract to meet stringent quality standards.²⁷ Spring wheat varieties are also in demand globally due to their shorter growth cycles.²⁸ The research and development efforts of TARI are pivotal in this area, with a mandate to develop improved wheat varieties suitable for Tanzanian conditions.² Complementing these national efforts, the International Maize and Wheat Improvement Center (CIMMYT) is actively involved in an East African wheat breeding

pipeline aimed at developing high-yield, disease-resistant, and climate-resilient wheat varieties for the region.³² Investment in R&D for local wheat varieties adapted to Tanzanian conditions and possessing specific niche quality traits is a fundamental prerequisite for developing a competitive specialty wheat sector. Without suitable and differentiated raw material, the scope for artisanal and health-focused product development will remain limited.

Artisanal and Health-Focused Products

The global artisanal bakery market is experiencing robust growth, valued at USD 95.13 billion in 2022 and projected to grow at a Compound Annual Growth Rate (CAGR) of 5.7%.³³ This expansion is driven by consumer demand for authentic, high-quality, and healthier bakery products, including those made from whole grains, organic ingredients, and without preservatives.³³ Specialty flours, such as those from ancient grains or heirloom wheat varieties, are also gaining traction among artisan bakers and health-aware consumers.²⁵ In Tanzania, particularly in urban centers like Dar es Salaam, rising incomes and increasing urbanization ² are likely to spur demand for premium and differentiated bakery items that go beyond basic bread and offer enhanced taste, nutritional value, or unique characteristics.

By-Product Utilization: An Overlooked High-Value Stream

A significant, and arguably the most overlooked, opportunity within the Tanzanian wheat value chain lies in the underutilization of milling by-products for higher-value human food applications. Wheat milling typically yields 20-25% by-products, primarily wheat bran, wheat germ, and resultant atta (a type of whole wheat flour).³⁴ Currently, the predominant use for these by-products in Tanzania, as in many regions, is for livestock feed; an estimated 90% of wheat by-products globally are used as such.³⁴ Tanzanian millers like the MeTL Group already export wheat bran and pollard for animal feed.²⁰

However, these by-products, particularly wheat bran and germ, are rich sources of dietary fiber, vitamins (E and B-complex), minerals (iron, zinc, magnesium, phosphorus), and various bioactive compounds like ferulic acid and lignans.³⁴ Research and product development initiatives have demonstrated their potential in a variety of value-added human food products. For example, wheat bran can be incorporated to produce high-fiber ice cream cones ³⁴, nutritious cookies ³⁶, bagels, and health bars.³⁹ Defatted wheat germ flour is also recognized as a nutrient-dense ingredient suitable for fortification or inclusion in specialized food products.³⁶ The global trend towards increased consumption of fiber-rich and functional foods aligns

perfectly with the nutritional profile of these wheat by-products.²⁵

Beyond food, wheat straw, an agricultural by-product of wheat harvesting, also offers value-addition potential. It can be processed into biodegradable packaging materials, such as plates and cups, providing an eco-friendly alternative to plastics.³⁵ While less emphasized for wheat in the provided research, cereal straws also have potential in biofuel production.

The economic and environmental benefits of enhanced by-product utilization are substantial. It allows for the creation of new revenue streams from what might otherwise be considered low-value outputs or waste, reduces the environmental burden of waste disposal, and improves overall resource efficiency within the food system.³⁵ Diverting a greater portion of wheat bran and germ towards human food applications represents a significant untapped economic and nutritional opportunity for Tanzania.

| Category | Specific Opportunity | Potential Market(s) | Key Snippet References |
|--------------------------------|--|---------------------|---------------------------|
| Specialty Varieties | Drought-resistant, high-gluten wheat | Local, Regional | 2 |
| | Organic wheat | Local, Export | 26 |
| | Local landraces with unique traits | Niche, Export | 29 |
| | Hard White wheat (for whiter flour, higher extraction) | Niche, Export | 27 |
| Artisanal & Health Products | Whole-grain breads and baked goods | Local, Regional | 25 |
| | Specialty flours (e.g., stone-ground, specific blends) | Local, Niche | 25 |

Table 3: Value Addition Opportunities in Tanzanian Wheat

| | Fortified flours/products (e.g., with bran/germ) | Local | 34 |
|-----------------------------------|---|-----------------|----|
| By-Product Utilization (Food) | Wheat bran for high-fiber cookies, snacks, breakfast cereals | Local, Regional | 34 |
| | Defatted wheat germ flour for nutritional enhancement | Local, Niche | 36 |
| | Resultant Atta for traditional flatbreads | Local | 34 |
| By-Product Utilization (Other) | Wheat bran/pollard for improved animal feed formulations | Local, Regional | 20 |
| | Wheat straw for biodegradable packaging | Local, Niche | 35 |

D. Challenges and Enablers for Wheat Value Chain Development in Tanzania

The development of a robust and self-reliant wheat value chain in Tanzania is a complex undertaking, characterized by a range of challenges that need to be addressed and existing enablers that can be leveraged.

Key Constraints

Several critical constraints impede the growth and efficiency of the Tanzanian wheat value chain:

- Input Supply Systems: A primary challenge is the limited access to, and affordability of, high-quality certified seeds and appropriate fertilizers for many farmers.¹ While the government has subsidy programs, farmers have raised concerns about the quality of some subsidized inputs.¹⁶ To address this, the government aims to significantly scale up certified seed production from a mere 1,058 MT to 200,000 MT and increase fertilizer use from 363,599 T to 1 million MT.¹
- Access to Finance: Smallholder farmers and agricultural SMEs often face

difficulties in accessing credit needed to invest in essential inputs, machinery, and technology.²¹ High interest rates further exacerbate this issue.³ Initiatives like the De-risking Agricultural Finance to Smallholder Farmers (DAFS) project and the Expanding Credit Access to Scale-up the Use of Hermetic Storage in Tanzania (CASH-Tz) program aim to mitigate these financial barriers.⁴⁰

- Technology and Mechanization: The productivity of smallholder farmers is often constrained by reliance on manual labor and traditional farming practices.³ There is a pressing need for increased adoption of irrigation (the government targets an increase in irrigated area from 727,280.6 ha to 1.2 million ha by 2025 ¹), mechanization, and modern agronomic techniques. While extension services promote the adoption of improved technologies such as certified seeds, appropriate fertilizer and pesticide use, row planting, and machinery, uptake can be slow and uneven.¹³
- **Post-Harvest Losses (PHL):** PHL represent a significant drain on the agricultural sector across Sub-Saharan Africa, and grains like wheat are particularly affected.⁴³ Estimates suggest that as much as 37% of food produced in SSA is lost between production and consumption, with grain losses alone valued at USD 4 billion annually for the region.⁴⁵ These losses directly reduce the available domestic supply of wheat, thereby exacerbating import dependency and diminishing farmer profitability. The Tanzanian government has recognized this issue and plans to fund research aimed at mitigating PHL in the wheat sector.¹³ Addressing PHL through improved storage, handling, and primary processing is a critical leverage point for enhancing the entire value chain.
- Policy and Market Access: The policy environment can sometimes present challenges, including sporadic export or import bans that create market uncertainty, and the influence of cooperative unions or crop boards that may hinder free market competition.³ Market access is further constrained by inadequate infrastructure (including transport, storage, and market services), insufficient market information for producers, and high transaction costs.⁵ The need for harmonized quality standards is also apparent to facilitate trade and ensure consumer protection.⁴⁷
- Land Access: The process of acquiring land for agricultural investment can be complex and bureaucratic, potentially deterring large-scale investments.³

Enablers and Government Support

Despite these challenges, several enabling factors and strong government support mechanisms are in place:

• Policy Commitment: The Tanzanian government has articulated a clear agenda

for agricultural transformation through national strategies such as the third National Five-Year Development Plan (FYDP III) and the Agenda 10/30 initiative.¹ A core element of this agenda is the drive to increase domestic wheat production and reduce reliance on imports.²

- Investment in R&D and Inputs: Substantial budgetary allocations have been made to TARI for wheat research and development, coupled with ambitious targets for seed multiplication and distribution.¹ Fertilizer subsidy programs are also operational, although their effectiveness is sometimes questioned by farmers regarding input quality.¹⁶
- Infrastructure Development: The government plans include significant expansion of irrigation infrastructure ¹ and the development of Special Agro-Industrial Processing Zones (SAPZ) and agro-processing hubs, which could benefit the wheat sector by concentrating processing activities and improving logistics.¹³
- Market Interventions: The government has implemented market interventions such as minimum price agreements for locally sourced wheat and mandates for local sourcing by millers.² Efforts to streamline bureaucracy include the initiation of a single-window system for permit and fee processing.²
- **Support Organizations:** A range of local and international organizations are active in supporting Tanzania's agricultural sector. These include Kilimo Trust, which works on inclusive market-led agricultural value chain development ⁵⁰; the Private Agricultural Sector Support (PASS) Trust, involved in de-risking agricultural finance ⁴⁰; and various international development partners such as the African Development Bank (AfDB), the World Bank, and the Food and Agriculture Organization of the United Nations (FAO), which provide financial and technical support to different aspects of the agricultural value chain.¹

While significant government investment and strategic plans are in place ¹, the actual on-the-ground impact on smallholder wheat farmers and the broader value chain will heavily depend on the effective and efficient implementation of support services. This includes ensuring timely access to genuinely improved extension advice, high-quality inputs, and affordable finance. Furthermore, overcoming systemic challenges such as poor rural infrastructure and information asymmetry in markets will be crucial for translating policy ambitions into tangible benefits for farmers and achieving national wheat self-sufficiency goals. This suggests that progress towards Tanzania's wheat self-sufficiency is a long-term endeavor requiring sustained, multi-faceted, and coordinated efforts.

III. High-Value Overlooked Agricultural Value Chains in Tanzania

Beyond the strategic focus on major staples like wheat, Tanzania possesses a wealth of agricultural biodiversity in the form of Neglected and Underutilized Species (NUS). These crops, often deeply embedded in local food cultures and well-adapted to specific agro-ecological niches, have historically been overlooked by mainstream agricultural research, development efforts, and policy frameworks.⁹ However, NUS are increasingly recognized for their potential to diversify food systems, enhance nutritional security, provide income opportunities for smallholder farmers (particularly women), and contribute to climate change adaptation and mitigation.⁷

A. Identifying Promising Neglected and Underutilized Species (NUS)

The "Building Opportunities for Lesser-known Diversity in Edible Resources" (BOLDER) project, an initiative spearheaded by the Global Crop Diversity Trust, is actively working to increase the utilization and inherent value of these opportunity crops, or NUS, within agri-food systems across West and East Africa, including Tanzania.⁴ Through a consultative process involving a diverse range of stakeholders—including representatives from civil society, the private sector, government agencies, and research institutions—the BOLDER project has identified and prioritized five key NUS for focused development in Tanzania.⁴ This participatory approach to selection lends significant credibility to the identified crops, suggesting a convergence of local indigenous knowledge and expert scientific assessment regarding their viability, cultural relevance, and socio-economic importance for the country. Such a focused approach on a manageable portfolio allows for concentrated efforts in research, value chain development, and policy support, which is likely to yield more significant and sustainable impacts than a more diffused strategy attempting to promote a broader range of underutilized species simultaneously.

The five NUS prioritized for Tanzania under the BOLDER initiative are ⁴:

- 1. Moringa (Moringa oleifera)
- 2. Orange-Fleshed Sweet Potato (OFSP) (Ipomoea batatas)
- 3. Finger Millet (Eleusine coracana)
- 4. Bambara Groundnut (Vigna subterranea)
- 5. Jute Mallow (Corchorus olitorius locally known as Mlenda)

The general rationale for the selection of these crops revolves around their established or potential contributions to food and nutrition security, their existing social and cultural linkages within Tanzanian communities, their market and economic potential (both locally and for export), and a clear understanding of the reasons for their current state of neglect or underutilization.⁴ These reasons often include a lack of research, poor market access, and limited processing technologies, all of which this

report aims to explore.

B. Moringa (Moringa oleifera)

Overview

Moringa, often referred to as the "miracle tree," is a fast-growing, drought-resistant tree renowned for its exceptional nutritional and medicinal properties.⁵⁴ Nearly all parts of the plant are useful. The leaves are particularly rich in protein, essential minerals (calcium, iron), vitamins (A, B, C, E), beta-carotene, and a wide array of antioxidants.⁴ Traditionally, moringa leaves are consumed fresh in salads, cooked as a vegetable in local dishes, or dried and powdered for use as a nutritional supplement or food fortificant.⁴ Various parts of the plant also have a long history of use in traditional medicine for treating a range of ailments.⁴

Despite its significant attributes and adaptability to Tanzanian conditions, moringa has been historically underutilized. Key reasons include a lack of comprehensive research and development focused on local varieties and optimal agronomic practices, insufficient documentation and dissemination of best production and post-harvest handling techniques, a lack of specific policy support and advocacy for the crop, limited and often small-scale processing capabilities, unreliable market channels, and inadequate access to credit for farmers and small-scale processors wishing to engage with the moringa value chain.⁴

Value Chain Analysis

The moringa value chain in Tanzania involves several key actors. **Small-scale farmers** are the primary producers, often cultivating moringa in mixed farming systems or home gardens. **Farmer groups and associations**, such as the Tanzania Moringa Association (TAMOA) ⁶³, play a role in organizing producers and advocating for their interests. **Micro and small enterprises (MSMEs)** are increasingly involved in primary processing (drying, powdering) and the manufacturing of value-added products.⁴ Notable processors and vendors include Makai Moringa Enterprise ⁶⁵ and Dhow Nature Foods ⁶⁶, both based in Dar es Salaam. Some enterprises, like Stack General Groups of Companies Limited, are also involved in exporting moringa products.⁶⁷

Current processing activities primarily revolve around drying the leaves to produce **moringa leaf powder**, which is the most common commercial product.⁴ Other products include **moringa oil** (extracted from seeds), whole **seeds**, **capsules** (containing leaf powder), and **tea** (made from dried leaves).⁴ Processing is often carried out at a small scale, using traditional methods like shade drying and manual pounding with mortar and pestle, although some entrepreneurs are adopting

improved techniques.4

Several initiatives aim to add value to the moringa chain. The East African Women in Business Platform (EAWiBP), for example, has provided training to women involved in the moringa value chain across Kenya, Tanzania, and Uganda on critical aspects such as branding, packaging, and quality certification.⁶³ Projects supported by organizations like the African Development Bank aim to promote improved agro-forestry techniques, develop new moringa-based value chains, and enhance market access for producer organizations.⁶¹ There is potential for more sophisticated value addition, such as the commercial extraction of moringa seed oil, which has applications in food, cosmetics, and pharmaceuticals.⁷⁰ Case studies from other African countries, like MoringaConnect in Ghana, demonstrate successful business models that integrate smallholder farmers into sustainable moringa supply chains, providing training, processing facilities, and guaranteed markets.⁷³ In Tanzania, a USAID-funded Feed the Future project implemented by Farm Africa involved mapping moringa MSMEs to better understand their business models and constraints.⁶⁴ The Church World Service (CWS) project at the Nyarugusu refugee camp also promotes moringa cultivation for nutrition and livelihood improvement.⁷⁴

Market Assessment

Local Market (Dar es Salaam): A variety of moringa products are available in Dar es Salaam. For instance, Dhow Nature Foods offers moringa capsules (typically around TZS 20,000), raw moringa leaf powder (e.g., 100g for TZS 6,499), and moringa leaf tea (e.g., 80g for TZS 6,499).⁶⁶ Makai Moringa Enterprise is another Dar es Salaam-based entity known for processing and exporting moringa.⁶⁵ Export price data for moringa seed from Tanzania showed significant volatility, with prices in 2023 at USD 5.69/kg, falling to a range of USD 0.18 to USD 1.30/kg in 2024.⁷⁵ Consumer awareness of moringa's general health benefits is growing, partly due to its "superfood" status globally. However, awareness of specific benefits, quality differentiation among products, and appropriate usage may still be limited among the general populace.⁵⁹

Regional Market (East Africa): There is active regional trade in moringa products. Tanzania exports moringa seeds to neighboring countries like Uganda and Kenya.⁷⁵ The EAWiBP project aims to connect women entrepreneurs in the moringa business across Kenya, Uganda, and Tanzania, fostering regional collaboration and market development.⁶³ A Ugandan moringa business highlighted the strong global demand for the product, which also implies regional market potential.⁷⁶

Global Market: The global market for moringa products is experiencing significant

growth and is projected to expand considerably. Estimates suggest the market could grow from USD 7.08 billion in 2020 to over USD 14.80 billion by 2028.⁷⁷ The Middle East & Africa (MEA) moringa products market alone is expected to reach USD 2.38 billion by 2030, with a CAGR of 9.6%.⁷⁸ Leaf powder is the largest and fastest-growing product segment globally.⁷⁷ Major export destinations for moringa products include the United States, Singapore, and Canada. India is the leading global exporter, followed by countries like Indonesia, Sri Lanka, China, and Nigeria.⁷⁷

Export Requirements and Quality Standards: Accessing lucrative export markets, particularly in Europe and the USA, requires strict adherence to quality standards and certification protocols. The European Union has stringent requirements for moringa products, including mandatory organic certification for many buyers, compliance with Maximum Residue Levels (MRLs) for pesticides and contaminants, adherence to Good Manufacturing Practices (GMP) for food safety, and specific labeling rules.⁸⁰ Key quality parameters typically assessed include appearance (fine powder), color (green, indicating freshness), moisture content (8-10% to prevent mould), particle size, heavy metal content (lead, cadmium, mercury limits), and microbiological activity (total plate count, yeast/mould, absence of Salmonella, E. coli).⁶⁹ Certifications such as USDA Organic, EU Organic, Halal, and Kosher are often necessary or advantageous.⁶⁹ It is important to note that the European Food Safety Authority (EFSA) has raised safety objections regarding Moringa stenopetala leaf powder due to insufficient information on undesirable substances, highlighting the critical need for species-specific safety data and thorough documentation for export.⁸² This underscores a potential challenge for Tanzanian producers: while global demand is high, meeting these rigorous international quality standards and navigating complex export regulations can be a significant hurdle, potentially limiting access to these high-value markets despite local production capabilities.

Opportunities and Challenges for Commercialization

Opportunities:

- The rapidly rising global demand for "superfoods," natural health products, and plant-based nutrition presents a significant market opportunity for moringa.⁶⁰
- Moringa's versatility allows for its use in diverse industries, including food and beverages, pharmaceuticals, cosmetics, and personal care.⁶⁰
- The moringa value chain offers substantial potential for income generation and empowerment, particularly for youth and women entrepreneurs, as demonstrated by various initiatives.⁴
- Its climate resilience and low input requirements make it an attractive crop for

sustainable agriculture in Tanzania.

Challenges:

- There is a critical need for more focused research and development (R&D) on moringa varieties suited to Tanzanian agro-ecologies, as well as optimized agronomic and post-harvest practices.⁴ The lack of a formal national breeding program for moringa in Tanzania directly impacts the availability of standardized, high-quality raw material, which in turn hinders the development of consistent value-added products.
- Inadequate processing infrastructure and limited access to appropriate technology at the SME level often result in inconsistent product quality and difficulties in scaling up production.⁴
- Meeting the stringent quality standards and certification requirements of international markets (EU, USA) poses a major challenge for many small-scale Tanzanian producers and processors.⁸⁰
- While general awareness of moringa is increasing, deeper consumer education regarding specific nutritional benefits, quality indicators, and diverse culinary uses is needed, especially in the domestic market.⁵⁹
- Harmonization of standards for moringa products within the East African Community (EAC) is necessary to facilitate smoother regional trade.⁶³

Table 4: Moringa Market Snapshot & Value Addition in Tanzania

| Category | Details | Source(s) |
|----------------------|--|-----------|
| Key Products | Leaf Powder, Seed Oil, Seeds, Capsules, Tea | 4 |
| Dar es Salaam Market | Vendors: Dhow Nature Foods, Makai Moringa Enterprise. Indicative Prices: Capsules (TZS 20,000), Leaf Powder (100g - TZS 6,499), Tea (80g - TZS 6,499). Seed export price (2024): USD 0.18-1.30/kg. | 65 |
| East African Market | Trade with Kenya, Uganda (seeds, processed goods). Regional initiatives by EAWiBP. | 63 |

| | Strong demand noted. | |
|----------------------------------|---|----|
| Global Market | Key Importers: USA, Singapore, Canada. Projected Growth: USD 7.08B (2020) to >USD 14.80B (2028). MEA market: USD 2.38B by 2030. Leading Exporters: India, China, Nigeria. | 77 |
| Value Addition Examples | Local: Drying, powdering, encapsulation, tea blending (Dhow Nature Foods). Branding/packaging training (EAWiBP). Potential for oil extraction. | 55 |
| Key Export Standards (EU/USA) | Organic certification (often mandatory), MRLs for pesticides, GMP, heavy metal limits, microbiological safety, specific labelling. | 69 |

C. Orange-Fleshed Sweet Potato (OFSP)

Overview

Orange-Fleshed Sweet Potato (OFSP) is a biofortified variety of sweet potato specifically bred to be rich in beta-carotene, a precursor to Vitamin A. Its promotion is a key strategy in combating Vitamin A Deficiency (VAD), a significant public health concern, particularly among children under five and pregnant women in Sub-Saharan Africa.⁴ Beyond its nutritional advantages, OFSP is an important food security crop, known for its adaptability to marginal growing conditions and relative drought tolerance.⁴

Historically, in Tanzania and many other African countries, consumer preference leaned towards white or yellow-fleshed sweet potato varieties, which are lower in beta-carotene.⁸⁹ The slower uptake of OFSP has been attributed to several factors, including a chronic shortage of quality planting material (vines), susceptibility to pests (like sweet potato weevils) and diseases, the relatively short shelf-life of fresh roots if not properly handled or processed, and initially weak or fragmented value chains.⁴ Furthermore, low initial consumer awareness of OFSP's benefits and a lack of established, commercially viable value chains for OFSP products also hampered its widespread adoption. However, significant progress has been made in recent years to address these challenges.

Value Chain Analysis

The OFSP value chain in Tanzania involves a growing network of actors. Vine multipliers play a crucial role in propagating and distributing clean planting material to farmers; initiatives have supported multipliers with certified tissue culture cuttings to scale up vine production.⁹⁶ Smallholder farmers are the primary producers of OFSP roots. While specific OFSP farmer cooperatives are not extensively detailed, the recent launch of a National Cooperative Bank in Tanzania is expected to improve financial access for farmers across various sub-sectors, potentially benefiting OFSP growers.⁹⁷ **Processors**, largely Small and Medium Enterprises (SMEs), are increasingly active in transforming OFSP roots into value-added products. Notable examples in Tanzania include Sokoine University Graduates Entrepreneurs Cooperative (SUGECO), which is involved in OFSP product development, processing (puree, flour, baked goods), and training ⁹⁸; Sanavita Company Ltd, focusing on OFSP flour and biofortified composite flours ¹⁰¹; Better Markets for Crops (BMC) products limited, which processes OFSP into flour, crisps, and other items ¹⁰⁰; and Lishe Products Limited, which has partnered with Makerere University to host an OFSP puree processing unit.¹⁰³ Research institutions like TARI and the International Potato Center (CIP) are instrumental in breeding improved OFSP varieties and developing processing technologies.⁴ Non-governmental organizations (NGOs) such as Helen Keller International (HKI) have also been active in promoting OFSP development, production, and consumption as part of integrated nutrition-sensitive agriculture approaches.¹⁰⁵

Processing of OFSP has evolved beyond the traditional consumption of fresh roots or simple dried chips like "michembe" and "matobolwa".⁴ Significant value addition now focuses on producing **OFSP puree**, which serves as a versatile ingredient in the bakery, culinary, and even meat industries.⁴ OFSP puree can substitute a substantial portion (up to 40-50%) of wheat flour in baked goods like bread, buns, cakes, and biscuits, offering cost savings to bakeries and enhancing the nutritional profile (beta-carotene content) of these products.⁸⁷ Other value-added products include **OFSP flour**, crisps, spice mixes, and nutritious porridge flours often blended with other cereals or legumes.⁴

Numerous value addition initiatives and technological advancements have supported this transformation. CIP and its partners, through projects like the Sweetpotato for Profit and Health Initiative (SPHI), SASHA (Sweetpotato Action for Security and Health in Africa), VISTA (Vitamin A for Africa), and BNFB (Building Nutritious Food Baskets), have been at the forefront of developing and disseminating improved OFSP varieties and processing techniques.⁴ Key technological breakthroughs include the development of methods to produce **shelf-stable OFSP puree**. This typically involves steaming, pureeing, adding food-grade preservatives, and vacuum-packaging, allowing the puree to be stored for up to 4-6 months without refrigeration, or even longer with aseptic packaging technologies.⁹⁰ This development is critical as it overcomes the perishability of fresh roots and the high cost associated with cold-chain storage, making OFSP puree a more reliable and accessible ingredient for a wider range of food processors, especially SMEs. Solar drying technologies are also being promoted for the production of OFSP flour, offering a cost-effective preservation method.¹⁰²

Market Assessment

Local Market (Dar es Salaam): The availability and visibility of OFSP products in Dar es Salaam are increasing. Fresh OFSP roots are supplied to supermarkets; for example, SUGECO reported supplying up to 3 tonnes of fresh roots per week to supermarkets in Dar es Salaam and Morogoro.⁹⁸ Processed OFSP products, including OFSP-based flour, nutritious porridge blends, and baked goods like bread and biscuits, are also becoming more common, marketed by SMEs such as SUGECO, Sanavita, and BMC.⁹⁸ Consumer awareness and demand for these nutritious OFSP products are reportedly growing, particularly among health-conscious urban consumers.⁸⁷ This marks a positive shift from earlier periods when awareness was a significant barrier.⁹⁴ The success of OFSP commercialization, especially for puree and derived baked goods, appears heavily dependent on creating this "pull" from the market through consumer demand and processor uptake, rather than solely relying on a "push" from production support initiatives.

Regional Market (East Africa): OFSP puree and its applications in bakery products have been successfully commercialized in several East African countries, including Kenya, Malawi, and Rwanda, with pilot projects and promotional activities also undertaken in Ethiopia, Uganda, and Tanzania.¹⁰³ Regional programs like BioInnovate Africa have supported the promotion of OFSP puree for bakery applications across East Africa, fostering knowledge sharing and market development.¹⁰³

Global Market: OFSP puree and flour hold considerable export potential as functional food ingredients, natural colorants, and partial wheat flour substitutes in the global food industry.⁹⁰ The demand is driven by global trends towards healthier eating, natural ingredients, and fortified foods. While specific international export standards for OFSP puree or flour were not detailed in the provided research, general food

safety regulations (e.g., HACCP, GMP), quality parameters (e.g., beta-carotene content, proximate analysis, microbiological safety), and proper labeling would be essential for accessing international markets.⁹⁰

Opportunities and Challenges for Commercialization

Opportunities:

- The strong nutritional profile, particularly the high beta-carotene content for Vitamin A, is a major selling point for OFSP and its products.⁴
- The ability of OFSP puree to substitute a significant portion of wheat flour in baked goods offers tangible cost reduction benefits for bakeries, making it an economically attractive ingredient.⁸⁷
- Growing health consciousness among consumers, both locally and globally, fuels demand for nutritious and natural food products like those derived from OFSP.⁸⁷
- Established and improving processing technologies for OFSP puree and flour provide a solid foundation for scaling up value addition.¹⁰⁹
- The emergence of successful SMEs in Tanzania (e.g., SUGECO, Sanavita, BMC) demonstrates the commercial viability of OFSP value addition and provides models for others.⁹⁹

Challenges:

- Ensuring a consistent and reliable supply of high-quality OFSP roots for processors remains a challenge, often linked to issues in the vine multiplication and distribution system, as well as agronomic constraints at the farm level.⁴
- Scaling up OFSP puree production while maintaining consistent quality, ensuring adequate shelf-life, and managing logistics requires technical expertise and investment.¹¹¹
- Further efforts are needed to build broader consumer demand and overcome any lingering preferences for traditional white-fleshed sweet potato varieties, particularly in rural areas.⁸⁹
- Access to affordable finance for SMEs to invest in processing equipment, working capital, and market development activities is crucial for growth.⁹³
- More coordinated value chain development efforts are needed, including strengthening linkages between farmers, processors, and markets, and improving overall market information systems.⁹¹

Table 5: Orange-Fleshed Sweet Potato (OFSP) Market & Value Addition in Tanzania

| Category | Details | Source(s) |
|---------------------------|--|-----------|
| Key Products | Fresh Roots, Puree (for bakery/culinary use), Flour (for porridge, baking), Dried Chips (Michembe, Matobolwa), Baked Goods (bread, buns, biscuits), Crisps, Spice Mixes | 4 |
| Dar es Salaam Market | Vendors/Brands: SUGECO, Sanavita, Better Markets for Crops (BMC). Fresh roots in supermarkets. Processed flours and baked goods increasingly available. | 98 |
| East African Market | Regional initiatives (e.g., Biolnnovate Africa). Commercialization in Kenya, Rwanda, Uganda; piloting in Tanzania, Ethiopia. | 103 |
| Global Market | Export potential for OFSP puree and flour as functional food ingredients and wheat substitutes. | 90 |
| Value Addition Examples | Puree for bakeries (wheat flour substitution, cost reduction). Nutritious flours for porridge and baking. Development of diverse OFSP-based consumer products. | 4 |
| Key Support Organizations | International Potato Center (CIP), Helen Keller International (HKI), SUGECO, TARI, various NGOs and development partners. | 4 |

D. Finger Millet (*Eleusine coracana*)

Overview

Finger millet, known scientifically as *Eleusine coracana*, is a highly nutritious and climate-resilient cereal grain that has been cultivated for thousands of years in parts of Africa and Asia.¹¹⁶ It is particularly valued for its rich micronutrient profile, being an excellent source of calcium (often three times that of milk), iron, and zinc, as well as essential amino acids like methionine and tryptophan, which are often limiting in other common cereals.⁴ Furthermore, finger millet is gluten-free, making it a suitable grain for individuals with celiac disease or gluten sensitivity.¹¹⁶ Agronomically, it is recognized for its ability to thrive in arid and semi-arid conditions, tolerate poor soils, and withstand periods of drought, making it a crucial crop for food security in marginal environments.⁴ The grain also possesses good storage qualities, allowing it to be kept for extended periods without significant insect damage, which is an advantage for household food reserves.⁴

Traditionally, finger millet has been a staple food in many Tanzanian communities, particularly in the Southern Highlands. It is commonly used to make porridge (uji), a component of the traditional stiff porridge (ugali), and is a key ingredient in the production of local fermented beverages such as "kimpumu" and "mbege" (a banana beer where finger millet malt is used for fermentation).⁴ Despite these attributes, finger millet is often categorized as an "orphan crop" ¹¹⁷ and has been underutilized in terms of commercial development and mainstream consumption. Reasons for this include historically low market demand outside traditional consumption areas, challenges associated with its processing (particularly dehusking and milling, which can be labor-intensive), shifting consumer taste preferences towards more convenient grains like maize and rice, limited investment in research and policy support specifically for finger millet, and competition from other crops with more developed value chains.⁴ There is a significant disconnect between finger millet's inherent high nutritional value and climate resilience and its current low productivity and commercialization status in Tanzania. This suggests that the primary bottlenecks are not intrinsic to the crop itself but lie within the supporting value chain, including seed systems, agronomic practices, processing technologies, and market development strategies.

Value Chain Analysis

The finger millet value chain in Tanzania primarily involves **smallholder farmers**, with women often playing a significant role in its cultivation and traditional processing.⁴ **Local traders** aggregate grain from farmers for sale in rural and urban markets. **Millers**, both small-scale traditional millers and, to a lesser extent, commercial millers, process the grain into flour.¹²⁵ **Brewers**, largely operating in the informal sector, use finger millet malt for traditional alcoholic beverages.⁴ **Retailers** in local markets and some urban shops sell finger millet grain and flour.¹²⁸

Processing of finger millet traditionally involves manual or semi-manual dehusking and grinding into flour, which can be laborious.⁴ The grain is used to produce flour for porridge and baking, and malt for brewing.⁴ There is considerable potential for product diversification into modern convenience foods such as biscuits, noodles, breakfast cereals, and infant foods, leveraging its nutritional benefits and gluten-free status.¹¹⁹

Regarding improved varieties and technology, several improved finger millet varieties have been released in East Africa, such as SEREMI 2 and PESE 1, which have seen some adoption in Tanzania due to attributes like early maturity and good brewing/bread-making qualities.¹²⁹ Ethiopian varieties like Kako-1 have also shown good yield potential.¹³⁰ However, overall adoption rates of improved varieties by smallholder farmers can be low, often due to challenges in accessing quality seed, limited awareness, or a mismatch with local preferences.⁴ Breeding efforts are complicated by finger millet's predominantly inbreeding nature, which can limit genetic recombination.⁴ Technological advancements are occurring in processing, with the development of more efficient millet dehullers and milling equipment aimed at reducing drudgery and improving flour quality.¹³¹ The labor-intensive nature of traditional finger millet processing is a major deterrent to both increased household consumption and commercial-scale processing. This, in turn, limits market demand and reduces farmers' incentives to increase production. Therefore, innovations in processing technology are critical for unlocking the value chain.

Market Assessment

Local Market (Dar es Salaam): Finger millet grain and flour are available in Dar es Salaam markets. Recent data from February 2025 indicated a notable increase of 10.1% in the price of finger millet grains, suggesting active market dynamics.¹²⁸ Historically, prices for related dryland cereals like sorghum in Dar es Salaam have sometimes been lower than those for maize, which could influence consumer choice depending on availability and preference.¹³³ The market for traditional beverages like Mbege, which uses finger millet malt, is also present, particularly among communities with cultural ties to the drink.¹²³

Regional Market (East Africa): Tanzania plays a role in the regional finger millet trade, exporting to neighboring countries, with Kenya being a significant destination.¹³⁴ Trade data indicates Tanzania is among the top global exporters of finger millet, with Kenya as a key buyer.¹³⁵ Uganda is another important player in the regional trade dynamics of finger millet.¹²⁹ Ethiopia, Tanzania, and Uganda each

produce substantial quantities of millet flour, estimated at around 45,000 tonnes per year per country, indicating established processing and consumption within the region.¹²⁵

Global Market: The global market for finger millet is expanding, valued at USD 2.55 billion in 2023 and projected to reach USD 3.50 billion by 2030, growing at a CAGR of 4.65%.¹²¹ This growth is driven by increasing consumer awareness of its health benefits, the rising demand for gluten-free products, and government initiatives in some countries promoting the cultivation and consumption of traditional grains.¹²¹ Major global importers of finger millet include the United States, Kenya (re-exporting or for local demand), and the United Arab Emirates. The leading exporters are India, followed by Tanzania and Ethiopia, underscoring Tanzania's existing, albeit perhaps under-leveraged, position in the international market.¹³⁵

Opportunities and Challenges for Commercialization

Opportunities:

- The rapidly growing global gluten-free market presents a significant opportunity for finger millet products.¹²¹
- There is strong potential to market finger millet as a "Smart Food," targeting health-conscious urban consumers with products like nutrient-dense flours, weaning foods, specialty breads, and beverages.¹¹⁹
- The United Nations' declaration of 2023 as the "International Year of Millets" has helped raise global awareness of its benefits, which can be further capitalized upon.¹¹⁷
- Success stories of local entrepreneurs, such as Celina Kisha Chibanda's "Chi Products" in Iringa, which incorporates finger millet into nutritious flour blends, demonstrate the potential for viable small-scale enterprises.¹³⁷

Challenges:

- Low yields at the farmer level are a major constraint. Average yields in Uganda, for example, are around 0.6 t/ha compared to an on-station potential of 3.5 t/ha.¹²⁹ Tanzanian yields are also reported to be low.⁴ This is due to biotic stresses (e.g., finger millet blast disease, Striga weed infestation) and abiotic stresses (drought, low soil fertility).⁴
- There is limited adoption of improved varieties and a lack of consistent access to quality inputs by smallholder farmers.⁴
- The relatively high price of finger millet compared to maize or wheat can limit its incorporation into animal feed or as a blending flour in some contexts, thereby restricting some avenues for market expansion.¹²⁵

- Traditional processing methods are difficult and time-consuming (especially dehusking and milling). Additionally, finger millet contains anti-nutritional factors like phytates and tannins, which require appropriate processing (e.g., soaking, germination, fermentation) to reduce their levels and improve nutrient bioavailability.⁴
- Lack of stable market outlets for farmers and insufficient product development and marketing efforts for value-added products hinder commercialization.⁸

Table 6: Finger Millet Market & Value Addition in Tanzania

| Category | Details | Source(s) |
|-------------------------|---|-----------|
| Key Products | Grain, Flour (for porridge, ugali, baking), Malt (for brewing), Traditional Brews (Mbege, Kimpumu), Packaged Nutritious Flours (e.g., blended with other cereals/legumes) | 4 |
| Dar es Salaam Market | Grain and flour available in markets. Price of grain increased 10.1% (Feb 2025). Traditional beverages sold. | 123 |
| East African Market | Significant regional trade; Tanzania exports to Kenya, Uganda. Ethiopia, Tanzania, Uganda are major millet flour producers. | 125 |
| Global Market | Market Size: USD 2.55B (2023), projected USD 3.50B (2030). Key Importers: USA, Kenya, UAE. Key Exporters: India, Tanzania, Ethiopia. Driven by gluten-free/health trends. | 121 |
| Value Addition Examples | Traditional brewing (Mbege). Local enterprises producing nutritious flour blends (e.g., | 4 |

| | Chi Products). Potential for modern snacks, baby food, gluten-free baked goods. | |
|----------------|---|---|
| Key Challenges | Low farm yields, difficult traditional processing (dehusking/milling), limited adoption of improved varieties, inconsistent market demand for value-added products. | 4 |

E. Bambara Groundnut (Vigna subterranea)

Overview

Bambara groundnut (*Vigna subterranea*) is an indigenous African legume highly regarded for its nutritional completeness and remarkable resilience.⁴ It is often referred to as a "complete food" due to its well-balanced macronutrient composition, typically containing 15-25% protein, 49-63.5% carbohydrates, and 4.5-7.4% fat, along with significant amounts of fiber and essential minerals like iron and calcium.⁴ Agronomically, Bambara groundnut is prized for its drought resistance, ability to thrive in poor, sandy soils where other legumes might fail, and its nitrogen-fixing capabilities which contribute to soil fertility.⁴

Traditionally, Bambara groundnut plays a vital role in household food security, especially in drier regions of Sub-Saharan Africa. It is often cultivated by women and serves as an important dietary supplement or a fallback crop when other staples fail.⁴ Despite these strengths, Bambara groundnut has largely been neglected in terms of formal research and commercial development. It is often stigmatized as a "poor man's crop" or a "women's crop," which has limited investment and wider adoption.⁴ Other significant constraints include the characteristically long cooking times required for the dried beans, difficulties associated with traditional dehulling and milling processes, a lack of formally developed and disseminated improved varieties, and weak market linkages.⁴ The presence of anti-nutritional factors (like tannins and phytates), primarily in the seed coat, also requires proper processing (such as soaking, dehulling, or fermentation) to ensure optimal nutrient absorption and palatability.¹³⁹ The "hard-to-cook" and "hard-to-mill" characteristics are central, multi-faceted constraints that negatively impact the entire value chain, from consumer convenience and appeal to processing efficiency and, consequently, farmer incentives for increased production.

Value Chain Analysis

The Bambara groundnut value chain in Tanzania predominantly involves **smallholder farmers**, with women playing a central role in its production, processing, and local trade.⁴ **Local traders** and intermediaries handle the aggregation and movement of the crop from rural production areas to markets.¹⁵⁰ The formal **processing sector** for Bambara groundnut is very limited, with most processing occurring at the household or small-scale community level.⁴ Research institutions, such as Bunda College (Malawi) and ARI Naliendeli (Tanzania), have been involved in past projects focusing on Bambara groundnut, including variety selection and agronomy, often in collaboration with international partners.¹⁴⁵

Cultivation is typically on small plots, often as an intercrop with cereals like maize or sorghum, leveraging its soil-enriching properties.⁴ Traditional processing methods include consuming the fresh pods (boiled or roasted), or drying the mature seeds for later use. Dried seeds are commonly boiled (often after prolonged soaking) for stews or porridges, roasted as a snack, or milled into flour which can be used for making traditional flat cakes, bread, or porridge-like dishes.⁴ Dehulling (removal of the seed coat) and soaking are common traditional practices that help to reduce cooking time and the levels of anti-nutritional factors.¹³⁹ However, the inherent hardness of the dried seeds makes milling laborious and energy-intensive.¹³⁹ There is significant potential for commercial processing into value-added products such as pre-cooked canned Bambara groundnuts, high-protein flour for bakery and composite food formulations, Bambara milk (a plant-based alternative), and ingredients for animal feed.⁴

Value chain development projects, such as those funded by the McKnight Foundation's Collaborative Crop Research Program (CCRP), have undertaken scoping studies and implemented projects in Malawi, Mozambique, and Tanzania. These initiatives focused on aspects like variety selection, local seed supply systems, and stimulating market demand.¹⁴⁵ However, research on Bambara groundnut still requires more emphasis on economic aspects, processing innovations, and market development strategies to complement ongoing agronomic and genetic studies.¹⁴¹

Market Assessment

Local Market (Dar es Salaam): Specific information on the availability and pricing of processed Bambara groundnut products in Dar es Salaam is limited in the provided research. It is likely that fresh or dried Bambara groundnuts are sold in local informal markets, particularly those catering to traditional food preferences.¹⁵⁵ Online platforms like Etsy and Amazon list "Okpa flour" (Bambara groundnut flour), though these

products are often of Nigerian origin, they indicate the type of processed product that could find a market.¹⁵⁶ The prices for these imported specialty flours tend to be relatively high (e.g., a 2lb / 0.9kg pack of Okpa flour listed at USD 49.95 on Amazon ¹⁵⁷), suggesting a potential premium for conveniently processed forms.

Regional Market (East Africa): While sometimes perceived as a subsistence crop with low commercial value in certain East African contexts ¹³⁸, a study from 2009-2010 indicated that there was actually more demand than supply for Bambara groundnuts locally, regionally, and even internationally.¹⁴⁵ This suggests an existing, perhaps unmet, market potential within the region.

Global Market: The global market for Bambara beans (groundnuts) is showing positive growth trends, driven by the increasing demand for plant-based proteins, interest in sustainable and climate-resilient crops, and the "superfood" status of many indigenous legumes.¹⁵² Market size estimates vary but consistently project growth: one report valued the market at USD 989 million in 2022, forecasting it to reach USD 1.4 billion by 2032 (CAGR 4%).¹⁵² Another estimated the market at USD 112.8 million in 2020, projecting USD 199 million by 2030 (CAGR 5.8%) ¹⁵⁸, while a third cited USD 119.57 million in 2023 with a CAGR of 6% to 2032 ¹⁵⁹, and a fourth USD 158.72 million in 2024 with a CAGR of 5.39% to 2035.¹⁵⁴ Africa remains the primary producer and consumer, but demand is reportedly increasing in Europe, North America, and the Asia-Pacific region, particularly in countries like India and China where there's a growing middle class seeking healthy and novel food products.¹⁴⁶ This presents a nuanced picture: while often labeled a subsistence crop, there is evidence of unmet demand and premium prices in some African markets ¹⁴⁵, and growing international interest. This suggests that with strategic market development, product innovation, and improved value chains, its commercial value could be significantly enhanced.

Opportunities and Challenges for Commercialization

Opportunities:

- The high nutritional value (complete protein, minerals) and climate resilience (drought tolerance, poor soil adaptation) of Bambara groundnut are strong selling points in an era of increasing health consciousness and climate change concerns.⁴
- The expanding global market for plant-based proteins and functional foods provides a significant opportunity for Bambara-based ingredients and products.¹⁵²
- There is potential for diverse value-added products, including flour for baking, snacks, dairy alternatives (Bambara milk), and fortified foods.⁴

- The crop can command premium prices in certain African markets, indicating consumer willingness to pay for its unique attributes when available and properly marketed.¹⁴⁶
- Its cultivation primarily by women offers opportunities for gender-focused value chain interventions that can enhance their economic empowerment.¹⁴⁰

Challenges:

- The long cooking times and difficulties in traditional processing (dehulling, milling) are major deterrents to wider consumption and commercialization.⁴
- There is a lack of formally released improved varieties and established formal seed systems, leading to reliance on landraces with variable performance.⁴
- Farm-level yields are often low (0.6 to 1 tonne/ha in Africa, though potential is >3 t/ha) due to limited access to inputs, poor agronomic practices, and lack of research focus.¹³⁸
- Market linkages are generally weak, and consumer awareness outside of traditional consuming regions is low.¹⁴¹
- Smallholder farmers and processors often have limited access to credit, appropriate processing technologies, and adequate storage infrastructure.¹⁶⁰
- The social stigma associated with it being a "poor man's crop" or "famine food" in some areas can hinder its acceptance and market development.¹³⁸

Table 7: Bambara Groundnut Market & Value Addition in Tanzania

| Category | Details | Source(s) |
|----------------------|---|-----------|
| Key Products | Fresh/Dried Beans, Flour (e.g., Okpa flour), Roasted Snacks, Boiled beans/porridge. Potential: Canned beans, Bambara milk, composite flours. | 4 |
| Dar es Salaam Market | Likely available in local/traditional markets (fresh/dried). Imported processed flour (e.g., Okpa) available online at premium prices. Limited local commercial processing. | 155 |

| East African Market | Some regional demand reported to exceed supply in past studies. Traditionally consumed but low commercial profile in some areas. | 138 |
|-------------------------|---|-----|
| Global Market | Growing demand (CAGR 4-6%). Market size est. USD 100-990M (varying reports). Key drivers: plant-protein, sustainability. Importers: Europe, N. America, Asia-Pacific. | 152 |
| Value Addition Examples | Traditional: Boiling, roasting, home milling. Potential: Commercial milling into flour, canning, development of Bambara-based snacks and beverages. | 4 |
| Key Challenges | Long cooking time, hard-to-mill seeds, lack of improved varieties, weak market linkages, low yields, limited processing technology, social stigma in some areas. | 4 |

| F. Jute Mallow (Corchorus olitorius - Mlenda |
|--|
|--|

Overview

Jute Mallow, scientifically *Corchorus olitorius* and commonly known in Tanzania as Mlenda, is a traditional leafy vegetable highly valued for its nutritional content and culinary uses.⁴ The leaves are rich in micronutrients, including carotenoids (Vitamin A precursors), protein, Vitamins C, K, and B9 (folate), and essential minerals such as iron, calcium, and magnesium.⁴ Traditionally, Mlenda leaves are consumed fresh in salads, cooked as a side vegetable, or incorporated into soups and stews.⁴ Its characteristic mucilaginous (slimy) texture when cooked is particularly appreciated in sauces accompanying staple starchy foods.⁵⁸ Various parts of the plant also have applications in traditional medicine.⁴

Despite its nutritional benefits and local dietary importance, Jute Mallow is largely an underutilized crop in Tanzania. It is often gathered from the wild or as a volunteer

plant in cultivated fields rather than being systematically cultivated.⁴ This perception of Mlenda as a semi-wild or gathered vegetable is a primary barrier to its formal development, hindering investment in research, seed system development, and value chain upgrading.⁴ Other reasons for its underutilization include limited knowledge sharing about its benefits and cultivation, scarcity of quality seeds for preferred vegetable varieties, potentially slow growth in higher altitude regions, and competition from more commercially established exotic vegetables.⁴ Consequently, formal markets for Mlenda are almost non-existent or very poorly developed in Tanzania.⁴

Value Chain Analysis

The Jute Mallow value chain in Tanzania is predominantly informal. **Smallholder farmers**, particularly women who are often responsible for its gathering, preservation, and household preparation, are key actors.⁴ **Local traders** may handle small quantities, especially in rural markets or for sale to urban centers.¹⁶⁵ A formal **processing sector** for Jute Mallow is virtually absent, with most processing limited to traditional sun-drying of leaves at the household level for preservation.⁴

Cultivation, where it occurs, is often on a small scale, and the plant is frequently found growing spontaneously.⁴ Some research indicates potential for intercropping Jute Mallow with cereal crops like sorghum and finger millet, which could offer agronomic benefits and diversify farm income.¹⁶⁴ Traditional processing primarily involves **drying the leaves**, which extends their availability beyond the rainy season when fresh leaves are abundant.⁴ However, these traditional drying methods often face challenges such as contamination from dust, exposure to rain, pest infestation, and mould growth, all of which can significantly compromise the quality and safety of the dried product.⁴ There is considerable potential for value addition through improved drying techniques (e.g., solar dryers), better packaging to maintain quality and extend shelf-life, and branding to create market differentiation.¹⁶⁶

Specific value addition initiatives for Jute Mallow in Tanzania are not extensively documented in the provided research, beyond general promotion of African Indigenous Vegetables (AIVs). The Africa Rising project reportedly introduced some improved varieties to increase its use, but broader awareness of Mlenda as a formally cultivated crop remains low among many farmers.⁴ The establishment of dedicated processing facilities, even at a small to medium scale, could significantly enhance its economic value by producing higher quality dried or powdered products.⁴

Market Assessment

Local Market (Dar es Salaam): Fresh Jute Mallow (Mlenda) is sold in local markets in

Dar es Salaam and other urban centers, typically by small-scale vendors.¹⁷⁰ Prices for AIVs, including Mlenda, can be significantly higher in Dar es Salaam compared to regional production centers like Arusha, sometimes two to three times higher, reflecting transport costs and urban demand dynamics.¹⁷¹ The availability of fresh Mlenda is highly seasonal, being abundant and cheaper during the rainy season, and becoming scarce and more expensive during the dry season.¹⁶⁷ Dried Mlenda leaves are also traded, though often through informal channels. Some online vendors, primarily based outside Tanzania (e.g., Mwanakafresh Farm Foods in Kenya, which ships dried Mrenda, or Adonis brand dried Mouloukhia available on Amazon internationally), offer dried jute mallow leaves, indicating a product form with wider market potential if quality and supply can be assured.¹⁶³

Regional Market (East Africa): Jute Mallow is consumed in other East African countries, such as Kenya (where it is also known as Mrenda) and Uganda.¹⁶¹ A common challenge across the region is the limited availability of quality seed for preferred vegetable varieties, which constrains farmers' ability to meet potential demand consistently.¹⁷³

Global Market: Internationally, Jute Mallow leaves are sold in dried or powdered form, often under names like "meloukhia" (a product of Lebanese origin found in European markets).¹⁶¹ It is important to distinguish the vegetable types of *Corchorus olitorius* from those cultivated primarily for jute fiber, which is a major industry in Asia (India, Bangladesh). The vegetable varieties are distinct.¹⁶¹ The existence of an international niche market for dried leaves suggests export potential if Tanzanian producers can meet quality and consistency requirements.¹⁷²

The lack of effective, scalable drying and preservation techniques is a major causal factor for the seasonality in Jute Mallow availability and high post-harvest losses. This prevents it from becoming a reliable year-round income source for farmers or a consistently available product for urban markets, thereby limiting its overall economic impact.⁴

Opportunities and Challenges for Value Chain Development

Opportunities:

- Jute Mallow boasts a high nutritional value, particularly in micronutrients, making it a valuable component of healthy diets.⁴
- There is existing, albeit often informal, local consumption and familiarity with the vegetable in Tanzania.
- Significant potential exists for value addition through improved drying

technologies (e.g., solar dryers), hygienic processing, and attractive packaging, which can extend shelf life, improve product quality, and enable access to wider urban and potentially export markets.⁴

 Its potential for intercropping with common cereal crops offers agronomic benefits such as diversified production and possibly pest management, enhancing overall farm system resilience.¹⁶⁴

Challenges:

- The prevailing perception of Mlenda as a "wild" or "volunteer" plant significantly limits initiatives for its formal cultivation, research, and seed system development.⁴
- There is a lack of established formal seed systems for preferred vegetable varieties of Jute Mallow, making it difficult for farmers to access quality planting material.⁴
- High post-harvest losses and quality deterioration occur during traditional sun-drying processes due to contamination and inadequate moisture control.⁴
- Market development and value addition activities for Jute Mallow in Tanzania are currently very limited, with weak market linkages and minimal product differentiation.⁴
- Competition from more established and commercially promoted exotic vegetables can overshadow traditional vegetables like Mlenda in consumer preference and market presence.⁴

| Category | Details | Source(s) |
|----------------------|---|-----------|
| Key Products | Fresh Leaves, Traditionally Dried Leaves. Potential: Hygienically dried/powdered leaves, branded products. | 4 |
| Dar es Salaam Market | Fresh leaves available in local markets, especially during rainy season. Prices fluctuate seasonally, higher in dry season. Limited availability of processed forms. | 167 |

Table 8: Jute Mallow (Mlenda) Market & Value Addition in Tanzania

| East African Market | Consumed in Kenya (Mrenda), Uganda. Limited quality seed availability is a regional constraint. | 162 |
|-------------------------|---|-----|
| Global Market | Niche market for dried leaves/powder (e.g., "meloukhia" in Europe). Distinct from jute fiber market. | 161 |
| Value Addition Examples | Traditional sun-drying. Potential for improved solar drying, hygienic packaging, branding, and product formulation (e.g., in composite flours or soups). | 4 |
| Key Challenges | Perception as a wild/gathered plant hindering formal cultivation, lack of formal seed systems, poor post-harvest handling (drying), very limited market development. | 4 |

IV. Cross-Cutting Strategies for Developing High-Value Agricultural Chains in Tanzania

The successful development and upgrading of the wheat value chain, particularly its diversification aspects, and the unlocking of the potential inherent in Neglected and Underutilized Species (NUS) in Tanzania, necessitate a series of cross-cutting strategies. These strategies must address systemic challenges and create an enabling environment that fosters growth, sustainability, and inclusivity across these diverse agricultural opportunities.

A. Policy and Institutional Support: Strengthening the Enabling Environment

A conducive policy and institutional framework is paramount. While Tanzania has national agricultural strategies like the Five Year Development Plan III (FYDP III) and the Agricultural Sector Development Programme Phase II (ASDP II) aimed at increasing productivity and commercialization ¹, there is a critical need for explicit policy recognition and dedicated support for NUS within these frameworks. NUS are often ignored in mainstream agricultural planning ⁹, and their unique development needs require targeted interventions. Policy recommendations should include the

integration of NUS into national food security and nutrition action plans, allocation of specific budgetary resources for NUS research and development, and the creation of incentives for their cultivation and value addition.¹⁷⁵

Key institutions like the Tanzania Bureau of Standards (TBS) have a vital role in developing and enforcing appropriate quality standards for traditional and NUS-derived food products. This is crucial for ensuring consumer safety, building trust, and facilitating access to both domestic and export markets.¹⁷⁶ TBS should work on specifications for ingredients, processing methods, packaging, and labeling tailored to these products, potentially drawing on or adapting existing regional or international standards where applicable. Similarly, the Tanzania Food and Nutrition Centre (TFNC) is instrumental in promoting the utilization of under-utilized food crops, conducting research on their nutritional guality, and developing educational materials to raise consumer awareness about their benefits.¹⁷⁹ Strengthening the capacity of agricultural research institutions, notably TARI, to undertake focused R&D on NUS-covering breeding for improved traits, developing appropriate agronomic practices, and innovating processing technologies—is essential.² A disconnect may currently exist between broad national-level policy ambitions for agricultural transformation and the specific operational support and standards development required to nurture nascent NUS value chains. TBS and TFNC, if adequately resourced and specifically mandated, are well-positioned to bridge this gap by ensuring that NUS are explicitly integrated into their operational plans, standard-setting processes, and promotional activities, all underpinned by supportive national policies. Furthermore, government facilitation of effective Public-Private Partnerships (PPPs) will be crucial for mobilizing investment, expertise, and market linkages for these emerging value chains.¹

B. Enhancing Access to Finance, Technology, and Quality Inputs

Access to finance remains a significant hurdle for smallholder farmers and SMEs across all agricultural value chains in Tanzania, including wheat and NUS.³ While general agricultural finance initiatives are emerging, such as the De-risking Agricultural Finance to Smallholder Farmers (DAFS) project ⁴⁰, the warehouse receipt financing facilitated by projects like CASH-Tz for grain storage ⁴¹, and the recent launch of the National Cooperative Bank aimed at improving financial access for farmers ⁹⁷, there may be a need for financial products specifically tailored to the unique risk profiles and longer return-on-investment timelines often associated with developing *new* NUS value chains. These ventures frequently require upfront investment in market creation, consumer awareness, and specialized R&D, for which standard loan products may not be suitable. Patient capital, blended finance

mechanisms, or targeted credit guarantee schemes could be more effective in supporting NUS entrepreneurs.

The promotion and adoption of appropriate technology are critical for enhancing productivity and efficiency. This includes improved cultivation practices, mechanization suitable for smallholder contexts, and irrigation technologies to mitigate climate risks.¹ For value addition, support is needed for the dissemination and adoption of processing technologies such as efficient OFSP puree production lines ¹⁰⁹, moringa oil presses ⁷⁰, modern millet dehullers and mills ¹³², and effective solar dryers for various crops.¹¹² The Small Industries Development Organisation (SIDO) plays a role in supporting SMEs with technology transfer and business development training, and its efforts could be specifically channeled towards NUS processing.¹⁸¹

Ensuring the availability and affordability of quality inputs is fundamental. For wheat, this means strengthening the certified seed supply chain and improving access to appropriate fertilizers.¹ A major gap for almost all prioritized NUS is the lack of formal seed systems that can provide farmers with quality planting material of preferred and improved varieties.⁴ Addressing this requires investment in NUS germplasm collection, conservation, breeding, and the establishment of community-based or commercial seed multiplication and distribution channels.

C. Improving Post-Harvest Management and Processing Capabilities

High post-harvest losses (PHL) significantly diminish the economic returns for farmers and reduce the overall availability of food, whether it be grains like wheat ⁴³ or perishable products like African Indigenous Vegetables (AIVs), which include Jute Mallow.¹⁶⁶ Strategies to address PHL include investment in improved on-farm and community-level storage facilities ¹ and the promotion of PHL reduction technologies, such as hermetic storage bags (e.g., PICS bags).⁴¹

Developing the processing capabilities of SMEs is crucial for value addition, extending shelf-life, and creating diversified products that meet consumer demands. This involves support for acquiring appropriate machinery for drying, milling, pureeing, oil extraction, and packaging for both wheat by-products and NUS.⁴ The government's initiative to establish Special Agro-Industrial Processing Zones (SAPZ) aims to concentrate agro-processing activities, which could provide infrastructure and services beneficial for processors of these overlooked commodities.⁴⁹ However, alongside these larger hubs, the lack of appropriate small-to-medium scale processing technologies that are accessible and affordable to rural communities remains a major bottleneck for many NUS. This often forces reliance on traditional, inefficient methods that limit product quality, scalability, and market competitiveness.

Decentralized processing solutions are therefore vital for inclusive value chain development.

D. Fostering Market Linkages, Consumer Awareness, and Branding

Effective market development is key to driving the growth of these value chains. This requires improving market information systems to provide farmers and traders with timely and accurate price and demand data.⁵ Facilitating direct and transparent linkages between producers, processors, and buyers can help reduce transaction costs and improve returns for farmers.¹⁷⁵

For NUS in particular, creating "demand pull" is as important as "supply push." This involves conducting sustained consumer awareness campaigns to educate the public, especially in urban markets like Dar es Salaam, about the nutritional benefits, culinary versatility, and cultural significance of NUS products.⁴ Many NUS are traditionally consumed but may be unfamiliar in processed forms or to newer generations of urban consumers. Promotional activities, including cooking demonstrations and integration into institutional feeding programs (e.g., schools), can stimulate demand.

Support for branding, attractive packaging, and quality assurance is essential for local products to compete effectively with imports and to access higher-value domestic and export markets.⁶³ The strategic use of digital platforms for marketing and e-commerce can also expand market reach, particularly for branded NUS products.¹⁵⁸

E. Promoting Sustainable Practices and Certifications

Many NUS are inherently climate-resilient and adapted to low-input agricultural systems, making them ideal candidates for promoting sustainable agriculture.¹¹⁶ Supporting farmers in adopting and scaling up organic farming practices for both specialty wheat and NUS can open doors to premium niche markets.²⁶

Facilitating access to internationally recognized certifications, such as Organic, Fair Trade, and GlobalG.A.P., is crucial for export-oriented value chains to meet the requirements of discerning international buyers.⁶⁹ Concurrently, ensuring compliance with national and international phytosanitary requirements is non-negotiable for agricultural exports.¹⁸⁶ The current high cost of obtaining phytosanitary certificates in Tanzania, reportedly 460% higher than previous fees and significantly more expensive than in neighboring East African countries ¹⁸⁸, poses a serious concern. This high cost could disproportionately affect the export competitiveness of emerging NUS value chains, which are often driven by SMEs and farmer groups with limited capital, potentially stifling their access to lucrative international markets before they even establish a foothold.

F. Strengthening Farmer Cooperatives and Public-Private Partnerships (PPPs)

Well-organized and empowered farmer cooperatives can play a transformative role in developing these overlooked value chains. Cooperatives can enhance smallholder farmers' access to quality inputs, provide a platform for collective bargaining for better prices, facilitate access to training and extension services, and enable collective marketing and processing.²¹ The new National Cooperative Bank could provide tailored financial services to these groups.⁹⁷ For NUS value chains, which often start from a low base of commercialization, strong producer organizations are particularly important for aggregating produce, ensuring quality, and engaging effectively with processors and buyers.

Public-Private Partnerships (PPPs) are essential for leveraging the expertise, resources, and market access of the private sector while aligning with public development goals.¹ PPPs can be instrumental in investing in processing infrastructure, developing new products, establishing quality management systems, and creating sustainable market linkages for both wheat and NUS products. The government's role in PPPs includes creating an attractive investment climate, providing supportive infrastructure, and ensuring a fair regulatory environment.

V. Conclusions and Strategic Recommendations

This report has undertaken a detailed analysis of the wheat value chain in Tanzania and explored the significant, yet largely untapped, potential of five prioritized Neglected and Underutilized Species (NUS): Moringa, Orange-Fleshed Sweet Potato, Finger Millet, Bambara Groundnut, and Jute Mallow. The overarching conclusion is that while Tanzania faces a substantial deficit in wheat production, necessitating continued focus on improving domestic output and efficiency, a parallel and equally critical opportunity lies in the strategic development of these overlooked NUS value chains. These crops offer pathways to enhanced food and nutrition security, diversified farmer incomes, increased climate resilience, and access to growing niche markets.

The "overlooked" status of these NUS, and certain aspects of the wheat value chain (like by-product valorization), is not due to an inherent lack of value but rather a consequence of historical underinvestment in research, inadequate policy support tailored to their specific needs, fragmented value chains, and insufficient market development efforts. Realizing their potential requires a paradigm shift from a primary focus on a few major staples towards a more diversified and resilient agricultural system.

Based on the comprehensive analysis, the following strategic recommendations are proposed for policymakers, investors, research institutions, and development partners:

- 1. Strategic Policy and Institutional Prioritization:
 - Integrate NUS into National Plans: Explicitly incorporate the prioritized NUS into national agricultural development strategies, food security action plans, and nutritional programs, allocating specific targets and resources for their development. This includes the FYDP and ASDP frameworks.¹
 - Strengthen Regulatory and Standards Bodies: Enhance the capacity of the Tanzania Bureau of Standards (TBS) and the Tanzania Food and Nutrition Centre (TFNC) to develop and promote appropriate quality standards, processing guidelines, and nutritional information for NUS products, facilitating both domestic market confidence and export compliance.¹⁷⁶ Review and rationalize the high costs associated with phytosanitary certification to ensure Tanzanian agricultural exports, especially from SMEs in emerging value chains, remain competitive.¹⁸⁸
 - **Supportive Land and Trade Policies:** Ensure land tenure security and streamlined access for investment in these value chains. Maintain predictable and transparent trade policies to encourage private sector investment and market development, avoiding sporadic bans that create uncertainty.³

2. Targeted Investment in Research, Technology, and Inputs:

- R&D for Wheat and NUS: Increase investment in TARI and foster collaborations (e.g., with CIMMYT, CIP, World Vegetable Center) for breeding programs focused on:
 - Wheat: High-yield, disease-resistant, drought-tolerant varieties suitable for Tanzanian conditions, including specialty wheats with specific quality traits for value addition.²
 - NUS: Characterization of local landraces, breeding for improved yield, nutritional content, climate resilience, and processing characteristics (e.g., reduced cooking time for Bambara groundnut, improved seed varieties for Jute Mallow).⁴
- Dissemination of Appropriate Technologies: Facilitate access to and adoption of affordable and scalable technologies for cultivation (e.g., small-scale irrigation, mechanization) and post-harvest handling (e.g., hermetic storage, solar dryers).¹ Promote and support SME access to processing equipment for milling, pureeing, oil extraction, and packaging.⁷⁰
- Quality Seed Systems: Invest in establishing robust formal and informal seed

systems for the prioritized NUS to ensure farmers have access to quality planting material of desired varieties. This is a critical gap for most NUS.⁴ For wheat, continue efforts to scale up certified seed production.¹

- 3. Value Chain Development and Market Enhancement:
 - Processing and Value Addition: Support the establishment and upgrading of SME processing facilities for wheat by-products (bran and germ for human food) and for NUS (e.g., OFSP puree, moringa powder and oil, finger millet flour, Bambara groundnut flour, dried Mlenda).⁴ Encourage innovation in product development to meet diverse consumer preferences.
 - Market Linkages and Information: Facilitate stronger and more transparent market linkages between producers, processors, and end-buyers (retail, export). Invest in market information systems accessible to all value chain actors.⁵
 - Consumer Awareness and Branding: Implement targeted consumer awareness campaigns to promote the nutritional benefits and culinary uses of wheat-based value-added products and NUS products, particularly in urban centers like Dar es Salaam.⁵⁹ Support local branding and packaging initiatives to enhance product appeal and marketability.
 - Promote Sustainable Certifications: Provide technical and financial support for farmers and SMEs to achieve relevant certifications (e.g., Organic, Fair Trade, GlobalG.A.P.) to access high-value domestic and international niche markets.¹⁷⁶

4. Capacity Building and Collaboration:

- Farmer and SME Empowerment: Invest in capacity building programs for farmers on Good Agricultural Practices (GAP), financial literacy, and cooperative management. Provide business development services, quality management training, and access to finance for SMEs in processing and marketing.¹⁷⁵
- Strengthen Farmer Cooperatives: Support the formation and strengthening of farmer cooperatives to improve collective bargaining power, access to inputs and services, and engagement in value addition.⁹⁷
- **Foster Public-Private Partnerships (PPPs):** Actively promote and facilitate PPPs to leverage private sector investment, expertise, and market channels for the development of these overlooked value chains, with clear roles and responsibilities for public sector support.¹

By adopting these cross-cutting strategies, Tanzania can move beyond its traditional agricultural confines, unlocking the immense potential of its wheat sector's diversification opportunities and the rich biodiversity of its Neglected and

Underutilized Species. This will not only contribute to economic growth and improved livelihoods but also build a more resilient, nutritious, and sustainable food future for the nation.

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