Competitiveness of Ugandan bred OSP varieties and key emerging seed system innovations

Charles Musoke, Sam Namanda and Robert Mwanga

[1]*National Crops Resources Research Institute*
[2]*Harvest Plus*
[3]*International Potato Center*

HarvestPlus c/o IFPRI
Plot 15 East Naguru Rd • Kampala, Uganda
Tel: +256 414 287107• Fax: +256 414 285079
HarvestPlus@cgiar.org • www.HarvestPlus.org

Content of the presentation

- Ugandan bred OFSP varieties and thier competitiveness

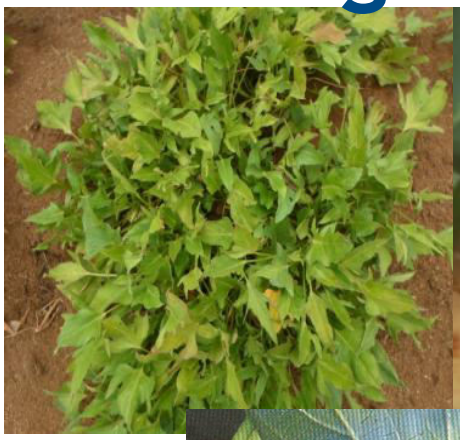
- Quick Background to the Uganda seed sector and implication to sweetpotato seed innovations/Commercialization dynamics

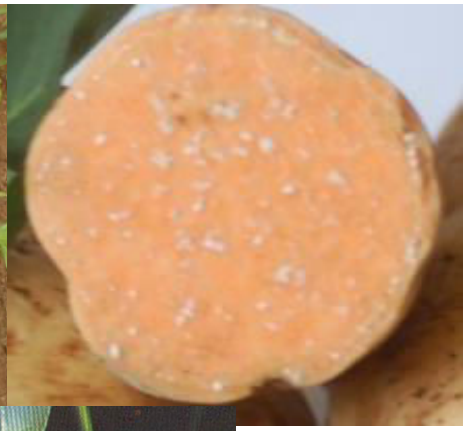
- Emerging Sweet Potato Seed Systems innovation in Uganda

Biofortification: a cost effective approach to alleviating VAD

- 1990s - CIP introduced OFSP to NARI partners in SSA.

- OFSP clones were not adapted to local growth and consumption conditions (SPVD, Alternaria, DM)





OFSP Cvs development focuses on embedding SPVD and Alternaria blight resistance, DM content, root shape, culinary qualities, and balanced HI into a genetic background with enhanced β-carotene (& the must traits)

Considerations for our innovations in expanding production of OFSP

- Combining Pro-vitamin A, DM and SPVD resistance is a big challenge - many potential high yielding varieties have been lost in this way.

- Low DM of most OFSP limited increased utilization at HH level =low Dry yields after processing. High acceptance for some varieties is still limited to children; adults prefer dry textured roots.

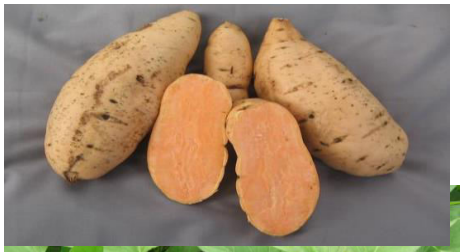
- Poor seed systems - affect quality, quantity, timing

- This is coupled with a crippled extension

RELEASED OFSP VARIETY ATTRIBUTES

Variety	Year released	Root yield (t/ha)		Pest/disease resistance		
		Station	Farm	SPW	SPVD	Alternaria
Ejumula	2004	19	15	S	S	M
Kakamega	2004	15	12	S	M	M
NASPOT 8	2007	20	16	S	M	M
NASPOT 9 ('Vita')	2007	20	13	S	M	M
NASPOT 10 ('Kabode')	2007	18	12	S	M	M
NASPOT 12 O	2013	25	16	S	M	R
NASPOT 13 O	2013	38	11	S	M	R

The new OFSP varieties break the link between flesh color & DM, offering growers the good yields, a relatively high Vit. A content in a background with good starch and disease resistance!!



NASPOT 13 O

NASPOT 12 O

Competitiveness of varieties

Central	Yield (t•ha^{-1}) ^{y}		Disease severity		Dry matter
	Root	Vine	SPVD	Alternaria	(%)
NASPOT 1	33.2	33.8	4.0	3.3	33.5
NASPOT7/2006/1185	18.9	38.8	2.8	2.0	33.3
NASPOT 12 O	46.1	31.3	3.1	2.6	30.3
NASPOT 8	39.8	26.5	2.8	2.3	34.4
New Kawogo	7.9	45.3	2.4	2.7	31.2
NASPOT 13 O	27.8	41.7	3.1	2.3	32.7
Dimbuka-Bukulula	18.3	39.6	3.8	2.5	34.4
Mean	26.2	37.3	3.1	2.5	32.5
$LSD_{(0.05)}$	6.6	7.9	0.5	0.5	3.6

Regional differences NOTED

Buyende	Eastern	Root	SPVD	Alternaria	Taste Test Rank[w]
	NASPOT 10 O	12.6	2.3	1.0	2
	NASPOT 7/ 2006/	5.6	3.0	1.0	6
	NASPOT 12 O	19.5	2.6	1.0	3
	NASPOT 13 O	9.2	2.1	1.1	4
	Muwulu aduduma (LC)	9.5	3.0	1.0	1
	Mean	11.3	2.6	1.0	NA
	$LSD_{0.05}$	3.9	0.7	NS	NA

Regional preferences

District[z]	Cultivar	Yield[y] (t•ha^{-1})	Disease severity		Taste test
Isingiro		Root	SPVD	Alternaria	rank
	NASPOT 10 O	10.9	2.7	1.2	2
	NASPOT 7/ 2006	8.2	3.3	1.2	6
	NASPOT 12 O	18.7	2.9	1.7	1
	NASPOT 13 O	11.5	2.7	1.6	3
	Kyebandira (LC)	11.3	3.4	1.8	4
	Mean	12.7	3.0	1.5	NA
	$LSD_{0.05}$	4.0	NS	0.4	NA
	CV (%)	34.5	28.3	28.2	NA

Uganda Seed Industry; Implication to innovation

The seed industry consists of two sectors: Informal and Formal Sectors

The Informal Seed Sector

- **Local/traditional or farmer seed system.**
- **Seed does not come from planned seed production. It represents a part of the grain crop.**
- ***Involves farm saved seed.***
- ***Characterized by:***
  - **Lower level organization,**
  - **Lower level institutional development,**
  - **Lack functional specialization.**
- **A wide variety of exchange mechanisms,**
- **Traditional exchanges of information**

Composition of the Seed Industry

Formal Seed Sector

- Comprises public organizations and private seed companies.
- Clear distinction between “seed” and “grain”.
- Activities are institutionalised,.
- Activities are specialized and structured.
- Seed trade is subjected to seed laws:
  - variety control, seed testing, etc.
  - identity of seed quality traded.

- Varieties are a result of organized breeding programs.

The Formal Seed Industry

- The formal Uganda seed industry comprises:
  - Germplasm conservation
  - Plant breeding
  - Variety Evaluation and Release
  - Seed production, processing, storage and marketing
  - Seed quality control
  - Seed Extension
  - Farmers using the seeds

- Seed industry is governed by the Seed Law
  - Plant Variety and Seeds Act, 2006, Seed Policy 2015
    - Is enforced by MAAIF
    - Seed classes:

Transitional system! We belong here

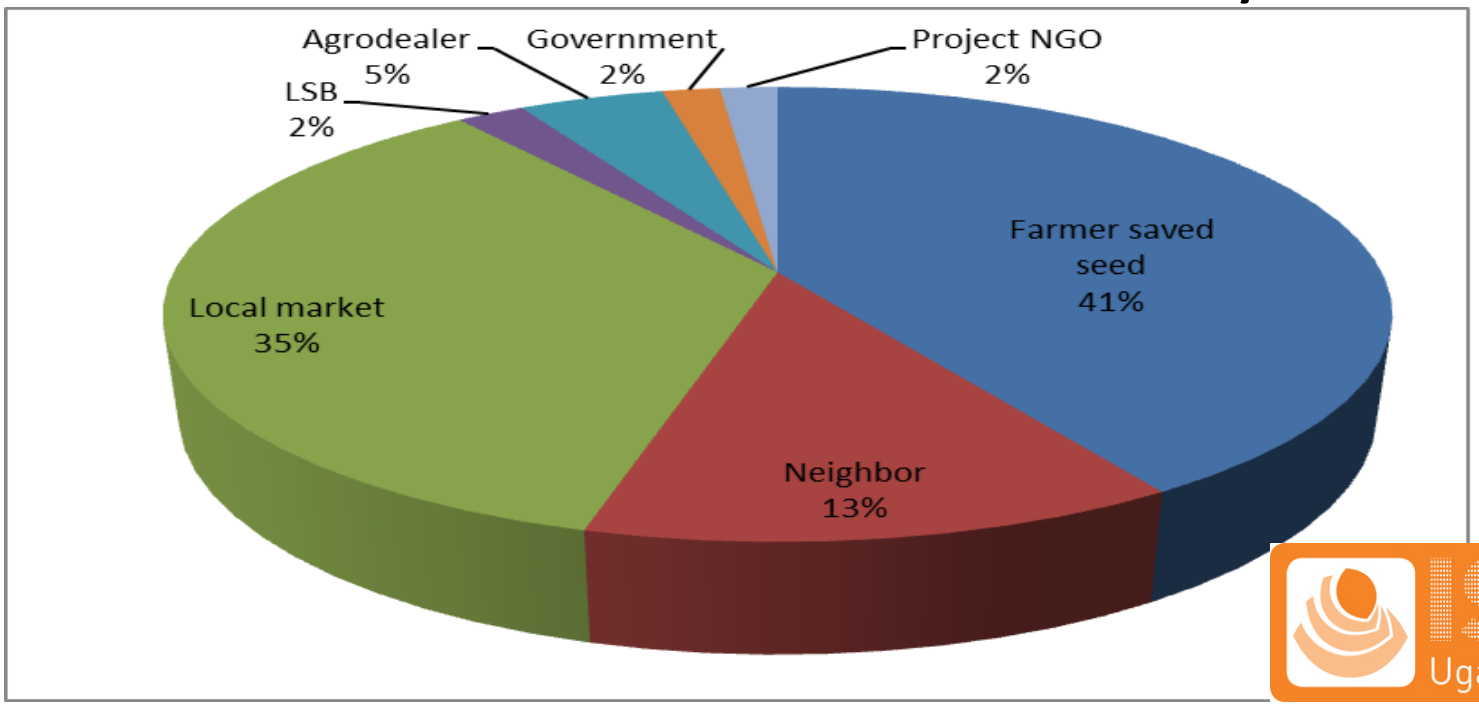
- Seed and planting materials are accessed from both community and improved varieties from research thru extension and farmer groups, potential for elite varieties

- Implication: Transformation will happen when the seed merchant is registered and the variety they are producing is listed in the catalogue,

- seed and plant act, 2006 and draft policy 2015

Current trends in seed sector

- 13% of the planted area is planted with seed from commercial seed companies (formal system)
- ISSD baseline shows that 89% of the farmers obtain seed from the informal seed system

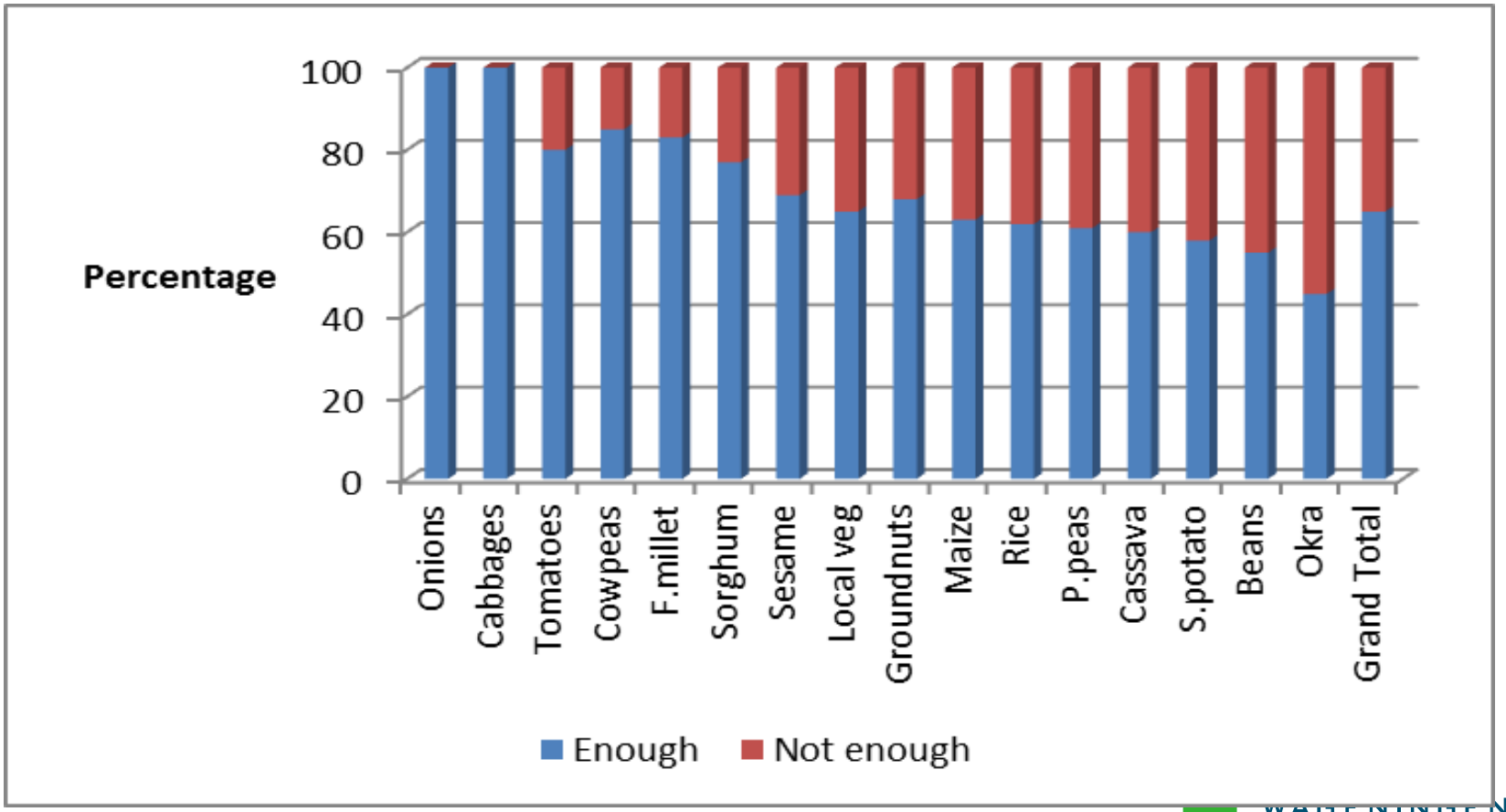


ISSD Uganda

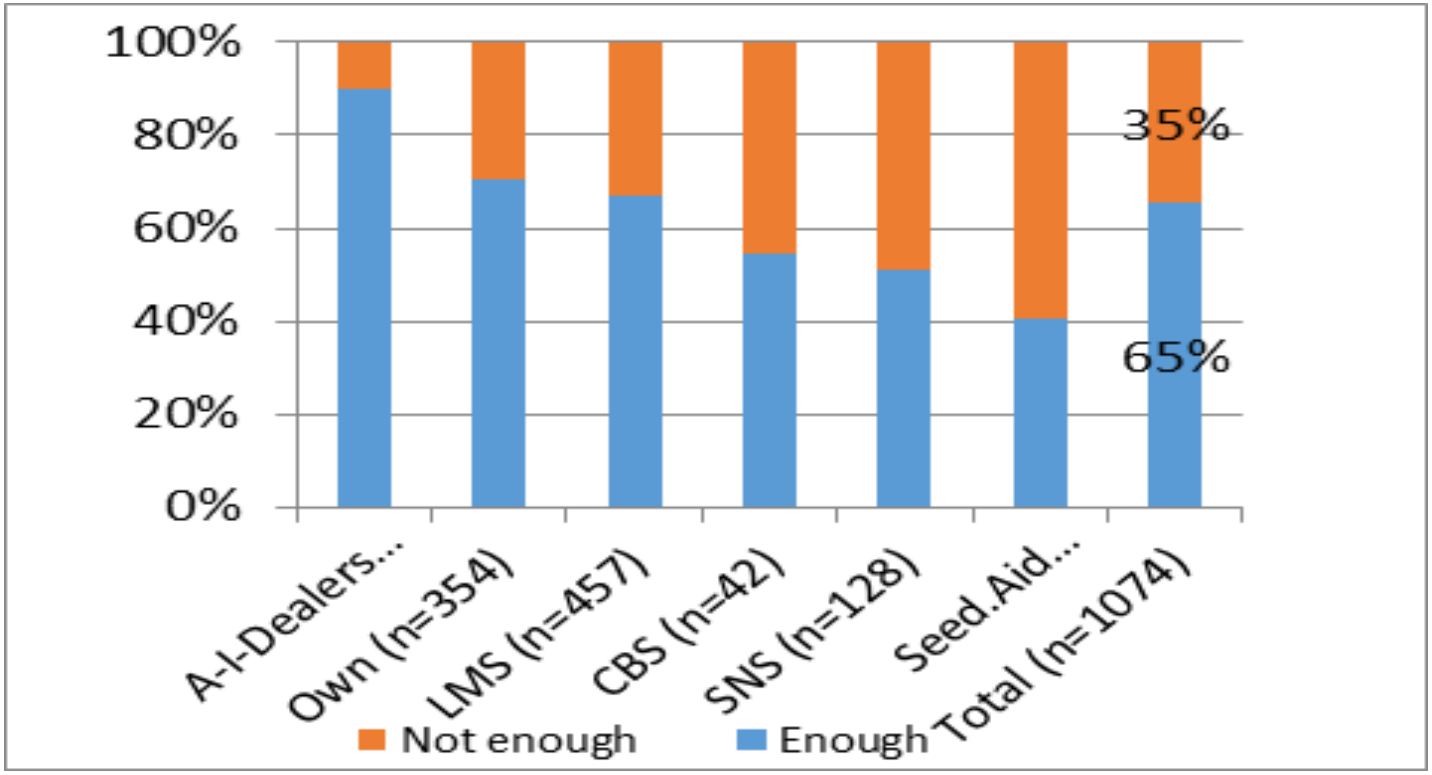
1.2 Seed Availability by Source

1. Availability of seed

1.1 Seed availability status by crop

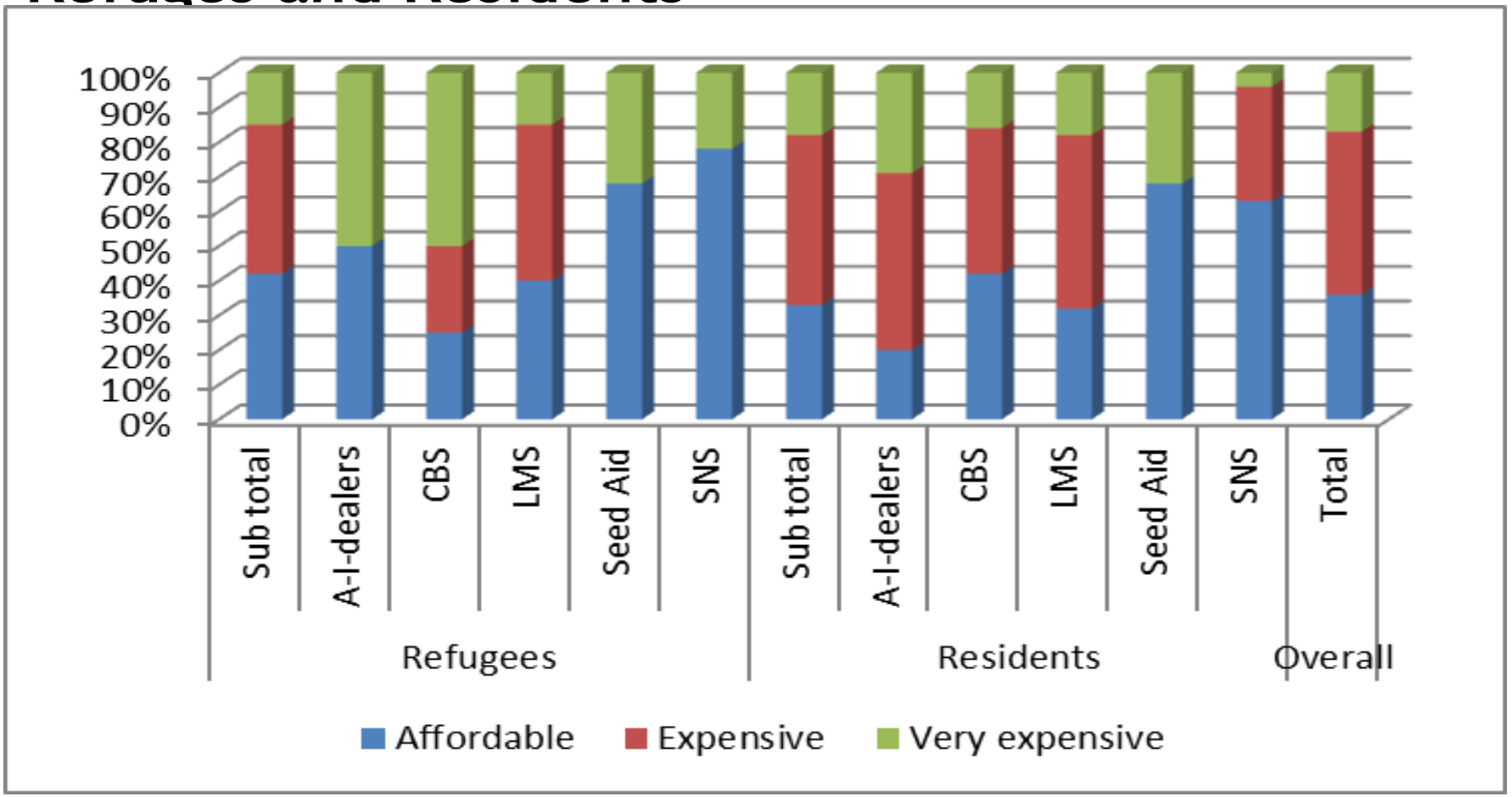


1.2 Seed Availability by Source



WAGENINGEN UR
For quality of life

2.2 Costs of Seed by Source as Perceived by the Refuges and Residents



Variety suitability

- Farmers grow both improved and local varieties.

Varieties of the major crops

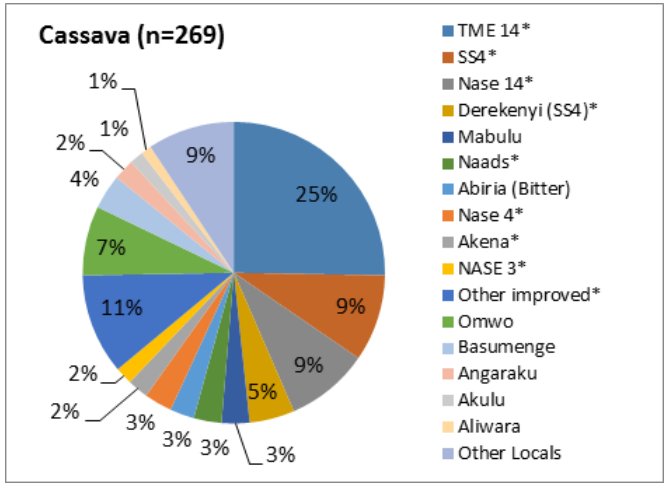
- have done well in their agro-ecologies and coped with the prolonged dry spells.

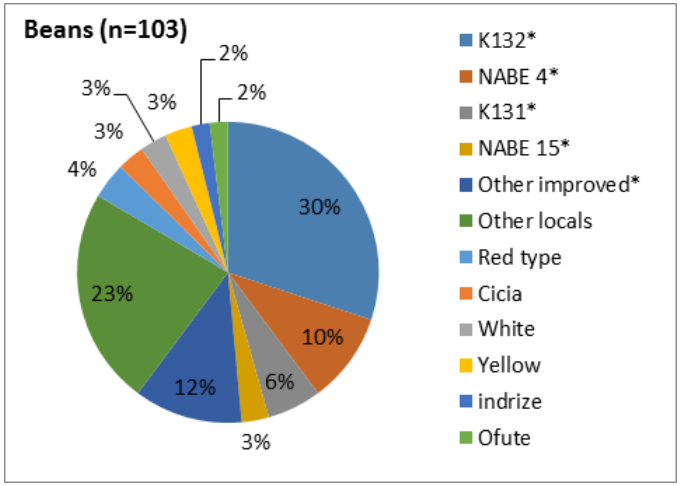
- A number of new varieties introduced and adopted by the community such as cassava (TME14 and Nase series), and Naspot 1, naspot 11 and Naspot 8, hence need to promote both !

Resilience

- The high level of diversity of varieties within a given crop species

- Household's seed system in West Nile sub-region is generally resilient to weather (drought) and biotic (pest and diseases) shocks.





So what for sweetpotatos?

1. **Build upon variation of seed systems and foster pluralism**

- Farmers gains access to vines seed from different sources
- Own, Neighbor, Buy, Ngo and government, local seed business
- Need to have robust regulated systems to capture LSB and Local markets, replenishing own source

Marginal economic value of quality seed of improved varieties

	High	Low
Level of demand for crops grown with quality seed of improved varieties — High	**1) Private sector Dominant Archetype** Quality of improved varieties is both attractive for private sector actors to produce and that produces crops the market demands, resulting in robust private sector investment with minimal public sector involvement	**3) Public- Private collaborative Archetype** Quality seed of improved varieties for crops with strong demand but for which the cost of production or demand risk create barriers to private sector investment and innovation resulting in public sector involvement
Low	**2) Niche Private Sector Archetype** Quality of improved varieties for crops with niche market demand but profitable to produce in certain quantities, produced by a vertically integrated private sector with minimum public involvement	**Public Sector Dominant Archetype** Quality seed of improved varieties that are not highly desirable or profitable to produce, but which are promoted by public sector to advance a public goal such as seed security or food security.

Progress to-date and pertinent issues to do with commercialization

Invitro culture virus elimination and multiplication(kephis)

Mother stock multiplication (Makerere and private Labs)

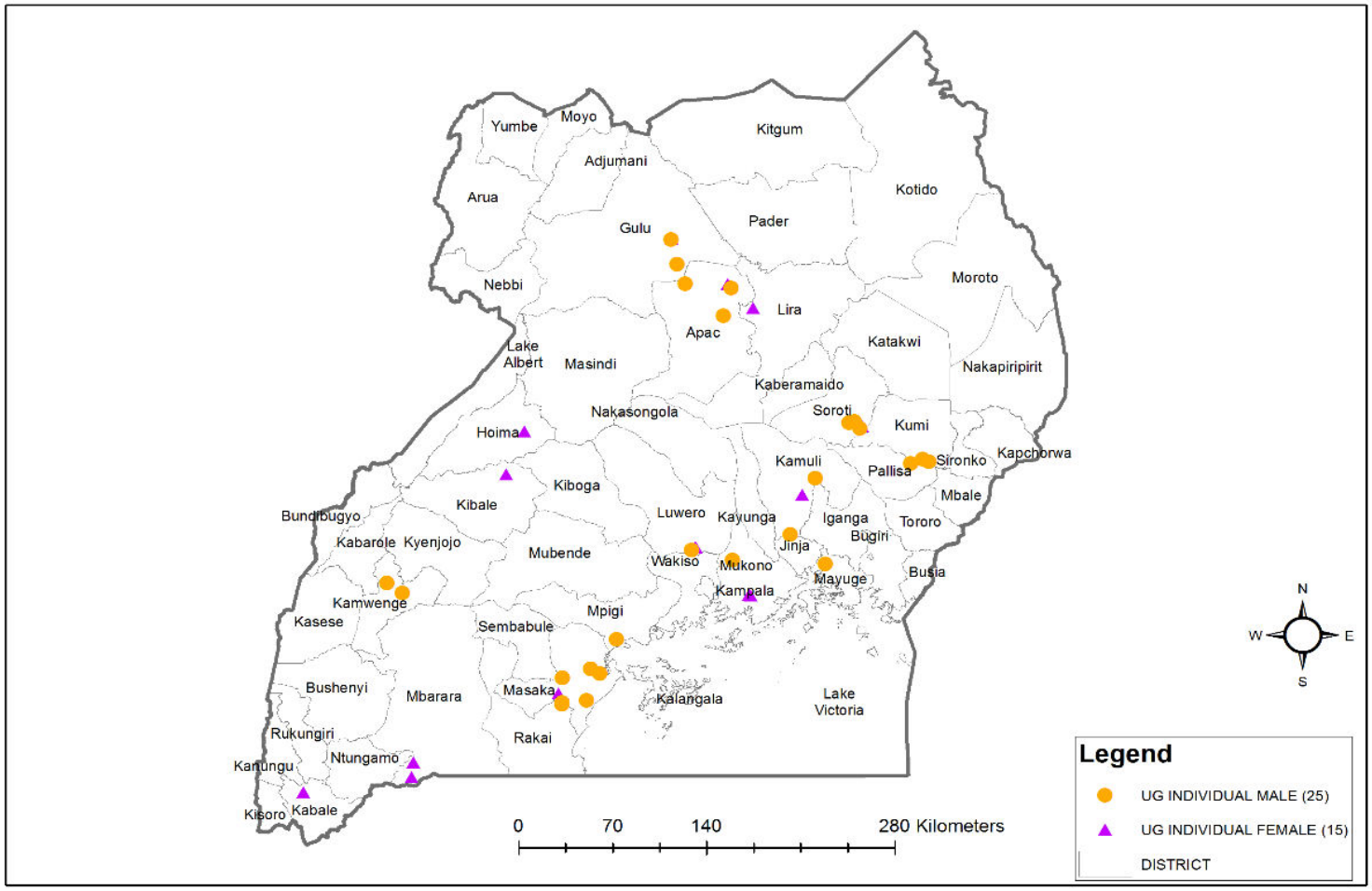
Secondary Multiplication sites in shade nets and isolated fields in districts

Tertiary multipliers affiliated to secondary sites fields in fields

Clean sweetpotato vines in farmers fields

Clean sweetpotato vines in farmers fields

Secondary vine multipliers(GPS)



Vine Multipliers established by HarvestPlus with support from USAID

Source: Global Administrative Areas Database, 2015

Inspection suggestion: Start with Tissue material

- Perception and mind set(Novel)
- Our diagnostic put own source at 90%!
- Traceability purposes
- Disease and pest

Commercialization model need robust(wide coverage)

Vine distribution system

- Inspection more than once
- Collection from fields
- Packaging(Sorting, quantifying, Bundling, labeling).
- Transporting, Distributing and planting
- Yet vines are perishable and bulky, many varieties!

Mode of multiplication and conservation

a)Dual purpose multiplication approach (Crop planted on 0.6 m2 mounds in swamp).

-Usually planted at onset of dry period

b) Specialized vine multiplication approach (irrigated high density beds)

-Usually planted in sequence depending on season

Mode of multiplication and conservation

Dual purpose

- Risk aversion: Produces both roots vines
- Only 60 – 70 bags harvested per 4000m^2 (can harvest double)
- Between 25 and 40 bags of roots harvested per 4000m^2
- Plant 30-cm long cuttings 3cuttings/1m^2
- Rouging of infected plants and rigorous earthing
- Inspected at 2.5 months old

Mode of multiplication and conservation

Specialized vine approach

- Produces only planting material, very risky
- Only 400 – 600 bags harvested per 4000m^2 with fertilizer application
- Plant shorter cuttings of 20 cm long at 50 cutting per m2
- Rouging of infected plants
- Inspected at 2.5 months old

Gross Margins for Secondary Multipliers

Particular	Ejumula	kabode
Total No. bags(1000 cuttings)	52	72
Total Income	780,000	1,080,000
Total Costs	292,000	292,000
	488,000	788,000

Sweetpotato seed system pillars have been established providing basis for piloting formal inspection protocols to enhance quality

Kick starting efforts

Connecting with labs

Region Lab
Central Senai
Mid-west Biocrops
East Senai
North Biocrops

Associations(networks)

Region	Districts
Mid-west	Hoima, Kibale
East	Bukedea, Serere, Buyende, Kamuli, Mayuge
North	Oyam, Gulu, Lira, Kole
South west	Isingiro, Sheema, Kabale, Kamwenge
Central	Luwero, Masaka, Mukono, Mpigi, mityana and Rakai

Field standards for sweetpotato seed certification tolerance levels

Parameters	Seed classes				
	Nuclear	Basic	C 1	C 2	QDS
Variety integrity and **agronomy**					
Varietal purity (%)	100	100	99	99	98
Field isolation distance (m) (with suitable barrier crop) (Minimum)	100	70	50	50	30
Crop rotation or furrow period (Min. years)	2	2	1.5	1.5	1
Number of inspections/ crop (Min.)	1	1	2	2	2
Maximum permitted ratoons	5	3	2	2	1
Diseases of sweetpotato					
Sweet potato virus disease (or causing viruses: SPCSV, SPFMV, SPMMV, or SPLCV) (Max. %)	0 (lab test)	1 (lab test)	2 (seto sa)	3 (seto sa)	5 (seto sa)

Some critical variables of interest Actors

- Commercial viability of seed systems and production of sweetpotato roots(30% yield increase for clean, less land)
- Seed enterprise competitiveness(timely availability, disease and pest free, consumer preferred varieties, incentives too)
- Capacity of current seed systems to respond to commercialisation(Seed policy, more funding, people buying, empowered technical staff)
- Increased outputs MUST be addressed (value chain integration e.g animal feeds, bakery, Waragi and promotions
- coordination is key: Multiplier can integrate horizontally

Why Pluralistic and commercialization

- Plural denotes a diversity of views/ approaches rather than a single method
- Not only diversity But the energetic engagement, understanding across lines and encounter commitments
- Assist in Deeper understanding of the systems, identify constraints and opportunities and this will inform targeting of the technologies.
- End result: increase farmer acceptance and uptake of clean material.

Pull Factors; value addition and Silage

Sitosa, protected net and Inspectors; thanks for listening