Towards Upscaling Sweetpotato Seed Production and Delivery of Quality Planting Material in Sub-Saharan Africa

7th
SWEETPOTATO SEED SYSTEMS COMMUNITY OF PRACTICE CONSULTATION

SPHI
Sweetpotato for Profit and Health Initiative

13-14 JUNE 2017

Colline Hotel
Mukono, Uganda

Regional Technical Support Platform for East, West, Central and Southern Africa

Sweetpotato Seed Systems and Crop Management Community of Practice
Seventh Consultation - Towards Upscaling Sweetpotato Seed Production and Delivery of Quality Planting Material in Sub-Saharan Africa
Colline Hotel – Mukono, Uganda
13-14 June 2017

Compiled by Christine Bukania; edited by Margaret McEwan

Cover photo: *Photo montage showing decentralized vine multipliers in Uganda, net tunnel technology for maintaining clean planting material, and roadside kiosk selling sweetpotato roots (Photos courtesy of V. Atakos/CIP-SSA)*

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Acronyms

AbiZARDI	Abi Zonal Agricultural Research and Development Institute
APA	African Potato Association
AVCD	Accelerated Value Chain Development Project
CIP	International Potato Center
COMESA	Common Market for Eastern and Southern Africa
CRS	Catholic Relief Services
CVMs	Commercial Vine Multipliers
DDBC	Developing and Delivering Biofortified Crops
EUSEMO	Eastern Uganda Seed Multipliers Organization
FCI	Farm Concern International
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ISSD	Integrated Seed Sector Development
KEPHIS	Kenya Plant Health Inspectorate Service
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MISST	Malawi Improved Seed Systems and Technologies
NaCRRI	National Crops Resources Research Institute
NARO	National Agricultural Research Organization
NGO	Non-governmental Organization
NUSEMA	Northern Uganda Seed Multipliers Association
OFSP	Orange-fleshed sweetpotato
OSP	Orange sweet potato
PCR	polymerase chain reaction
QDS	Quality declared seed
REU	Reaching End Users
SASHA	Sweetpotato Action for Security and Health in Africa
SOSPPA	Soroti Sweetpotato Producers and Processors Association
SPHI	Sweetpotato for Profit and Health Initiative
SPVD	Sweetpotato virus disease
TARI	Tigray Agricultural Research Institute
TOSCI	Tanzania Official Seed Classification Institute
WFSP	White-fleshed sweetpotato
WUSEMA	Western Uganda Seed Multipliers Association

Executive Summary

The 7th Sweetpotato Seed Systems Community of Practice Consultation was held from 13th to 14th June in Colline Hotel, Mukono Uganda. The theme of the meeting was **Towards Upscaling Sweetpotato Seed Production and Delivery of Quality Planting Material in Sub-Saharan Africa.**

The meeting was attended by 62 participants from 11 countries (Ethiopia, Kenya, Uganda, Tanzania, Ghana, Nigeria, Burkina Faso, Malawi, Mozambique, Nigeria and Zambia).

The Director of National Crops Resources Research Institute (NaCRRI), Dr. Godfrey Asea opened the meeting on behalf of the Director General of the National Agricultural Research Organization (NARO). He was introduced by Bernard Yada. As the sub-accounting officer of the orange-fleshed sweetpotato (OFSP) project with NaCRRI, he stated that progress had been good. He commended the good working relationship with International Potato Center (CIP) over the years and stated that the meeting had a good mix of public and private partners.

Prior to the official opening, Dr. Jan Low presented the **progress made by the Sweetpotato for Profit and Health Initiative (SPHI)**. This is a multi-partner, multi-donor initiative that seeks to reduce child malnutrition and improve smallholder incomes in 10 million African families by 2020 through the effective production and expanded use of sweetpotato in 17 SSA countries. In total, 2,895,382 (29%) households of the 2020 target of 20 million had been reached by September 2016.

There were four keynote addresses. In the first one titled **Scaling sweetpotato seed systems in Uganda: an analysis of the accelerators and brakes**, Charles Musoke (HarvestPlus Uganda) provided highlights of Africa and Uganda seed systems with relevance to sweetpotato, HarvestPlus' seed dissemination efforts and suggestions of accelerators and brakes for the sweetpotato seed systems in Uganda.

The second keynote address was titled **How sweetpotato seed standards can contribute to scaling up delivery and access to quality planting materials: the Uganda experience.** Dr. Settumba Mukasa (School of Agricultural Sciences, Makerere University) elaborated the status of the sweetpotato seed system in Uganda and how the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) Department of Crop Protection (inspection and certification) had worked in collaboration with stakeholders to develop protocols for sweetpotato planting material as part of the comprehensive strategy to pluralistic seed sector including vegetatively propagated planting materials. Lessons from orange sweetpotato saturation and thought leader experiments for promoting adoption in Uganda.

Anne Rietveld (Bioversity) made the third keynote address titled **banana seed systems and the influence of gender**. This presentation was preceded by an explanation of the steps of banana growth and reproduction. Anne highlighted the effect of gender on banana seed systems, and the importance of having a gender-responsive approach to seed access. This was followed by a panel discussion by Reuben Ssali - Sweetpotato Breeder at CIP; Wilfred Mushobozi - Crop Biosciences Tanzania; Anna Rietveld - Bioversity Uganda; Maureen Mwangangi - Kenya Plant Health Inspectorate Service (KEPHIS); Harold Mate – Farm Concern International (FCI). It was moderated by Gorettie Ssemakula (NaCRRI).

In the fourth keynote address titled **Lessons from orange sweetpotato saturation and thought leader experiments for promoting adoption in Uganda** Dr. Daniel Gilligan (International Food Policy Research Institute) presented findings of a study that uses a randomized saturation experiment and influential technology promoters to test strategies to promote diffusion of orange-fleshed

sweetpotato and high-iron biofortified beans in Uganda. The study aim was to measure which approaches are most cost-effective at achieving high adoption rates.

Two poster sessions were held: (i) quality assurance in sweetpotato seed systems with six posters and (ii) experiences with scaling in sweetpotato seed systems with eight. All posters can be accessed at this link. During each session, participants selected three posters to visit, spending about 15 minutes per poster. The presenter made five minutes' presentation on the poster, and the participants identified the accelerators and brakes.

On the second day of the meeting, participants had an opportunity to go to one of three learning journeys: NaCRRI, Namulonge, public sector model for pre-basic seed production; BioCrops (U) Ltd tissue culture lab, private sector model of pre-basic seed production; and commercializing clean orange sweet potato (OSP) vine production: Lwanyaga Vicent (HarvestPlus). The learning journey approach has been adapted from the concept of Learning Routes, an approach where participants embark on a journey with clear learning objectives that will enable them identify relevant experiences that could enable them tackle similar challenges in innovative ways.

All proceedings of the meeting are available at: http://www.sweetpotatoknowledge.org/7th-sweetpotato-seed-system-crop-management-community-practice-consultation/

Introductions and objectives of the meeting

The 7th Sweetpotato Seed Systems Community of Practice Consultation was held from 13th to 14th June in Colline Hotel, Mukono Uganda. The theme of the meeting was Towards Upscaling Sweetpotato Seed Production and Delivery of Quality Planting Material in Sub-Saharan Africa.

Seed Systems CoP meeting participants pose for a photograph outside Colline Hotel, Mukono (photo: C. Bukania/CIP-SSA)

The meeting was attended by 62 participants from 11 countries (Ethiopia, Kenya, Uganda, Tanzania, Ghana, Nigeria, Burkina Faso, Malawi, Mozambique, Nigeria and Zambia). These participants were drawn from organizations such as National Agricultural Research Institutes (NARIs), universities, local government, seed multiplier associations, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), CGIAR and sweetpotato projects from Volunteer Efforts for Development Concerns, Catholic Relief Services (CRS), Farm Concern International (FCI), and World Vision International.

David Talengera (Biocrops Ltd.) welcomed participants to the meeting, whose objectives were to share experiences on scaling sweetpotato seed systems; quality assurance (seed standards and inspection); and on different vegetatively propagated crops (sweetpotato, banana)

The format of the meeting incorporated different approaches that were designed for interactive and iterative discussion on the key topics.

There were four keynote presentations:

1. Scaling sweetpotato seed systems in Uganda: an analysis of the accelerators and brakes
2. How sweetpotato seed standards can contribute to scaling up delivery and access to quality planting materials: the Uganda Experience
3. Banana seed systems and the influence of gender: presentation and panel discussion
4. Lessons from orange sweetpotato saturation and thought leader experiments for promoting adoption in Uganda

In a World Café set up, two poster presentations were held. The first focused on experiences with scaling in sweetpotato seed systems, while the second focused on experiences with quality assurance in sweetpotato seed systems. During these sessions, participants visited at least three posters each, and identified the accelerators and brakes.

On 14th June 2017, participants had an option to go to one of three learning journeys.

1. NaCRRI, Namulonge, public sector model for pre-basic seed production
2. BioCrops (U) Ltd tissue culture lab, private sector model of pre-basic seed production
3. Commercializing clean OSP vine production: Lwanyaga Vicent (HarvestPlus)

1 Session 1A: Ready for Scaling

1.1 Keynote: Scaling sweetpotato seed systems in Uganda: an analysis of the accelerators and brakes

Charles Musoke – HarvestPlus Uganda

The presentation provided highlights of Africa and Uganda seed systems with relevance to sweetpotato, HarvestPlus' seed dissemination efforts and suggestions of accelerators and brakes for the sweetpotato seed systems in Uganda.

1.1.1 Seed acquisition: Africa context

A recent study undertaken in six countries with a sample size of 9660 found that 90.2% of households get seed through informal routes. About 50% get seed from local market, and 55% paid cash, although they paid less for vegetative materials. The key influences are specificity of variety, complexity of farming systems and policy environment.

Uganda's seed industry is made up of three systems. The first is informal seed sector which is also known as local/ traditional or farmer seed system. Seed does not come from planned seed production, but represents a part of the grain crop. It involves farm saved seed. This sector is characterized by a lower level of organization and institutional development and lacks functional specialization. There is also a wide variety of exchange mechanisms and traditional exchanges of information.

The second is the formal seed sector. This comprises public organizations and private seed companies. There is clear distinction between "seed" and "grain". Activities are institutionalized and specialized. Seed trade is subjected to seed laws governing variety control, seed testing, identity of seed quality traded, and varieties from organized breeding.

The third is the transitional system. Planting materials of both elite and improved varieties from research accessed through extension and farmer groups. The implication here is that transformation is happening as the seed entrepreneurs are registered and the varieties they are producing are listed in the catalogue. This system is emerging for vegetatively propagated crops such as cassava. The Seed and Plant Act, 2006 recognizes this system and the Seed Policy 2015 included the aspects of quality declared seed integrated.

1.1.2 Current trends in seed sector

The current trends paint a similar picture. Thirteen percent of the planted area is planted with seed from commercial seed companies (formal system). The Integrated Seed Sector Development (ISSD) baseline shows that 89% of the farmers obtain seed from the informal seed system, with the local market, farmer-saved seed and the neighbours providing 35%, 41% and 13% respectively.

When farmers were asked whether they had enough seed when they wanted it, about 42% said that they did not. Thirty percent did not have enough seed generally, meaning that lack of sweetpotato seed is higher than the mean. One factor of commercialization is the cost. Looking at sources, availability, affordability and expenses, overall most people find sweetpotato seed expensive. Another factor to take note of is that farmers grow both local and improved varieties at almost the same scale across the country.

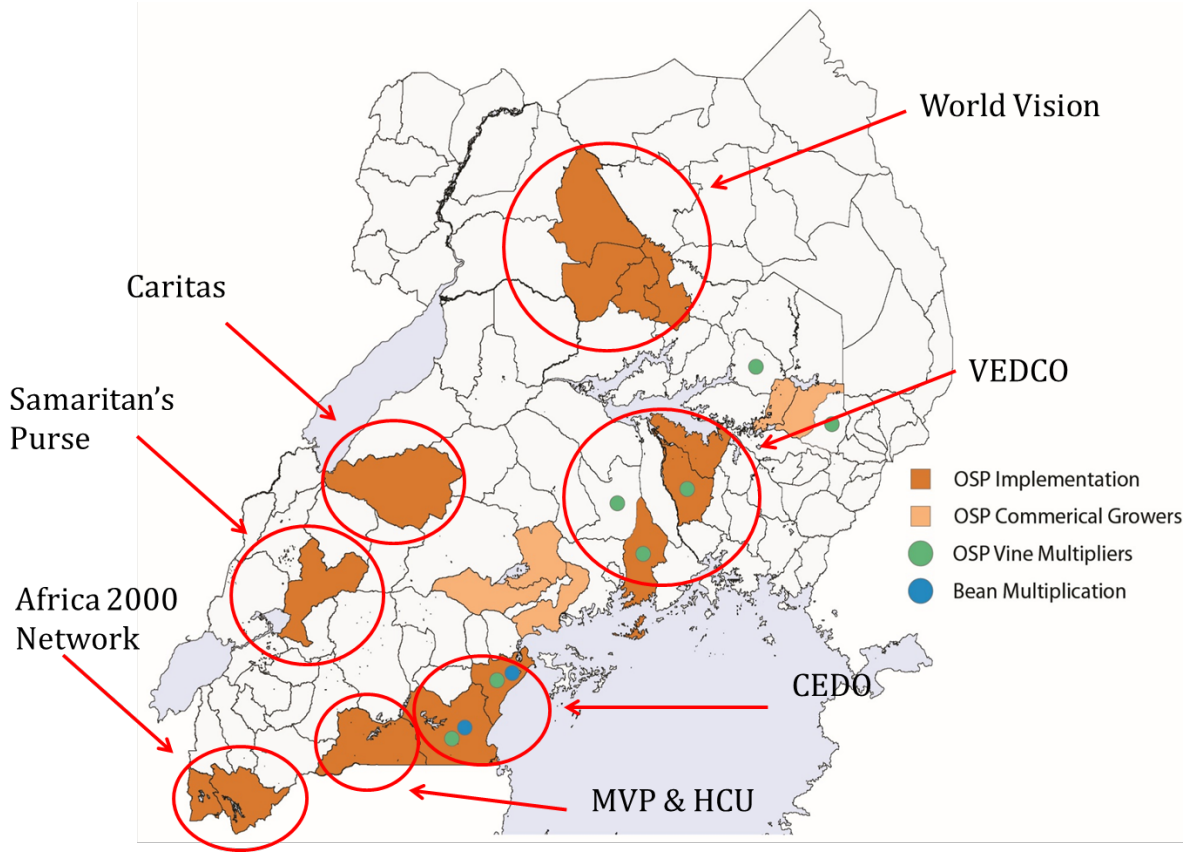
1.1.3 Sweetpotato seed systems diagnostic report - HarvestPlus 2014

Farmers acquire seed from their own fields, from fellow farmers, institutions or through purchase (10%). There is an increase in farmers buying seed. The sources of planting material are sprouts, previous crop, under shade, offseason crop (swamp). Majority of farmers in eastern and Northern are unable to conserve, and those who did were 41% in Eastern, 69% in Central, 86% in Western and 37% in the North.

1.1.4 HarvestPlus efforts in Uganda

The goal of the project is to reduce micronutrient malnutrition and improve dietary intakes of vitamin A and iron in 25 districts in Uganda. The purpose is to increase the production and consumption of orange sweet potato (OSP) and high-iron beans in 14 districts of Uganda. The figure below indicates the core implementation areas.

Figure 1 HarvestPlus core implementation areas



HarvestPlus is partnering with Non-governmental Organizations (NGOs) to disseminate the crops to farmers and several research partners to do different pieces of research.

Currently, 1,346,155 households out of the total 7.3 million Ugandan households are growing sweetpotato. Approximately 616,954 grow OSP directly impacting 3,084,770 people (household size is 5). The target is to increase production of OSP to a further 80,000 households influencing at least 400,000 people.

In terms of volumes 281,000 bags of vines were planted in 2016. First there were seed loans to direct households, which is a situation in which farmers are given planting material on loan, on condition that they pay it back so that it can be given to their neighbours. There are also multipliers who are selling planting materials to households, NGOs and governments. Others are producing at a large commercial scale.

From HarvestPlus estimate, farmers who had producing for subsistence had about 0.5 acres and the semi-commercial farmers had 1 acre on average. The estimate of the area under sweetpotato in the country is less than 400,000 hectares. These statistics show that there is less supply of planting material in the country.

Initially, there was a primary multiplication centre, with the National Agricultural Research Organization (NARO) and the International Potato Center (CIP), who bred the initial stock after release of varieties. This was then pushed to secondary multiplication centres, who are commercially oriented. As the volumes increased, they could not meet the demand, and they pushed production to tertiary multiplication centres in target communities. These tertiary multipliers were early adopters with access to land, water and willing to undergo intensive training.

The next stage was to identify beneficiaries through an extension workers in HarvestPlus and the Seed Systems Specialist at CIP. They trained vine multipliers and extension workers, who in turn trained promotion agents. The promotion agents trained farmers' groups with emphasis on making available a continuous supply of good quality planting materials of Vitamin A rich varieties of sweetpotato. As this system started to emerge other issues began to emerge, such as degeneration of planting material despite other factors remaining constant. The main causes were viral and weevil, and to address these, there was need to develop a system for quality management.

Initially, *in vitro* culture virus elimination and multiplication was done at the KEPHIS, but now it can be done efficiently in NARO and Makerere. Mother stock multiplication began at Makerere but it was later on passed to private labs. From there, the labs started working closely with secondary multipliers in shade nets and isolated fields in the districts. They also got tertiary multipliers affiliated to secondary sites fields in fields. Through this system, pathways have been created to provide clean sweetpotato vines in to governmental and non-governmental programs, and directly to farmers. Therefore, the system is being handled by a consortium of partners that has agreed on a theory of change, with activities attached to each partner.

The long term outcome is increased production and adoption of biofortified sweetpotato and the short term outcome is increased access and quality of orange-fleshed sweetpotato planting materials. Each partner has outputs with associated activities. NARO and CIP are mandated to develop and release better performing varieties; Makerere University enhances capacity to support certification; HarvestPlus works to increase market share and private labs and multipliers enhance commercial production; while MAAIF ensures that materials are inspected. Small scale vine multipliers from four regions have also organized into associations. These associations procure clean material from the labs

to make sure they have certified material. Inspection is done by the quality control team of that region, and then the inspectors from the government programme visit the fields twice a year.

1.1.5 Accelerators: Going to scale with focus on clean materials

The product, which is clean planting material, is now available. Now, there is need to go to scale, i.e. to move seed faster and widely. Accelerators for this are:

- Presence of catalysts which is precipitating events; nutrition, processing, projects
- Recurrent stresses e.g. virulent pests and diseases plus climate change and land degradation. While this looks like a challenge, it requires people to replenish their planting material
- Existence of an ongoing process of replenishing materials lab, training, decentralized multipliers
- The idea of clean materials clear is well understood by all the participating institutions. There is proof that clean materials perform
- Bringing on board seed certification and quality control
- Guidelines are ready and agreed upon by all parties
- Multiple use of roots implying commercialization of the crop. This will make farmers more willing to spend money for clean planting material
- Increasing urbanization, feeding animals, value added products like puree are good drivers for sweetpotato production
- Proof of product support: There is customer feedback that average yield increase on farm is 30% (cycle 1, multiplier reports, Uganda)
- Filling a gap in shortage of vines, even non-clean as shown in introduction
- Cleaning and indexing is doable and complete (MAAIF,KEPHIS and MUK)
- Variety preferences coming into play; that is it is now possible to determine exactly which varieties are preferred by customers
- Potential customers are known, institutions and individual farmers
- Business model options have been suggested and tested
- Risk aversion options are emerging among farmers
- The target market is understood, e.g. pricing model based market forces
- Market penetration strategies in few locations have been kick-started and influencers mapped out
- The market is in transition. Dominant production objective is not profit but utility maximization and risk avoidance. Other non-market attributes as well as income
- Integration in farming systems is key

1.1.6 Key brakes in the system

- Key actors tend to confuse commercialization with sales; the project manager, researchers, and donors do not have a common understanding.
- Technology commercialization is the process of converting ideas into business and consequently jobs.
- Commercialization of any product is a process and with actors commercializing at varying rates. Each step has different milestones and targets.
- Understanding of sustainable scale: estimating real demand is difficult. Start up and maintenance costs incurred in the process of catalyzing and strengthening networks. There is need to piggy back to create more demand. Strategic brokering of linkages with developed

markets. Sustainable scale is when an enterprise is successful and exists for several years even if with support.

- Responding to markets: project biased decisions do not consider the dynamism of variety use by farmers. There is a mismatch of varieties preferred, both elite and improved.
- Not responding to ladder of technology development: agronomy yields a small yield, with chemical and fertilizer there is an incremental yield and with both, there is improved seed. Small quantities of seed are required and they must have different marketing strategies at each stage.
- Brakes in efficiency and pricing issues: Competitive advantage, example cost of seed per acre, economies of scale and brake even points should be well understood.

1.1.7 Implication of accelerators and brakes

- Catalytic options which show that seed channel both formal and informal are integrated are going to be key to scaling
- There is need for coordinated action between formal and informal sectors, some medium to long term support to some chain actors e.g. labs, inspection, indexing
- Specific level targeting/efforts rather than system at some point

In conclusion, risk is the best way to figure out where you are going and failures provide lessons that could be the first step to success.

1.1.8 Discussion

Wilfred Mushobozi, who chaired the discussion, invited contributions by asking, “Are we ready to scale?”

Ephraim Chabayanzara: There is a gap in the development of savings and credit schemes for creating demand for clean vines. Investments into water are also a good accelerator for increased use of vines.

Some sections of the seed system may need long term and short term support. There is a framework of support for each sector.

Srini Rajendaran: The cost of production is Ush 180,000 per hectare. How many bags were being produced and does it match with the selling price of Ush 15,000 for 12 bags? What is the volume of transaction made in the formal sector and how much do they pay for that?

Depending on variety, we get 400 bags per acre to 600 bags per acre. Kakamega gives the highest number. This also depends on the method of production. Multipurpose varieties could produce 70 bags per acre because they have to leave some for the production of roots. Plowing in the traditional way gives 200-300 bags.

Jan Low: In the North and east people are having problems retaining materials. Do you see Triple S as a potential solution?

Triple S is a contributor but it does not affect the commercial one. The volumes required for commercial production are too high, so Triple S is complementary.

1.2 World café poster session 1: Experiences with scaling in sweetpotato seed systems

Benjamin Rakotoarisoa presents the Nutritious Sweetpotato for Niassa project poster (photo: C. Bukania/CIP-SSA)

In the second poster session, each participant selected three posters to visit, spending about 15 minutes per poster. The presenter made five minutes' presentation on the poster, and the participants identified the accelerators and brakes for scaling in sweetpotato seed systems.

Poster 1– Scaling sweetpotato seed systems through DVM registration

Accelerators	Brakes
• Registration of DVMs • Opportunity to develop a seed app • System available to know sellers of vines and linking with youth is high priority • Linkage with NARIs and agriculture ministries and departments to maintain DVM data when projects close • Need to document feedback from buyers getting information from website • Good localization / information from DVMs	• Sustainability of this initiative must be addressed if CIP's project closes • Limited internet availability • DVMs are not well described • Lack of knowledge by the DVMs on the vines they are multiplying • Database need to be inclusive, not all DVMs have been recorded • Not integrating the app/ information to hand-held devices easy to use for many stakeholders • Labeling needs to be improved • Lack of resources for irrigation • DVMs do not fit to government purchase system • Vine conservation lacking • Lack of youths involvement • High fall out of DVMs when project ends • Drought • Link with inspectors needed

Poster 2 – MISST Malawi: Formalizing sweetpotato seed system: experiences from MISST project in Malawi

Accelerators	Brakes
• Field days to popularize varieties • Participatory on farm trials • Farmer training on quality vine use • Continuous awareness creation on importance of quality seed • Use of clean starting planting material • Use of DVMs and commercial multipliers • Farmers are buying vines • The mother-baby trial / demo to fast track awareness and dissemination of verities and clean seed materials • Review of national seed policy to include vegetatively propagated crops • Quality control in place. QDPM certification process initiated to assure clean planting material is passed into the system • Commercial Vine Multipliers (CVMs) • High levels of malnutrition among children under five and lactating mothers • Stakeholders meeting to drive seed system by bringing buyers and sellers of vines together effective • Year-round water access by DVMs means potential for irrigated root production • Market for roots • Trains CVMs, DVMs and households to equip them with climate smart agriculture practices • Organizes vulnerable households into savings and credit schemes that will increase purchasing power to buy clean vines and increase demand • Innovations in education, promotion and production • Trains more OFSP commercial farmers • Monitoring vine multipliers to ensure good practice • Private commercial farmers • Having a clear seed system for vine disseminators CVMs/DVMs	• Limited involvement of private sector • Prolonged drought, dry spells • Dependence on rains • Mismatch in volumes produced vs demand • High subsidy for vines sales – sustainability is curtailed • Lack QDPM as one of the seed classes, but this is under review • Long term affordability of clean vines • Narrow target population • End of free distribution • Need for vines only at one time for planting in unimodal system • High cost of planting materials • Limited human capacity to handle inspection • Inadequate knowledge on importance of using clean planting material • Translating the voucher system into self-supporting approaches when support is withdrawn

Poster 3 – Irish Aid Mozambique: orange-fleshed sweetpotato vine multiplication and access: lessons from the most vulnerable households in Niassa Province, Northern Mozambique

Accelerators	Brakes
• Different strategy starting with a small number of households get vines to plant during dry season for availability on season • Conservation of planting material locally • The system provides for clean material for farmers • Low income farmers are able to access and multiply seeds • Having more women households receive vines will accelerate improvement of household nutrition • Good links to government that got their buy in for expansion • Government support - all districts have to multiply vines • Trains DVMs to adopt vine cutting systems other than buying in kilograms as other varieties are naturally big	• No quality assurance • Private players are limited • Maintains sole cropping • No inspection to ensure validity of planting material • Quality control at level 2 is difficult • Limited land for production of planting material • Clear message on value of clean seeds • Quality assurance – number of times the cuttings are regenerated (ratooned) by DVMs • Tradition of not purchasing vines

Poster 4 – SUSTAIN/FTF Rwanda: Scaling sweetpotato seed systems in Rwanda

Accelerators	Brakes
• Presence of commercial DVMs with large mobile net tunnel, indicator of quality • Free land in Northern Uganda • NGO support to DVMs • Not enough vines yet for all beneficiaries, demand is still high • Vines are distributed free-of-charge • Shortage of land in Rwanda • Strong marketing strategies and promotional activities– mass media, print, sign posts • Partnership with Ministry of Agriculture and health extension services • Clear demonstration of yield benefits • Sweetpotato gaining a commercial value • Processors as catalyst	• Free distribution of vines distorts market and limits purchase • Buying vines by vulnerable households not common • Limited postharvest technologies • Not enough investment in fresh root market development • Unavailability of land and marshland • Demand and supply is erratic and not well known • Vine conservation at household level challenging • Shortage of land for vine multiplication in Rwanda

Poster 5 – SUSTAIN Mozambique: Scaling up sweetpotato adoption and consumption in Mozambique

Accelerators	Brakes
• Inclusion of seed service unit for inspections • Institutional buyers • NGOs reaching households • Nutrition messages use of value chains for demand creation • Trained DVMs • Demand from unintended targets • The NGO buyers would be encouraged to use voucher system so that they do not undermine the vine market • Nutrition value addition • Quality of vines • Processors	• Absence of seed certification • NGOs free distribution of vines • Free distribution of vine discourages willingness to pay for vines • Capacity building of DVMs and extension works and decentralizing them in different provinces • Gap in the value chain linkage from the breeders to breeders • Seed certification delay • Limited trained extension workers • Free handout of vines seeds

Poster 6 VISTA Mozambique: Dealing with drought – the experience from Mozambique

Because none of the representatives of this project could attend the meeting, the poster was not presented to participants, and as a result, there were no accelerators and brakes identified.

Poster 7 VISTA Tanzania: Enhancing orange-fleshed sweetpotato adoption in Tanzania

Accelerators	Brakes
• Processors stimulating uptake • OFSP project still new in Tanzania • DVM presence • Irrigation availability • Triple S technology for vine conservation • Technology innovation in water storage in multiplication sites e.g. micro irrigation schemes • Model for scaling involving breeders, primary, secondary and tertiary favors adoption • Seed standards provide an opportunity to promote clean seed • Nutrition education on OFSP improved • Several high yielding varieties • Farmers buy seed in Tanzania	• Dependence on rains in seed multiplication • Kakamega is doing well in Tanzania (root and vines) but the beta carotene is low • Limited willingness to pay for seed • Poor storage of fresh OFSP • Initially only 0.8 percent of farmers were growing sweetpotato • Short rainy season and planting season • Long process in variety release • Kegea is grown at low scale • Out of five varieties, only two are preferred • Difficulty in maintaining clean planting material • Existence of DVMs in the seed value chain

Poster 8 – AVCD Kenya: Scaling up Sweetpotato seed systems in Kenya: Experience from the Accelerated Value Chain Development Project

Accelerators	Brakes
• DVMs diversified and activities to cushion losses • 40 DVMs (70% male and 30% female) • Buy in by government • Government support to households i.e. multisectoral approach • Linkage with markets • Farmers need more vines for planting in Northern Uganda • Change of attitude, behaviour so that farmers can buy vines • Strong postharvest and processing component with bakeries and restaurants as catalysts • Potential partners engaging in construction of storage facilities for roots • Organized households into savings and credit groups to mobilize savings for purchasing and increasing demand for vines • Commercial beneficiaries purchasing vines is a good practice • Administration government awareness • Vine given free to primary vine multipliers • Vine conservation using net tunnels and Triple S	• Land acquisition system with men owning a lot of land but less involved in sweetpotato farming • Area has dry weather conditions, and prone to drought • Diverse partnership • Lack of markets for roots • Still very small present a problem for commercialization • Price distortion NGOs • No quality control mechanism • 100% free vines • Lack of skills/input for farming • Lack of demand for clean seed by farmers • Why is the proportion of female DVMs low compared to male?

1.3 Summary

Participants summarized their feedback to the poster presentations by identifying what worked well, and what needed improvement.

- Many projects still give vines for free, which hinders the willingness to pay. Free distribution by NGOs distorts prices and hampers sustainability.
- Commercialization of sweetpotato is still a challenge. This is partly caused by the small plots that are allocated for sweetpotato production. Not enough emphasis is placed on root market development as key strategy for building planting material demand. In order to spur an increase in demand for planting material, OFSP commercialization should be promoted. This requires improved marketing, storage of roots, and value addition. A feedback loop should be established between breeders and end users to ensure that the varieties distributed are the ones required by the market.
- Currently, there is a linkage between vine producers and root producers, and good linkages among the different players in seed systems. There is already clean material in the system, and the different levels of seed multiplication and model of distribution is working well.
- The existence of DVMs offer potential for scaling up sweetpotato vine multiplication, and are the source of quality planting material for many households. DVMs receive substantial training and timely support from projects. Projects include gender considerations in vine production.
- Sustainable seed enterprises require a cost-benefit analysis, and a clear understanding of demand and supply to enhance viable vine marketing. Packaging of material that is sold should be distributed in standardized units of trading. There should be clear linkages within the seed system value chain.
- Quality control and inspection are not strong, and there are weak monitoring systems for DVM performance. To strengthen delivery quality of planting material, CVMs and DVMs should be empowered through training and inspection to produce and distribute clean planting material, maintain the variety identity of OFSP.

1.4 Highlights from the Sweetpotato for Profit and Health Initiative (SPHI)

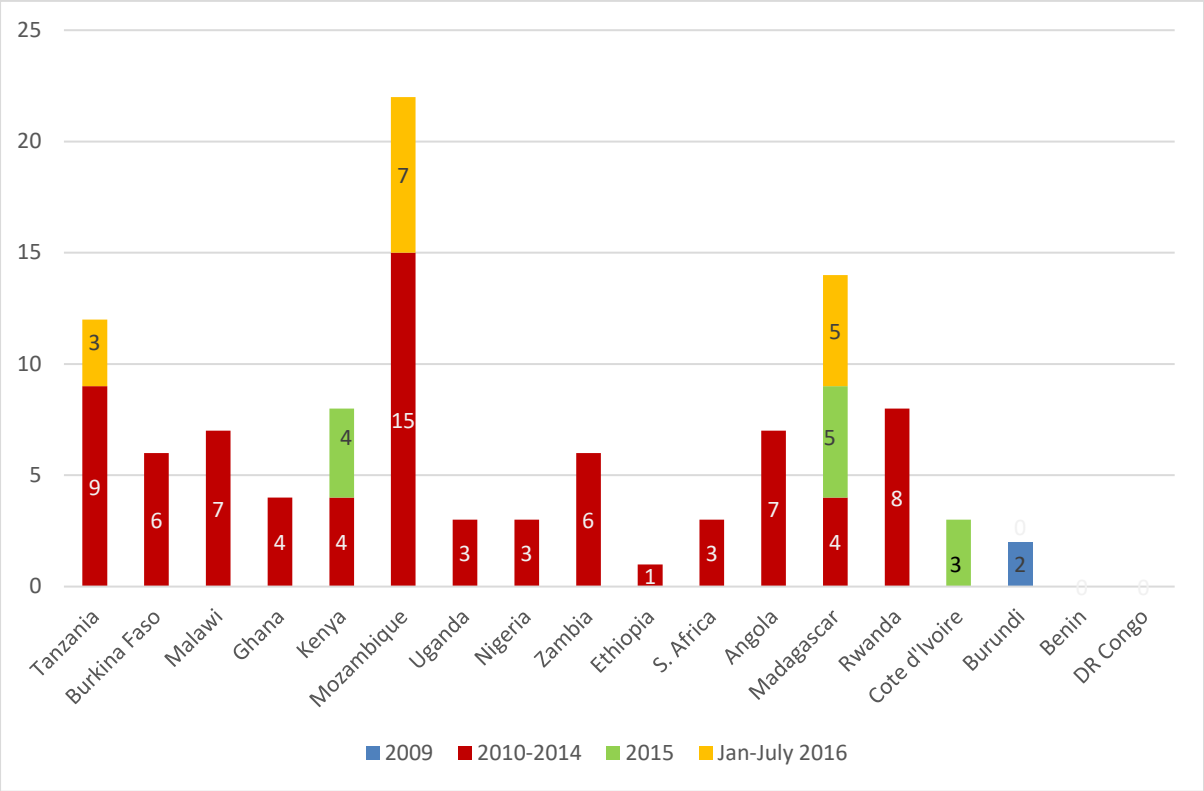
Jan Low – International Potato Center (CIP)

The SPHI was launched in Uganda. SPHI is a multi-partner, multi-donor initiative that seeks to reduce child malnutrition and improve smallholder incomes in 10 million African families by 2020 through the effective production and expanded use of sweetpotato in 17 SSA countries. The Sweetpotato Action for Security and Health in Africa (SASHA) Project is a 10 year project among 26 partners led by the International Potato Center that will develop the essential capacities, products and methods to reposition sweetpotato in the food economies of Sub-Saharan Africa. It serves as the foundation for the broader initiative.

Since the launch, there has been a lot of progress. One of the greatest achievements is *Breeding in Africa for Africa*. In 2005, only two countries were breeding. In 2016, 12 countries were breeding; three more are engaged in selection. Since 2009, 70 OFSP varieties and 39 non-OFSP have been released in 15 of the 17 target countries and one non-target country. Most of the new releases are in Mozambique. Many breeders are working on seed systems as well because they have to ensure that new varieties are disseminated. It is important for seed systems people to have continuous interaction

with the breeders in order to get the most improved varieties out to farmers and to give breeders feedback about how the varieties are doing in the field.

Figure 2: Number of sweetpotato varieties released in SPHI target countries



In Year 3, a successful SPHI Technical Meeting was held in Addis Ababa. The theme of the meeting was **Celebrating the World Food Prize for 2016,** with 94 participants from 36 organizations. New members joined the board, and this year we have CRS, Farm Africa. The meeting was aligned with the 10th African Potato Association (APA) Triennial Conference (10-14 October 2016). It was co-hosted by the Ethiopian Ministry of Agriculture and had 300 participants from 30 countries. Field trips were cancelled due to insecurity. Open Agriculture will publish 60 papers from this meeting. Rwanda will host next APA in 2019 and handover from Ethiopia took place in February 2017.

Major highlights of 2016 were:

- World Food Prize Ceremony & Borlaug Dialogue 2016 - 10-14 October 2016 in Des Moines, Iowa
- Half day sponsored Symposium at the Micronutrient Forum was attend. 71 participants attended to hear Mama SASHA findings and panel on taking the model to scale

Kofi and Nane Annan visited Ghana in January 2017 to continue their advocacy work. The Laureates attended the Global Panel on Nutrition from 10-11 May 2017. A presentation was also made to the UK All-Party Parliamentary Group on Agriculture and Food for Development.

In total, 2,895,382 (29%) households of the 2020 target of 20 million had been reached by September 2016. The data comes from projects of CIP, HarvestPlus, Helen Keller International, and FCI.

1.5 Official opening by Director General, NARO Opening Speech

Dr. Godfrey Asea – NaCRRI

The Director of NaCRRI, Dr. Godfrey Asea opened the meeting on behalf of the Director General of the NARO. He was introduced by Bernard Yada. As the sub-accounting officer of the OFSP project with NaCRRI, he stated that progress had been good. He commended the good working relationship with CIP over the years and stated that the meeting had a good mix of public and private partners.

Dr. Godfrey Asea (Director of NaCRRI) officially opens the meeting (photo: C. Bukania/CIP-SSA)

"The challenge for you in the remaining phase of SASHA is to move sweetpotato seed from the informal to the formal sector"," he said, emphasizing that there were many who had already developed and adopted standards. These were examples that others could draw from.

1.6 Lessons from orange sweetpotato saturation and thought leader experiments for promoting adoption in Uganda

Dr. Daniel Gilligan, International Food Policy Research Institute (IFPRI)

Ugandan child eating OFSP (Photo courtesy of D. Gilligan/IFPRI)

Micronutrient deficiency affects over two billion individuals globally. The highest prevalence of vitamin A deficiency and iron-deficiency anaemia among children is in Africa. Biofortification, the process of breading staple crops with elevated levels of key micronutrients, is one complementary strategy to combat micronutrient deficiencies. It is an effective strategy to increase dietary intake of vitamin A and improve micronutrient status among populations vulnerable to deficiency. Most households will not access

The greatest challenge of biofortification is to get the required high rates of adoption. HarvestPlus has been able to achieve surprisingly high levels of adoption in Uganda, and this was the basis of the presentation.

1.6.1 The Developing and Delivering Biofortified Crops (DDBC) Project

This project builds on a previous project called Reaching End Users (REU), which was conducted in Uganda and Mozambique. This work found that biofortification requires a high rate of sustained adoption for it to be a successful strategy at the population level and to eliminate the need for routine micronutrient supplementation. However, market development in the initial stages is very slow, so most households do not go to the markets to purchase biofortified foodstuff.

To get a sense of how effective the REU project was in Uganda, there was a reduced prevalence of inadequate vitamin A intake in three reference groups. Overall, it was a successful intervention to improve the vitamin A dietary intakes. There was a 31-34% decrease in the proportion of children below age three who had inadequate vitamin A intakes, and a 26-36% decrease in adult women.

Adoption rates of OFSP over an eight-season cycle between beneficiary and non-beneficiary households showed that over time, in Bukedea, where sweetpotato was less of a key crop, it started to decline after some time. In Kamuli and Mukono, there was a decline, but after four years, after they received 20kgs of vines, more than half of the farmers were still growing OFSP. In non-beneficiary households i.e. those that were not in the project but were living in the community, at least half received and planted vines, and after four years, in Mukono, half were still growing the vines. There was a definite large effect because people shared planting material.

To harness this, the saturation study was designed as part of the DDBC project. This project reached 225,000 households across 13 districts from 2012 to 2017 with OSP and high-iron beans. IFPRI conducted an impact evaluation of the DDBC project testing varying strategies to encourage broad diffusion of biofortified crops.

1.6.2 Research questions and study design

The main research questions were:

1. Can spillover effects be harnessed to sustainably increase adoption rates?
2. Are opinion leaders more effective at promoting adoption?
3. How does the rate of saturation of planting material in project communities affect overall adoption rates and spillover to non-beneficiaries within the same communities?

The study design was an experiment that varies who gets access to planting material, with four treatment arms. These were Low saturation: farmer group plus 20% of other households; High saturation: farmer group plus 50% of other households; thought leaders: opinion leaders and progressive farmers; DDBC project: only farmer groups (comparison group). The design was a randomized control trial. The household listing was done in 2013, and the baseline in 2014.

1.6.3 Results

The effect on adoption rates over different growth periods up to the present showed that the following results:

- Thirty-five percent of non-farmer group had the probability of growing high-iron beans or OFSP. This was within the level of the anticipated saturation rate, which lay between 20-50%. It was a good validation of the study design with HarvestPlus and NGO partners.
- Adoption pattern over time shows a decline in the group of non-farmer group members, for both OFSP and high-iron beans, but there is still a significantly higher adoption rate as compared to the normal DDBC project.
- Saturation to spill over effect demonstrates that giving more planting material to households outside the project target increases chances of adoption. About half of the households that were not in the project got access to planting material, and this resulted in a 16% jump.
- Adoption rates were not significantly different between the high and low saturation, but something between 20-50% saturation rates among non-farmer groups seems to be optimal. It is not clear what the impact pathway is, but there is important evidence of the potential of higher saturation rates. It seems to be a strategy for sustainable adoption of biofortified crops.

1.6.4 Discussion

Jan Low: One of the rationales is that farmers would have been prepared to know that the material is coming and they would be trained to prevent loss of planting material. How was this preparation implemented?

HarvestPlus and the partners were trained on conducting the experiment. The treatment participants were invited to the same training events, so it was not a surprise. Farmer groups provide a unique structure to support that, and the structure was kept as a comparison group, and the low and high saturation groups were included.

Srini Rajendran: How did you decide on the sample frame of 20% low saturation and 50% high saturation?

Those choices were somewhat arbitrary. However, we knew that 100% of the community would not be effective. We wanted the saturation point to be lower than 100% and we settled on 50%. We also wanted the low and high levels not to be too close together. We decided that 20% was considered reasonable in terms of scalability.

Ted Carey: I am interested in the quantities of planting material that were given in the basic group and the spill over groups. Was it 20kg?

20kg of vines were given out in the REU project that preceded the experiment. It was a lot of planting material to ensure that supply would not be a constraint to adoption. In the DDBC project farmers got 15kg of vines and 2kgs of improved iron rich beans. Anybody that was a beneficiary got that quantity of planting material. In the opinion leader, they got enough planting material to share with an average size farmer group. This was 15kgs of vines multiplied with 22 households on average, similar to what DDBC would give.

Julius Okello: What was driving the difference in adoption in Bukedea? Secondly, what was the basic strategy for distributing the material by opinion leaders?

There were a variety of factors driving adoption in Bukedea. The households were less likely to grow sweetpotato as compared to the other areas, the conditions are dryer as well. There were a few households that made a business out of this - about 8-10% continued to access material at end line. Many treated and untreated farmer groups got short trainings and they were encouraged to go out and share that material with households when they received it. We think that part of the ripple effect is influenced by the scale of effort.

Everlyn Matiri: Did the intervention include strategies of behaviour change? How do you ensure that the treatment arm was not previously growing OFSP?

They received trainings on planting and maintaining crops, and on nutrition, how to prepare and consume the crop and the benefits. We did not control so it is possible that they were already growing sweetpotato. There were some adoption rates of perhaps below 10% but the idea was to select those with lower adoption.

2 SESSION 2: WILL SWEETPOTATO SEED STANDARDS BENEFIT SEED PRODUCERS AND FARMERS

2.1 Keynote: How sweetpotato seed standards can contribute to scaling up delivery and access to quality planting materials: the Uganda experience

Dr. Settumba Mukasa, School of Agricultural Sciences, Makerere University

2.1.1 What would be an ideal seed system?

A sustainable 'seed' system for vegetatively propagated crops should serve four critical roles: (i) provide a timely supply of adequate quantities of planting material for farmers, including new varieties (ii) provide for development and conservation of varieties, (iii) provide a means for controlling quality of planting material, and (iv) provide planting material at affordable prices.

The challenges that have faced the system include pests and diseases and slow rate of multiplication. The critical need to have planting material at the start of the rains to avoid late or missed planting is sometimes considered more important than quality of the planting material.

This indicates the importance of finding solutions to the problem of vine conservation through dry periods; and increasing the multiplication rates from 15:1 to rate that are comparable to cereals (200 - 300:1).

However, there are strategies for sweetpotato multiplication with the potential for attaining rates of 90:1. Their management require to understand of how to optimally structure primary multiplication and what mix of secondary multiplication and community based approaches are appropriate.

2.1.2 Background to the Uganda seed sector

13% of the planted area in Uganda is planted with seed from commercial seed companies (formal system). ISSD Uganda baseline shows that 89% of the farmers obtain seed from the informal seed system. The figures for vegetatively propagated crops (e.g. cassava and sweetpotato) are even worse.

But when targeting to sell seed, it is important to decide exactly which kind of farmer is being targeted. Systems have been put in place to the extent of seed classification

2.1.3 Sweetpotato seed system

Sweetpotato production and constraints to its seed system. Sweetpotato is vegetatively propagated where each cropping cycle is started by planting the apical 20-30 cm vine cuttings. Use of root sprouts is also common. This allows accumulation of pests and diseases, through each successive generation leading to significant decline in yield. Most farmers source planting material from their own fields or purchase from neighbours. Thus, they do not check on the quality of vines planted.

Sweetpotato virus disease (SPVD), can cause 50-98% yield loss in susceptible varieties and has been associated with the extinction of once elite varieties. Other pests and diseases have been reported, and they also raise phytosanitary concerns. A more sustainable intervention would be to promote a combination of using moderately tolerant varieties and use of good quality (trueness to type, physiologically viable, free from pests/diseases) planting material.

Subsistence (left) and commercial (right) seed production systems in Uganda (Photo courtesy of S. Mukasa/Makerere University

2.1.4 Purpose of seed certification and seed classes

Good quality seed should be described the same way by all stakeholders in value chain, and therefore the need for standards. Then, the standards are used during inspection and certification of a seed lot to qualify as a given seed class. The purpose of seed certification is to ensure farmers realize the potential yield of sweetpotato (10-12 tons/acre) through timely access to adequate quantities of quality seed. This can be guaranteed by use of appropriate standards and protocols during inspection and certification of the different seed classes. There are a number of seed classification systems. Whatever system is used, standards and guidelines are set by the government. The current seed classes being considered in Uganda include: Nuclear (Pre-basic) seed, Basic seed, Certified 1 (first generation) seed, Certified 2 (second generation) seed, and QDS.

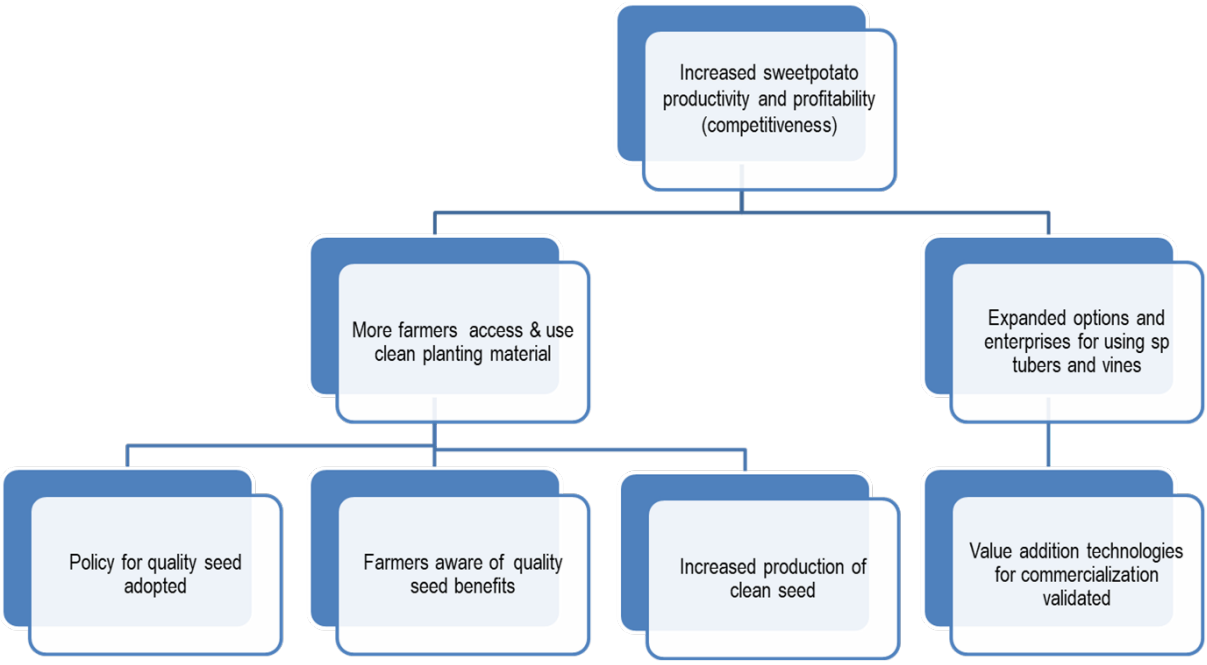
2.1.5 Recent Sweetpotato R4D in Uganda

MAAIF Department of Crop Protection (inspection and certification) in collaboration with Makerere University (CAES/MAK), HarvestPlus/ IFPRI, and CIP engaged in developing protocols for sweetpotato planting material (seed) as part of the comprehensive strategy to pluralistic seed sector including vegetatively propagated planting materials. The protocols are currently in form of technical guidelines for field inspection and certification of sweetpotato planting material in Uganda.

The team is also developing inspection instructional materials for sensitizing, training and technically empowering the plant inspectors, seed producers, laboratory operators, and net protected nursery multipliers.

The guidelines (standards) are primarily based on tolerances levels for visual disease readings, pest incidence varietal mixtures in the seed crop, land use history, source of planting material for the seed crop and laboratory testing in case of referral cases. The figure below shows a conceptualized impact pathway for promoting the contribution of access to quality sweetpotato planting material.

Figure 3 A conceptualized impact pathway for promoting the contribution of access to quality sweetpotato planting material



2.1.6 Seed delivery pilot in Uganda

A 3-tier production, multiplication and delivery model was piloted in Uganda.

- Level 1 involved selection, virus indexing and *in vitro* multiplication of elite sweetpotato varieties.
- Level 2 involved rapid screen house multiplication and bulking of virus tested vines.
- Level 3 involved primary (and secondary) open field vine multiplication in key sweetpotato producing regions by selected individuals or farmer groups.

However, for the sustainability of the sweetpotato seed system, there is need to identify policy issues that would ensure sustainability of a model for production and delivery of quality planting material.

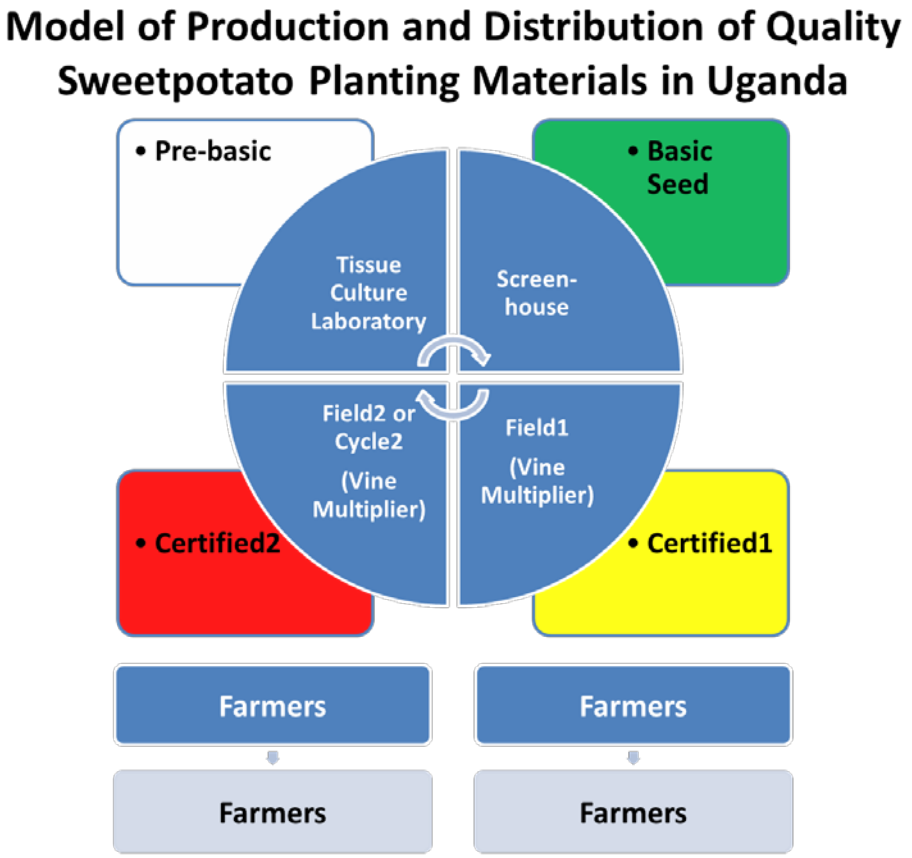
2.1.7 Sustainability issues

A study done in 2013 on farmers willingness to pay for virus free sweetpotato vines in central Uganda indicated a market of UGS 36.9 billion (USD 14.8 million) per year. The potential supply volume of virus free vines was estimated at 4.3 million bags per year each at UGS 10,000 per bag.

Our previous on-station studies at Makerere University showed over 80% yield increase when using virus free planting material vis à vis farmer-saved vines. Similarly, in China, the use of virus free sweetpotato planting materials restored varieties' original excellent yield.

An inspection process that can i) provide assurance to farmers and protection from unscrupulous seed dealers, ii) reduce the risk of spread of pests and diseases, iii) provide recognition to multipliers.

Figure 4 Model of production and distribution of quality sweetpotato planting materials in Uganda



2.1.8 Experiences and lessons learnt

- Informal 'seed' systems predominate, with the main source of planting material being farmer-saved 'seed' from old fields. This has a risk of spreading diseases despite farmers' efforts to select healthy-looking vines.
- There is clear evidence of a willingness to pay for vines. Effective farmer demand for purchased vines will depend principally on the level of virus pressure, rain patterns, availability of irrigation or wetlands, and the existence of a significant demand for roots or specialty varieties.
- It will also be important to distinguish between developing 'seed' systems for farmers increasingly linked to markets and for those who remain largely subsistence farmers.
- For long term economically sustainable 'seed' systems, there is need to involve the private sector, including farmers located in wetlands or prepared to irrigate, and private laboratories taking advantage of tissue culture, virus therapy, and diagnostic technologies.

2.1.9 Issues for discussion

- Informal 'seed' systems predominate, with the main source of planting material being farmer-saved 'seed' from old fields. This has a risk of spreading diseases despite farmers' efforts to select healthy-looking vines.
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- For long term economically sustainable 'seed' systems, there is need to involve the private sector, including farmers located in wetlands or prepared to irrigate, and private laboratories taking advantage of tissue culture, virus therapy, and diagnostic technologies.

2.1.10 Discussion

The question and answer section of the presentation was moderated by Kwame Ogero. He introduced the discussion by stating that one of the challenges for seed systems scale-up was quality assurance. He gave examples of a number of countries that have been working towards developing the standards for sweetpotato seed: Ethiopia are implementing their standards, and Uganda and Tanzania are in the process of developing theirs. However, the question has been how to fast track implementation. He also pointed out that in the recently launched seed standards for Common Market for Eastern and Southern Africa (COMESA) region, potato was the only vegetatively propagated crop.

Kennedy Masamba: There were some contradictions with regard to the standards.

There must be some standards. These standards can be revised but they should serve the community and country at the current time.

Kennedy Masamba: Is the cost of inspection affordable?

Sometimes the cost of inspection especially for small multipliers could be very high; they usually add this cost onto the price of vines. However, sweetpotato is supposed to compete with other root, tubers and bananas (RTBs), so if the price turns out to be high, then there is reduced competitiveness.

Ephraim Chabayanzara: According to experience, even small holders can be commercially viable so they should also be targeted with improved varieties.

Different categories of farmers will have different requirements; it is about what one wants to produce and why, e.g. a subsistence farmer is producing for food; and one with over 10 acres will be planting for commercial purposes.

Jude Njoku: Where in the seed system should inspection start?

MAAIF is not mandated by law to inspect pre-basic and basic, so the institution starts inspection from Certified 1 and 2.

Srini Rajendran: What is the actual supply, the amount circulating and the number of kilograms per bag?

In Uganda, sweetpotato is bought by volume and not weight. Issues to do with weight in bags is not clear, and it makes it difficult to get the right statistics at the national level; but as the market changes, people will start buying in kilograms.

2.2 World café poster session 2: Experiences with quality assurance in sweetpotato seed systems

During this session, each participant selected three posters to visit, spending about 15 minutes per poster. The presenter made five minutes' presentation on the poster, and the participants identified the accelerators and brakes for quality assurance in sweetpotato seed systems.

Kennedy Masamba (DARS Malawi) presents his poster during the World Cafe (photo: C. Bukania/CIP-SSA)

Poster 9 – Tanzania – ARI Uyole: Towards use of quality and certified sweetpotato seeds in Tanzania

Accelerators	**Brakes**
• Gender Involvement • Strategy to train DVMs and seed certifiers • Farmers' acceptance of clean seed and readiness to pay • Seed regulation act passed and implementation started; and Quality declared seed (QDS) officially recognized in seed law • Institutional collaborations • Inspector training planned • Policy environment is conducive • Seed standards and quality inspection implemented for sweet potato	• Few inspectors trained • Poor irrigation system • Lack of skilled personnel in virus indexing • Infrastructure/lab for indexing is lacking with a lab in only one location • Only relying on Tanzania Official Seed Classification Institute (TOSCI) as inspectors will become a practical barrier • Need to focus on developing inspection system that is not too costly • Farmers' willingness to invest in clean seeds is limited

Poster 10 – Malawi – DARS: Towards a functional and sustainable sweetpotato seed system in Malawi

Accelerators	Brakes
• Root and Tuber Crops Development Trust plays a key role in fostering adoption • Government and institutional support • Use of district level staff for inspection • Stakeholders' meeting to educate buyers	• Projects are paying for inspection which is not sustainable • Middlemen supplying seed (poor quality) • Procurement of poor quality of vines as a result of open tenders • Seed inspectors are currently field based. Government needs to think and plan for plan after project. To continue the inspection activities • Vine procurement system discourages actual vine multipliers

Poster 11 – Kenya – KEPHIS: Quality assurance in sweetpotato seed systems in Kenya

Accelerators	Brakes
• Cost of registration as seed merchants • High certification and mileage charges • Decentralize certification of seed services • Cost of inspection and registration fee is high • Role of NGOs and CBOs • High certification charges • Cost of inspection	• Training of inspectors • Law in place for seed certification • Training of inspectors • Policy makers' role in quality assurance

Poster 12 – Nigeria – NRCRI: Situation report on quality assurance of sweetpotato seed systems in Nigeria

Accelerators	Brakes
• DVM pay for the inspection • Progress on getting a draft for seed quality, willingness to get QDPM informally recognized at low charges • Decentralizing seed inspectors in all different classes	• Recycling of planting materials • Inspection protocol submitted • Confusion on naming systems compared to other countries with cassava • Classes still need to be better defined • Insufficient inspectors • QDPM not recognized

Poster 13 – Rwanda – RAB: Status of quality assurance in sweetpotato seed systems in Rwanda

Accelerators	Brakes
• DVM paid the inspection • Developing sub-inspectors since recognize #of inspectors is not enough • Government subsidizing inspection cost • Government support /willingness to develop sweetpotato seed standards which are in the process of approval • RAB supporting the process	• Isolation distance a challenge due to small land holding sizes • Strict zero tolerance on virus for basic seed may result in no basic seed producers only certified • Insufficient trained inspectors available

Poster 14 – Ethiopia – SARI and TARI: Sweetpotato seed standards in Ethiopia

Accelerators	Brakes
• Inspection is paid for by government; Research institutes are happy for support in inspection process • Well-developed standards with government involvement and initial government support to certify seed • Many stakeholders involved • Capacity building	• The DVM may have to pay the cost of inspection in the future • Recruitment of inspection staff required to increase the number • Absence of willingness for farmers to pay for vines • Government paying for inspection will affect sustainability

2.3 Panel and plenary discussion on quality assurance for sweetpotato seed

This panel discussion was moderated by Jan Low. The panel discussants were as follows: Regina Beinomugisha: Western Uganda Seed Multipliers Association (WUSEMA); Peter Omondi: Northern Uganda Seed Multipliers Association (NUSEMA); Charles Otuda: Eastern Uganda Seed Multipliers Organization (EUSEMO); Joseph Okalebo: Coordinator of Soroti Sweetpotato Producers and Processors Association (SOSPPA). This section provides a summarized version of their responses to the moderator's questions.

Regina (holding microphone) makes her contribution to the panel discussion (photo: C. Bukania/CIP-SSA)

Regina Beinomugisha: WUSEMA

My association started in 2012, we had a group producing vines in 2013, and last year we formed an association after we were trained on how inspection is done. We understand that we have to pay some money to inspectors. Every group is supposed to pay UGS 100,000 - 50,000 for facilitation and 50,000 for the fuel.

The inspector checks the screen house to ensure that infection is not more than 1% and for the C1 and C2 not more than 3% and QDS was 5%.We passed our inspection and got certified to supply materials to some districts that have nutrition programs. Payment for inspection influenced the prices. We were selling one bag for UGS 10,000 but we had to increase our price to between 15,000 and 20,000. This is because we have to put more effort in the screen house because we have to spray and maintain the quality. The pricing for Certified 1 and Certified 2 is higher than QDS, which has relatively low involvement.

Peter Omondi: NUSEMA

My first inspection covered the screen house up to the field. My seed was very good and I was certified. We do not sell the vines, instead, we have many organizations that make orders from us. Based on our experience with inspection, I feel that getting the screen house would make us real sweetpotato seed multipliers.

The quality standards stipulate an isolation distance of 50 meters. I do not support this because your neighbours can plant very close to your field and you cannot chase them. I think they should reduce the isolation distance to between 15 and 20 meters.

Charles Otuda: EUSEMO

Before we formed ourselves into one big organization, we started as a small group in 2007 and worked like that until 2015, but marketing of vines was not easy. Vine selling was a challenge and I always had to wait for World Vision or CRS to buy. When I did a market survey, some districts had started participating in the inspection and they informed me that this was something I should be prepared for. When the inspection program was introduced, we were advised to set up one organization. 2017 has not been a good year, but we have been able to sustain the materials and I sold around 7,200 bags. My farm is near the highway and so people park by the roadside to buy. I charge UGS 15,000 and above depending on the willingness to buy, and it is based on many factors including the transport.

Joseph Okalebo: SOSPPA

I agree with Peter that the isolation distance should be reduced to 15-20. The number of permitted ratoons for QDS should be increased, otherwise the farmer might not find it viable to multiply sweetpotato seed. It would also be important to train the multipliers on identification of pests and diseases.

In SeFaMaCo, we have tried to engage youth directly through schools. We have two technical schools in which students are being taught the skills they need to go into multiplication when they get out of school. One example is of a youth who got 700 bags at UGS 25,000 sold by one person. The problem is that youth are not interested in an enterprise that takes long before showing results. On the other

hand, youth have a challenge of accessing land, and so seed production would be a reasonable option to utilize the small pieces of land.

2.3.1 Discussion

Kennedy Masamba: You are operating as associations. Are you selling as an individual or a group?

Peter Omondi: I am working as part of a big organization which is composed of 39 farmers, 31 men and eight women. Any transaction is handled as a group.

Moses Wandera: There is a big difference in pricing ranging from UGS. 15,000-25,000. What influences this difference?

Peter Omondi: Before inspection, we had started to consider vines as a commodity. We price differently depending on the type of customer.

Srini Rajendran: If all these NGOs left the business, would you continue working in seed production?

Charles Otuda: This business is part of our lives. When we come to a training like this they talk about sustainability after the NGOs go away. In the North, we have many communities that only hear about OFSP, and they transfer money to me via Mobile Money so that they I can deliver the vines to them. Such individuals pay less but demand is continuous. In contrast, NGOs buy once in bulk then they disappear, and they dictate the price.

Norman Kwikiriza: Are local farmers buying from you? What proportion of sales are coming from local farmers?

Regina Beinomugisha: We sell to NGOs because we have been announcing our business on radio and on local markets. We sold 500 bags to HarvestPlus and 1600 bags to government program on nutrition and food security. We sell the planting material to tertiary multipliers, every farmer should have at least six tertiary multiplying seed. Every tertiary multiplier gets 15 bags to multiply for neighbouring households.

Joseph Okalebo: SOSPPA trains farmers on root production. We support the roots production to boost demand of planting material. We supply vines through schools and we recruited market breakfast traders to buy roots. The government nutritionist at the local hospital asked me to supply to the school and hospital for a demonstration.

3 Session 3: Cross crop learning – Banana Seed Systems

3.1 Banana seed systems and the influence of gender presentation

Anne Rietveld, Bioversity

Anne Rietveld makes her presentation (photo: C. Bukania/CIP-SSA)

The presentation is part of the session to have a discussion that was held on the similarities between sweetpotato and banana; and the role of gender. The presentation was preceded by an explanation of the steps of banana growth and reproduction.

3.1.1 Banana in East African highlands

The East African highlands that are prominent banana producing areas include Eastern Congo, Western Kenya, Uganda, Rwanda and Burundi. In these areas banana is important for food security and income. Although banana did not originate in this area, it was introduced over 1000 years and the region has become a secondary biodiversity hotspot, where banana is produced throughout the year.

3.1.2 Cropping systems

In Central and Western Uganda, there are commercial mono-cropping, systems producing banana for the markets. In other parts of East Africa (Eastern Congo/Burundi), farmers produce beer varieties which are not managed intensively and are used for producing juice and beer for selling. In this area, banana is considered a bank to go to when one needs quick cash. Intercropping can be found across the entire region.

3.1.3 Gender analysis of banana systems in East Africa

Men are usually in control of banana plantations. Men and women have specific tasks in banana management, e.g. weeding, and mulching, while men do uprooting corms, desuckering, harvesting, planting, marketing and sales. However, this division of labour is based on assumptions about what is appropriate for men and women.

Because land belongs to men, they own the banana plantations. As heads of the households, the men feel that they should make decisions about money and land. There is an assumption that women do not need cash, so they tend to have limited options to invest in farming. The husband controls (to some extent) work allocation of wife and even if they do not like working on bananas, it is expected of them. Women work mornings in the plantation. They are also considered as belonging at home and whenever they want to go out, they must seek the permission of their husband. This reduces their capacity to access information and purchase inputs. Yet, when women are in control, for example as widows who have inherited land, they work and manage their own plantations.

3.1.4 Banana intercropping and seed systems in East Africa

There is high diversity of cultivars on the farm; productivity is quite low; there is a low use of inputs. Threats of diseases such as Bunchy Top Disease and Xanthomonas Wilt. Some of the plantations could be very old; this means that farmers have a relatively low need for seed.

Usually, farmers need seed only in exceptional situations such as establishment of new plantation, when expansion exceeds own sucker availability, disease or degeneration, change of production objectives that require other varieties, or a mix these factors.

There is no regular complete re-planting but 'gap-filling'. The need for seed mostly filled with own-farm available 'suckers'. There is relatively little seed exchange and the role of the formal seed sector is negligible. Improved varieties come from research or development agencies.

3.1.5 An overview of the value chain analysis in Western Uganda: ENDURE

ENDURE aimed at improving the cooking banana value chain through various interventions along the chain through:

- Promotion of four market-demanded varieties - establishing community based seed production system
- Mother gardens hosted by individual farmers chosen by the communities or farmers representing groups (5 women, 5 men)
- Training in field banana planting materials multiplication techniques, and in establishment and management of macropropagation chambers and shade

All the people were trained and the project ended in 2016. This way of producing seed was copied and you do see that there was demand for it. At the same time, you see that those that became commercial are managed by men and those run by women were either discarded or are run by a group including men.

To change the seed system, it is important to understand the need of farmers and the production system, but also to understand the gender aspects and how they interact. If one component is changed, it will be expected to have an implication on the way that men and women are involved. Therefore, the wider context should always be paid attention to.

With this in mind, the research and development questions on banana seed systems could be:

- What is our objective? Is it economic empowerment to men and women involved? Is it to transform the ways in which men and women are involved - promoting gender equality?
- Taken that banana is mainly a man's crop, is it important to have a gender-responsive approach to seed access? What would that approach look like?

3.2 Banana seed systems and the influence of gender panel discussion

The panel discussion consisted of Reuben Ssali - Sweetpotato Breeder at CIP; Wilfred Mushobozi - Crop Biosciences Tanzania; Anna Rietveld - Bioversity Uganda; Maureen Mwangangi - KEPHIS; Harold Mate – FCI. It was moderated by Gorettie Ssemakula (NaCRRI).

Gorettie Ssemakula: Taking into the account the current characteristics of banana seed systems and sweetpotato seed systems, how would targeting women in seed multiplication and nursery management influence the seed system?

Wilfred Mushobozi: Where I come from, banana is considered a women's crop but coffee and cows belong to the men. However in the region of Kagera, banana is a man's crop. At Crop Biosciences, we realize the importance of women. When we set up satellite nurseries, we realized that men shy away from setting them up because it requires men to fetch water during the dry season, and women are the ones that fetch water. Women also take care of household food security, and for this, both banana and sweetpotato play an important role.

Maureen Mwangangi: Seed multipliers are mostly men, so if we increase the number of women, then accessibility will also increase.

Ann Rietveld: I made statements about the gender norms because they are ideas that come up, but it does not mean that they are accurate and that they will always be like that. That is why I ask what our objective is? Do we want to propose things to farmers that reinforce certain ideas or to contribute to changing these ideas and creating alternative ones? For example, we know that men can go and fetch water, but it is just assumed that they should not. These seed systems could make them change their behaviour.

Harold Mate: Whatever is not commercial is usually delegated to the woman, and when it generates income, men take interest and take over. The decision on how land is used is still made by men. Until women can make commercial decisions, their participation will continue to be limited.

Reuben Ssali: As banana gained in popularity, it was produced in different places and sometimes had to be transported large distances to the market. Some of the varieties get damaged easily so it is important to know what varieties the farmers really want. Apart from access to seed, there is also the workload that women are engaged in, such as household chores and assisting the husband on the farm. It is always important to consider how increasing their participation affects the women's workload.

Gorretie Ssemakula: What are the constraints to women and youth becoming effective nursery managers or sweetpotato seed systems, and what can be done to overcome these constraints?

Reuben Ssali: Give these nurseries to women and youth so that they can pool labour.

Ann Rietveld: Women and youth are a lot of people and the diversity within these groups is enormous. There is no similar constraint, but land access could be common across many women. It is often the smaller personal things like access to resources, social network, family support, and business skills that are a constraint. When examining constraints, we have to break down what we are talking about to focus on specific sub-groups. We often want to put women and youth in groups thinking that they will overcome the power issues they are confronted with, but I don't think this is always a solution. In fact it can cause a problem within the groups.

Maureen Mwangangi: If women are involved in this business, it could give them more control.

Wilfred Mushobozi: No nursery has been run successfully by a group. It has to be run as an individual business. We have a nursery being run by a widow, it is sponsored by International Fund for Agricultural Development (IFAD). They understood that the constraint was water, so they did provided

a reservoir for rain harvesting and trained the widow on managing the nursery (handling tissue culture crops, soil sterilization, potting etc.).

Harold Mate: I agree that working with groups is not a solution. It is better to engage communities to understand that women can also run successful enterprises.

Audience contributions

David Talengera: Government programs are emphasizing a lot on the youth; these are strong people who can do manual labour, and it enables them get absorbed into income generation.

Everlyn Matiri: Gender roles are culturally determined and hard to do away with. At CRS, we have taken a different approach of how couples communicate. This influences how household decisions are made. It really works in nutrition programming.

Kwame Ogero: When talking about the youth, one must think about profitability of the seed system, and to understand the different categories of youth.

4 Session 4: Learning Journeys

4.1 Sweetpotato pre-basic (nuclear) seed production at NaCRRI

4.1.1 Background

The National Crops Resources Research Institute (NaCRRI), one of the constituent institutes under the National Agricultural Research Organization of (NARO) of Uganda is implementing the production of early generation seed of sweetpotato. The International Potato Center (CIP) through the SASHA project supports this work.

The objectives of the project are to

- Conduct virus indexing and *in vitro* production of planting material
- Multiply pre-basic and basic seed in the screen house and field
- Build capacity and coordinate production of pre-basic and basic sweetpotato seed

Presently, virus indexed stocks of popular sweetpotato varieties are being maintained in the tissue culture laboratory at NaCRRI. The visitors will also be able to see the cleaned pre-basic seed being multiplied in the sweetpotato seed multiplication screen house at NaCRRI. We are currently multiplying NASPOT 12O, NASPOT 13O and Dimbuka-Bukulula varieties in the screen house to be transferred to the field site at Abi Zonal Agricultural Research and Development Institute (AbiZARDI) in Arua. Arua is a low sweetpotato virus disease zone, suitable for basic seed production. The project has enhanced the dissemination of virus indexed sweetpotato planting material especially in the West Nile region where the basic seed multiplication site is located.

4.1.2 Main learning points

- Limited funding from the government
- High demand for clean seed but limited land for production; and not able to estimate exact demand.
- Impressive awareness creation strategy: agricultural shows, annual sweetpotato day, radio talk shows etc.
- Multiplication of seed in a low virus pressure area
- Linkages with the private sector to increase production of clean material
- Demonstration plots to show performance between virus indexed and farmer-sourced material
- The need to identify niche market before going into seed business; initially started with pre-basic but started basic seed later
- Important to do real time cost-data analysis
- Revolving fund mechanism is still a constraint. Money put in a consolidated fund which is not easy to access
- Synergy between different SP projects
- SASHA 2 support for pre-basic seed production is a good opportunity to ensure reliable supply of quality seed for both white-fleshed sweetpotato (WFSP) and OFSP
- Linkage with the private laboratory encouraging for PPPs
- Pest and disease management practices: soil sterilization, yellow sticky traps, pesticide spraying biweekly, use of polymerase chain reaction (PCR) in virus diagnosis, routine cleaning of screen house
- Gender not sufficiently mainstreamed
- Use of signboards to warn buyers against unscrupulous seed dealers
- Be actively involved in inspection especially when segregating the different classes

Online discussion topic

- How can a buyer know that he/she is getting the seed class he/she is paying for? – Kennedy Masamba.

Key research questions

- Exploring performance of different generations of seed at the same time.
- Real time cost-benefit analysis for pre-basic and basic seed production to come up with reasonable selling price.

4.2 Commercializing clean OSP vine production; a case of Lwanyaga Vicent

Learning journey to Lwanyaga Vicent (photo: V. Atakos/CIP-SSA)

4.2.1 Background

HarvestPlus Uganda is trying to set up a system of replenishing the vines in the community with clean tissue cultured material. This arose out of the fact that the sweetpotato varieties we are promoting had degenerated and the rate of dis-adoption was raising due to decline in yield. This is being done through a partnership with technical back stopping from CIP, engaging two private laboratories BioCrops and Senai, Makerere University and vine multipliers who are entrepreneurs based in the communities where roots are being produced. These entrepreneurs have formed regional associations and are now being inspected by Ministry of Agriculture, Animal Industries and Fisheries Inspectors to ensure quality. Also efforts to become resilient to weather changes by managing low cost irrigation are being explored. Today's visit demonstrates this process.

This has resulted in increased popularity and demand for clean planting materials as the farmers are exposed to the clean vines which result in the high yield that farmers used to get when they received initial planting materials. The surplus roots arising from productions are being marketed by the roots producers. This area demonstrates an aspect of commercialization where farmers have expanded area under roots and have been linked to road side and urban markets. HarvestPlus is supporting interventions to make the entire system efficient and profitable along the entire value chain.

The objective of this learning journey was to learn about OFSP seed value chain in practice, generate practical action points for improving approaches in scaling up.

4.2.2 Main learning points

Production

- Market for vines is available from root producers, NGOs and government programs
- Excess unmarketable vines are used in silage for pig feed
- Farmers are implementing a crop/livestock production system that fully utilizes the resources including animal waste
- Careful vine harvesting that enables quality root production
- Segmented root market for OFSP roots as road side market

Seed multiplication

- Seed multiplication system is self-sustaining because it is profitable
- It is a complete loop linked to root producers that are not able to conserve seed
- Income can be generated at any level; screen house, rapid multiplication, dual purpose, root production, silage
- The seed production per unit area is still low
- Land utilization is sub-optimal due to use of mounds
- Stand-alone vine production for seed may not be profitable unless it is integrated.

Seed health and standards

- Farmers appreciate the role and importance of seed health in improving seed quality
- Farmers amenable to adopt even more stringent standardize with sensitization and education because seed business pays
- Lack of variety labelling, isolation distances, and condition of screen houses need improvement

Pest and disease management

- Farmers undertake integrated pest and disease management
- Timely field operations e.g. weeding and rouging
- Undertake pest scouting before deciding to use pesticides
- May do spot application than total coverage
- Reduce pesticide use, cost and environmental contamination
- Dual purpose system compromises seed quality

Alternative use of vines and root

- They make silage for livestock feed especially pigs
- Have formulae for different silage types by livestock

Business sustainability for silage

- Maize-based animal feeds have become very expensive
- Growing pig production enterprise
- Easy source of raw materials

Business sustainability

- Supported by agro-enterprise integration

- Group is known in the community and beyond as sources of quality seed
- Having knowledgeable people to help in doing work
- Enhanced gender participation particularly youth
- Passion for enterprise and hard work
- We shall need food and this can be produced from seed
- It is profitable

Emerging research question

- Developing an efficient system for delivery and use of water for production
- Feed efficiency of sweetpotato silage in livestock other than pigs
- Developing practical isolation distances
- Comparative study for profitability between sole vine and dual purpose seed vine production systems
- Developing alternative efficient soil sterilization methods
- Alternative screen house media
- Agronomy, seed and root quality issues in dual purpose sweetpotato enterprises

Strategy for sustainability

- Product line diversification
- Enterprise integration
- Action points by individuals/country teams Each country to provide at least two action points

Topics for online discussion

- Alternative uses of excess vines and unmarketed fresh roots (Jude Njoku)
- How do we stimulate rapid uptake of inspection services in sweetpotato seed systems by vine multipliers as a means of seed health management for high (Moses Wamalwa)
- Potential use of barrier crops for isolation distances in QDS systems (Robert Mwanga)

4.3 Visit to BioCrops (U) Ltd private tissue culture laboratory

Learning journey to Biocrops Uganda Ltd. (photo: C. Bukania/CIP-SSA)

4.3.1 Background

BioCrops Uganda Ltd. is a registered Private Agribusiness Company specialized in the production and supply of high quality planting materials of vegetatively propagated crops. Started by seasoned biotechnologists, the company uses plant tissue culture technology to mass propagate and eliminate plant borne diseases and pests that limit conventional clonal propagation. The company also carries out research and consultancy. Major crops handled include bananas, sweetpotatoes, cassava and Solanum potato, while production procedures for coffee and ginger are already developed and await up-calling. Since its creation, BioCrops has worked with several partners including but not limited to: CIP, HarvestPlus, International Institute of Tropical Agriculture, Makerere University, NARO, MAAIF as well as individual and group farmers

4.3.2 Main learning points

Main learning points from the visit

- Participants gained new technical knowledge e.g. how to harden the sweetpotato
- The managers of Biocrops have a strong technical knowledge
- Biocrops is a pioneer in the sweetpotato seed system business
- The company is working hard to lower cost while trying to ensure quality
- It has worked hard to get many partnership as possible
- More technical and financial support required, especially through collaboration with public institutions, CIP, NGOs etc.
- Weak government and policy (implementation) in the seed sector
- Limited awareness/ information gap about the seed sector business
- Weak marketing strategies

- Biocrops can maximize the benefits and advantages of being a monopoly, develop innovative marketing strategy based on market research and develop a pricing strategy

Other strategies for scaling up

- Create more awareness in private sector, public sector and regulatory bodies etc.
- Management needs to be aggressive on working to ensure continuity, especially if there are no NGO support e.g. through diversification
- Strengthen forward and inward linkages. Create a strong relationships and bond with all actors both upstream and downstream; e.g. strong link to the root producers, processors (downstream actors)
- Understand the commercial viability of sweetpotato and related products
- Advertise the real benefit of promoting clean planting material to create demand
- Establish evidence that their vines are the best e.g. by setting up a demonstration site
- Undertake market quantification to determine the countrywide seed demand and consequently the Biocrops market

Action points

- For the Seed systems CoP, set up guidelines on how to create demand for the sweetpotato vines and other products (Daniel, Norman, Simon, Harold, Srini)
- Develop marketing guidelines for the DVMs as this is key for survival of the vine multipliers; Strong evaluation process for DVMs especially on the ability to make it commercial (Beyene, Ricardo)
- Verify quality aspects of DVMs, approaches used in marketing, and assess commercial viability of sweetpotatoes (Simpson, Ricardo, Norman-CIP)
- ICT framework for connecting actors in the sweetpotato seed system network (Norman; Srini, CIP)
- Every seed producer should work closely with all the stakeholders in the value chain (Some) DVM clusters visit the seed multiplication companies, trained to learn and appreciate as a group (Daniel-CIP)
- Follow BioCrops regarding the development of marketing strategies and business plans; Document profitability of seed entrepreneurs established under SEFAMACO program in Tanzania, Uganda, Ethiopia (Harold, FCI; Srini-CIP)
- Develop guidelines for utilizing resources efficiently and cost effectively in tissue lab and screen house (Rosemary, Beyene; Some and Srini)

One Key message

Technically, the company is sound. But it is not telling the farmer the beauty that is in their products to the end users. For example, a demo garden at the premises, attractive messaging and demos in the farming communities.

Annexes

Meeting evaluation

The Sweetpotato Seed System CoP Seventh Consultation was held in Mukono, Uganda on 13-14 June 2017. Sixty-two participants participated in the meeting, but only 46 filled the evaluation form out of which 76.1% were male and 23.9% were females. The average age of participants was 42 years. Thirty-six percent of participants were agronomists, and 22% were breeders. The remaining 42% were from other professions such as extension officers, farmers, private sector players and agricultural economists.

Most respondents (78.3%) felt that the meeting met their expectation. Forty-eight percent were satisfied with the overall organization and outcome of the meeting. All of them found all the technical content quality of presentation good. With regard to logistics, 56.5% found the arrangements good, whereas 35% participants felt that it was very good.

The top three most useful sessions were: Session 2: Will sweetpotato seed standards benefit seed producers and farmers? and Session 4: Preparation for the Learning Journeys. The least useful session was Session 3: Does gender influence success in scaling.

Half of the respondents participated in the learning journey to Lwanyanga Vicent, while 28.3% went to NaCCRI. The rest visited Biocrops Ltd.

Those who visited NaCCRI felt that there are three lessons which they could try in their own country or situation. The first lesson was setting up demo plot, virus indexing, performance of generation and ratooning and was reported by 46.14% of total participants who visited NaCCRI. The second was demo plot and efficient use of screen house for producing pre-basic seed reported by 30.76% of the participants on this Learning Journey. The third was seed management and usage of wooden box, also reported by 30.76% of participants.

Out of those who visited BioCrops Ltd, 50% reported that they have learned importance of quality assurance in the tissue culture lab, quality management of planting materials and efficient use of resources. About thirty-three percent of the participants felt that marketing strategies are important for improving revenue and sustaining the business in the long-run, while 20% of participants reported that they learned the importance of soil sterilization.

For those who visited Lwanyaga's home, 74% reported that producing vines alone may not be a profitable business and efficient use of production resources. It is necessary to integrate with other activities particularly silage production that has high demand from the livestock sector and low cost of production. The second most important lesson learned from the field visit is silage marketing strategies while the third was lessons on conservation, packaging, and regular multiplication of vines, net tunnel utilization and dual purpose varieties.

Most of the participants suggested that learning journey can be improved by allocating sufficient time, it can be done through following suggestions a) selecting fewer topics b) identifying places closer to venue; c) allocating full day for field visit and d) follow-up discussion on next day are going to be beneficial for improving the session efficiently.

Three areas of improvement for the next meeting suggested by the participants were allocation of more time for discussion and presentation (33%), followed by better venue, success story from other

partner countries and identifying action points during CoP and then follow them in next meeting (14%). Finally, few suggestions such as more private players and better venue with internet, and number of days required.

Further, participants suggested some topics for the next meeting. The list of the most suggested topics was as follows:

- Good agricultural practices which includes quality standard, pest and diseases management
- Farm budgeting including costing and price strategies and business models;
- Demand projection and integrated farming system with vine production by 28.21%.
- Sustainable business case studies and marketing strategies.

Interestingly, some participants also highlighted how buyers of planting materials ensured that they are getting good quality planting materials based on the number of ratooning and generation materials for the amount paid by them.

Brief: Growing sweetpotatoes is the easiest by Ernest Lapat, DVM in Pader district of Uganda

In the previous time, we used to grow sweetpotatoes just for home consumption without thinking (knowing) that sweetpotatoes can bring for us good amounts of money when we sell the vines and roots but later we realised that keeping potato vines can help us in the following ways:

- It brings money: It can be used as a food security because we can grow it in the first rain since the vines are available.
- Land: Concerning the issue of land, I have enough pieces of land both near the Pager River and on the hilly areas of which I can grow sweetpotatoes as early as possible and in a large scale.
- Research: In my research, I have found that the people of |Acholi have large pieces of land but we don't have knowledge and skills on how to utilize this available resources.
- Framing equipment/tools: in order for us to eradicate poverty, we need to be assisted with different farm tools and equipment which can make our work easy and to save time other than using our local ox-plough which may require a week to clear one piece of land. An example of the equipment and tools needed are slashing machine, diesel generator, water gun, pipes, walking tractor etc.
- Plan: In our plan for the year 207/2018, we are planning to have five gardens of sweetpotatoes in each farming season in the first and second rains. |all these plans will work when all the farm tools and equipment are given in place and in time.
- Value addition: As we plan to grow sweetpotatoes on a large scale, we cannot be in a positon to consume it all, but we can carry out value addition through doing the following: making cakes from sweetpotatoes; sweetpotato juice, grinding sweetpotatoes in a fine form (poluso). All these can be done if the machines are available.
- East Acholi Sweet Potatoes Growers Association: Under this association we covered some parts of Acholi sub region. The areas which you can get us are Kitgum, Lamwo and Pader and our customers are very many.

LAPAT, ERNEST: INCOME AND EXPENDITURE REPORT

Income

Date	Description	Rate (UGX)	Total (UGX)
28/03/2017	Vines 05 bags	20,000	100,000
03/04/2017	Vines 09 bags	20,000	180,000
10/04/2017	Vines 36 bags	20,000	620,000
25/04/2017	Vines 24 bags	20,000	480,000
04/05/2017 – 03/06/2017	Vines 58 bags	20,000	1,160,000
04/06/2017 – 08/06/2017	Vines 40 bags	20,000	800,000

Expenses

Date	Description	Rate (UGX)	Total (UGX)
28/03/2017	Cutting vines 05 bags	20,000	100,000
03/04/2017	Cutting vines 09 bags	20,000	180,000
10/04/2017	Cutting vines 36 bags	20,000	620,000
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Meeting Agenda

Sweetpotato for Profit and Health Initiative-

Regional Technical Support Platform for East, Central and Southern Africa

Sweetpotato Seed Systems Community of Practice: Seventh Consultation- Towards up scaling sweetpotato seed production and delivery of quality planting materials in Sub-Saharan Africa.

13-14 June 2017, Mukono, Uganda

PROGRAMME

TIME	SESSION	Responsible
Monday 12th June: Arrival of CoP participants		
Day 1: Tuesday 13th June		
7.45- 8.00	**Registration**	Martha Ameru (CIP)
8.00 – 8.30	**Introductions and objectives of meeting**	Benard Yada, (NaCRRI) David Talengera (BioCrops), Margaret McEwan (CIP)
Session 1a: Ready for Scaling - 1 Moderator: Wilfred Mushobozi; Rapporteur: Christine Bukania		
8.30 – 9.00	**Keynote: "Scaling Sweetpotato Seed Systems in Uganda: an analysis of the accelerators and brakes"**	Co-presentation: Charles Musoke, Cletie Lukusa **(H+ Uganda)**
9.00– 10.00	World Café Poster Session: Experiences with Scaling in Sweetpotato Seed Systems i. MIIST Malawi ii. SUSTAIN & FtF Rwanda iii. AVCD Kenya iv. VISTA Tanzania v. DVM Mapping vi. SUSTAIN Mozambique vii. VISTA Mozambique viii. Irish Aid Mozambique	Presenters: Participants select 4 posters to visit: 5 minutes' presentation on the poster; 10 minutes' discussion and identification of accelerators and brakes for scaling sweetpotato seed systems
OFFICIAL OPENING BY DG NARO Moderator: Benard Yada		
10.00 – 10.30	**i. Highlights from the Sweetpotato for Profit and Health Initiative (SPHI)** **ii. Opening Remarks**	Dr Jan Low, SPHI Co-Lead and Principle Scientist (CIP) Dr Ambrose Agona, DG NARO
• ***10.30 – 11.00 Group photo and tea/coffee break***		
11.00 – 11.30	**Plenary discussion on scaling in seed systems**	Moderator: Margaret McEwan
Session 2: Will sweetpotato seed standards benefit seed producers and farmers? Moderator: Kwame Ogero; Rapporteur: Christine Bukania		
11.30 – 12.00	**Keynote: "How sweetpotato seed standards can contribute to scaling up delivery and access to quality planting materials: the Uganda Experience"**	Presenter: Settumba Mukasa

TIME	SESSION	Responsible
12.00 – 13.00	**World Café Poster Session: Experiences with Quality Assurance in Sweetpotato Seed Systems** i. Ethiopia: SARI & TARI ii. Malawi: DARS iii. Rwanda: RAB iv. Kenya: KEPHIS v. Nigeria: NRCRI vi. Tanzania: Uyole ARI	Presenters: Participants select 4 posters to visit: 5 minutes' presentation on the poster; 10 minutes' discussion and identification of accelerators and brakes for scaling quality assurance in sweetpotato seed systems
13.00 – 14.00 Lunch		
14.00 – 14.30	**Panel and plenary discussion on quality assurance for sweetpotato seed**	Moderator: Jan Low Panel: Joseph Okalebo (SOSPPA), Regina Beinomugisha (WUSEMA) and Peter Omondi (NUSEMA)
Session 3: Cross crop learning – Banana Seed Systems Moderator: Gorrettie Ssemakula; Rapporteur: Christine Bukania		
14.30 – 15.30	**Banana seed systems and the influence of gender: presentation and panel discussion**	Presenter: Anne Rietveld – Bioversity Panel: Reuben Ssali (CIP); Wilfred Mushobozi (CropBioScience Arusha); Harold Mate (FCI) Maureen Mwangangi (KEPHIS)
Session 4: Preparation for the Learning Journeys. Moderator: Margaret McEwan; Rapporteur: Christine Bukania		
15.30 – 16.15	**Group work: preparation for learning journeys:**	Groups 1 and 2: Visit to NaCRRI and BioCrops Groups 3 and 4: Visit to Lwanyaga's site in Mpigi District a. Net tunnels; b. Silage c. Root aggregation/ marketing
• ***16.15 – 16.30 Tea/Coffee break***		
Session 1b: Ready for Scaling – strategies for diffusion. Moderator: Charles Musoke; Rapporteur: Christine Bukania		
16.30 – 17.15	**"Lessons from orange sweetpotato saturation and thought leader experiments for promoting adoption in Uganda."**	Dan Gilligan – IFPRI, Washington DC. (By Webex)
17.15 – 17.30	**Wrap up for day**	Benard Yada
• **18.30**	**Cocktail**	Martha Ameru
• **DAY 2: Wednesday 14th June: Learning Journeys**		
06.00 – 06.30	**Breakfast**	
06.45	**Departure**	
13.30 -14.15	**Lunch at hotel**	
15.00 – 16.00	**Group reflections and write up on learning journeys**	Groups 1 and 2: Visit to NaCRRI and BioCrops Groups 3 and 4: Visit to Lwanyaga's site in Mpigi District a. Net tunnels; b. Silage c. Root aggregation/ marketing.
16.00 – 16.15 Tea/Coffee break		
16.15 – 17.15	**Group presentations: 4 x 10 minutes plus discussion**	Moderator: James Mwololo
17.15 – 17.30	**Evaluation and wrap up of CoP meeting**	Srini Rajendran and Jan Low
	Participants departure: Wednesday evening or Thursday morning	Martha Ameru

Participants' List

Sweetpotato for Profit and Health Initiative-

Regional Technical Support Platform for East, Central and Southern Africa

Sweetpotato Seed Systems Community of Practice: Seventh Consultation- Towards up scaling sweetpotato seed production and delivery
of quality planting materials in Sub-Saharan Africa.
13-14 June 2017 - Draft participants' list

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The Big Crop

Lack of certified sweet potato

Uganda's sweet potato production has reduced from 2.8 million tonnes in 2010 to 1.8 million tonnes

By Prossy Nandede

Sweet potato is one of the rich crops that can shield a family from starvation during dry spells. They are hardy, afforded by the dry spell and can be cultivated with minimal input.

These characteristics make sweet potato a valuable crop for mitigating food insecurity. They can be eaten without waste and the vines can be sold as seed or animal feeds.

Botanically known as Ipomoea batatas, sweet potato is the leading food crop according to the ministry of agriculture, animal industry and fisheries. They take three to four months to mature.

First cultivated in central and western Uganda prior to 1900, especially on the slopes of Mt Rwenzori, but moved to the north.

By the 1950s, sweet potato accounted for 9% of Uganda's crops, ranking behind millet, bananas and cassava as the nation's most important food crops. Estimated production is 4.5 tonnes per hectare, according to the agriculture ministry.

According to the Food and Agricultural Organisation, sweet potato is the third most important root crop in the world. Uganda is the fourth largest producer of the crop globally. In Africa, Uganda is the third largest producer of sweet potatoes at about 1.6 million tonnes annually after Nigeria and Tanzania.

Uganda's sweet potato production has reduced from 2.8 million tonnes in 2010 to 1.8 million tonnes.

The low production is attributed to a combination of factors, including socio-economic considerations, such as lack of farm labour and rural to urban migration. Other factors are declining soil fertility, shortage of improved varieties, as well as planting materials, frequent drought, diseases and pests.

Nutritious varieties

Through the years, farmers have moved from the original varieties like Kasogo and Kyebukuba to growing the yellow and purple fleshed varieties. In terms of nutrition, the orange-fleshed varieties have been enhanced with vitamin A. They are valuable for children and pregnant women. The purple-fleshed potatoes have on the other hand, have elements that kill cancer-causing cells due to their purple colour, but research is still ongoing.

The purple fleshed sweet potatoes have a compound called anthocyanin which helps in fighting diseases such as cancer, lowers high blood pressure, increases dietary fibre intake in the body. It also lowers cholesterol levels and is responsible for the purple colour. However, having purple flesh does not mean that the variety is genetically modified variety, explained Dr. Ronald Yada, head of Sweet potato programme at the National Crop Resources Research Institute (NaCRRI).

Unfortunately, too much attention has been resolved in this wonder crop in terms of availing quality seeds or vines that are disease-free and can be accessed by smallholder farmers easily. Instead, farmers get seed from recycling old vines, according to Margaret McEwan, the seed systems component leader at the International Potato Centre an organisation located in Nagura in Kampala.

"The challenge with recycling of vines is that there could be a quick build-up of sweet potato diseases and pests in the planting material. When these build up, the harvest of the varieties reduces sometimes leading to 100% yield loss in a short period of time," McEwan said.

The other challenge is the long dry spell that is no longer predictable due to the changing weather patterns. This makes it impossible for sweet potato fields to replace the vines, until the rainy come. This normally leads to delays in planting of the crop by the farmers.

This is what sweet potato researchers and promoters of the crop are now addressing, by training sweet potato seed multipliers to produce sufficient quantities of quality seed or planting material to match the demand for planting material at the beginning of every season.

This is being done in partnership with National Agricultural Research Organisation (NARO) through the National Crop Resources Research Institute under the Root Crops Programme and farmers being piloted in Mpigi, Tororo region and Gulu, before spreading it to other parts of the country.

McEwan said they are targeting farmers who accept the seeds from their neighbours or pick it by the roadside by ensuring quality vines to them through fellow farmers.

Solving the challenges

"So what we are trying to address is the problem of getting disease-free planting materials, which have to be delivered through an efficient seed system so that farmers can access disease-free seeds of better varieties in time," said McEwan.

This is being done through training farmers to become seed multipliers in villages. This way, the sweet potato seed can easily be accessed by fellow farmers without encountering such

A potato garden on trial at Namulonge. Farmers should check vines before planting, to control the transfer of pests to their gardens

Sweet potato leaves showing signs of the virus disease

Sweet potato is the third most important root crop in the world. Uganda is fourth largest producer of the crop globally.

varieties easily.

After training, farmers will sell the seeds at a fee, ranging from sh15,000 a bag to sh50,000, depending on the season.

However, participants at the seventh consultative meeting of different countries to share experiences on how they are addressing challenges in the sweet potato seed systems called for development of inspection standards that will guide the multiplication process.

The meeting, held at Colline Hotel in Mukono recently, attracted 11 countries including Ethiopia, Rwanda, Nigeria, Mozambique, Malawi, Kenya, Tanzania, Rwanda, and Uganda among others.

It also attracted the private sector, Makerere University, Ministry of Agriculture Animal Industry and Fisheries and researchers from NARO.

Sweet potato seed standards

A Makerere University lecturer from the faculty of agriculture, Prof. Samanda Mafabi, said the sweet potato seed inspection guidelines for Uganda has been completed and presented. What is pending is the ratification of the guidelines and use by the agriculture ministry so that seed inspectors can start using them to inspect planting materials of vines.

The ideal sweet potato seed system emphasises quality of planting materials, which should be delivered in time and in the right amounts in addition to improved varieties.

"Currently, the seed system is characterised with diseases, pests, low multiplication of new seed compared to cassava and only 30% of farmers can access quality planting materials from research stations," Samanda said.

Dr Yada explained that they have worked with Makerere University, agriculture ministry and the International Potato Centre and HarvestPlus to develop the inspection standards.

Such a move will help ensure that the planting material sold by the seed multipliers is of high quality and of the right varieties, he said.

The programme is being supported by NARO. Thus all seed coming to the districts will first be inspected by the districts agriculture officer who will look out for a permit from NARO's seed inspectors and an assurance will be offered if there are no pests. The planting materials will also be destroyed.

Those with clean vines have been relying on positive selection. The farmers examine the leaves, to look out for symptoms of diseases and pests on them with assistance from researchers. Countries that have sweet potato standards in place include Kenya, Rwanda, Ethiopia, and Tanzania among others.

Pests and diseases

Paul Mutesa, a research assistant and crop entomologist at NaCRRI explains that the white fly and aphid causes the sweet potato virus disease. They transmit the disease called the sweet potato virus.

While sweet potato weevil can cause up to 100% yield loss depending on the weather conditions, at the moment, there are no resistant varieties in the country, Mutesa explained.

"What we have is a land race or traditional variety called the new Kasogo that has shown a level of resistance to the weevil, presenting a big challenge in Africa where no variety resistant to the weevil has been produced," Mutesa explained.

Agnes Alajo, a senior technician at NaCRRI said sweet potatoes are mainly affected by the sweet potato virus disease and Alternaria blight. Sweet potato Alternaria is a fungal disease, transmitted through spores that can easily be moved by wind, and rain splashes.

The virus is capable of causing

seed failing production

A farmer excited about his potato harvest

Sweet potatoes pay off

Steven Anguzubo, an agricultural economist under Root Crops Programme at NaCRRI, says sweet potatoes can be grown three times a year, which is assurance of food for both home consumption and sale. According to research, with a little investment of about sh100,000 in half an acre, one is able to harvest more in terms of food and vines for money. If a farmer invested in half an acre, he will have to set aside money for slashing, about sh3,000 per piece and this can be done four times which is sh12,000. To make the soil tender, could cost sh6,000 and this can be done twice, which is sh12,000 as well. Since farmers do not invest in buying seed, they could borrow from neighbours and the only cost could be transporting them. One could spend sh5,000 while those using a motorcycle.

100% yield loss while Alternaria can cause yield loss of about 2.5 m ric nonnes per hectare.

What brings the pests?
Munene explained that pests attack gardens based on the environmental conditions. For example, higher temperatures favour the breeding of pests. That is why the weevil is mainly found in North-eastern Uganda and West Nile due to higher temperatures compared to the western region, which is relatively cooler.

He adds that the weevil spreads through poultry. If a farmer's crops are infected, chances are high that it can move to the neighbouring farm.

Products of sweet potatoes

How pests attack the potatoes
The weevil attacks sweet potatoes at an early stage. Here, they feed on the leaves (foliage), lay eggs on them, which hatch into larvae. The larvae then eat up the leaves causing growth.

According to Munene, the weevils also make tunnels and use cracks the cause due to higher temperatures to enter the roots which they feed on, hence causing 100% yield loss. The roots or vines damaged by the weevil cannot be fed to domestic animals. The weevils produce a toxin that is harmful to the health of animals.

Control measures
Since there are no resistant varieties, but cultivated methods, like early harvesting, weeding to cover the cracks that the weevils use to enter into the soil to eat the roots. Other methods are timely planting to evade the cause of higher temperatures which favour weevil development and inspecting the vines before planting will help control the pest.

Symptoms
When the vines are infected with the virus, the plants become yellow. The yellow leaves curl and have a mosaic appearance (dark green mixed with light green and yellow). With time, the plant becomes stunted and in severe cases, the plants fall off.

In addition, plants develop black lesions, on the roots, leaves, and vine. As the lesions enlarge, leaves become yellow and fall off.

At the moment, there is no control for these diseases, but farmers are still using the traditional methods to control.

TIPS & TRICKS

Avoid damaging the sweet potatoes while harvesting

How to grow sweet potatoes
They can be grown in ridges or by heaping, which is the common practice. However, scientists say ridges save more space than heaps. They also allow proper weeding and harvesting. Sweet potatoes mature in 90 to 120 days.

Post-harvest handling practices
Sweet potatoes can be stored up to nine months in the developed world. Under our conditions, sweet potatoes can be stored in cool environment for up to one and/or half weeks.

According to Dr Bernard Vade, farmers should also wash the potato roots, dry them and keep them in cool dry rooms in form of potato chips or amukeke.

Sweet potato roots can stay for one week with minimal post-harvest deterioration.

Harvesting should be done using fairly using blunt implements to minimise root damage through cuts as this will lead to rotting.

Also, they should packed well to minimise bruises during transportation.

Observing weed management to prevent diseases moving organisms from settling there so as to find their way in the potato heap, beyond clean seed, plant on time.

Farmers should also use cultural methods, early harvesting. They should also weed and hill up to cover cracks that weevils use to enter into the soil, to eat the roots (sweet potatoes).

Sweet potato chips and flour

Other than consuming the sweet potatoes as steamed food, there are other products that one can produce from sweet potatoes including chips and flour.

Requirements
- Mature sweet potato roots
- A clean area ideally raised working surface.
- Large plastic containers, preferably 10- to 20-litre buckets with lids
- Supply of clean water
- Knives for peeling and chipping
- A solar drier

Procedure
- Choosing the roots

The roots ale harvested or purchased and sorted. Use the undamaged and mature potatoes – three to four months for the early maturing varieties and five to six months for the late maturing ones

- The potatoes are washed in clean water in large buckets, with water being changed as frequently as required.
- After washing, the potatoes are drained by being placing them on nylon sacks.
- The washed potatoes are peeled and chipped to uniform size (3-4 cms thick) manually, with sharp knives.
- Sweet potato chips are spread evenly on trays and loaded into a solar drier (can also be sun dried but the quality will be lower than that of a solar drier), dried for about eight hours until brittle, according to the sun's intensity.
- The dried chips are packed in polythene bags and stored in buckets until further processing to flour
- The potatoes are milled, using a hammer mill (village "posho" mill) into flour.
- The flour is packed in strong (thick gauge) black polythene bags, Labelled to state source, date of manufacture and expiry date (after six months).
- The bags are placed into buckets to protect the flour from light.

If orange fleshed sweet potato is sliced and subjected to four different treatments
- Slicing while leaving the potatoes in open air
- Slicing and immersing the chips in water
- Slicing and immersing the chips in water mixed with sodium bisulphite
- Un-peeling the roots followed by slicing
- Steaming the potatoes for 15 minutes before slicing and drying

Treatment one
The chips will brown even before being put in the drier, the flour made from the dried chips subjected to this treatment will be discoloured due to oxidation. The orange colour will not be pronounced and the flour will have a brown coloration.

Treatment two
The orange colour leaches into the water and the flour made from these chips is nearing to white; the smell of the CPSP will though still be pronounced. However the vitamin A is far soluble and will not be lost in the soaking water.

Treatment three
Chips immersed in water with Meta bisulphite will retain the orange colour. The flour made from these chips will be more attractive.

Treatment four
The peeling of the orange sweet potato is proved to be rich in nutrient, however on drying the peel will tend to blacken and the black substances will also be manifested in the flour which will make the flour unattractive.

Treatment five
Steaming the potatoes for 15 minutes before slicing and drying will retain more orange colour and hence the carotenoids as compared to slicing and drying without steaming. Slicing the potatoes and drying them immediately will retain as much carotenoids as pre-steaming. Therefore, we prefer slicing and drying without steaming because it saves energy and it is convenient in terms of labour. The flour will also keep better than the fresh potatoes.

The products that can be made from the potato flour included; cakes, biscuits, composite flour, buns, cookies and doughnuts.

Compiled by Geoffrey Ssempiri, an agronomist

[Seed system needed for raising sweet potato yields]

[Scientists push for sweet potato laws]

www.sweetpotatoknowledge.org