



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

FINAL REPORT

1 December 2014–30 June 2019



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DISCLAIMER

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ACRONYMS

CADECOM	Catholic Development Commission
CIP	International Potato Center
CVM	Commercial vine multiplier
DAES	Department of Agricultural Extension Services
DARS	Department of Agricultural Research Services
DNA	Disaggregates not available
DNCC	District Nutrition Coordination Committee
DNHA	Department of Nutrition HIV and AIDS
DVM	Decentralized vine multiplier
EPA	Extension Planning Area
FTFMS	Feed the Future Monitoring System
HH	Household(s)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEC	Information, education, and communication
M&E	Monitoring and evaluation
MBTs	Mother–Baby trials
MISST	Malawi Improved Seed Systems and Technologies
OFSP	Orange-fleshed sweetpotato
ToT	Training of trainers
TWG	Technical Working Group
USAID	United States Agency for International Development
ZoI	Zones of Influence

PROJECT OVERVIEW

This final report summarizes the achievements of implementing Feed the Future Malawi Improved Seed Systems and Technologies—Orange-fleshed Sweetpotato (OFSP) Component (MISST–OFSP) project, from 1 December 2015 to 31 June 2019. The project lasted 4 years and 9 months (1 Dec. 2014–30 June 2019) and was led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). MISST consisted of five project components implemented by four CGIAR centers through various partners in Malawi; the International Potato Center executed the OFSP component. MISST–OFSP was funded by the United States Agency for International Development/Malawi mission through ICRISAT for \$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
- Improved storage and marketing of fresh OFSP roots and vines
- Enhanced human and organizational capacity for scaling up OFSP

OVERALL MISST RESULT AREAS

- **Result area 1.** To improve functionality of input and output of selected value chains: groundnuts, pigeon pea, sorghum, millet, soybeans, drought-tolerant maize, and OFSP.
- **Result area 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.
- **Result area 3.** To enhance the adoption and uptake of improved technologies in the target districts of Malawi.
- **Result area 4.** To enhance resilience of vulnerable households in rural communities in the Feed the Future Zones of Influence.

1. EXECUTIVE SUMMARY

The Feed the Future Malawi Improved Seed Systems and Technologies—Orange-fleshed Sweetpotato (OFSP) Component (MISST–OFSP) project enabled more than 63,000 households (HH) to produce and consume pro-vitamin A-rich OFSP. The International Potato Center (CIP) has built the capacity of private sector, government, and NGOs to scale out OFSP technologies to help smallholder farmers in Malawi. In rural Malawi, limited crop and food diversification results in consumption of diets that are lacking in essential micronutrients. The risk of vitamin A deficiency is high, affecting especially women and children under the age of 5. HH often do not know that consuming OFSP is a proven and easy way to enhance their vitamin A intake. Moreover, farmers who have heard about the nutritional benefits of the crop often struggled to access the planting material of these improved varieties. This was because OFSP planting material was not commonly being multiplied near them. Moreover, farmers with access to OFSP were often unaware of the various options for its use at HH level, or how best to store or market the freshly harvested roots.

The project therefore aimed to (1) increase productivity and production of OFSP among smallholders; (2) improve nutrition knowledge, OFSP utilization, and OFSP consumption at HH level, in particular to improve the diets of women and children under 5 years; (3) improve storage and marketing of fresh OFSP roots and vines; and (4) enhance human and organizational capacity for scaling-up of OFSP. The project activities were implemented in the Feed the Future Zones of Influence (ZoI) in most Extension Planning Areas (EPAs) in seven districts in Malawi: Mchinji, Lilongwe, Dedza, Ntcheu, Balaka, Machinga, and Mangochi.

CIP and partners have built the capacity of private sector, government, and NGOs through training of trainers (ToT) on all aspects of the sweetpotato value chain. Topics covered included commercial and community-based multiplication of planting material, on-farm variety demos and evaluations by farmers, participatory evaluation of postharvest root storage technologies, nutritional messaging and recipe preparation, and marketing of vines and roots. Partners have subsequently trained others in their organization and rolled out activities to the rural HH they are supporting by integrating OFSP work into ongoing projects. Much of the farmer trainings took place around the Mother–Baby demo plots. On a Mother plot a host farmer demonstrated the six available OFSP varieties, namely ‘Zondeni’, ‘Ana Akwanire’, ‘Kaphulira’, ‘Mathuthu’, ‘Kadyaubwerere’, and ‘Chipika’. Fifty farmers around the Mother plot received a bundle of planting material of one of the varieties to plant in their own garden as a Baby plot. We also involved media and drama to create more awareness of the benefits of OFSP.

CIP worked with government departments—that is, the Department of Agricultural Research Services (DARS), the Department of Agricultural Extension Services (DAES), and the Department of Nutrition HIV and AIDS (DNHA). NGO partners included We Effect, Concern Worldwide, Welthungerhilfe, and Catholic Development Commission (CADECOM) Dedza. The project integrated part of the activities with other projects funded by the United States Agency for International Development (USAID), including Integrating Nutrition in Value Chains, Ag Diversification, Protecting Ecosystems and Restoring Forests in Malawi (PERFORM), and Pathways to Sustainable Food Security (Njira). We have also been involved in sweetpotato fertilizer trials with Ex-Agris Africa Ltd, a private commercial farm in Lilongwe District, and Farmers World Ltd. Key achievements include:

- More than 56,000 direct beneficiaries received planting material and training on agronomic practices, vine conservation, and nutrition messages.

- More than 40 commercial vine multipliers (CVMs) and 200 decentralized vine multipliers (DVMs) have been trained on vine multiplication and are selling OFSP planting material to date. This has increased access to clean OFSP planting material for farmers and other stakeholders.
- More than 7,000 beneficiaries reached with nutrition-sensitive messages for MISST value chains (e.g., OFSP, soybean, groundnut, pigeon peas, millet, sorghum, orange maize).
- More than 1,100 technical staff from 10 project partners were trained on Mother–Baby demos, vine multiplication, postharvest and root storage, marketing, nutrition, and monitoring and evaluation (M&E).
- Popular comedians, Chindime and Samalani, and musician Skeffa Chimoto, were engaged to conduct live comedies and promotional audio and video songs to improve awareness of vitamin A benefits during field days and in 21 markets across the MISST ZoI districts.
- There is increased demand for OFSP roots and vines created through media involvement, field days, and demos. We contributed to a mass radio awareness campaign on OFSP with the Feed the Future Ag Diversification project.

CIP led efforts to link agriculture and nutrition in the country by building capacity of district and community nutrition structures on nutrition-sensitive agriculture. Our main target has been pregnant and lactating mothers and HH with children under 5. More than 4,000 information, education, and communication (IEC) materials on nutrition counseling, food processing, and agronomic practices for biofortified and high nutritive value foods such as legumes have been distributed. About 600 recipe books for utilization and recipe demos were developed and distributed to care groups, cluster leaders, and lead farmers for reference during future community trainings.

Important lessons learned in the project are that technical support to CVMs and DVMs played a key role in ensuring a more sustainable supply of planting material and reduced the need to transport perishable planting material over long distances. We learned about the importance of partnering for impact at scale and the key role that a research institute can play in this process to take technologies “off the shelf” and put into the hands and fields of smallholders. We also learned about the important role that biofortified crops developed by CGIAR and DARS can play in increasing the linkages between agriculture and nutrition. CIP will continue to engage partners that can help us strengthen our agriculture-to-nutrition linkages to ensure that farmers receive the nutrition messages, have access to planting material, understand agronomic practices, achieve good yields, and receive maximum benefits from investing in crop diversification with OFSP.

2. ACHIEVEMENTS PER THE FEED THE FUTURE MONITORING SYSTEM

The MISST–OFSP component performance against the selected Feed the Future progress indicators was remarkable (Table 1). The project managed to surpass its life target of reaching 62,500 direct beneficiary HH; the actual number was 63,168 HH. Furthermore, 64,720 individuals received various short-term trainings against a target of 62,500—a 104% achievement rate. Annual beneficiary surveys led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as the lead center did not take place in all years of the project. Therefore the achievements reported under the survey-based indicators cover only certain years and final results are not available (NA). CIP did not contribute to the Feed the Future

performance indicators in year 4 since there was no budget to implement field activities due to funding cuts by USAID to the MISST project.

Table 1. Feed the Future indicator progress

Indicator/Disaggregation	Project Life Target	Y1	Y2	Y3	Y4*	Y5	Achievement	Completion Rate (%)
EG.3-1: (4.5.2-13) Number of households benefiting directly from USG interventions	62,500	15,198	18,845	21,394	0	7,731	63,168	101
New/Continuing								
New		15,198	18,845	21,394		7,661		
Continuing						70		
Disaggregates NA								
Location								
Rural						7,731		
EG.3.2-1: (4.5.2-7) Number of individuals who have received USG-supported short-term agricultural sector productivity or food security training	62,500	15,176	19,105	22,413	0	8,026	64,720	104
Type of Individual								
Producers		15,000	18,242	21,024		7,731		
People in government		103	545	881		295		
People in private sector firms		73	34	0				
People in civil society			272	168				
Disaggregates NA			12	340				
Sex								
Male		11,890	9,065	8,994		989		
Female		3,286	9,239	13,398		6,957		
Disaggregates NA			801	21		80		
EG.3.2-4: (4.5.2-11) Number of for-profit private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community based organizations (CBOs) receiving USG food security related organizational development assistance	200	20	116	121		70	327 (237 new)	119 (based on new)
Type of organization								
For-profit private enterprises		20	85	25		70		
Producers organizations			90	120				
Water users associations								
Women's groups								
Trade and business associations				1				
Disaggregates NA								
New/Continuing								
New		20	96	121		0		
Continuing			20	25		70		
Disaggregates NA								

Indicator/Disaggregation	Project Life Target	Y1	Y2	Y3	Y4*	Y5	Achievement	Completion Rate (%)
EG.3-6, -7, -8: (4.5-16,17,18) Farmer's gross margin per hectare, per animal, or per cage obtained with USG assistance	530	300.76		350.5			NA	NA
EG.3.2-17: (4.5.2-5) Number of farmers and others who have applied improved technologies or management practices with USG assistance	62,500	15,218	18,944	21,394			NA	NA
EG.3.2-18: (4.5.2-2) Number of hectares of land under improved technologies or management practices with USG assistance	3,970	553		1,801			NA	NA
EG.3.2-20: (4.5.2-42) Number of for-profit private enterprises, producers organizations, water users associations, women's groups, trade and business associations and CBOs that applied improved organization-level technologies or management practices with USG assistance	200	20	116	100			NA	NA
EG.11-6: Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance	62,500	15,000	18,845	21,394			NA	NA

3. IMPLEMENTED WORK AND ACHIEVEMENTS BY RESULT AREA

This section highlights some of the activities and approaches that contributed to achieving the Feed the Future targets. For an exhaustive list of activities, we refer to the quarterly and annual reports submitted over the 5-years course of the project.

CIP collaborated with a wide range of partners to implement the work in this project. To bring new OFSP technologies from “off the shelf” and put them into the hands and fields of smallholders required an approach we call “partnerships for impact at scale.” The partnerships consisted of sub-granted partners, collaborative partnerships, and “integration” partnerships with other USAID-funded activities in Malawi. Partnerships with government departments at different levels were also crucial to enhance ownership of the scaling activities and build capacity of government staff at grassroots level to ensure sustainability beyond the life of the project. Table 2 provides an overview of the partnerships during the life of the project.

Table 2. Project partnerships by district

Partners	Mchinji	Lilongwe	Dedza	Ntcheu	Balaka	Machinga	Mangochi
DAES/DARS/Government	1-5	1-5	1-5	1-5	1-5	1-5	1-5
Welthungerhilfe			2, 3				
Inter Aide		2, 3, 4					
Farmers World	3	3	3	3			

Partners	Mchinji	Lilongwe	Dedza	Ntcheu	Balaka	Machinga	Mangochi
INVC (DAI)	1	1	1	1	1	1	1
PERFORM						1-4	
Njira (PCI/Emman. Int)					2, 3	2, 3	
Ag Diversification	3-5	3-5	3-5	3-5	3-5	3-5	3-5
Concern Worldwide	2, 3	3					
We Effect							2, 3
CADECOM Dedza			2, 3	3			
CADECOM ZARD						2	
Farmers Union	2	2	2				

NOTE: Color indicates the district and type of partnership: orange = “collaborative” and blue = “integration” with other USAID projects, and green = “sub-granted” partners. The numbers indicate the project years.

INVC = Integrating Nutrition in Value Chains; Njira = Pathways to Sustainable Food Security project

3.1 Improved Functionality of OFSP Input and Output Markets (Various Generations of Vine Multiplication, Root Storage, and Marketing of Roots and Planting Material)

3.1.1 CVMs

Scaling out OFSP starts with a strong seed system. The seed system work conducted in this project aimed to address the bottleneck of unavailability of clean planting material of the six available OFSP varieties in Malawi (i.e., ‘Zondeni’, ‘Anaakwanire’, ‘Kadyaubwerere’, ‘Mathuthu’, ‘Chipika’, and ‘Kaphulira’). Except for ‘Zondeni’, which was approved in 2009, all of these varieties were released in 2011 but had not yet moved into the fields of smallholder farmers. The project therefore embarked on a mission to identify and train commercial farmers and enterprises that were willing to start the business of vine multiplication. These commercial multipliers were trained by CIP, receiving classroom training, practical sessions, and follow-up support visits by CIP technical staff at the farms. The CVMs were provided some clean starter materials from the screenhouses or open-field at Bvumbwe research station or Nankhwali Farm, which were the main registered sources of early generation planting material in Malawi. Over the life of the project, more than 30 CVMs were trained and started the business of vine multiplication (Photo 1). Several workshops were conducted in which the CVMs, supported by CIP, could exchange lessons learned and learn from each other how to address the main production and marketing challenges associated with the business.



Photo 1. Multiplication beds at CVMs' fields in Lilongwe.

3.1.2 DVMs

Where CVMs were identified based on their potential to produce, market, and sell large quantities of planting material to institutional buyers (e.g., in response to floods and droughts or for development projects), there was also a need to bring sources of clean planting material closer to the farming communities. This was where the wide range of project partners came into play their part. CIP invested in centralized ToT events for selected partner staff. Following this, step-down trainings were conducted in each of the seven districts to the technical staff from government and development partners. Subsequently, sites for community-based vine multiplication were selected based on criteria explained in the trainings. These DVMs could be either groups or individual farmers, and were trained on how to establish nursery beds as well as on harvesting, bundling, marketing, and pest and disease identification and control (Photo 2). In total 207 DVMs were trained and provided with clean planting material. Depending on the intensity of support by the partners, DVMs accessed institutional markets, or were able to share, sell, or barter their vines within the communities. This initiative supported the indirect dissemination of vines in the communities, far beyond the number of direct beneficiaries reported in the Feed the Future Monitoring System (FTFMS).



Photo 2. Farmers receive practical training in sweetpotato nursery establishment in Machinga District.

3.1.3 Additional support to vine multipliers

Much of the feedback from newly trained multipliers included concerns about marketing in response to cyclic demand for planting materials. The project responded with two activities. First, a ToT session in root and vine marketing was offered to all partner staff in order to build their capacity to support DVMs in marketing. Second, a national workshop on sweetpotato planting material was organized. This workshop brought together stakeholders around the sweetpotato planting material value chain to discuss critical issues and bottlenecks in the vine supply and demand and the need to procure planting material from registered and inspected sources. It helped stakeholders better understand what it takes to produce large quantities of high-quality planting materials. Following the meeting, a list of registered multipliers was updated and shared with the Root and Tuber Crops Development Trust, which has the mandate to support stakeholders in the root and tuber sector in Malawi to access markets and develop business opportunities. CIP also supported vine multipliers regularly by procuring vines for project activities or by facilitating market linkages with other buyers. CIP, in conjunction with DARS and the Root and Tuber Crops Development Trust, also offered 2 days of training on certification standards and inspection of root and tuber crops that focused on sweetpotato and potato seed multiplication. The training drew some 70 participants from DARS (including the Seed Services Unit), DAES, and CIP. Through both theoretical and practical sessions, the main training topics covered crop variety and disease identification.

3.1.4 Early generation planting material

Activities in the tissue culture laboratory, screenhouses, and open-field at Bvumbwe were supported by other donor-funded projects to ensure that quality early generation planting material can be supplied to CVMs and DVMs. However, MISST still contributed to the earliest point in the value chain to fill an important gap in the seed system in Malawi. There was no facility to clean up virus-infected sweetpotato varieties in the country prior to introducing them into the tissue culture lab. In response to a written request by DARS, CIP helped procure a growth chamber and microscope and formally handed these over to the research station. To build capacity in the meristem culture technology required for cleaning up planting material, two DARS and two CIP technicians were trained at the Kenya Plant Health Inspectorate Service in Kenya on how to use the growth chamber and on general tissue culture techniques.

3.1.5 Sweetpotato root storage

Storage of sweetpotato roots after harvest will allow farmers to consume pro-vitamin A-rich sweetpotatoes over a longer period instead of consuming or selling all produce at harvest time. Traditionally, farmers tend to dig a pit and mix the sweetpotatoes with ash before storing. A ToT session on postharvest handling and root storage was held for key partner staff participating in the project. This was followed by seven district-level step-down trainings of technical partner staff. In the training CIP covered root quality and grading aspects, but also introduced a practical session on establishment of small-scale root storage options. During the project we tested three alternative methods: the ladder pit, the ventilated storage pit, and the granary storage unit. The demos were set up by CIP technicians and partners; evaluations and measurements took place regularly. Sixty-one demo sites were established and more than 2,000 farmers participated in the evaluations (Photo 3). Data from the root storage technologies demos were analyzed. Results showed that the ladder pit was the most promising storage method. It produced the smallest percentage of rotten roots (18%) and shriveled roots (9.1%) and highest percentage of consumable roots (89%). About 39.8% of roots stored in the granary sprouted, compared with 57.5% and 68.2% in ladder pit and ventilated pit, respectively. Farmers preferred the ladder pit because it is cheap to build and provides easy access to the roots. The ventilated pit was the least preferred. Ease of accessibility to the roots during storage, the cost of constructing structures, and the quality of roots were key factors that farmers used to select a storage method.



Photo 3. Example of root grading and ladder pit preparation and roots to enter storage in Lilongwe District.

3.2 Enhanced Capacity and Strengthened Seed Partnerships to Ensure Quality of Seed from Production to Distribution of OFSP

As described earlier, CIP employed a “partnerships for impact at scale” approach. This approach included strategic placements of field technicians in the district agricultural development offices in each of the seven

districts. These technicians provided technical and financial support to government extension staff in the districts to implement the project activities. They also supported the step-down trainings by various partners at district level and provided technical support. The capacity-building components in the project included trainings on vine multiplication; Mother–Baby trials (MBTs); and agronomy, marketing, root storage, nutrition, and monitoring and evaluation (M&E). Each of these components was first covered in one central ToT workshop and subsequently repeated in the seven districts as step-down trainings. Through this approach some 2,700 staff from government and NGOs were trained and which has contributed to building national capacity in scaling OFSP in Malawi.

3.3 Adoption and Uptake of Improved Technologies Enhanced, Increased Productivity and Production of OFSP, and Access to Varieties among Smallholder Farmers

3.3.1 MBTs

The main scaling approach to reach the targeted number of 62,500 direct beneficiaries and individuals receiving short-term training was through MBTs. The Mother trial consisted of six OFSP varieties together in one demo field. About 50 other farmers were invited to participate in the planting, evaluation, and harvesting of the demos and receive hands-on agronomic training in OFSP production. We counted a farmer as “trained” if he/she attended at least two of the events (planting, evaluating establishment, participatory harvesting). The 50 farmers receive a bundle with 100 cuttings of one variety to plant in their own field (Photo 4). These are called the “Baby” farmers. Most farmers received a brochure in Chichewa together with the bundle with an explanation on the agronomy and nutritional benefits of OFSP. A total of 979 MBTs were established over three rainy seasons and two dry seasons during the first 3 years of the project.



Photo 4. Farmers benefiting from planting material; information, education, and communication (IEC) material; and training around an OFSP MBT.

In some strategic sites additional vines were distributed to achieve the total project target. These included one “hot-spot” Extension Planning Area (EPA) per district where sweetpotato is most commonly grown. It also included some distributions in response to droughts caused by the El Niño event in response to a request by USAID to support affected HH. Whatever the mechanism used, the farmers received the OFSP bundles enthusiastically and were very excited to have access to new planting material and try out the OFSP varieties.

The explanation of the health benefits in terms of vitamin A intake added to farmers' interest in trying OFSP. Topics covered around the MBTs included land preparation, planting, vine conservation, pest and disease identification, harvest method, nutrition benefits, and sensory evaluation of boiled roots. An additional benefit of this approach is that we learn which variety is best adapted to the various agro-ecological conditions as well as what farmers prefer in terms of root-and-leaf yields and tastes. Analysis of 221 Mother trials in the 2016–2017 rainy season showed that varieties 'Anaakwanire' and 'Zondeni' are yielding significantly less than the four other varieties (Fig. 1). This was also observed in other seasons.

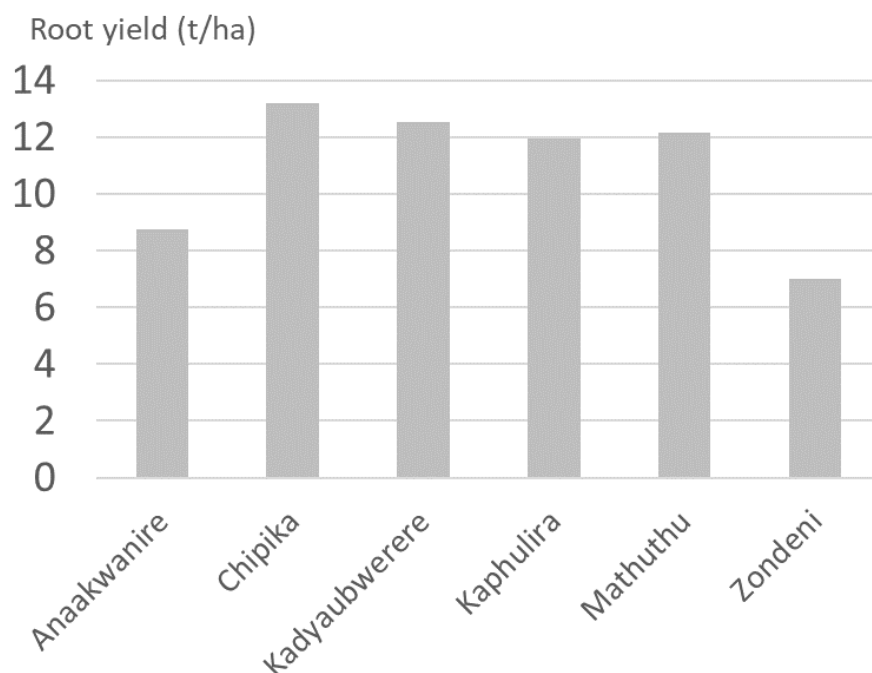


Figure 1. OFSP variety yields in the 2016–2017 rainy season Mother plots.

An opportunity arose for collaboration with the NGO Farmers World Ltd to test special blended fertilizer to improve sweetpotato productivity. CIP helped the NGO procure vine bundles and develop and share protocols and data collection forms for fertilizer trials. Forty-five fertilizer trials were established by Farmers World in eight districts (four MISST districts), and about 3,000 bundles were distributed to farmers in the MISST districts around the NGO's fertilizer demos. CIP project managers and other staff, as well as Farmers World's project manager and area managers, visited the field demo sites for a day. 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 at 25 sites with (yes) and without (no) fertilizer.

3.3.2 Field days and market campaigns

Field days were the main platform for creating awareness and providing feedback to farmers who were interested in OFSP (Photo 5). CIP and partners organized at least 200 field days; at least 20,000 farmers participated. Farmers had an opportunity to get in-depth understanding of the technologies that MISST was promoting and were able to ask questions and guide the technology developer on their preferences through sensory evaluations and general discussions. The field days were normally during early season, mid-season, and end of season. In addition to the field days, CIP engaged live theatre comedians who held awareness campaigns in 21 markets across the seven districts.



Photo 5. Participants during a field day at Maiwa in Mangochi appreciating Innosi Chimwala's Mother plot.

3.3.3 Mega demos

The mega demos were established as a way to showcase the complementary nature of the technologies that were being implemented by the various partners in the MISST consortium. The demos included OFSP, maize, soybean, groundnuts, and pigeon pea technologies. These demos, therefore, helped enhance the understanding by partners and farmers that MISST was a single project but implemented by different stakeholders, each according to its mandate. In most years, four mega demos were established per district. CIP led the coordination of the demos in Lilongwe and Ntcheu districts.

3.3.4 Symposium and radio campaign

To create more awareness of OFSP in the country, CIP collaborated with the Feed the Future Ag. Diversification project to organize an OFSP symposium. The symposium presented a unique opportunity to bring together stakeholders working on 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 (i.e., from breeding new varieties to 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 a mindset about sweetpotato. This shift should be from 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 supported Farm Radio Trust (which was sub-granted by the Ag. Diversification project) with the audio and video materials of OFSP; a list of contacts for partners in OFSP was provided, as was input into a message-development workshop for the OFSP radio campaign. MISST staff also participated in the recording of the radio programs, which were aired for over 1 year on more than six radio stations in the country. CIP also developed some jingles and a song to promote OFSP that was written by Skeffa Chimoto, a famous Malawian musician (Photo 6).



Photo 6. Skeffa Chimoto in his song and video clip on OFSP.

3.3.5 OFSP culinary event and training of chefs

Four bags of the humble sweetpotato produced by farmers supported by MISST in Lilongwe District reached the highest levels of appreciation when they were served to Lilongwe's diplomatic community during a culinary diplomacy event hosted by Her Excellency Virginia Palmer, Ambassador of the United States. Throughout the day, a wide range of dishes were prepared by U.S. celebrity chef Claudia Sansone and supported by four young chefs from the Malawi Institute of Tourism. When guests (including many guests from the hospitality industry) arrived in the evening, she demonstrated how to prepare delicious sweetpotato peanut soup, after which invitees partook of a large variety of dishes containing OFSP (Photo 7). The diplomatic community was pleasantly surprised with this exceptionally delicious dinner. The aim of the event was to bring people together around food, which is the best way to discuss issues that matter. The ambassador explained that OFSP is an example of a crop that can help rural Malawians to improve their nutritional status since it



Photo 7. OFSP features highly in the US Embassy culinary diplomacy event.

can still be produced in the face of climate change and can also be enjoyed by urban consumers at all levels. Malawi Broadcasting Corporation TV covered the event and aired it. This is just one example of how OFSP was promoted in the project. Several other hotels and restaurants were trained on OFSP recipes as well.

3.4 Increased Resilience of Vulnerable Families through Improved Nutrition Knowledge, OFSP Utilization, and OFSP Consumption at HH Level

CIP has been leading the nutrition technical working group (TWG) in the MISST consortium. This work started mainly in year 3 of the project, though initially first through engagement of a consultant who developed a strategy for nutrition work in the MISST consortium and trained partners on the nutritional benefits of OFSP and recipes that can be derived from this crop. When a fulltime nutritionist was engaged, the project started collaborating closely with DNHA. The development of IEC materials within MISST was championed by the Nutrition TWG, which organized several workshops involving all MISST stakeholders. The workshops set out to design and develop nutrition-sensitive behavioral change communication and IEC materials on various foods and their nutritional benefits for different target groups. Apart from linking agriculture to nutrition, the workshops also created awareness on the effects of aflatoxin on nutrition and health and enhanced inclusion of nutrition aspects in MISST activities. Different IEC materials have since been developed, including posters, billboards, fact sheets on crop diversity in the field, aflatoxin, soybean, OFSP, maize, sorghum, and groundnut production, and the nutritional benefits of these crops. Most of the materials were translated into Chichewa so that the messages would be easy to understand. All IEC materials were developed jointly with other key government and NGO stakeholders involved in agriculture and nutrition in Malawi. This enhanced ownership of the developed materials. More than 35 recipes have been developed covering all the value chain commodities that MISST promoted. These recipes have been endorsed by DNHA and have been compiled into a recipe booklet that also covers food safety and handling. Some recipes were tried and tested for acceptability during the community trainings, especially those for complementary feeding. The recipe booklet was approved by all MISST managers before being translated into the local language (Fig. 3).



Figure 3. Recipe book developed by the Nutrition TWG under MISST led by CIP.

The nutrition work was implemented in close collaboration with the district agricultural offices as well as the district health offices in the seven districts. It consisted of the following steps:

- Planning meetings were held centrally in Lilongwe with all relevant stakeholders from the districts.

- A District Nutrition Coordination Committee (DNCC) briefing meeting was held in every district following the planning meeting.
- Orientation and briefing of extension frontline workers was done in all targeted EPAs. A total of 295 (193 males, 102 females) workers attended these orientation meetings on the use of IEC materials and nutrition counseling.
- Refresher nutrition training was given to 997 (317 males, 680 females) cluster leaders and promoters. Topics covered included agronomic practices for MISST value chains (soya bean, groundnuts, orange maize, millet sorghum, pigeon peas and OFSP); processing, storage, and utilization; and prevention and control of aflatoxin. An orientation on IEC materials was also covered in the training. IEC materials included counseling cards, flyers on agronomic practices, and the recipe book. A combination of the trainings and the IEC materials has improved capacity of the cluster leaders.
- A total of 7,182 (568 males, 6,536 females, 78 DNA) beneficiaries were reached with the nutrition trainings, counseling, and dissemination of IEC materials. The beneficiaries were members of care groups backstopped by the cluster leaders and promoters (Photo 8). Care groups comprise 10 members who are pregnant, lactating mothers, and women children under 5 years.
- Eight field days were held in all the MISST districts to promote production and utilization of all MISST value chain crops. To increase awareness of OFSP production, processing, and utilization, the project organized field days in each target district. The aim was for communities to showcase what has been learned and to increase awareness of the project activities and outcomes achieved. The field days took place on 3–12 June 2019. Some 2,000 people participated and were reached with nutrition messages, production messages, and recipe demos. The participants included community members, NGOs, and government representatives. During the field days, the care group members showcased the different food-processing techniques that they have been trained on. The food-processing techniques included how OFSP is processed into porridge, cakes and other pastries, juices, and one-pot dishes. Participants were also able to taste the processed products. Additionally, the care group members shared their knowledge on good hygiene and other nutritional aspects, such as the six food groups and their importance in human nutrition.
- Two bundles of OFSP vines were distributed to 2,200 cluster leaders for multiplication. The care group leaders will lead the vine multiplication exercise and will later share the vines with the care group members in the next production season.



Photo 8. Some care group members showcasing food items cooked during food demos in Mangochi.

4. ACTIVITY MANAGEMENT AND LEARNING

4.1 Project Coordination and Management

As part of a wider MISST consortium, CIP frequently met with the other consortium members—ICRISAT (the lead center), the International Institute of Tropical Agriculture, and the International Maize and Wheat Improvement Center—to discuss progress, challenges, and opportunities in the program. Several TWGs were launched and led by different CGIAR centers; for example, on M&E, finance, nutrition (led by CIP), communication, gender, seed systems, and value chain analyses. The joint mega-demos where all technologies were demonstrated in one field across districts were a good example of integration between the different centers in the MISST consortium. CIP also participated in and contributed to:

- Supporting the work of the consortium management office at ICRISAT
- Participating in bimonthly program management meetings
- Meeting with District Executive Committees to introduce the project and share progress
- Participating in midyear, annual, and midterm reviews with all project partners
- Leading the preparation of annual works plans and budgets for OFSP component
- Leading the preparation of progress reports and annual reports for OFSP component
- Contributing to project monitoring and capturing and entering quarterly and annual indicator data into online USAID management information systems (FTFMS and DevResults)
- Contributing to the production and periodic updating of the activity monitoring and evaluation plan
- Contributing to the M&E surveys (baseline and annual beneficiary surveys)
- Managing the OFSP project partners and stakeholders

The CIP component was initially poorly staffed with only a project manager, an M&E specialist, and a training and promotion coordinator budgeted for. Staffing was increased over time with the addition of a seed systems agronomist, a nutritionist to lead the nutrition TWG, and seven district-based technicians. With this team the OFSP project component was well equipped to support the wide range of partners who participated in the OFSP activities. Unfortunately, the project funding ran dry in year 3, resulting in termination of all staff contracts and a long break in project activities. The agreements with five sub-granted partners were also not renewed beyond year 3 due to a lack of funds. It was only during the last 6 months of the project that some funds became available. This enabled CIP to quickly engage a nutrition consultant, an M&E consultant, and two consultant field technicians. Supported by some other CIP staff, this team was still able to train 70 DVMs, strengthen capacity of nutrition staff at different levels in the seven districts, and reach more than 7,700 caregivers with nutrition counseling.

4.2 Special Studies

And although MISST was not a research project, CIP conducted four special studies in the areas of sweetpotato value chains, nutrition, agronomy, and seed systems. In year 1 a consulting firm was engaged to

conduct a value chain analysis of OFSP to allow the project to better target its interventions.¹ In year 3 a cultural acceptability study was conducted; the resulting publication can be accessed online.² Yield results from MBTs were also analyzed and published open access in *Field Crops Research Journal*.³ Finally, many CVMs and DVMs were visited to assess the productivity and profitability of vine multiplication in Malawi.⁴

4.3 Challenges, Solutions, and Actions Taken

During the 4.5 years of the project, some challenges were experienced (Table 3).

Table 3. Some challenges and potential solutions identified during the reporting period

Challenge	Solutions and Actions Taken
Partners showed a strong interest in scaling OFSP in their ongoing programs but were not always able to provide the required data.	A data flowchart and additional M&E trainings for partner staff were held. Technicians were tasked to assist partners in data collection. Despite these efforts, the project has reached many more direct beneficiaries than reported here. But we only reported on those beneficiaries for whom partners have provided supporting documentation.
Several trained multipliers underestimated the requirements for year-round water availability, and the drought resulted in delays in expansion of area under multiplication.	The need for investment in irrigation was stressed during the learning exchange meetings. It separates the “commercial” from the community-based multipliers.
The field days exposed the sweetpotato fields to thieves who admired the potato during field days.	As a protective measure, we had to harvest the sweetpotato soon after organizing each field day before going for the next field day.
During the first year of the project, the lead center had not yet staffed the consortium management office.	CIP’s project manager and M&E specialist supported the lead center in the development of the activity monitoring and evaluation plan and work plans that needed to be submitted to USAID.
The initially planned and budgeted number of staff within CIP was insufficient to meet project targets and to assist partners.	In year 2 CIP recruited a seed systems agronomist and seven field technicians. In year 3 a nutritionist was added to the team.
At the start of year 2 there were many requests for realignment of work plans and budgets within a short period. That is, increase project to 4 years, add 3 districts, increase to 4.5 years, remove three districts, response to El Niño event. This distracted from planning the season-bound work.	Tasks were divided so that the project manager could focus fully on administrative tasks of realignments of work plans and budgets in response to donor requests while the technical team still managed to plan and implement the seasonal activities in time.
Project budgets changed due to changes in funding mechanism from direct grant from USAID to CIP to a grant through ICRISAT.	The work plans and budgets were revised and submitted to the consortium management office. Several activities had been canceled to allow for the budget reduction.
By the end of year 3 the project ran out of funds and the consortium was affected by budget cuts from USAID due to changes in the U.S. Administration.	CIP responded by terminating all staff contracts and halt implementation until the next trench of funds arrived. As a result, the project work was suspended for about 1.5 years.

1. TCP. 2016. Value Chain Analysis and Marketing Chain Mapping for Orange-Fleshed Sweet Potato (OFSP) in Feed the Future Zones of Influence (Report).

2. Hummel, M., Talsma, E.F., Van der Honing, A., Gama, A.C., Van Vugt, D., Brouwer, I.D., et al. 2018. Sensory and cultural acceptability tradeoffs with nutritional content of biofortified orange-fleshed sweetpotato varieties among households with children in Malawi. *PLoS ONE* 13(10): e0204754. <https://doi.org/10.1371/journal.pone.0204754>

3. Van Vugt, D., and Franke, A. C. 2018. Exploring the yield gap of orange-fleshed sweet potato varieties on smallholder farmers’ fields in Malawi. *Field Crops Research* 221: 245–246.

4. Chibwana, A. 2019. Social and Economic Analysis of Decentralized and Commercial Vine Multiplication in Malawi (report) 71 pp.

4.3 Lessons, Best Practices, and Recommendations

Many lessons were learned during the project implementation:

- For maximum efficiency, the project needed to have its own staff based in the districts. Partners were often juggling responsibilities for several projects and needed to be reminded regularly to prepare for MISST activities and put in the effort. Having MISST staff in the districts contributed significantly to expediting the work of project partners.
- Use of the existing government structures is the best way of working with more communities on the ground. The project mounted demos in all the districts through the DAES.
- MBTs in the dry season are very challenging and may have a low rate of success due to water scarcity and livestock damage. The best practice would be to do these only in irrigation systems with year-round water supply, not in wetlands that may dry out.
- Theft of roots and vines is a challenge due to the popularity of the crop. Organizing field days in farmers' fields is crucial for transferring knowledge and creating awareness among farmers and other stakeholders, but also puts the host farmer at risk of becoming a target of thieves.
- Benefits of the DVMs are that planting material is available in the communities, less transportation results in fresh vines being planted in the demos, which then results in better establishment.
- Farmers in the communities want to copy the vine multiplication methods they see in the DVMs since they see it as profitable and as a good way to have planting material available. This will result in diffusion of the OFSP varieties in the target communities beyond direct beneficiaries and beyond the project.
- The long-term profitability of DVMs after project operations end need to be assessed, and farmers need to know they will be responsible for marketing the planting material in their communities. This requires monitoring of sales, demand for vines, and willingness to pay for them in the communities over time. There is also need for close communication with DVM host farmers for them to have realistic expectations on potential sales and profits of vines in the community. It will require more training to DVM hosts on gross margins and marketing of planting material.
- The nutrition-led agriculture activities filled a gap in the country and resulted in suitable IEC materials to fill the gap in linkages between agriculture and nutrition. Many other partners implementing nutrition programs were involved in the development, and government took a key role. In the future we will need to evaluate the impact of the use of these IEC materials on nutrition awareness and practices since we do not know whether (or under what circumstances) better IEC materials will lead to better nutrition outcomes. Working through the existing government structures such as DNCC, promoters, care groups, and cluster leaders contributed to capacity strengthening at district level and to reaching the set targets efficiently and effectively. There is a general interest in new methods of cooking and utilization of locally made food in the country.
- Farmers tend to sell sweetpotato roots as individuals to local vendors. To attract better markets and prices, there is need for group collective production and marketing trainings.
- OFSP tends to attract better market prices than white- and yellow-fleshed varieties in some districts. There should be emphasis on nutrition and expansion of area under OFSP so that only surplus is sold and HH consumption needs are met. However, this is difficult to prescribe to farmers. It is important to

combine marketing activities with nutrition education while being mindful of the gender dimension in decision-making.

- It was observed that there is little availability of OFSP in most marketing centers against the white-fleshed varieties. Many buyers and sellers do not know most of the OFSP by variety name. Therefore, we conducted training and awareness creation to 150 vendors and middlemen about benefits of OFSP and where to source them. Some lessons learned from interactions with the vendors are the importance of targeting project interventions to areas where vendors normally source their sweetpotatoes and empowering farmers to bargain for good prices when selling OFSP to vendors. Other interventions could include market promotions and supporting vendors to allow them to present their produce in better parts of the market, which could help to improve the crop's image.
- Engaging commercial-oriented farmers and businesses in vine multiplication has shown to be a good investment. These multipliers managed to organize themselves into an association that aims to make a significant contribution to the development of the OFSP value chain and can be a good entry point for future interventions.
- The fall armyworm attack on maize across the country has made farmers decide to turn their attention to less-affected crops such as OFSP. We observed that farmers will harvest less maize under irrigation because of the fall armyworm attack. Despite this disaster, it provides opportunities for wider adoption of OFSP.

5. SUCCESS STORIES

OFSP Are Transforming This Malawi Community

It's a hot dry day in November 2015 in Dedza District's lakeshore area in Malawi. Francis Chibwana is sitting under a tree at noon, wiping the sweat off his forehead. After some hours of work in the field, he just wants to rest a bit before going home to his family. It is the end of the dry season, and it has not rained for over six months, but the rains are expected to come soon. He's thinking about the old days. Sometimes, growing up, his family used to be without food for months. But these days Chibwana lives in a community with year-round access to irrigation water. Instead of producing only one crop during the four months of the rainy season, he can produce two crops in a row. Bending over to feel the water flow through the irrigation canal, just a short time before taking the midday break, he says “*Madzi ndi moyo* (Water is life).”



Heavy lifting of OFSP roots produced in the dry season in Njolo irrigation scheme.

Despite having access to water to produce enough food, he still worries about the well-being of his community. Despite being food secure, Chibwana continued to see weak and sickly children in his community; others seemed to have problems with their eyesight. The same was true for some young mothers in the village. His worries changed to hope when people from CIP came to visit the area in December 2014. The organization works with USAID and other partners to promote six varieties of OFSP to improve the lives of the poor. OFSP is an important source of vitamin A, a nutrient that helps the body fight infections, keeps the eyes and skin moist, and prevents night blindness.

CIP came to the area as part of the Feed the Future Malawi Improved Seed Systems and Technologies—Orange-fleshed Sweetpotato (OFSP) Component—under the U.S. Government’s global hunger and food security initiative. The project complements the work of another Feed the Future project in Malawi, Integrating Nutrition in Value Chains, which introduced groundnuts and soybeans to the community. Under these projects, field officers of CADECOM in Dedza worked closely with the community to educate families about the importance of a varied diet. “Before the USAID projects started, farmers produced and consumed mainly maize because they did not have access to the other crops and were not aware of the nutritional benefits of OFSP,” said Enock Issa, a CADECOM field officer.

Today, Francis Chibwana knows that it is important for his children’s health that they eat a variety of different foods throughout the year. He also understands the importance of OFSP to beat the problems of malnutrition and vitamin A deficiency. In addition to consuming the roots when the sweet potato grows in the field, farmers can also pick and cook the crop’s nutritious leaves. “The orange-fleshed sweet potato component of the MISST project in Malawi provides access to clean planting material to over 62,500 households, increasing production, developing market potential, and increasing consumption of OFSP,” says USAID/Malawi Feed the Future coordinator Lynn Schneider. “OFSP is growing in popularity and becoming an important means of reducing vitamin A deficiency in Malawi.”

Chibwana and a group of over 100 other farmers received bundles of OFSP vines from the project to plant in their irrigated fields during the dry season from June to October 2015. They were not sure what to expect because they used to plant sweetpotato only in the rainy season. But when all the farmers got together to harvest the crop, three of the OFSP varieties gave astonishingly high yields of 25 t/ha—more than double what was expected. The children could hardly lift the roots! According to Schneider, introducing OFSP in Dedza’s lakeshore area was a strategic decision to enhance food and nutrition security in the face of the looming impact of the El Niño weather phenomenon. In the long run, the community will be able to access the nutritious OFSP roots and vines through trade, exchange for other goods and services, or through community sharing. This will contribute to reduced malnutrition in smallholder farming families throughout the area.

Earning More by Trading in OFSP

It is in the middle of the sweetpotato harvest season in July 2016. All forms of village transport, such as bicycles, oxcarts, and even old un-roadworthy vehicles, are laden with bags of sweetpotatoes. Men, women, boys, and girls from all directions are flocking to the urban market in Lilongwe City. Maliya Mnkhalamba, a 39-year-old from Lilongwe, is seated quietly under the shade of acacia trees that form most of the newly established market opposite Wakawaka Hotel on the M1 Road as you drive into Lilongwe from Blantyre. She is an OFSP trader who orders in bulk one bag at a time from Dedza’s Linthipe and Bembeke areas at wholesale price and resells at this market.

This market sells all types of farm produce, from meat products, fish, grains, and legumes to locally available vegetables. The market serves the populous locations as well as travelers passing by on the M1 road in this

conveniently located part of Lilongwe. Commodities are sold at relatively low prices as compared with other markets in the city. Unlike other traders in the market, who tirelessly call passers-by to sample their sweetpotatoes, Maliya only needs a five-word marketing statement “*mbatata yofiira mkati iri pano*” meaning “OFSP are available here.” Interchangeably, she would say “*mbatata ya karoti mkati iri pano*” referring to the OFSP’s carrot-like color. According to Maliya, this marketing strategy helps customers to distinguish “her” sweetpotatoes from other-colored sweetpotatoes. “People are aware of the nutritional benefits of OFSP that it has got vitamin A,” adds Maliya. “Vitamin A combats ailments such as malnutrition, a culprit in under five children and pregnant mothers in Malawi, and aids in clear vision,” she concludes. Asked for her source of information, Maliya mentions hearing the message at the same market from a professional comedy duo named Chindime and Samalani Theatre that toured Wakawaka market with their OFSP promotion campaign in July this year. CIP, under the MISST project, engaged these comedians to create awareness and demand in order to promote production, consumption, and utilization of OFSP. Maliya uses the knowledge she grasped during this event to market her OFSP. In addition, orange varieties are tasty, appealing to the eye when cooked, and attractive to children.

Despite the availability of large quantities of sweetpotatoes at Wakawaka market every day, Maliya sells her sweetpotatoes at a profit. Since these OFSP sell relatively fast compared with other sweetpotato varieties, she can order three or four times in a week from producers in Dedza District. This gives her an edge over other traders who sell white- or yellow-fleshed sweetpotatoes. “In the past I would stay for a week and half before completing one bag full of white-fleshed sweetpotatoes,” laments Maliya. “Now things are better,” she says with a smile. The MISST–OFSP project component has partnered with CADECOM in Dedza, a relief and development arm of the Catholic Church. CADECOM is involved in training farmers in all agronomic practices pertaining to OFSP and organizes the farmers into marketing clubs and associations. These farmers are involved in hosting OFSP variety demos, vine multiplication, and, more importantly, OFSP root production through out-scaling initiatives. In the 2015–2016 rain-fed season about 1,000 smallholder farmers received four bundles each of any of the five OFSP varieties ‘Anaakwanire’, ‘Chipika’, ‘Kadyaubwelere’, ‘Kaphulira’, and ‘Mathuthu’. Coincidentally, these farmers were also reached by the comedians in Dedza District to encourage them to grow OFSP since they are nutritious and have a readily available market in urban areas. It is these farmers who provide OFSP roots to traders like Maliya of Wakawaka Market in the sweetpotato harvest season.

OFSP Are the Next Investment Opportunity in Malawi

Mabvuto Mndau is a 41-year-old entrepreneur from Malawi with a passion for agriculture. He is a multiplier of planting material of OFSP varieties along the shores of Lake Malawi in Chikoleza village, Golomoti EPA in Dedza District, as well as on his farm in Mchinji District. Two years ago Mabvuto, like most commercial farmers in Malawi, had never heard about sweetpotato vine multiplication as a viable business opportunity. But his interest was aroused after reading an advertisement in the local newspaper in which CIP was seeking expressions of interest from potential commercial multipliers. He is keen to exploit new ideas and opportunities: “We tried maize production but realized that this business was not profitable enough.” The fact that he no longer produces maize but a wide variety of other crops, including cassava, potato, banana, mango, guava, and sugarcane, on his farms proves he likes exploring alternative business opportunities.



Workers preparing an order of high quality OFSP planting material (left) and Mabvuto Mndau in his OFSP vine multiplication field (right), Dedza District, Malawi.

Mabvuto has no regrets venturing into the multiplication of sweetpotato planting material. He explains: “Thanks to the training received by CIP under the Feed the Future MISST project, I learned all the skills needed to start the vine multiplication business. I learned that it would not be easy but decided to give it my very best effort to succeed as a multiplier.” CIP provided Mabvuto with only 30 bundles of planting material to plant in six beds of 1 x 20 m each before the 2015–2016 growing season. With special care and hard work, he managed to expand his area under multiplication and sold his planting material at a good price. Encouraged by the market potential he expanded his area under multiplication to 5 ha this 2016–2017 season. According to Mabvuto, the key practices to ensure good crop establishment in his multiplication beds are to use a layer of mulch and proper irrigation and water management to prevent the vine cuttings from drying out.

When asked what it takes to be a commercial vine multiplier in Malawi, Mabvuto says, “First of all you need a strong passion and commitment to multiply quality material. Second, you need to be willing to invest in irrigation infrastructure and ensure you have committed staff that will maintain high quality standards. Last, but not least, it is important to set yourself a goal and identify all the steps you need to take to reach that goal.” Part of his planning involves expanding the area under irrigation in the dry season in order to supply in the months of December and January. This requires a lot of resources to keep his diesel pumps going, but it is an investment that pays off.

As a result of his entrepreneurial spirit and investments, Mabvuto is now preparing orders of planting material in response to the large demand for clean planting material by NGOs. One of his marketing strategies is to advertise on the radio. He even receives phone calls from other commercial farmers who want to procure his planting material. Mabvuto also considers the production of roots as a profitable enterprise and is planning to allocate OFSP varieties. “There is high demand for these varieties because there is growing awareness that consuming OFSP is an important source of vitamin A.” In Malawi vitamin A deficiency is a serious problem in women and children under five, especially in rural areas. “I am glad I can develop a viable business that provides employment and profit, while at the same time selling a high quality product that will largely benefit my fellow Malawians.”

The project has so far provided training to 40 potential multipliers who had submitted a proposal, but successes vary. MISST provides technical support, training, and advice; but the project does not guarantee any market and does not provide funds or equipment to these budding entrepreneurs. This ensures that only those willing to invest in irrigation infrastructure and have a marketing strategy will develop independent and sustainable businesses. WhatsApp groups and facilitating regular meetings to share successes and challenges are helping the multipliers learn from each other and identify markets. What the project has learned from

these interactions is that limited market assurance hinders expansion of area under multiplication. Owing to internal procurement requirements, NGOs often place tenders in newspapers to the benefit of middlemen instead of directly sourcing quotations from eligible multipliers. This poses a risk for multipliers like Mabvuto, but we have learned that taking high risk can also result in high benefits in years when OFSP planting material is in high demand.

From a Child's Dream to a Model Farm: The Case of Matamando Farm, an OFSP Vine Multiplication Site

When Matamando (Praises) was only 4 years old, his kindergarten teacher asked him what he would like to be when he grew up. Unlike other children who chose to be a pilot, accountant, or some fancy career, his teacher was amazed when he said he wanted to be a farmer. When the teacher informed the parents about their child's choice of career, they were excited and started buying farm tools and implements such as watering cans, hoes, and rakes for him. It was early 2016 after noticing the harsh effects of the El Niño that Matamando's father thought of going into irrigation farming. The farm sits on 1.5 ha in Msipu village, Traditional Authority Malili in Chitsime EPA in Lilongwe District. It was named Matamando Farm to keep their child's dream alive. Today he is 9 years old and the dream has not yet faded.

Diversifying into OFSP. The farm initially started with legume production as the main enterprise until one day the family watched a TV program on OFSP activities in the Feed the Future MISST project. The family was referred to by an agriculture officer to CIP in Lilongwe. The visit coincided with the introduction of DVM by the MISST project. After expressing interest, they were shortlisted for training and eventually trained on vine multiplication skills. This was followed with the distribution of initial starter vines of six varieties of OFSP (i.e., 'Zondeni', 'Kaphulira', 'Kadyaubwelere', 'Ana Akwanire', 'Chipika', and 'Mathuthu'). A nursery was promptly established and seed multiplication started immediately. In three months, there was vine cover of about 0.5 acre. Today, it is a 1.5-ha farm.



Maria Phikani, a proud owner of Matamando Farm, in her OFSP field.

Model farm. Impressed with the high level of management at the farm and its strategic location, the OFSP project requested the owners to use it as a model site. It serves as a learning site for people interested in sweetpotato vine multiplication, admirers, and visitors. So far many have visited Matamando Farm and are impressed with what they see. The farm's vision for the future is to increase its size and area under irrigation in 2 years' time. This will enable the farm to multiply vines on a commercial scale. Starting from the next growing season, the farm will start training farmers in vine multiplication and supplying them with start-up vines while ensuring that they follow all recommended procedures. They plan to explore and increase market coverage. Thereafter, they intend to diversify into raising pigs and dairy cattle and producing sweetpotato roots throughout the year.

The Sweet Harvest of Giants: Making OFSP 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 the inadequate rains and sporadic dry spells have only compounded the effect of the Malawian farmers' new worst enemy, the fall army worm, 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.

Earlier this morning, Samuel carried his machete to his wetland garden, known as *dimba*, and cut the vines that he carefully kept alive in the hot dry months before the start of the rains. 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 sweet potatoes, but until the USAID-funded Feed the Future MISST and PERFORM projects taught Samuel and 2,337 other farmers around Liwonde Forest Reserve the benefits of OFSP and trained them in proper planting techniques, they did not dedicate much of their land to the crop. Once CIP, the lead for MISST's sweetpotato component, 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 5 months before the 2015–2016 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 OFSP 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-based staple food, *nsima*. The family agreed; the OFSP leaves were much sweeter and tastier than their old, white-fleshed ones. 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 2016–2017 rainy season, their sweetpotato vines were flourishing. 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 the fall army worm, 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—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 ‘Kadyaubwerere’ roots were traded for a heaping bowl (about 1.5 kg) of dried maize.



Samuel Kosimasi planting OFSP on his farm (left); three ‘Chipika’ roots or seven ‘Kadyaubwerere’ roots were traded for a heap bowl of maize (right).

By June the couple harvested and exchanged their OFSP for seven 50-kg bags of maize. With the drought and fall army worm conditions of the season, Samuel estimates, “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 huge 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 heapful, he could make an additional \$5 per bag.



Samuel Kosimasi with his wife and children at home (left) and with one of the goats procured from OFSP sales (right).

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 major 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.

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