FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

FEED THE FUTURE MALAWI IMPROVED SEED SYSTEMS AND TECHNOLOGIES—ORANGE-FLESHED SWEETPOTATO COMPONENT

YEAR 4 ANNUAL PROGRESS REPORT

1 October 2017–30 September 2018

USAID
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CIP
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ACRONYMS

CAC	Consortium Advisory Committee
CIP	International Potato Center
CMO	Consortium Management Office
CVM	Commercial vine multiplier
DARS	Department of Agricultural Research Services
DMC	Dry matter content
DVM	Decentralized vine multiplier
HH	Household(s)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
M&E	Monitoring and evaluation
MISST	Malawi Improved Seed Systems and Technologies
MTE	Midterm evaluation
OFSPA	Orange Fleshed Sweet Potato Association
OFSP	Orange-fleshed sweetpotato
SSU	Seed Services Unit
UI	Universal Industries
USAID	United States Agency for International Development

PROJECT OVERVIEW

This report summarizes the progress of implementing Feed the Future Malawi Improved Seed Systems and Technologies—Orange-fleshed Sweetpotato (OFSP) Component (MISST–OFSP) project, from 1 October 2017 to 30 September 2018 (Y4). MISST is a 4.5-year project (1 Dec. 2014–30 June 2019) being led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). MISST consists of five project components implemented by four CGIAR centers through various partners in Malawi; the International Potato Center is executing the OFSP component. MISST–OFSP is funded by the United States Agency for International Development/Malawi mission through ICRISAT at $4,729,866.

MISST–OFSP Project Component Objectives

- Increased productivity and production of OFSP among smallholders
- Improved nutrition knowledge, OFSP utilization, and OFSP consumption at household level, in particular to improve the diets of women and children under 5 years of age
- Improved storage and marketing of fresh OFSP roots and vines
- Enhanced human and organizational capacity for scaling up OFSP

Overall MISST Objectives

- **Objective 1.** To improve functionality of input and output of selected value chains: groundnuts, pigeon pea, sorghum, millet, soybeans, drought-tolerant maize, and OFSP.
- **Objective 2.** To strengthen capacity of stakeholders involved in the selected seed sector. This objective aims to improve the capability available to deploy and promote new crop varieties and their allied technologies.
- **Objective 3.** To enhance the adoption and uptake of improved technologies in the target districts of Malawi.
- **Objective 4**. To enhance resilience of vulnerable households in rural communities in the Feed the Future Zone of Influence.

1. OVERALL PROJECT PROGRESS FOR Y4

This project year, the International Potato Center (CIP) has operated without an approved work plan and budget and without a contractual agreement with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Following news from the United States Agency for International Development (USAID) about budget cuts leading to budget uncertainties, CIP decided to terminate the contracts of staff of the Feed the Future Malawi Improved Seed Systems and Technologies—Orange-fleshed Sweetpotato (OFSP) Component (MISST–OFSP) project. There was no budget to implement activities beyond December 2017. Despite this, CIP stayed engaged with the project through participation in meetings, preparation and submissions of revised work plans and budgets throughout the year, participating in the midterm external project evaluation, and in some collaborative activities with other USAID-supported programs.

1.1 Feed the Future Performance Indicators

CIP did not contribute to the Feed the Future performance indicators since there was no budget to implement field activities.

1.2 Description of Progress on Work Plan Activities

Several versions of work plans and budget were submitted to ICRISAT (see section on management), though most of the fund allocated to CIP ($208,865) were used for staff time and benefits prior to their termination in Q1. Therefore, this annual report mainly focuses on some of the activities conducted early in the year.

1.2.1 Key activities

OFSP awareness radio campaign. CIP supported Farm Radio Trust with the audio and video materials that were developed under MISST. We also provided a list of contacts for partners in OFSP. All partners were invited to a message development workshop for the OFSP radio campaign, for which CIP staff also helped to develop messages and record the radio programs. The OFSP radio campaign by Farm Radio Trust is one of the collaborative activities between MISST-OFSP and Feed the Future Ag Diversification Activity (AgDiv). The campaign took place throughout the year and programs are aired on more than six radio channels in the country.

OFSP symposium. It was from both the consumption and commercial points of view that CIP and AgDiv organized an OFSP symposium, in Lilongwe, Malawi, to provide the platform for discussion and debate. Dr. Makumba, director of the Department of Agricultural Research Services (DARS), gave the opening speech (Fig. 1). The symposium presented a unique opportunity to bring together stakeholders working in different areas along the sweetpotato value chain in Malawi. Besides exchanging challenges and lessons learned, it generated a list of suggestions of key intervention areas for future work to further develop the value chain, from breeding new varieties, strengthening seed systems, to enhancing awareness of farmers on the multiple benefits of OFSP in terms of root production, nutrition, market opportunities, and processing initiatives. Several lessons were shared about the need for further investments in storage and the need for strong policy support to shift the mindset about sweetpotato. This shift should be from

Figure 1. Dr. Makumba, DARS director, gives the opening speech at the OFSP symposium in Lilongwe.

sweetpotato being seen as an emergency crop for which free seed handouts are the rule, to a more business-minded approach that includes the multiple benefits of resilience, income generation, and nutrition. CIP took on much of the preparation and implementation of this activity, whereas most of the funds were provided by AgDiv. A draft report has been shared with AgDiv for its input.

Fertilizer trials with Farmers World Ltd. CIP provided support to Farmers World Ltd in the analysis of last years' (2016/17 rainy season) OFSP fertilizer trials, and helped identify sources of planting material for this years' trials. Results from 25 trials showed that applying 250 kg/ha of basal fertilizer enhanced yields by 23%, from 11.8 to 14.5 t/ha, compared with the no-fertilizer treatments (Fig. 2). There was no significant difference in fertilizer response between the different OFSP varieties.

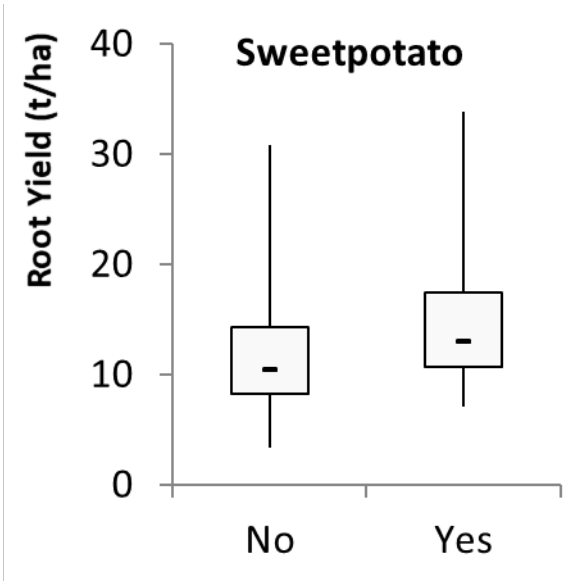

Figure 2. Boxplots of OFSP yields in 25 sites with (yes) and without (no) fertilizer.

A more in-depth analysis of Farmers World Ltd multilocational fertilizer trials in sweetpotato, maize, soybean, and groundnut was conducted. We explored options for crop intensification and diversification in Central Malawi by combining yield responses to inputs in 50 maize on-farm trials, 28 soybean, 24 groundnut, and 26 sweetpotato on-farm trials with economic analysis and focus group discussions. Owing to proper crop management and the use of good varieties in a season with above-average rainfall, excellent mean trial yields of 5.0 t/ha for maize, 3.4 t/ha for soybean, 2.5 t/ha for groundnuts, and 13.2 t/ha for sweetpotato were achieved. Responses to combinations of inorganic fertilizer and lime were highly variable, although yields of all crops were enhanced. Although maize production and response to fertilizer were not as profitable as the other crops, fertilizer application to maize gave the best returns of food per amount of money invested. Yield responses and value–cost ratios showed that investments in fertilizer and lime on soybean were more worthwhile than on groundnut, although the relative differences were somewhat hidden by high groundnut prices. And though there is potential to derive better financial returns from diversification and intensification with legumes and sweetpotato, farmers prioritize maize in terms of land area and resource allocation. Policies to enhance crop diversification and intensification should address the main constraints of lack of awareness of the agronomic and financial benefits of nutrient application to legumes and sweetpotato, unstable markets, access to credit, and access to improved seed.

OFSP acceptability study report. Final rounds of comments were provided by the project manager on the work that was done by a PhD student, Marijke Hummel. This resulted in the completion of the report on the OFSP acceptability study. The report has been shared with the nutrition community in Malawi.

Thermotherapy growth chamber for DARS–Bvumbwe. The growth chamber and microscope that were procured in FY3 were delivered at Bvumbwe Research station. This will allow DARS to clean up planting material of vegetative propagated crop varieties in-country, rather than in Kenya.

2.1.2 Monitoring and evaluation (M&E) activities

General M&E data entry. The data entry consultant continued work for some time to complete M&E data entry for FY17 activities in CIP's database. This was necessary to allow us to report fully on achievements in FY17 and to be better prepared for the MISST midterm evaluation (MTE).

MISST MTE. USAID had engaged a consulting firm to evaluate the MISST project in the period May–June. CIP's project manager participated through presentations and interviews with the consultants. He also helped organize partner visits and field visits. The CIP country manager and project manager attended a meeting at USAID, where the consultant presented the preliminary findings of the evaluation for feedback. CIP also commented on the draft evaluation report.

Analysis of winter beneficiary and vine multiplication surveys. Basic analysis of data for the OFSP winter beneficiary and vine multipliers surveys early in the year allowed for timely reporting of key values into the Feed the Future MS system. Despite this, the full survey analysis and reporting were initially planned to be done by consultants; this was, however, not possible given the funding constraints. Owing to additional pressures on the M&E specialist to contribute to the consortium's annual beneficiary survey, reporting was pushed forward. Engaged as a consultant with funding from another project, the M&E specialist is expected to complete both reports in Q1 of FY19; 35 decentralized vine multipliers (DVMs) and 17 commercial vine multipliers (CVMs) participated in the survey. Some preliminary results from the vine multipliers survey are:

- A total area of 217.8 ha was put under OFSP planting material multiplication for both DVMs (129.9 ha) and CVMs (88ha) by this sample of multipliers.
- CVMs produced on average 14,920 bundles and sold 90% of these, whereas DVMs produced on average 1,737 bundles and sold 69%.
- Average vine yields by CVMs ranged from 1,270 bundles/ha for 'Chipika' to 4,917 for 'Mathuthu' varieties. For DVMs yields were 295 bundles/ha for 'Anaakwanire' to 810 bundles/ha for 'Mathuthu'.
- Gross margins calculated using Feed the Future method for CVMs ranged from $1,067/ha for 'Chipika' to $4,845/ha for 'Mathuthu'.
- The production cost per bundle was $0.13 and the average price was $0.99/bundle.
- Poor water supply and livestock damage are the main factors constraining livestock production.

Support to consortium annual beneficiary survey

The M&E specialist provided support to the consultants (CDM) who were engaged by the consortium to conduct the annual beneficiary survey for the FY17 beneficiaries. This support included providing assistance with the data analysis and commenting on the draft reports.

2.1.3 Other activities

Scientific publication. The project manager incorporated reviewers' comments and published a scientific paper, "Exploring the yield gap of orange-fleshed sweet potato varieties on smallholder farmers' fields in Malawi" in *Field Crops Research Journal*. The study is based on data collected in the Mother–Baby Trials and is freely accessible online (https://www.sciencedirect.com/science/article/pii/S0378429017315691) with highlights:

- The performance of six sweetpotato varieties was evaluated at 221 sites in Malawi.
- Farmers only achieve about 30% of attainable yields; the yield gap is 18.5 t/ha.
- Variety choice and timely planting of quality planting material enhance yields.
- Weevil control is required to enhance the percentage of marketable roots.
- Gender-sensitive extension should ensure that women have timely access to planting material.

USAID visit to MISST project. The Acting Deputy Assistant Administrator of USAID/Washington, Sheila Roquette, visited the MISST project on Thursday, 30 November 2017 (Fig. 3). CIP actively prepared for this high-level visit by producing information sheets on project performance and verbal explanation on OFSP component at the display that was set up at ICRISAT.

Figure 3. MISST-OFSP display (left) and John Macey (Feed the Future team leader Malawi Mission) with Sheila Roquette appreciating the presentations by MISST project managers.

2. CHALLENGES, SOLUTIONS, AND ACTIONS TAKEN

The OFSP component faced some challenges during the reporting period (see Table 2).

Table 2. Challenges and potential solutions identified for the OFSP component during the reporting period

Challenge	Solutions and Actions Taken
There were no funds for activity implementation, due to large pre-financed amount in FY17 in accordance with the terms of the sub-agreement with the lead CGIAR center. There was no agreement/ approved work plan between CIP and ICRISAT for FY18. This was not because CIP did not want to elaborate a work plan, but because there were no financial resources committed from the lead center.	CIP country manager requested a Consortium Advisory Committee (CAC) meeting, which took place on 22 December. A clear solution was not identified. Several work plan and budget discussion took place with the ICRISAT Consortium Management Office (CMO) throughout the year in anticipation of release of funds by USAID.
Communication to the districts government staff was a challenge due to uncertainty of project continuation. We could not explain whether CIP would implement project activities or not.	While technicians have left the districts, the project is yet to communicate to the DADOs, as soon as the status of the project is clear.
Lack of support to vine multipliers. The project could not communicate to vine multipliers whether they will still receive technical and marketing support from the project or not. Many multipliers have good material but have not been supported with marketing trainings or quality control visits.	Without staff, there could be no more support from CIP to multipliers trained under MISST.
The funding allocation presented to CIP for FY2018 ($208,865) was below the necessary budget needed to carry out all activities as listed in the revised work plan for FY2018 as presented by ICRISAT to USAID.	Because of this reduction in funding, all MISST national staff contracts were terminated by December 2017, limiting the ability to plan and implement work and complete outstanding assignments. All activities were suspended by 30 April 2018, due to insufficient budget allocation.

3. LESSONS, BEST PRACTICES, AND RECOMMENDATIONS

At the OFSP Symposium various actors along the value chain exchanged ideas and lessons learned. This section summarizes some of the lessons, best practices, and recommendations brought in by participants. CIP is already addressing or has implemented activities to address several issues raised, whereas other areas of concern can be taken up later in the project or in other upcoming projects.

Part of the Value Chain	Discussion Points/Lessons Learned
Breeding 	Breeding programs should incorporate end-user (farmer preferences) in the development and final selection of new sweetpotato varieties, which should satisfy preferences in addition to contribute to reducing the vitamin A deficiency problem. According to farmers, the main challenges mentioned with the currently available varieties are the low dry matter content (DMC) and the difficulties in storage. This results in low demand for OFSP varieties (e.g., in Lilongwe). Breeding objectives should include OFSP varieties with high DMC that are preferred in the market. There are still quality issues for sweetpotato fresh roots for processing that affect the quality and uniformity of processed products. The members recommended that Universal Industries (UI) should communicate the requisite traits so that breeders can start developing varieties with those traits.
Seed Systems	**The following ideas were provided for multipliers:** • Multipliers should be legally registered with the Seed Services Unit (SSU) and comply

Part of the Value Chain	Discussion Points/Lessons Learned
	with seed standards. This will encourage farmers to buy clean seed. • When selling the vines, multipliers need to follow the bundling orders (i.e., recommended number and length of vines per bundles and labels for OFSP bundles with multipliers contact details). • Multipliers should make sure to cut the requested amount of sweetpotato vines within 1–2 days of planting to maintain quality of the planting materials. • Vine multipliers should be encouraged to start sensitization and OFSP promotion at community level for production of roots. • Multipliers need to invest in advertising (TV, radio, print media, etc.) to disseminate information on availability and prices of OFSP planting material. **The following ideas were provided for buyers of planting material:** • Large vine buyers such as government and NGOs should ensure that seed is procured from known suppliers that are registered and certified by SSU. • Use of brokers and vine middlemen should be discouraged or completely stopped. • Buyers/NGOs who use the procured planting material to multiply their own seed with farmers/farmer groups need to declare their source of planting materials, and whether their multipliers are registered and being inspected for certification by SSU. **General discussion points about seed systems:** • There is large difference between revenue generated by vine multipliers versus gross margins per hectare from root production. Vine multiplication is much more profitable, but comes at higher risk in terms of market identification. • Farmers are not willing to pay for sweetpotato planting materials. Some participants mentioned the need to set prices (price regulations) and encourage farmers to buy seed by highlighting the importance of starting production with clean seed. • Standard price of a bundle should be set with consideration of high input costs that multipliers are investing. • Everybody charges what they want for planting material and takes advantage of demand and supply situation. However, farmers should not feel like they have been taken advantage of with high prices. • Ideally farmers should be convinced that investments in quality planting material will enhance the quality and market potential of the roots.
Root production 	To stimulate root production there is need to create more awareness by farmers in different areas. **Importance of clean planting material** Responses from farmers to the Farm Radio Trust radio campaign show that there are information gaps about the benefits of buying clean planting material to enhance root production and realize good profits. There is a task to provide information in a timely way for farmers to have the full information and details of what is clean material and where to find it. Farmers should also know the incentives and benefits for the market. Farmers need to know and understand that not all sweetpotato cuttings are recommended planting materials. Farmers need to know and understand that farming is a business and that sweetpotato seed is worth buying by highlighting all benefits of sweetpotato in terms of both food security and nutrition. There is need to intensify demos at village level to farmer groups and let them choose their preferred variety. **Potential for irrigated root production** Members of the National Orange Fleshed Sweetpotato Association (OFSPA) use irrigation mainly for vine multiplication and less for root production. Why are the members not taking advantage of the many irrigation schemes in the regions to produce roots during winter to ensure all year-round availability of OFSP in the root market? Besides, there is irrigation equipment available in the Ministry of Agriculture and is not deployed for use. This could be used to promote winter OFSP root production.

Part of the Value Chain	Discussion Points/Lessons Learned
	Potential for income generation OFSP root production has high potential for farmers to make a decent income. OFSP prices are still above that of maize, and yields (8–9 t/ha) achieved by farmers are still better than maize yields. Farmers should be made aware of this and of the nutrition benefits of OFSP.
Root consumption 	Discussions on the consumption of OFSP roots included both urban and rural consumption. The advantages of promoting consumption of OFSP in urban areas are: • If urban people start consuming more OFSP, village people will be influenced and will more easily adapt to and respond to the demand. • Urban consumption will enhance the market for rural producers and result in stronger value chains. • Enhance campaigns in urban areas about the health benefits will create more awareness which will result in more people buying roots produced by farmers. People's mindset and attitudes will not change overnight. This will be a gradual process. However, several approaches may be adopted to facilitate this mindset change: • Feature celebrities and influential people during OFSP campaigns to emphasize the importance of OFSP. Many radio stations across the country will be involved to maximize the coverage and reach many people. • Use health centers that are frequently visited by women of child-bearing age with children under the age of 5 to promote OFSP and enhance demand. • Adopt a household approach to nutrition, targeting men, women, and children and ensure that there are diverse uses of nutritious OFSP and other nutritious foods. Without losing sight of the six food groups, OFSP is one of the many options that can contribute to improved nutrition. However, it should be featured in national extension materials such as the six-food group chart that currently has no OFSP. Farmers are not restricted to only planting OFSP varieties—other white- and yellow-fleshed varieties also have health benefits and contribute to food security. The advantage of OFSP is its pro-vitamin A content that can prevent problems associated with vitamin A deficiency, especially in breastfeeding mothers and children under the age of 5.
Postharvest handling and storage 	Storage of OFSP was considered a challenge by several of the participants. It was reported that this negatively affected the demand for OFSP in Lilongwe. The reason for poor storability is the low DMC of the roots. It was suggested that research institutions and NGOs should come up with OFSP roots storage mechanisms and asses the effect of storage on vitamin A content of the roots. Farmers are sensitized enough on production and lack knowledge in good storage practices. Dr. Felistus Chipungu (CIP) explained that OFSP roots should be harvested when they reach their full maturity stage to increase the storage life. Roots harvested before then will easily bruise during transportation, which will lead to the roots rotting in storage. There is need for timely harvesting and correct harvesting procedures like cutting the vines 3 days prior to digging. This practice improves the root quality.
Root marketing and trading	**Marketing challenges for OFSP** The root marketing and trading challenges are also associated with the low DMC and poor storability of the varieties. Participants engaged in root marketing with different experiences. One vine multiplier engaged in root production and explained: "In Mulanje there was lot of white-fleshed sweetpotato at the market. The price for OFSP was MWK 2,700 for 50 kg compared with MWK 2,500 for 100 kg of white-fleshed sweetpotato. Within an hour I sold my 50 bags of OFSP for a better price, whereas the white-fleshed sweetpotatoes of colleagues at the market did not sell. The only problem is that farmers out there do not have the OFSP planting material." This is in contrast with a root producer who tried to sell in Lilongwe. Owing to the poor DMC, the 'Mathuthu' variety she produced spoiled quickly, which made it a difficult

Part of the Value Chain	Discussion Points/Lessons Learned
	experience to sell the OFSP on the Lilongwe market. Buyers preferred to choose the white-fleshed varieties because they can be kept longer. **Suggestions to enhance marketing of OFSP** The discussions resulted in several recommendations to enhance marketing: • Create market incentives for farmers. We need to create clear linkages between producers and processors. • Promotion of public-private partnerships will ensure that all players in the value chain, including farmers, middlemen, and processors, are connected. • There is opportunity for distribution of roots from areas of high production to areas of low production, but with most economic and effective demand. Farmers must supply roots in such areas. • There should be more awareness about where to find the roots. • Inclusion of vendors in promotions and trainings to create awareness and affect a positive supply response induced by the traders' demand. • Include middlemen in the line of value chain because they are in touch with the primary producers and consumers so they must be given good quality produce. • There is need to sensitize hotel owners and other service providers so that their restaurants start to serve OFSP at conferences.
Root processing 	It was acknowledged that processing of OFSP is an important part of the value chain in Malawi. Having more companies will drive up the demand of multipliers to produce more vines as there will be markets readily available for root producers who will be looking for quality vines of specific varieties. This may happen if private sector partners in processing make investments on the ground, at farmers level, to advance production of OFSP varieties that they need. If there are focused investments that lead to root demand and therefore need for supply, farmers will see OFSP as a viable crop with a market. Therefore, there is need for strong linkages between producers and processors. If there is a market for processing, farmers usually become more motivated to invest in a crop because they know there is market (e.g., farmers knowing that UI will buy get motivated to grow). There are still quality issues for sweetpotato fresh roots for processing affecting the quality and uniformity of processed products. The members recommended that UI should communicate the requisite traits so that breeders can include this in their breeding program to develop suitable varieties for processing. Private sector partners, including UI, should participate more actively in the selection of future varieties.
Policy/ Supporting environment	There is need for strong policies and a supporting environment for the development of the OFSP value chain. Some areas discussed by the participants include: • OFSP could be included into the Farm Input Subsidy Program (FISP). Farmers need to know what is OFSP and what is it they are going to gain from that. Why not include horticultural crops in FISP? • Stimulation of private sector investments in processing can be a driver for the value chain development. More factories will stimulate the market for vines so farmers can produce good roots. • Using existing Department of Agricultural Extension Services structures to disseminate information about OFSP and its benefits. There are so many platforms that can be used to push the message forward. This will induce demand and therefore create markets. • Lobbying with policymakers so that production is not only seen for relief but also for nutrition benefits and income generation. This requires investment in awareness campaigns. • There is need to address the issue of free handouts when it comes to planting material distribution and reduce the dependency syndrome.

Part of the Value Chain	Discussion Points/Lessons Learned
	• There is need to change the way we communicate to farmers by using more pictures in a language that is easy to understand by all. • Bringing all key stakeholders, including donors, together to talk about OFSP for its nutrition and economic benefits. OFSP must be stimulated because it is an introduced crop and therefore needs various actors to work together.

4. SUCCESS STORIES

A success story was developed together with the PERFORM project as part of integration between MISST and PERFORM. The story is also published on the CIP website (https://cipotato.org/press_room/blogs/sweet-harvest-giants-making-orange-fleshed-sweetpotatoes-new-family-tradition/) and later in modified form on the USAID website: https://www.usaid.gov/results-data/success-stories/sweet-harvest-giants

In addition to this, a pitch for the USAID impact story competition was developed.

The Sweet Harvest of Giants: Making Orange-fleshed Sweetpotatoes the New Family Tradition

With heavy clouds looming behind the forested hills of his farm's Liwonde Forest Reserve backdrop, 42-year-old Samuel Kosimasi hums to himself and leans over a long ridge of soil as he expertly inserts leafy vines. Even without equipment, apart from his steady hand and even stride, the vines above the dirt's surface appear to be perfectly spaced. He knows nutritious sweetpotato roots will soon start forming under the soil, as the vines grow vigorously above the surface.

Samuel is not the only farmer tending to his field this morning. In the surrounding fields, other farmers are applying urea fertilizer to their shoulder-high maize fields. They planted their maize fields at the first hint of the rainy season, in mid-November. As they carefully apply the expensive fertilizer to each maize plant, they say a silent prayer that their crop will still yield enough food for the year. This year's rainy season started earlier than the past couple of years, but its inadequate rains and sporadic dry spells have only compounded the effect of Malawian farmers' new worst enemy, the Fall Armyworm, a pest that has eaten through maize stalks and leaves.

When the others celebrated the early rains and rushed to plant their maize, Samuel patiently waited. As the rainy days passed, his neighbors warned him that if he did not plant soon, his family would go hungry. But Samuel had a plan; he nodded knowingly when he heard their warnings, but still he waited. His patience paid dividends last year, and he was confident it would do so again this planting season. While he waited to plant his own field, Samuel made money by working in other families' fields and by constructing houses.

But now that he and his family reflected on their fruitful 2017 and welcomed 2018, he was ready. Today was planting day.

Samuel Kosimasi planting OFSP on his farm.

Earlier this morning, Samuel carried his machete to his wetland garden known as his *dimba* and cut the vines that he carefully kept alive in the hot dry months before the start of the rain. Then, he and his wife, Eliza, piled the vines atop their heads and walked to their main, rain-fed field. There he started to hum to the rhythm of his planting.

Samuel and his wife had always planted sweetpotatoes, but until the USAID-funded Feed the Future Malawi Improved Seed Systems and Technologies (MISST) and Protecting Ecosystems and Restoring Forests in Malawi (PERFORM) projects taught Samuel and 2,337 other farmers around Liwonde Forest Reserve the benefits of orange-fleshed sweetpotatoes (OFSP) and trained them in proper planting techniques, they did not dedicate much of their land to the crop. Once the International Potato Center (CIP)— lead for the sweetpotato component of MISST— and PERFORM explained the nutritious vitamin A and drought tolerant attributes of OFSP, Samuel signed himself up to take part in the project and try OFSP for himself.

Besides training, Samuel and Eliza received three bundles of 100 vine cuttings about five months before the 2015–16 rainy season. They systematically planted the cuttings about a foot apart in the *dimba* and watered the vines until the rains began. After planting the new orange-fleshed varieties 'Kadyaubwerere' and 'Chipika', the couple monitored the vines carefully.

Remembering PERFORM's explanation of OFSP leaves' nutritional value, Eliza cooked a new dish of steamed sweetpotato leaves to accompany the family's maize staple food, *nsima*. The family agreed: the OFSP leaves were much sweeter and tastier than those of their old, white-fleshed sweetpotato. Eliza started cooking this dish more and more often. The first year's OFSP roots were also so delicious that the couple kept vines growing in their *dimba* even after they harvested the sweetpotatoes.

Near the beginning of the 2016–17 rainy season, their sweetpotato vines were flourishing and Samuel and Eliza made an unconventional decision. Instead of planting maize on one of their farm plots, the couple decided to save the land for planting OFSP.

Machinga District, where the couple lives, has historically been one of the most food-insecure districts in Malawi due to the area's vulnerability to both floods and drought. Nevertheless, farmers in Machinga plant maize as their main food crop. Samuel and Eliza, remembering MISST and PERFORM's promise of "drought tolerance," decided to change their family's tradition and plant something other than maize.

In January 2017, the family planted OFSP on 0.25 acres of their farmland. While the maize fields around them were stunted by drought and attacked by Fall Armyworm, Samuel's field of OFSP comfortably grew beneath the soil protected from these pests and the drought.

When the couple began to gradually uproot the sweetpotatoes, they found they really had grown. The 'Chipika' variety especially grew into a giant sweetpotato. Sweetpotatoes of this variety were so big that Samuel and Eliza nicknamed the variety 'Chipona' or 'Giant'. The couple began to trade their sweetpotatoes for maize. Under their exchange system, three 'Chipika' roots or seven 'Kadyabuwere' roots were traded for a heaping bowl or approximately 1.5 kg of dried maize.

Samuel Kosimasi with his wife and children at home.

Three 'Chipika 'roots or seven 'Kadyabuwere' roots were traded for a heaping bowl of maize.

By June, the couple harvested and exchanged their OFSP for seven 50-kg bags of maize. Samuel estimates that with the drought and Fall Armyworm conditions of the season, "I would have only harvested three to five bags of maize from the field had I planted maize last year." Instead, he had seven bags for his family and had saved money by not buying fertilizer, as the sweetpotatoes performed well even without those costly inputs.

Eliza and Samuel did not trade all their sweetpotatoes, however. They also kept some for their household. Eliza likes to serve them for breakfast. She either boils them or makes the traditional *futali* dish in which she mixes boiled sweetpotatoes with salt and peanut flour for an extra nutritious breakfast. She likes knowing that OFSP are giving her four children the vitamin A they need. When asked which variety she prefers, Eliza will tell you the giant 'Chipika' or 'Chipona' ('Giant') variety: "One sweetpotato feeds my whole family!" she exclaims.

Realizing the giant potential of this new, nutritious crop, the couple immediately planted more vines back into their *dimba*. There, they used watering cans to water the plants every day to keep the vines alive for not only the following rainy season, but also to cultivate more sweetpotatoes for consumption and sale.

When businessmen from nearby markets heard there were OFSP in the area, they travelled to the garden to buy them directly from the source. Smartly, Samuel calculated that a 50-kg bag of sweetpotatoes usually sold for about $10. But by selling the sweetpotatoes by the heaps, he could make an additional $5/bag.

By November, without spending any money on transport to or from the market to sell the OFSP, the couple sold all their sweetpotatoes. With their profits, they were able to pay secondary school fees for their niece to attend the government boarding school she had qualified for, and to buy a pregnant goat. In that way, USAID's investment in farmer training and 300 OFSP cuttings transformed into giant behavior changes, a new family tradition and business, an education, and gained livelihood assets (two goats) for Samuel and Eliza.

Samuel, proud of his new spending power, reported, "We will continue to grow OFSP, because we see a lot of future in OFSP as healthy food and business." And today, he is keeping to his word as he confidently walks the lengths of his ridges and buries another leafy vine into the soil. Today is planting day.

Samuel Kosimasi with one of the goats procured from OFSP sales.

Story by Gina Althoff, Communications and Outreach Specialist for the USAID-funded PERFORM Project, with contributions from Daniel van Vugt, Project Manager of MISST at CIP.

Impact story pitch: OFSP. The humble sweetpotato has recently conquered the hearts of donors, governments, international organizations, private sector, and, most important, the smallholder farmers in sub-Saharan Africa. It is not surprising that the development of orange-fleshed varieties of this nutritious, resilient, easy-to-grow, and delicious food crop has resulted in three CIP scientists and one Harvest Plus scientist winning the World Food Prize in 2016, especially after research has proven that OFSP can be a low-cost food-based approach to reduce vitamin A deficiency in pregnant and breastfeeding women and children under the age of 5. Owing to its ability to survive dry spells, the sweetpotato can even be enjoyed in years of poor rainfall when most of the maize crop fails. Sweetpotato therefore enhances resilience of the cropping systems as well as nutritional status of vulnerable households.

The key question is: Where does a farmer find the planting material of these improved OFSP varieties? Under the Feed the Future Malawi Improved Seed Systems and Technologies (MISST) project, CIP and partners worked hard to find a lasting answer to this question. At the start of the project there were only few multipliers of sweetpotato planting material in the country, and they mainly focused on the old white- and yellow-fleshed varieties. The newly released OFSP varieties called 'Kadyaubwerere', 'Chipika', 'Mathuthu', 'Kaphulira', and 'Anaakwanire' mainly remained "on the shelf" in governmental fields and screenhouses. This changed when CIP sent out a request for proposals by commercial farmers with an interest in OFSP vine multiplication. Since 2015, more than 40 commercial vine multipliers (CVMs) received theoretical and practical training by CIP on how to rapidly multiply sweetpotato planting material in nursery beds. Each multiplier received enough clean planting material to start with six beds, each measuring 1 x 20 m. From those beds, the CVMs could rapidly multiply the material under irrigation and establish additional beds by themselves to prepare for the sales of large quantities of bundles of planting material to NGOs, government, or private farmers. After seeing the business potential along the OFSP value chain, and to address marketing challenges, these entrepreneurial CVMs have joined hands and formally registered the National Orange Fleshed Sweetpotato Association (OFSPA). It is registered as a company by limited liability with the vision to become a commercial hub for OFSP farmers in Malawi.

CIP also trained a wide range of governmental and nongovernmental partners in supporting decentralized vine multipliers (DVMs). DVMs are community-based groups or individuals that manage a vine multiplication site to provide planting material to farmers within a 9-km radius. This is a revolutionary approach in sharp contrast with the previously "centralized" approach, where planting material was mainly found on research stations or a single private sector source. Through integration with other USAID-funded activities (PERFORM, NJIRA), additional DVMs were established. Since 2015, 200 DVMs received planting material to start vine multiplication in nursery beds for the benefit of farmers in their communities.

By focusing on capacity building of commercial farmers, government, and NGOs, the total investment costs of sustainably enhancing the quantity and quality of OFSP planting material in Malawi remained low. But, due to intensive trainings, the results of decentralized multiplication are more sustainable compared with previous approaches of ad hoc mass distribution of poor quality planting material in response to natural disaster.

Vine multiplication can be a good source of income for farmers. According to our survey, in the 2017 season the multipliers sold more than 150,000 bundles to NGOs and fellow farmers, realizing average gross margins of $1,145/ha. Farmers who receive bundles can take advantage of this by multiplying them in their own wetlands or kitchen gardens. This allows them to plant a larger area under OFSP, and they even start sharing, trading or selling the planting materials to fellow farmers as is common among the rural households in Malawi. Therefore, while over 56,000 households directly received clean planting material and agronomic and nutritional training under the MISST project, we are sure that many more households have benefitted indirectly by accessing the planting material of the improved pro-vitamin A rich varieties through social networks.

5. MANAGEMENT ISSUES

The following management activities took place during the year.

Reporting on FY17 achievements and expenditures. CIP developed and submitted the FY17Q4 and FY17 annual technical and financial reports to ICRISAT.

Work plan and budget development. At the start of the first quarter, CMO called for a project management meeting to discuss activities that could be part of the FY18 work plan. These activities needed to respond to the general MISST objectives, but also to the objectives of the Higher Education and Nutrition concept notes. More detailed development of work plans and budgets for FY18 for different funding scenarios was done after this, though neither were approved.

Work plan presentation at USAID. On 9 November 2017, MISST was asked to present its work plan at USAID office. Members of the Consortium Advisory Committee (CAC), project managers, and CMO attended; the MISST chief of party attended and made the presentation. The CIP country manager asked for clarification, since there was no budget allocation to some centers to support all the proposed work plan activities. This led to a follow-up meeting with the CMO, country managers, and USAID mission staff to better understand the financial situation of the project in terms of pre-financing of activities by some centers.

Partners close-out. The accountant and project manager reviewed the financial and technical reports for FY17Q4 submitted by the partners (We Effect, Concern Worldwide, and Catholic Development Commission Dedza). This was done in preparation for formal close-out of these sub-grant agreements. All partner close-out formalities have been completed.

Staff terminations. CIP handled the administrative and legal procedures for the termination of contracts for all MISST national staff. Owing to uncertainty in funding, all staff contracts were terminated by end of December 2017. Only the project manager was still supported by the project for some months in early 2018.

CAC meeting. A CAC meeting, attended by CIP's country manager, took place on 22 December to discuss the way forward on the fund allocation to the different MISST components following budget cuts by USAID. This was needed since some centers, including CIP, had pre-financed expenses in FY17. Different scenarios for reimbursement of funds were discussed. It was agreed the scenarios should be shared with USAID after review and input from each center's headquarters in the minutes.

Suspension of work. As reported, CIP budget allocation could not allow for any implementation beyond 30 April 2018. This was also explained in a formal letter submitted by CIP–HQ (Michael Gerba) to ICRISAT (Dr. Okori) on 16 April 2018. This letter contained an official notification that CIP would be suspending activities for FY2018 beginning April 30, stating that if another allocation from the Malawi Mission is forthcoming CIP could resume activities.

Work plan and budget development in Q3. In early May, the MISST chief of party communicated to the CIP project manager that USAID had allocated an additional $2 million to the MISST project. All project managers were asked to give a presentation at ICRISAT office with ideas on how these additional funds could be used. The meeting was held on 8 May 2018 and attended by country manager, Dr. Paul Demo, and project manager Daniel van Vugt. The following ideas were presented in detail for the OFSP component:

- Support multipliers to ensure sustainability of the approach.

- Train DARS staff on thermotherapy/meristem culture.
- Finalize the nutrition interventions as per the work plan submitted to USAID.
- Assess adoption and impact of OFSP

On Wednesday, 28 May MISST's chief of party asked the CIP project manager to submit a revised work plan and budget to ICRISAT based on the presentations and an additional allocation of $350,000 as a working figure. The request was followed with the recommendation to plan in such manner that the funds could cover both FY18 and FY19 activities. A budget and work plan were submitted on 7 June 2018, covering the remaining period of the project up to June 2019.

Another work plan and budget were developed and submitted in August 2018, following a slightly revised funding scenario. The submissions of various versions of work plans and budgets did not result in any approvals or agreements to continue implementation, since the funds from USAID had not reached ICRISAT throughout the year.

Conclusion. The project operated without funds, staff, or an agreement for most of the year, which stalled project implementation. Since ICRISAT received funds from USAID toward the end of FY18, the project expects to continue implementation in the next quarter after a new agreement for FY19 is signed.

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