



RESEARCH
PROGRAM ON
Roots, Tubers
and Bananas



Building Gender- Responsive & Nutritious Sweetpotato Value Chains in Rwanda

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**Participatory Plant Breeding
and Resilient Seed System
Development Course**
1 December 2020

Different impact pathways have been pursued

1

Combatting vitamin A deficiency in rural areas, especially among young children & their caregivers has been **the** major focus, with improve vitamin A status the goal



2

Linking OFSP & nutrition education to health services for pregnant women --specifically addresses the first thousand days with focus on nutrition outcomes



3

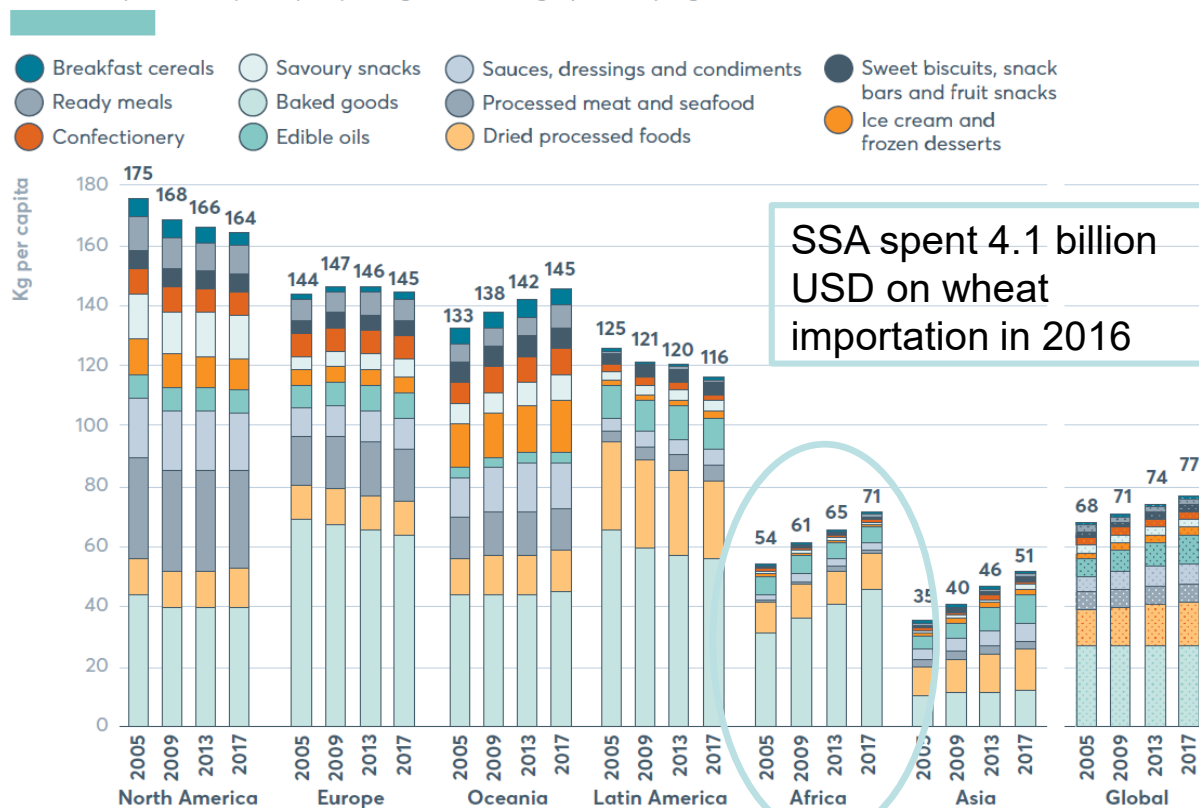
Having a market for roots drives adoption, expansion, and willingness-to-pay for quality planting material. The challenge is how to ensure women benefit from commercialization...



Increasing urbanization represents a challenge & an opportunity for orange-fleshed sweetpotato

- Africa— fastest urbanizing continent
 - 50% of population in urban areas by 2030
- Most sweetpotato in Africa is boiled or steamed
 - Diversified use unknown
- Consumers desire convenience & affordability—processed food demand increasing

Trends and patterns in per capita packaged food category sales by region, 2005–2017



Source: Data is from the Euromonitor International Market Information Database.⁴⁶

Partial substitution of wheat flour in baked and fried products is a win-win proposition..



Example of building the first gender-responsive value chain for OFSP processed products in Rwanda

Identify potential partners...
Private sector processor needs to be willing to take risk & show evidence of commitment to social responsibility...



CIP, NGO & government partners must be willing to jointly develop intervention & agree to common monitoring tools & commitment to emphasizing female inclusion



Smallholder landholding size very small (0.2 ha).
Increasing productivity essential for having surplus for sale. Disease-free or “quality” seed is critical.



Catholic Relief Services
Imbaraga
YWCA



Formative research with the private sector partner key to selecting a product company will support

- Flour vs Puree...
- Which product makes sense..
 - Economic standpoint
 - Consumer standpoint
 - Biscuits, bread, donuts, queen cakes
- Six-month effort..



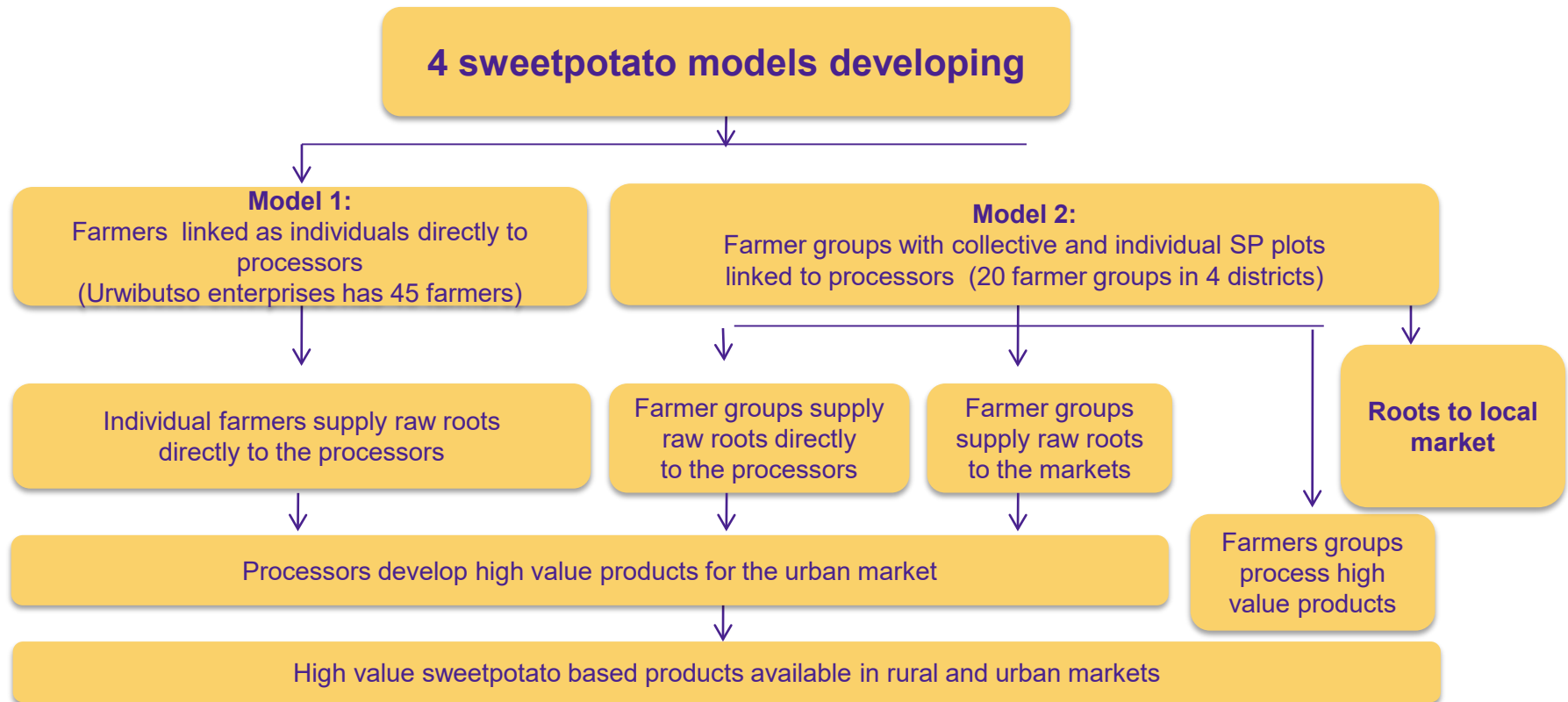
43% wheat flour
replaced by puree



20-60% wheat flour
replaced by puree

On average, OFSP puree use reduced cost of production per unit 12%

Expected to have 2 models... But deviations occurred



- From the outset, agreed that 75% of the farmers linked to the processor had to be women...

Selection of Varieties

- **Goal:**
 - Recognition of nutritive value of orange-fleshed types (OFSP)
 - Recognition of value of disease-free planting materials (local yields 4-6 t ha⁻¹)
 - Orange-fleshed types linked into agro-processing
- **On-farm Demonstrations and Consultations**
 - **Gihingamukungu** best for processing and good yields
 - **Ukerewe** best taste, preferred by adults for home consumption
 - **Carcearpedo** good taste, good yields, but too virus susceptible
 - **Kabode** started to be used in year 3, highly productive & virus tolerant acceptable taste to households; bumpy shape difficult for processing



Gihungamukungu

Variety	Dry Matter	Highest production Tons/ha	Average yields on-farm Tons/ha
Cacearpedo (2008)	31%	19.4	12.5
Gihingamukungu (2004)	26%	16.5	12.5
Ukerewe (pale yellow)	33%	15.8	10.3
Kabode (Uganda)	28%	19.6	15.4

Biscuit Development Required Substantial Investment & Training

Old technology

Farmer sorting
out SP roots



Manual biscuits making



Wheat flour Biscuits



Biscuits
packaged



New technology

EIL
Support



The Golden Power Biscuit



Packaging
targeting
high end
consumer



Packaging
targeting
lower end
consumer



Monitoring & Survey Work

- Monitored yields annually and root & product sales monthly
- Baseline survey: 2012: 596 households;
 - 279 Northern Districts
 - 317 Southern Districts
- Endline survey (# hhs): September 2014, 852 households
 - Control (213): No participation in project activities
 - Participants (327): Linked to project activities directly
 - Spillovers (312): Obtained vines from neighbors in project but had no direct access to market opportunities

Sweetpotato remained a staple part of the diet.

Food Security still #1



Disease-free
seed from RAB
raised yields 30-300%
on farmer's fields
& enabled surplus
for sale

Mean area in
agriculture only
0.43 ha; area under
sweetpotato 0.08

Quantity of Sweetpotato Produced and Sold by Gender of Principal Grower across Categories*

Group	Sample Size	Total produced (kg/HH)	Sold (kg/HH)	% Production sold	Value of Sales (\$/HH)
Control Female	119	409	116	28%	174
Control Male	88	333	147	44%	181
Participant Female	247	1118	364	33%	277
Participant Male	80	1099	321	29%	143
Spillover Female	220	487	134	28%	110
Spillover Male	92	750	206	28%	109
Total	846	731	226	31%	187

*Source: Reported production and sales by plot by season for 2013-2014 from Rwanda Endline Survey.

Strengthening of Pre-basic Seed System at RAB Rubona Station



New distiller to fix water quality issues

1) 4,000 plantlets per month



2) Hardening in glass house



3) New screenhouse

Investment in identifying and training networks of vine multipliers (both individuals & groups)



- 40 persons trained
- Labor/frame from community
- Netting from project
- Near home of leader best
- Able to maintain for 2 years

1,200 cuttings in 2 months

**RWANDA
SWEETPOTATO
SUPER FOODS
PROJECT**

Ukeneye imbuto nziza
y'ibijumba bya kijyambere
bikungahaye kuri vitamini A

**BARIZA MURI
COOP: TUZAMURANE
TEL: 078 378 4462**

SWEETPOTATO SUPER FOODS
RWANDA
WONGERERE ACACIRO IBIJUMBA RWANDA



The composition and wealth level of the individual vs the two NGO-supported groups differed

Table 4. Characteristics of Participant Households in Super Foods Value Chain

Type of Supplier/Grower	Individual	Group	Group	Total
Technical Support Provider	SINA	IMBARAGA	YWCA	Total
Sample Size	37	169	121	327
Characteristics of HH head				
HH head is female (%)	32%	27%	49%	36%
HH head is single (%)	8%	5%	18%	10%
HH head is widowed (%)	24%	18%	26%	22%
HH head is <30 years old (%)	8%	11%	22%	15%
Mean years of formal education	7.26	5.81	5.48	5.85
Household Level				
Wealth index (N, 1-12)	7.67	6.75	6.41	6.73
Total Livestock Units (2014)	1.75	1.12	0.71	1.04
Land under sweetpotato production (ha) in 2013/2014	0.08	0.10	0.05	0.06

Source: Rwanda Super Foods Endline Survey, September 2014.



YWCA vulnerable groups required additional agronomic training....

Very distinct sub-groups

Market-oriented Imbaraga

Vulnerable YWCA

Farmers better off when sold to processor than to local market (2013/2014 data)

- % of households selling any sweetpotato
 - 50% Control 80% Participant 60% Spillover
- Female participants accounted for 42.5% of total sweetpotato sales transactions, compared to 11.5% for male participants.
- Both participant female and male SP growers received higher average prices (145 and 149 Rf/kg, respectively) if they sold to Sina than if they sold to traders (111 Rw/kg) or directly to consumers (103 and 88 Rf/kg, respectively)
- ***Note SINA encouraged to pay slightly above going market price***



Farmers in groups more economically efficient than individuals; market-oriented Imbaraga best....

Average Revenue, Costs, Profit per Hectare, Profit Margin, and Economic and Profit Efficiencies by Category

	Control	Participant	Participant	Participant	Spillovers
Category of Beneficiary		SINA	IMBARAGA	YWCA	
<i>Sample size</i>	213	37	169	121	312
Sweetpotato output value (\$/ha)	112	249	357	209	214
Variable cost (\$/ha)	115	185	145	123	113
Profit(\$/ha)	78	153	257	136	141
Profit margin	69%	62%	72%	65%	66%
Economic efficiency	0.7	0.8	1.8	1.1	1.2
Profit efficiency	44%	48%	52%	56%	54%

Source: Rwanda Super Foods Endline Survey, September 2014. For definitions see Table 2.

++ Profit margin: profit as a percentage of the revenue (output value).

*Economic efficiency= profit per hectare/ variable cost per hectare. It is the profit made from unit cost of production; for instance 1.8 indicates a 1 dollar investment in sweetpotato production system generates a 1.8 dollars net profit.

**Profit efficiency (PE) is computed by using stochastic profit frontier function, which combines technical, allocative and scale efficiency in profit function. PE is defined as the ability of farmer to achieve highest profit given the output price and cost of inputs used and profit gained from potential.

Coordinated communication effort to change the image of sweetpotato to be a healthy crop



Mandazi day



RADIO & TV promotion



Exhibitions



Sign post for vines



Monthly newsletter



Farmer recognition of importance of nutritional value of crop is clear...

Group	Control	Beneficiary	Spillover	Total
1. Sweetpotatoes that are orange inside are healthier than ones that are white inside				
Strongly agree	20%	63%	44%	45%
Agree	28%	34%	47%	37%
Not know or no opinion	46%	3%	7%	15%
Disagree	6%	0%	2%	2%
Strongly disagree	0%	0%	0%	0%
2. Sweetpotato is the most reliable food crop for our family during times of food shortage				
Strongly agree	54%	66%	54%	59%
Agree	42%	33%	43%	39%
Not know or no opinion	0%	0%	1%	1%
Disagree	3%	1%	2%	2%
Strongly disagree	1%	0%	0%	0%
#. Sweetpotato should be included as part of the Crop Intensification Program in my District				
Strongly agree	38%	48%	37%	41%
Agree	48%	45%	50%	48%
Not know or no opinion	6%	5%	7%	6%
Disagree	5%	2%	3%	3%
Strongly disagree	3%	0%	3%	2%



3 of 4 project districts began permitting vine production in value bottoms again...

2 or 4 made increased sweetpotato production part of performance contracts

Proof that economically-viable, OFSP-based processed products can meet consumer preferences



- Launch in Nov 2012
- From November 2012 through June 2014, Sina earned \$364,410 in sales of OFSP products
- *Post-project* Sales from July 2014-July 2015, \$403,559
 - mandazi 81%
 - biscuits 19%
- Products still on market today

	Per 100 gms	Per Serving
Vitamin A (micrograms or mcg RAE)	340	157
Protein (grams)	7.5	3.5
Carbohydrate (grams)	65.1	30
Fat (grams)	15.8	7.3
Dietary fiber (grams)	3.0	1.4

Analysis by ALS Food & Pharmaceutical Laboratory, Cambridgeshire, England

One serving = 4 biscuits = 46 grams total

Child under 9 years old requires 400 mcg daily

Non-pregnant woman requires 700 mcg, adult men 900 mcg



Other efforts are underway



Vacuum-packed purée as a separate product



OFSP bread loaves and buns in Kenyan supermarkets



Manual machines for chipping into fries..



Thanks for your attention!

For more information consult www.sweetpotatoknowledge.org

