Commercial Pathways for Scaling-up Puree of Orange-fleshed Sweetpotato (OFSP) in Africa:

Lessons Learnt on OFSP Value Chain Development in SSA and Opportunities for Scaling UP.

Tawanda Muzhingi
Regional Food Scientist
International Potato Center
March 2017

Developing Biofortified Orange-fleshed Sweetpotato (OFSP) in Africa

- **Biofortification:** Enriching beta-carotene content in sweetpotato through conventional breeding
  - In Africa, sweetpotato is mainly white-fleshed, not having beta-carotene
  - Orange-fleshed sweetpotato is among the most efficient sources of Vitamin A

- CIP's strategy: Breeding in Africa for Africa
  - Supporting NARS through regional breeding populations and training in accelerated breeding schemes

➢ **10 African countries have released 42 OFSP varieties since 2009**

Promoting OFSP in Africa: Improving nutrition among 2.9 m households

Evidence of efficacy & effectiveness concerning vitamin A:

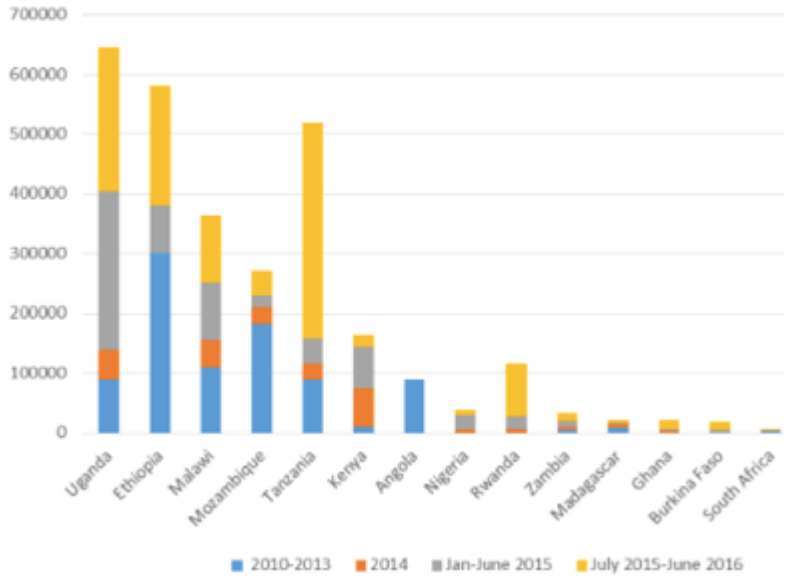
- At least doubling of vitamin A intakes
- 15% reduction in prevalence of vitamin A deficiency

Mama SASHA Study (2010-2015): 7% stunting reduction in children under 2 yr of age ***when*** mothers grew OFSP & attended ante-natal clinics & pregnant woman's clubs

2.9 m households cultivating OFSP since 2010

Driven by demand and improved delivery systems:

- Integration with health and nutrition programs
- Consumer education
- Seed system innovations
- **Improved processing technologies**
- **Market development**
- Partnerships with governments, NGO's, private sector



The OFSP post-harvest challenge

- Sweetpotato are highly perishable
- In Southern Africa, sweetpotato is a seasonal crop
- **How to build year-round supply of OFSP?**

➢ This challenge is a key space for innovation and generating economic value.

Key innovations for OFSP post-harvest management

Storage

Transformation

OFSP fresh root storage

- OFSP fresh roots can be stored for up to 12 months under climate controlled conditions (standard practice in US)
- Storage conditions :
  - Temperature between 13 - 18 ◦C
  - Relative Humidity > 85%
- Storage in Africa:
  - Off-grid (solar) climate control feasible
  - Commercial model under proof-of-concept evaluation

- **OFSP Flour**
  - Dry product, limits to easy formulation into food products
  - But economically inefficient (7kg OFSP fresh roots to get 1kg flour)
  - Loss of beta-carotene during drying and processing
  - Low consumer acceptance of products

- **OFSP Puree**
  - Wet product that is very perishable; requires cold chain
  - Easy to formulate into a variety of food products
  - High conversion 1.3kg of fresh roots to 1kg of puree
  - No significant loss of beta-carotene

OFSP puree demand: Wheat substitution

Country	Wheat imports per year (1,000 MT)
Egypt	11,800
Algeria	8,200
Morocco	5,000
Nigeria	4,400
Ethiopia	1,800
South Africa	1,650
Kenya	1,625
Mozambique	725
Zimbabwe	280
Malawi	160

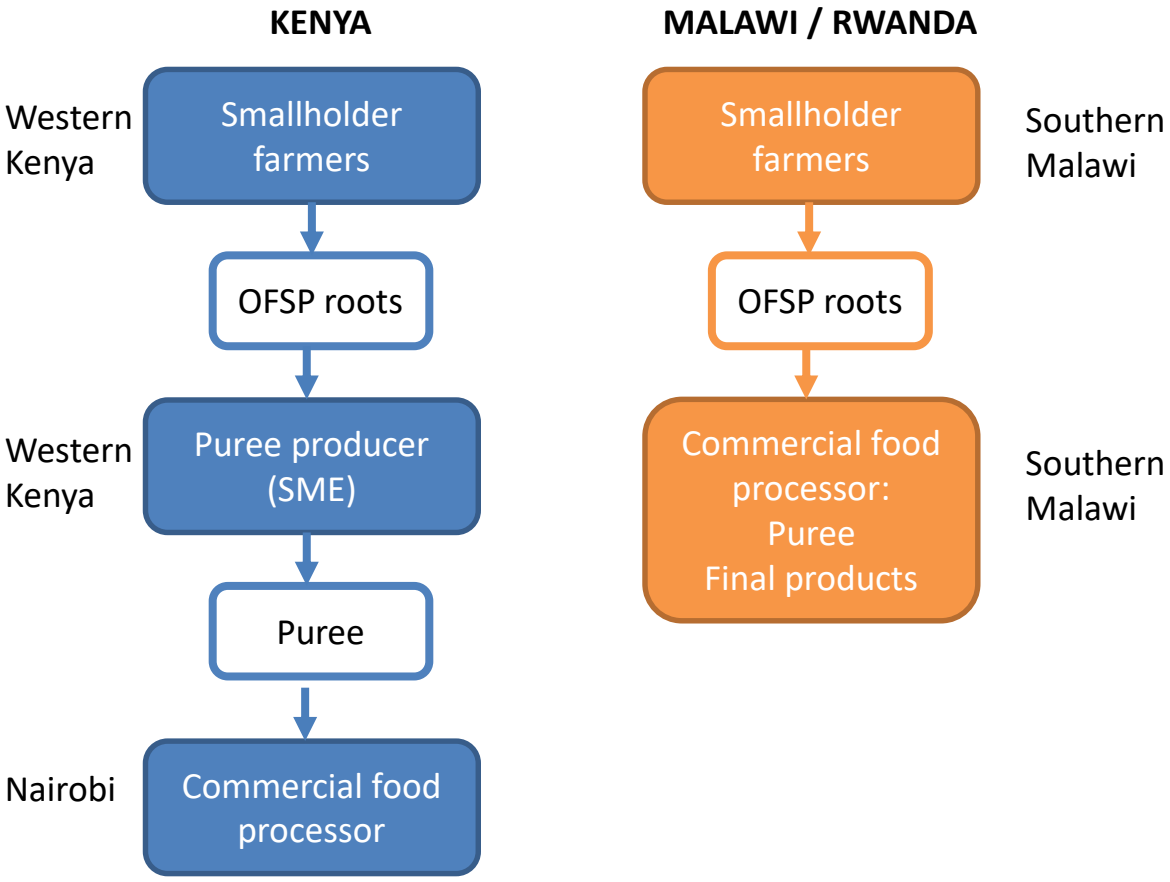
- Top 10 wheat importers in Africa
- Among top 100 in the world

➢ OFSP puree can significantly reduce need for wheat importation

OFSP puree processing technologies

A= Aseptic microwave puree processing method in NC, USA
B= Small-scale factory puree processing with cold chain in Kenya

Two supply chain models under proof-of-concept evaluation



Each model with different:

- Economic parameters
- Technology packages
- Supply chain challenges
- Income and employment benefits

MALAWI/RWANDA Model: Onsite OFSP Puree Processing

KENYA Model: Independent OFSP Puree Processing

OFSP Farmers

OFSP Puree Processor

OFSP Puree
Bakery ingredient

TUSKYS
Pay less, get more, Everyday

CENTRO INTERNACIONAL DE LA PAPA
CIP

Euro-Ingredient Ltd
Product Development
and Equipment Support

OFSP Puree Challenges

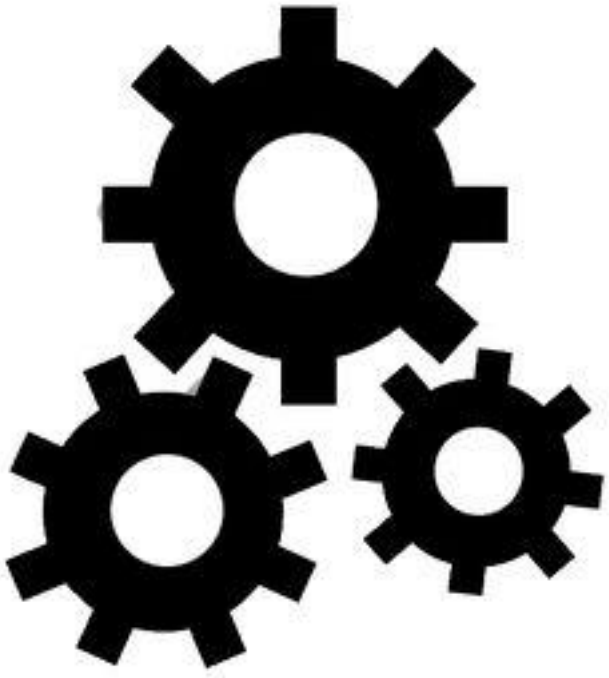
- Supply chain management of roots (seasonality, quality)
- Perishability of puree (cold chain reliance)
- Adoption of technology (new technology/new food products)
- Training needs (farmers and processors)
- Consumer education (nutritional value awareness)

Building blocks for solutions

PUREE STORAGE

- Development of Shelf-stable OFSP puree
- Current trials with 1% citric acid, 0.25% potassium sorbate, 0.25% sodium benzoate with vacuum package
- Storage T <25C
- Shelf-life 6 months
- Product quality

Building blocks for solutions



ENABLING FACTORS

- Off-grid technologies for fresh roots storage to bridge supply chain challenges (seasonality)
- Nutrition labeling and promotional activities for consumer education
- Business development for processors (business plans, linkages with suppliers)
- Enabling environment (policy, Bureaus of Standards)
- Collaboration with US institutions in the sweetpotato belt (technology transfer)

Long-term questions

CIP as a research partner works to address these questions

- **Development outcomes**
  - Smallholder participation
  - Employment
  - Consumer benefits
- **Competitiveness and sustainability**
  - Economic and business rationale over time and in different markets
  - Alternative products
  - Trade conditions
  - Policy support
- **Environmental conditions and impacts**
  - Continued sweetpotato productivity
  - Water requirements
  - Energy requirements

Positive medium-term outlook

- **Demand for healthier foods** in an urbanizing environment (including healthier types of bread etc.)
- Demand for **sweetpotato as an ingredient** (wheat substitute)
- Favorable **macroeconomic policies**: investment promotion, youth employment
- New OFSP varieties will target **processing quality traits** (shape, size, starch properties, colors)
- **Processing technologies** continue to improve and adapt (microwave etc.)
- CIP's **International collaboration** will strengthen: US, China, Japan