RAISE-FS experience brief # 004

Business opportunities for Orange Fleshed Sweet Potato processing in Ethiopia

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This brief highlights the strategic importance of Orange-Fleshed Sweet Potato, which is a climate-resilient, nutrient-rich crop prioritized in Ethiopia's agricultural policy for its potential to combat malnutrition, enhance food security, and support income generation in vulnerable areas.

Orange Fleshed Sweet Potato (OFSP) is prioritized in policy

Sweet potato is an important staple crop in southern, southwestern and eastern parts of Ethiopia where climate change and population growth are rapid; crop diversification and production intensifications are limited; and malnutrition is severe because of cereal dominance in the farming system. It grows well in diverse agro-ecological zones, ranging from mid altitudes to lowlands where temperature is higher; drought is frequent and on marginal lands with minimum or no inputs, proving its reliability as food source during lean seasons when cereals are scarce. In southern and southwestern parts of the country, sweet potato is widely recognized for its role in food security, nutrition, and livelihoods.

Sweet potato makes significant contributions to food and nutrition security in Ethiopia, providing essential nutrients such as dietary fiber, vitamins (A, C, B6), Iron, Zinc, Potassium, carbohydrates as well as antioxidants which are crucial in addressing micronutrient deficiencies among children, pregnant and lactating women, and adolescent girls (MoA 2024).

The orange-fleshed varieties are particularly valuable because they help to address widespread vitamin A deficiency while also providing energy, fiber, and other essential nutrients. Beyond household consumption, sweet potato supports rural incomes through the sale of roots and vines, and it serves as a raw material for small-scale processors producing puree, flour, and snacks. Farmers also value the crop as a fast and efficient livestock feed, which adds to its versatility. With its adaptability, nutritional benefits, and contribution to income generation, sweet potato plays a vital role in advancing nutrition-sensitive agriculture, improving resilience, and reducing poverty in Ethiopia, food and nutrition security, income and job creation, export promotion, and import substitution

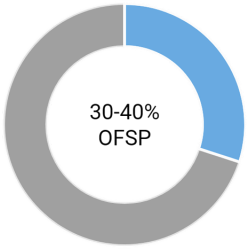
KEY messages

- **Nutritional and economic value**: OFSP provides essential nutrients, including beta-carotene for addressing vitamin A deficiency, dietary fiber, and antioxidants. Its versatility supports rural incomes through sales of roots and vines, and its use as livestock feed adds further economic value.
- **Opportunities for value addition**: OFSP puree is a cost-effective ingredient for diverse food products such as injera, bread, cakes, and snacks. However, addressing perishability, storage constraints, and supply chain inefficiencies is critical to scaling its production and market reach.
- **Value chain coordination**: Establishing aggregation centres, contract farming models, shared logistics systems, and anchor firms can improve efficiency, reduce losses, and ensure year-round supply of OFSP roots for processors.
- **Inclusive financing mechanisms**: Microfinance programs and blended financing solutions can support farmers with inputs and processors with working capital while enabling infrastructure development for aggregation centres and processing units.

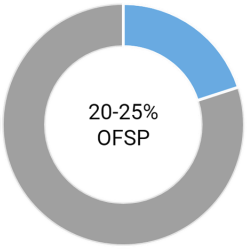
Farmers are the core actors in the OFSP value chain, responsible for growing, harvesting, and aggregating roots that serve as the primary raw material for the entire chain. Farmers are therefore expected not only to grow OFSP for household consumption but also to supply surplus roots to markets, enabling processors and retailers to deliver nutritious foods to non-growing consumers, thereby enhancing public nutrition and food security.

The following food products showcase OFSP as a natural, nutritious ingredient with versatile applications. OFSP puree can typically substitute 20–40% of the main ingredient to achieve the desired taste and texture.

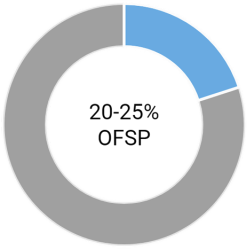
Proportion of ingredients for matching products



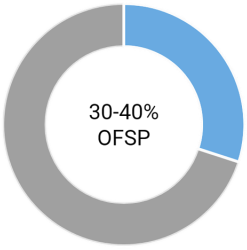
Injera (Teff flour)



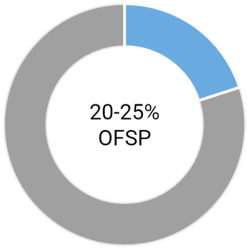
Bread OFSP (All-purpose flour)



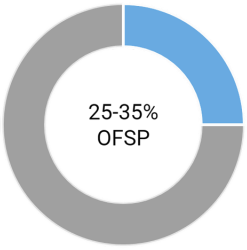
Flatbread (Whole wheat flour)



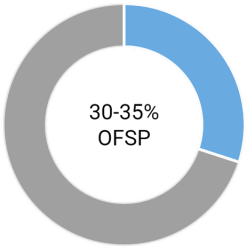
Cookies (All-purpose flour)



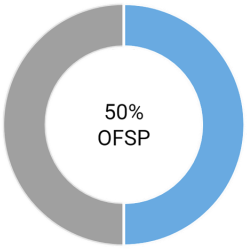
Biscuits (All-purpose flour)



Cake (All-purpose flour)



Porridge (Maize/sorghum flour)



Drink (smoothie) (Fruit (banana, 25%), Yogurt (25%))

Introduction of new, better varieties leading to higher yields, better nutrition, and climate resilience in Ethiopia

To combat malnutrition in the sweet potato dominated farming systems, biofortified orange fleshed sweet potato (OFSP) varieties, Kulfo and Tulla were tested and recommended for use by Southern Agricultural Research Institute (SARI) in collaboration with the International Potato Centre (CIP). Nevertheless, their adoption remained very low due to high moisture and low fiber contents, and a resulted adhesiveness to fingers. To ameliorate these challenges OFSP varieties: Dilla, Alamura and Kabode with better root dry matter and high Beta-carotene content, high yielding, drought tolerant, and widely adaptable species were released for production in southern parts of the country. The varieties have proven their richness in nutrient content, less stickiness, easily breakability after boiling, and good sensory qualities possession.

The following table compares the commonly grown white sweet potato variety (Gadissa), the earlier OFSP varieties (Kulfo and Tulla), and the recently released improved OFSP varieties (Dilla, Alamura, and Kabode). It highlights their agronomic performance, nutritional value, processing qualities, consumer preferences, and other uses to demonstrate why the improved OFSP varieties have greater potential for scaling in nutrition-sensitive agriculture and value chain development.

Sweet potato variety group comparison

Trait / Varieties →	Gadissa (White Sweet Potato)	Kulfo & Tulla (Older OFSP Varieties)	Dilla, Alamura, Kabode (Improved OFSP Varieties)
Key Traits	Widely grown, but lower yield	Low yield, less drought tolerant	High yield, drought/stress tolerant
Nutritional/Processing	Not specifically rich in target nutrients	Low dry matter, high moisture	High dry matter, rich in target nutrients, lower moisture (good for processors)
Consumption	Standard, less preferred	Finger-sticky, less pleasant texture	Less sticky, easily breakable after boiling, good sensory qualities
Other Uses	Mainly for household food	Limited adoption	Dual use: human nutrition + fast, efficient fattening feed for animals

Challenges and opportunities for scaling Drought-Tolerant OFSP Varieties in Ethiopia

Lack of clean planting materials, recurrent drought, pest infestation and knowledge gap on OFSP production and consumption, processing and poor value chain development are some of the key challenges in Ethiopia. In the study implemented by Stichting Wageningen Research Ethiopia, farmers described their new varieties of OFSP as drought resistant, surviving without rainfall. They use it for planting material, on-farm conservation, and extended consumption, noting yields are only 20–25% lower than in good rainy seasons. Farmers rely on seed conservation from previous season to maintain planting material for the next season, demonstrating acceptance of improved OFSP varieties. Irrigated farmers can produce roots and vine cuttings to support a local seed business, aided by Areka Research Center's tissue culture unit for clean planting material in Boloso Bombe Woreda.

Figure 1. Farmer harvest OFSPs storage roots, while keeping intact vine with fibrous roots for the next planting cuts

Cultural practices favor boiling and eating white sweet potato as a sole meal, limiting experimentation with OFSP. Currently, roots of OFSP are typically boiled and eaten alone, causing nutrient loss, higher fuel use, and sticky texture. Education on steaming techniques of OFSP and promoting its incorporation into staple foods can improve diet diversity and maximize nutritional benefits. Introducing simple, affordable steaming practices can preserve nutrients, reduce fuel and water use, improve texture, and facilitate incorporation of OFSP into staple foods and vending products, enhancing both nutrition and market potential.

Most farmers currently produce OFSP only for household consumption and are unaware of the possibility of selling roots to processors or retailers. Strengthening value chain connections and raising awareness on OFSP's benefits—drought tolerance, high yield, high dry matter content, nutrition, and consumer-preferred quality—can promote market partnerships and scale adoption in food-insecure districts. As a result, OFSP processor SMEs can reliably source roots to produce puree for nutritious food products that are pre-tested and consumer-approved, encouraging farmers to aggregate and sell their produce.

Figure 2. Farmers growing OFSP

Challenges and opportunities for post-harvest utilization and value addition

Postharvest handling of OFSP roots faces challenges due to high perishability and seasonal availability. Fresh roots can be stored for up to 12 months at 13–18°C with >85% relative humidity, but long-term storage is limited for most farmers. OFSP flour is easy to incorporate into foods but economically inefficient, requiring 7 kg of roots to produce 1 kg of flour, and processing often reduces beta-carotene and lowers consumer acceptance. OFSP puree offers higher conversion and versatility in food products while reducing reliance on expensive staples like teff and wheat, but it requires cold-chain storage. Addressing these constraints through improved storage, processing technologies, and market linkages can enhance nutrition, reduce postharvest losses, and increase the economic value of OFSP.

a. Companies engaged in OFSP puree production

OFSP puree distribution is weakly established, due to lack of sustainable access to OFSP roots for full operation. The core problem was found to be seasonality of the crop and shortage of the OFSP root sourcing.

The Duwame Enterprise puree unit (Hawassa) has a production capacity of 10–12 quintals per day per shift, but currently operates only occasionally, when OFSP roots are available. Distribution is limited due to seasonal shortages and weak access to consistent root supply. Attempts at contract farming were hindered by early harvests before the unit's power supply and equipment commissioning, highlighting the need for reliable sourcing to fully utilize

production capacity. The SME lacks cold storage for OFSP roots and puree and needs support for facility upgrades and capacity building. Improved storage would allow bulk procurement, increased puree production, and extended supply to nutritious food processors. The SME is eager to create linkage with OFSP root growers for stable supply.

Figure 3. Puree processing machines at Duwame Enterprise and Jara Agro Industry PLC

Jara Agro Industry PLC (JAI) (Wolaiyta zone, South region) has relocated its OFSP puree processing machines to its Blatie compound, where irrigated roots and planting materials are also produced. The company occasionally produces planting materials for smallholder farmers and previously supplied puree to bakeries in Addis Ababa, finding OFSP more profitable than other products. JAI has allocated 20 ha for OFSP roots, and its machines—including washer, steamer, pureeing, and vacuum packing units—have a full capacity of 10–12 quintals per day per shift. The processing hall and three-phase power supply are ready for operation, and the manager has received specialized training in Kenya and had exposure to OFSP puree enterprises in Rwanda and Malawi. The company has cold storage and irrigated farms to reduce seasonality, but faces bottlenecks due to distant puree users, weak value chain linkages, and limited business partnerships. JAI Plc is willing to scale up puree processing if strong market linkages and consumer awareness on OFSP nutrition are promoted. With its capacity to produce planting material, roots, and puree, JAI Plc could serve as an anchor firm to coordinate OFSP value chain actors, expand market access, and contribute to nutrition improvement.

a. Street food

Ertib (steamed tuber served with hot pepper powder) food vendors commonly serve boiled white sweet potato, but use of actual OFSP roots is limited. Vendors prefer roots over puree due to concerns about cost and accessibility, and many are unsure where to source them. Some still rely on older varieties, noting past issues with watery texture and stickiness. These challenges highlight the need for awareness campaigns, skills training, consumer education on nutritional benefits, market promotion, and roadside demonstrations showcasing preparation and use of new OFSP varieties.

Figure 4. Street Ertib food vender stalls

Enhancing chain-wide performance

Limited consumer awareness of OFSP's nutritional benefits has slowed acceptance and demand, while weak value chain linkages and underdeveloped chains and markets restrict root supply and product distribution. Addressing these gaps is essential to unlock OFSP's potential for nutrition, food security, and income generation.

However, there are opportunities that can drive value chain development:

- Availability of virus-free planting material ensures quality root production and reliable bulk supply for processors.
- OFSP puree is a cost-effective alternative ingredient for baking injera, cookies, and bread.
- Puree processing machines at certain SMEs are fully functional and ready for use.
- SMEs are committed to building viable and sustainable OFSP value chains to expand market reach.
- Cold chain enhances shelf-life of the roots as well as the puree
- Systematic value chain development can reduce losses, meet existing demand, and open new market segments.

Effective coordination, stakeholder collaboration, and strategic partnerships are needed to improve aggregation, storage, transport, market promotion, and consumer awareness of nutritional benefits. Strengthening these connections will enhance efficiency, profitability, and the long-term sustainability of the OFSP value chain while improving food security and nutrition outcomes.

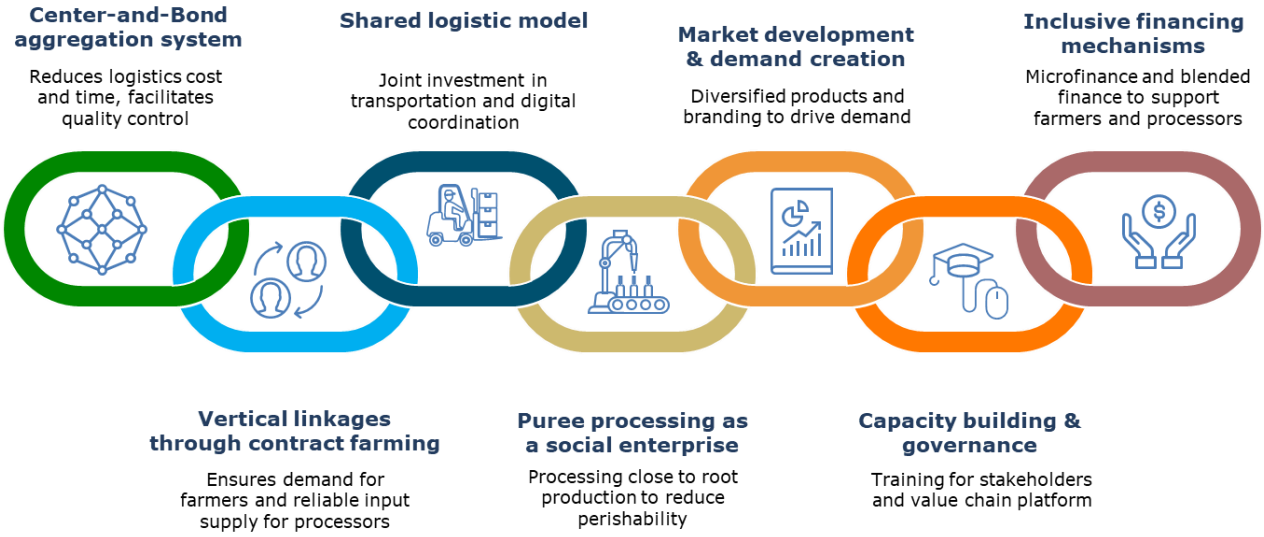
The roles, opportunities, challenges and possible solutions of key OFSP value chain actors are summarized in the table below.

Chain actors	Roles	Opportunities	Challenges	Recommendation
Farmers	Grow, harvest quality OFSP roots, manage post-harvest handling & nutritional value	Market expansion, support programs, partnering with Nutrition Sensitive Agriculture & processors	Access to quality seeds, knowledge gaps, post-harvest handling, food use, market access, seasonality	Training, subsidies, contract farming agreement with processors for market
Root aggregator and distributors	Aggregate, transport, store, and deliver OFSP roots from farmers to processors/ retailers	Efficient supply chain management, market growth	Solve logistical inefficiencies, perishable goods, ensuring quality during transit	Cold chain infrastructure, partnerships with processors
OFSP puree processor SMEs	Process raw roots into puree, package for puree food processors or direct consumers	Product innovation, local demand for nutrition, healthy food export markets	Limited processing capacity, access to equipment, seasonal supply, quality control, packaging, maintain food safety, demand management	Financing, training in food safety & quality control, innovative packaging
Puree user food processors	Use puree in final food products (e.g., baked goods, snacks, drinks), market to consumers via retail channels	Health-conscious consumer, naturally nutritious, product diversification (functional foods, gluten-free products, or baby food)	Sourcing quality puree, loss of quality leads production/ supply chain disruptions, production scaling, regulatory compliance market demand	Long-term contracts with puree processors for steady supply, capacity building, partnership with NGOs for certifications/ standards
Retailers	Sell OFSP products (roots, puree, nutritious food) to consumers	Capitalize on nutrition, health trends, increased foot traffic	Consumer education/ awareness, price fluctuations, shelf space, supply chain management	In-store education, product sampling
Consumers	Purchase and consume OFSP-incorporated nutritious food products	Health benefits, convenient products, nutrition cost benefits (esp. women & children)	Understanding nutritional benefits, taste preferences	Awareness campaigns, affordable products
Waste Management	Manage post-harvest and processed waste	Value-added products (e.g., animal feed), environmental sustainability	Improper disposal, lack of awareness and skills on utilization	Composting, recycling, waste-to-value programs

OFSP puree processing SMEs have gained valuable lessons from Irish Aid, EU, and CIP-supported Bio-Innovation Africa programs, as well as technical support from universities and research institutions on product development, recipe standardization, and market testing. They have procured processing machines, launched pilot products with food processors in Hawassa and Addis Ababa, and demonstrated applications in injera, bread, cookies, cakes, and snacks. The processed products cater to diverse consumer preferences and provide various food options in the market.

However, in order to build a robust value chain, key challenges must be overcome, which are highlighted in the table below.

Innovative linkage for IBM implementation



Recommendations

Ethiopia can improve nutritional outcomes, especially among the most vulnerable groups by employing wide-scale campaign in OFSP production and consumption mainly in maize and white sweet potato dominated food systems thanks to nutritional quality and productivity of OFSP. Promoting consumption of OFSP roots is often considered as the most affordable and sustainable strategy in combating malnutrition and health risks compared to industrial fortification.

Creating strong alignment with the national sweet potato strategy, non-governmental and the private sector initiatives is crucial to improve technology delivery, increase farmer and consumer interest, reduce postharvest loss; improve productivity and quality, sustain year-round supply of tubers at sufficient amounts for market development, puree processing, nutritious foods production and marketing.

Enhancing coordination, creating transparent value chain linkages among farmers, processors, and retailers is critical to ensure efficient supply, market growth, job creation, nutrition impact, and income improvement. Key actions include establishing binding contracts, supporting intermediary distributors, investing in irrigation to address seasonality, and providing skills training for all actors. Expanding irrigated OFSP production can reduce seasonal gaps, while training for all value chain actors and consumer awareness on OFSP benefits can promote mutually profitable businesses and wider adoption of nutritious foods thereby contributing to poverty alleviation and economic development.

Reference

Ministry of Agriculture 2024. The national potato and sweet potato development strategy 2024-2030.

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