Rooting out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato

Year 2 Midterm Report (1 October 2010–31 March 2011)

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Submitted by:
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ACRONYMS

ASWAp	Agricultural Sector-Wide Approach
BRS	Bvumbwe Research Station
CADECOM	Chikhwawa-Catholic Development Commission
CIP	International Potato Center
CU	Concern Universal
DAES	Department of Agricultural Extension Services
DARS	Department of Agriculture Research Services
DVM	Decentralized vine multipliers
EPA	Extension Planning Area
GoM	Government of Malawi
ICM	Integrated crop management
IPs	Implementing partners
MDGs	Millennium Development Goals
MT	Metric tons
MVP	Millennium Village Project
NGO	Nongovernmental organization
OFSP	Orange-fleshed sweetpotato
SHPI	Sweetpotato for Profit and Health Initiative
SSA	Sub-Saharan Africa
TA	Traditional Authority
VAD	Vitamin A deficiency

EXECUTIVE SUMMARY

In Malawi, maize is the most important food crop, followed by cassava, sweetpotato, and sorghum. However, sweetpotato is currently one of the most widely grown crops and, as a major food source, is increasingly contributing to the food basket in Malawi. The Ministry of Agriculture and Food Security estimates sweetpotato production at 2.7 million tons (MT) in 2009, a 500% increase over its estimates 12 years ago. This growth represents some diversification away from really solely on maize as their dominant food staple. Sweetpotato is also a source of cash and employment for many farmers.

Malawians are desperately poor, with 74% of the population living below the international poverty line of US $1.25 per day. Income is Mk 44 ($0.29) per person per day with 22.4% barely surviving. The levels of malnutrition remain high: 43.2% of children under five years are stunted, 59% have vitamin A deficiency (VAD), and 22% are underweight. The infant mortality rate and morbidity remain high, with 104 deaths per 1,000 live births in 2004/05 and 1,984 deaths per 100,000 births in 2004, respectively. There is also high prevalence of HIV and AIDS, currently estimated at 12%.

In 2009, the International Potato Center (CIP) launched the Sweetpotato for Profit and Health Initiative (SPHI) with the goal of enhancing the lives of 10 million African families, particularly by reducing child malnutrition and improving smallholder incomes through the effective production and expanded use of sweetpotato. Irish Aid became a founding partner in the SPHI through the present project, "Rooting out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato." This 4.5-year, multi-partner effort seeks to improve vitamin A and energy intake for at least 115,000 households with young children (the group most vulnerable to VAD) using orange-fleshed sweetpotato (OFSP) and an innovative approach to scaling up planting material dissemination. The project also seeks to improve income-generating opportunities for some producers of OFSP and increase their average sweetpotato yields by 50%. The SPHI and this project are rooted in regional and national policies and programs aimed at sustainably improving the lives of people in Malawi and the region in line with the Millennium Development Goals.

CIP is strongly working with partnership. The multiple partners included:

- **National Agricultural Research Services**: Department of Agriculture Research Services of Malawi, Department of Agricultural Extension Services (DAES) of Malawi, and Department of Nutrition, HIV and AIDS (Office of the President and Cabinet).
- **Nongovernmental organization (NGO) extension services**: Concern Universal, Chikhwawa-Catholic Development Commission, and the Millennium Village Project.
- **Private sector**: Universal Industries, started on a small scale (limited funding) during the second year of project implementation.

The altitude of Malawi ranges from 30 masl (Shire Valley in the south) to 3,000 masl (the mountainous north). Annual rainfall ranges between 800 and 1,400 mm. The rain is strongly seasonal and unimodal, occurring mostly between November and April. The air temperature and humidity are relatively high in low altitude areas during the dry season. In the last few years, Malawians have been experiencing strong effects of climate change.

Sweetpotato with its creeping vines provides good soil cover and protects soils from erosion during peak rainfall events and conserving soil moisture between rains. The crop produces very well in favorable environments. If there is sufficient rainfall to establish well, the crop reliably yields something even under marginal conditions of subsequent drought and low soil fertility, thus

suggesting it is an excellent food and nutrition security crop. Tolerance to drought is being improved through current breeding efforts.

Although the main emphasis of this project is on dissemination, selected research activities are being engaged in to address productivity constraints and build local research capacity so as to ensure sustained introduction of the OFSP into the cropping systems. These activities are: (1) intercropping between maize and sweetpotato, (2) rely-cropping (conducted in on-farm trials), and (3) irrigation with fertilizers/manure versus non-irrigation of sweetpotato (in preparation). For the rely-cropping, sweetpotato is planted immediately after the maize harvest. Ms. Phelire Nkhoma, an M.Sc. student from the University of Malawi, Zomba, District, will be involved in the research on the irrigation with fertilizers/manure trials as a part of her thesis. She is being supervised by the Dr. Welton Phalira, Chancellor College, University of Malawi.

The first year of the project has been completed and the results were presented in the annual project report in September 2010. Partners are on track to deliver large amounts of OFSP planting materials from nearby multiplication sites to producer households at risk of VAD. The number of beneficiaries initially targeted in Year 1 was 1,000 households. However, after launching the program with the government and NGO partners and exploiting small-scale irrigation potential with some multipliers, 7,097 beneficiaries were registered to receive vouchers in November 2010. Through March 2011, the dissemination of OFSP with subsidized vouchers in Malawi is reaching more than 10,000 farming households using an implementation strategy. The dissemination approach consists of six integrated components: (1) strengthening the partnership with government, NGOs, and private sector; (2) seed systems establishment; (3) training, visits, and field days; (4) demand creation campaign through behavior change communication (theatre, dancing, poetry, songs, and banners); (5) voucher systems for vine dissemination; and (6) product development and markets.

The project is being implemented in four districts: Dedza, Zomba, Phalombe, and Chikhwawa. In Year 1 of the project, efforts focused on building up the supply of vines, using a "1, 2, 3" seed multiplication system strategy that complements the sweetpotato production system in Malawi. It can also be suitable for low-input agricultural systems. With the onset of the rainy season, farmers focus on cultivating sweetpotato for production. After harvest, the multipliers grow the vines for multiplication. In the 1, 2, 3 seed multiplication system, the primary multiplication ("1") is carried out at Bvumbwe Research Station. There are 4 ha of land under primary multiplication of OFSP Zondeni. The secondary ("2") and tertiary ("3") multiplications are managed by farmers or farmer groups on their own land. Secondary multipliers typically have larger areas, are very well trained in quality vine multiplication, and often serve as suppliers of vines to the tertiary multipliers. The tertiary multipliers must be located close to the communities that they serve. We intend for these decentralized vine multipliers (DVMs) to become known sources of OFSP planting material for their communities. In the first year, 133 decentralized vine multiplications (DVMs) (7.7 ha of land) were established. The 133 DVMs, together with material from the primary multiplication site, could potentially provide clean OFSP vine cuttings to 23,000 households. Each household received 300 vine cuttings. In Year 2 of the project, each district has potentially targeted 6,000 beneficiaries and the numbers of DVMs doubled. Thus, the total number of targeted beneficiaries is 24,000 households.

An awareness campaign held in October 2010 was attended by more than 9,900 people. The campaign and songs were documented on a DVD. The documentation was only for local consumption since it was a homemade video. Another set of locally produced videos was meant for educational purposes. These videos were about "How to grow sweetpotato," "Weeding," and

"Nutrition awareness." On the basis of the reports from the NGO and DAES, these homemade videos were very useful for helping them on the ground. They could show the videos by using their laptop during training of the farmers. Besides the DVD, a CD, a tape, and a leaflet were produced to supplement the diffusion of the message when a computer is not available. A high-quality documentary will be made by a professional videographer. This will be meant for donors and other international audiences. This work should be done jointly with the Irish Communication Office of the Embassy.

A positive result of the awareness campaign was noted. A demand for OFSP planting material is growing. Through March 2011, the number of beneficiaries received vouchers was 35% higher than the registered number before the campaign. All multipliers at 133 DVMs were also growing the OFSP in their garden for production. They have indicated that they are willing to remain multipliers in subsequent years.

The project is using a voucher system approach which reduces the risk to multipliers because it guarantees that they will be reimbursed for a certain number of vines distributed through vouchers and it provides an excellent tracking system to capture the names and locations of the vine recipients who redeem their vouchers with the multipliers. The monitoring system through March 2011, has recorded that US $11,231.30 (MK 1,685,695) has been spent for redeeming the vouchers. The multipliers received the cash from the respective NGO partners. Multipliers generated additional income from selling the OFSP vine cuttings on the free market. A total of $1,732 (MK 259,800) was received through these additional sales. The cash mentioned above was used for various purposes (i.e., buying sugar, soap, salt, cooking oil, school fees, and other basic needs). A multiplier from Chikhwawa reported that he even purchased two diesel water pumps. Furthermore, a multiplier from Dedza is planning to construct a new diffuse light storage for Irish potato seeds. After completing the second year the project will evaluate how the voucher system is performing and decide whether to continue full voucher subsidization or move to a system where farmers must pay for at least part of the value of the vines.

Training activities were mostly organized by the implementing partners in each district and using a "Training of Trainers" approach. In such an approach, each person trained is expected to subsequently train others. For example, in Chikhwawa, Phalombe, and Dedza, one trained secondary multiplier should train five tertiary multipliers. In Zomba, one woman/household trained in utilization of storage roots is expected to subsequently train 10 additional women. This approach multiplies the number of beneficiaries from the initial training effort.

Sweetpotato farmers in Malawi, especially women, could gain substantially more profit from commercialization of sweetpotato roots. Assuring adequate participation by women is a key priority of this project, as they and their children are the principal target groups for nutritional benefits and the women themselves the principal targets for any monetary benefits. Participation by gender is recorded in the monitoring system. At the farm level, development of more continuous year-round supply is important in developing the crop as more than a snack food in urban markets. Improved efficiency in the marketing chain is also important in keeping sweetpotato competitive. Interventions at the production and marketing stages must be complemented by promotional strategies to change the image of the crop, develop alternative uses of the roots in urban diets, and increase effective demand. While market development is important, note that at Irish Aid's request, the focus of this project is more on the nutritional benefits than on the potential income benefits.

1. BACKGROUND AND JUSTIFICATION

Malawi is one of Africa's poorest countries (Randall et al. 2010). It is a small, densely populated country in Southern Africa. According to the 2008 census, the population is 13.1 million—that is, 110 inhabitants per km^2 compared to the average number in Sub-Saharan Africa (SSA) of 34 per km^2. Agriculture accounts for 34% of the GDP which is a higher percentage than in most eastern and southern Africa (MoAFS of Malawi 2008).

The altitude ranges from 30 masl (Shire Valley in the south) to 3,000 masl (in the mountainous north). Annual rainfall, which ranges between 800 and 1,400 mm, is strongly seasonal and uniformly distributed, occurring mostly between November and April. The air temperature and humidity are relatively high in low altitude areas during the dry season (Government of Malawi [GoM] 2008).

Maize is the most important food crop, followed by cassava, sweetpotato, and sorghum. However, sweetpotato is currently one of the most widely grown crops. It is increasingly contributing to the food basket in Malawi; it is also a source of cash and employment to many farmers. The Ministry of Agriculture and Food Security estimated sweetpotato production at 2.7 MT in 2009 (Chipungu 2010). According to Dixon Ngwende, the National Program Director for Rural Livelihood and Economic Enhancement, the production of sweetpotato has grown by over 500% in the past 12 years. There is increasing recognition by policy makers such as Ngwende that diversification of staple food consumption away from such high dependence on maize is needed (*The Sunday Times*, "Business of Malawi," 13 March 2011).

In 2009, following extensive consultation and planning, the Sweetpotato for Profit and Health Initiative (SPHI) was launched with the goal of enhancing the lives of 10 million African families, particularly by reducing child malnutrition and improving smallholder incomes through the effective production and expanded use of sweetpotato. Irish Aid became a founding partner in the SPHI through the present project, "Rooting out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato." This 4.5-year, multi-partner effort seeks to improve vitamin A and energy intake for at least 115,000 households with young children—the group most vulnerable to vitamin A deficiency VAD)—using orange-fleshed sweetpotato (OFSP) and an innovative approach to scaling up planting material dissemination. The project also seeks to improve income-generating opportunities for some producers of OFSP and increase their average sweetpotato yields by 50%.

By being part of SPHI, the "Rooting out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato" joins a significant continent-wide coordinated effort, contributing to the overall initiative and drawing on an expanding base of knowledge and experience about approaches to using sweetpotato to improve lives in SSA. Lessons learnt from this project will also make a valuable contribution to the SPHI. The SPHI and this project are rooted in regional and national policies and programs aimed at sustainably improving the lives of people in Malawi and the region in line with the Millennium Development Goals (MGDs).

The MGDs represents a policy shift from social consumption to sustainable economic growth and infrastructure development. It places emphasis on six key priority areas: (1) agriculture and food security; (2) irrigation and water development; (3) transport infrastructure development; (4) energy generation and supply; (5) integrated rural development; and (6) prevention and management of nutrition disorders and HIV/AIDS. These six key priority areas are expected to accelerate the attainment of the MDGs in the areas of health, education, gender, environment, and governance (GoM 2008).

The objectives of the "Rooting out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato" project align well with the priority areas for action announced by the Ireland's Hunger Task force in 2008:

1. To increase agricultural productivity in Africa—with a particular focus on women
2. To improve maternal and infant under-nutrition
3. To improve governance and policies to ensure that hunger is addressed effectively.

The GoM recognizes the need to invest in agriculture—especially the need to improve productivity—as over three quarters of its population depends on agriculture for survival. Moreover, the government explicitly recognizes the need to invest in nutrition and the potential synergies by improving links between the nutrition and agriculture sectors. The key nutrition unit is even based in the Office of the President.

Crop diversification is now at the core of Malawi's agriculture policy. Since the 1990s it has earmarked the promotion of cassava and sweetpotato as crops that are more drought tolerant than maize, and hence key food security interventions. The government's commitment to improving smallholder access to fertilizers and irrigation facilities means that integrated crop management (ICM) research can be conducted with the expectation that relevant findings will not just sit on the shelf, but also have a good probability of being integrated into other major ongoing agricultural initiatives if conducted in collaboration with farmers.

Table 1 presents the alignment of the objectives of this project with those of the Agricultural Sector-Wide Approach (ASWAp) of the GoM (GoM 2010). Note that there is good alignment between the two, with this project contributing to the achievement of various strategic objectives, support services (including institutional strengthening and capacity building), and focus areas (including strengthening public/private partnerships and improving sustainable production practices).

Table 1. Rooting Out Hunger in Malawi with Nutritious OFSP Project Objectives Corresponding to Malawi's ASWAp Strategic Objectives

Project Objective	Corresponding ASWAp Strategic Objectives
1. To improve vitamin A intake for rural vulnerable groups in Central and Southern Malawi through effective establishment of decentralized vine multipliers and a media-based demand creation campaign.	1.2.1.c: Increase productivity of cassava, sweet and yellow potato, and Irish potato in relevant areas 1.2.2.a: Promote dietary adequacy 1.2.2.b: Improve quality of diets for the most vulnerable groups 1.2.2.c: Intensify nutrition education Key support service 1.a: Institutional strengthening and development Key support service 1.b: Capacity building
2. Increase effective demand by changing the perception of sweetpotato and develop fresh root marketing chains for OFSP in the Blantyre market and reduce fluctuations in overall sweetpotato supply to the fresh market.	Key support service 2.a: Conducting results and market-oriented research on priority technology needs and provision of technical and regulatory services Focus area 2.3.a: Improve the public/private partnerships for broader growth of the agriculture sector Focus area 3.1: Sustainable agricultural land management
3. Increase the productivity and quality of sweetpotato in intensifying farming systems to ensure surplus production for sale and decrease the length of the hunger season.	1.2.1.c: Increase productivity of cassava, sweet and yellow potato, and Irish potato in relevant areas Key support service 1.a: Institutional strengthening and development Key support service 1.b: Capacity building Focus area 2.3.a: Improve the public/private partnerships for broader growth of the agriculture sector

Project Objective	Corresponding ASWAp Strategic Objectives
4. Increase the capacity of the Department of Agriculture Research Services to produce clean, tissue culture sweetpotato plantlets, maintain primary multiplication sites, and design and conduct seed systems and ICM research.	Focus area 3.1: Sustainable agricultural land management

The role of sweetpotatoes is substantial in Malawi as the post-Banda governments have recognized the significant contribution that root crops can make to food security, especially in densely populated areas where landholding size is severely constrained. Sweetpotato expanded dramatically in the 1990s due to a massive vine dissemination initiative. In terms of total production, sweetpotato is now the third most important food crop in the country (Fig. 1).

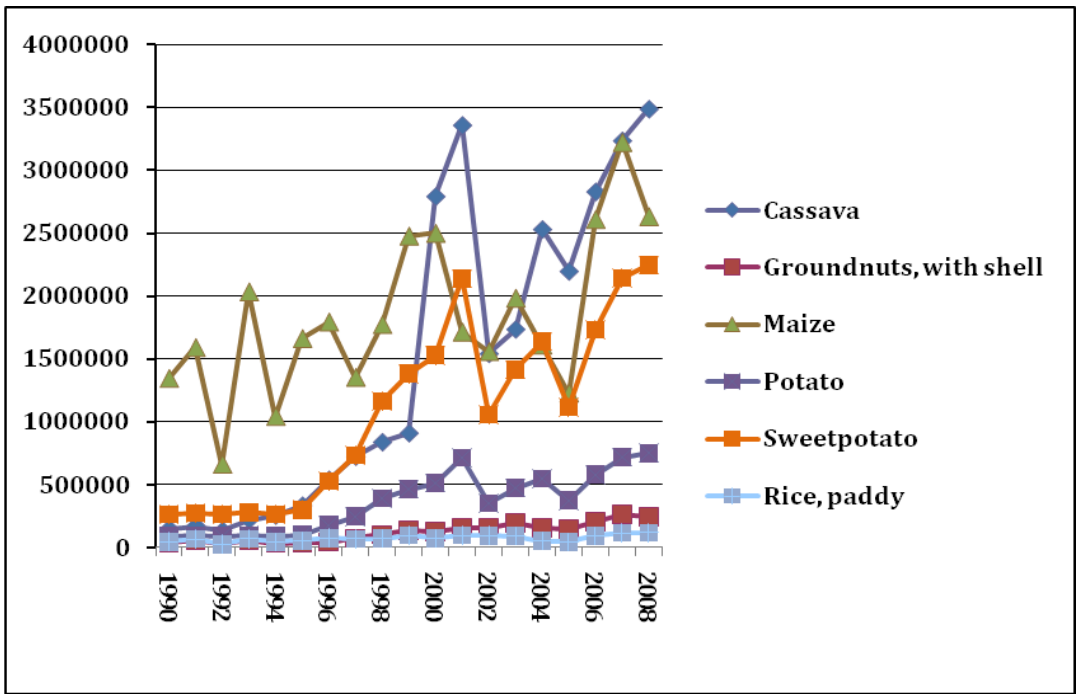

Figure 1. Annual production (MTs) of major food crops in Malawi (1990–2008) (FAO 2009). Note: FAO does not distinguish between potato and sweetpotato, therefore relative volumes were estimated based on data provided by FEWSNET (2006).

Most varieties grown in Malawi are white- or yellow-fleshed. With the prevalence of VAD among children under five years in Malawi among the highest in SSA (59%), the potential impact of getting beta-carotene-rich, orange-fleshed varieties into the diets of rural and urban consumers, especially young children, is enormous. The efforts of the Rooting out Hunger project are based on the dissemination of the recently released OFSP variety, Zondeni, and link strongly with efforts by Malawi's horticulture program to develop and disseminate new OFSP varieties; conduct crop management, postharvest, and product development research to boost yields; and develop market opportunities for sweetpotato in Malawi.

Sweetpotato farmers in Malawi, especially women, could gain substantially more profit from commercialization of sweetpotato if they bulked their product at an accessible site to transport and

more efficient value chains were built. The development of an efficient urban fresh market would require a coordinated approach across the value chain. At the farm level, development of more continuous year-round supply is important in developing the crop as more than a snack food in urban markets. Improved efficiency in the marketing chain is also important in keeping sweetpotato competitive. Interventions at the production and marketing stages must be complemented by promotional strategies to change the image of the crop, develop alternative uses of the roots in urban diets, and increase effective demand.

2. OVERALL GOAL AND OBJECTIVES

The overall objective of this 4.5-year project is to improve vitamin A and energy intake for at least 115,000 rural households with women and young children using OFSP-based approaches, and to ensure that at least 20% of households growing OFSP earn at least US $100 per year from OFSP sales and increase their average sweetpotato yields 50%.

In Year 2, specific activities include:

1. Establish in-vitro tissue culture capacity at Bvumbwe Research Station (BRS) and expand production of primary material of OFSP variety Zondeni to 4 ha. A large stock of pathogen-tested in-vitro Zondeni will be introduced from Nairobi to support primary multiplication to flush out the old planting material in the field and serve as foundation seed stock. On the basis of the results of the Year 1 on-farm trials, including taste tests, in the four districts, the project will multiply new candidate OFSP varieties that will be proposed by the Department of Agriculture Research Services (DARS) for official release by June 2011, with a goal of having at least 0.5 ha of primary planting material of each new variety by November 2011.
2. Identify and train an additional 25 secondary and 108 tertiary vine multipliers, with a goal of serving at least 23,000 vulnerable households using subsidized vouchers by November 2011. Vine multipliers will be allowed to sell vines to others in the community at their own price and record those sales, once their contractual obligations to serve the targeted vulnerable households have been met.
3. Initiate the demand creation campaign beginning in October 2010. This campaign will be predominantly community-based theatre, performed in each target district four times.
4. Implement ICM research (particularly related to fertility and possibly water management) at the on-farm trial/demonstration sites in each district. Also, at these sites, implement research/demonstration activities on appropriate storage and processing techniques aimed at providing a more consistent supply of fresh roots to be used for fresh market sales over an extended marketing season, or as a source of raw material for a somewhat extended period of processing/drying to produce chips/flour for markets such as the manufacture of biscuits.

3. TARGET GROUPS

The principal target groups are poor, rural women and their young children (6 months–5 years of age) in sweetpotato-producing areas. Each nongovernmental organization (NGO) partner will include additional specific criteria such as income, health status, and access to water of their target group. Although children and their women caregivers are a primary target group of the project, men will not be excluded from nutrition education and variety dissemination activities. This will ensure that they understand the importance of investing in nutritionally rich foods and good care-giving practices as they influence what decisions are made and how well decisions are implemented at the household level. A secondary target group is urban consumers, many of whom rely on

purchased foods. Slums in major Malawian cities and their associated peri-urban areas are expanding, and poor urban women and children would particularly benefit from a nutrient-rich root. Understanding the breadth of preferences among high- and low-income consumers concerning fresh roots will enable farmers to better target their variety selection and marketing strategies to specific areas and target groups, and by doing so obtain more revenue from sweetpotato sales.

4. STRATEGIES USED FOR PROJECT IMPLEMENTATION

The first year of the project has been completed and the results were presented in the annual project report in September 2010 (CIP 2010). Most of the planned milestones of the Rooting out Hunger in Malawi project have been achieved during the first year. Implementing partners (IPs) are on track to deliver large amounts of OFSP planting material from nearby multiplication sites to producer households at risk of VAD. The current status of dissemination of OFSP using subsidized vouchers in Malawi is that more than 10,000 farming households have been reached (Table 2) using an implementation strategy based on six integrated components: (1) strengthening the partnership with government, NGOs, and private sector, (2) seed system establishment, (3) training, visits, and field days, (4) demand creation campaign through behavior change communication (theatre, dance, poetry, songs, and banners), (5) voucher systems for vine dissemination, and (6) product development and markets.

Table 2. OFSP Planting Material, Subsidized Vouchers and Beneficiaries, and Area of Production: Achievement of Years 1 and 2 of the Project (1 October 2009–March 2011)

NGO	District	Subsidized Vouchers		Area of Production (ha)
		No. of Households	No. of Planting Materials	
Concern Universal	Dedza	4,733	1,419,900	32.0
Concern Universal	Phalombe	859	257,700	5.8
Millennium Villages Project	Zomba	3,250	975,000	21.9
Catholic Development Commission	Chikhwawa	2,027	608,100	13.7
Total	**4**	**10,869**	**3,260,700**	**73.4**

Each targeted household received 300 vine cuttings of 30 cm long from which they could plant sweetpotato in 18 ridges. Each ridge of 5 m long has 16 plants. Most farmers plant the sweetpotato cuttings with a distance of 30 cm within plants and 75 cm between ridges. Based on these assumptions, the total area of production was estimated and provided in Table 2. All farmers, including the multipliers at decentralized vine multiplication (DVM), were instructed to make use of the 2010/2011 rainy season for the production of storage roots. This was possible because we had already built up the "1, 2, 3" seed system strategy in the first year of project implementation (1 October 2009–30 September 2010).

4.1 Strengthening the Partnership with Government, NGOs, and Private Sector

The project participates in two fora organized by the GoM and partners, which are attended by key policy makers from the government, including the Permanent Secretary of the Ministry of Agriculture and Food Security, and which explicitly evaluate the alignment of project activities with ASWAp strategic objectives (Table 1). These are the Annual In-house review of the Horticulture Programme of DARS, and the Root and Tuber Crops Platform, a combined effort of partners,

including donor-funded projects and GoM to monitor and harmonize research and development activities on roots and tubers.
The major partners in this project are:

- International Potato Center (CIP).
- National Agricultural Research Services (NARS): DARS of Malawi, Department of Agricultural Extension Services (DAES) of Malawi, and Department of Nutrition, HIV and AIDS (Office of the President and Cabinet).
- NGO extension services: Concern Universal (CU), Chikhwawa-Catholic Development Commission (CADECOM), and the Millennium Village Project (MVP).
- Private sector: Universal Industries, starting in the second year of project implementation.

CIP is managing the project and ensuring international standards of financial management that will be followed by all partners. CIP conducts annual internal audits by its regional finance officer and provides a financial and technical report for all activities to Irish Aid annually. An annual stakeholders meeting is held to assess progress to which Irish Aid is invited. A senior CIP scientist is charged with guaranteeing the technical content of the research and manpower development; creating linkages with participating stake holders and assisting with day-to-day administration; and ensuring that results are disseminated locally, nationally, and in international fora and publications.

DARS, based at BRS, is providing a tissue culture lab and its facilities, land for primary multiplication, supporting research activities, and high-yielding and drought-resistant varieties from the breeding program. These varieties must be accepted by farmers. As a goal of this project, DARS Bvumbwe is seeking to become a permanent source of disease-free ("clean)" OFSP planting material for secondary farmer and institutional multipliers.

DAES has provided their services directly to farmers (vine multipliers and beneficiaries). One of their important roles is to ensure that the project is implemented. A diffusion of information is significantly needed through this service. They are also responsible for the training of farmers, multipliers, and the beneficiaries in the villages. The training includes all aspects of sweetpotato cultivation and the utilization of sweetpotato leaves and storage roots, as well as other topics.

The Department of Nutrition, HIV and AIDS (Office of the President and Cabinet) plays a key role in the advocacy for interventions that improves and monitors the nutritional status of women and young children and households affected by AIDS. Making this department involved will be our next step. They can help produce and disseminate training materials concerning nutrition. They can also encourage the public sector extension and NGOs to integrate nutritional concerns into their existing programs.

Dedza, Zomba, Phalombe, and Chikhwawa districts are the selected target districts for the project. The day-to-day management of the Rooting out Hunger project in each district is done by NGO IPs: Dedza and Phalombe are under CU, Zomba under MVP, and Chikhwawa under CADECOM. For this year, CU has already expanded their program into Mulanje District.

Universal Industries will support the development of a value chain, such as producing a viable sweetpotato biscuit, in which a significant proportion of imported wheat flour is substituted by OFSP flour. Chips from OFSP are also produced. An initial pilot product development by Universal Industries has been very positive. If nutritional analyses, shelf life tests, and economic assessments indicate that the biscuit product is viable, Universal Industries has estimated that 20 tons of sweetpotato flour a day is needed. The feasibility assessment will take place this year.

A planning meeting was held in November 2010 (Fig. 2) shortly after the 2nd year of the project was approved by Irish Aid. This meeting was very important because all stakeholders sat together and jointly prepared work plans and detailed budgets, all of which were synchronized with the overall goals of the project. Monitoring visits are taking place regularly. Field days have been set up during which the diffusion of the new and appropriate technology occurs. The scientists, extension officers, and innovative farmers are always present. At district level, the NGO partners, CU, MVP, and CADECOM are working closely with DAES and DARS to implement the programs as agreed during the planning meeting. So far, work with partners is going smoothly. Each stakeholder plays its own role, but as part of an joint effort in a well-defined framework. Table 3 captures the significant progress of the partnership to date.

Figure 2. All stakeholders participated in the planning meeting held in November 2010.

Table 3. Number of Households Benefiting from OFSP Vine Distribution for Storage Root Production during the 2010/2011 Rainy Season, and Income to DVMs from Subsidized Vine Sales

NGO IP	District	Extension Planning Area (EPA)	No. of Male- and Female-Headed Households Receiving Subsidized Vouchers through March 2011		
			Male	Female	Total
CADECOM	Chikhwawa	Mitole	335	194	529
		Mbewe	310	247	557
		Livunzu	354	587	941
	Subtotal Chikhwawa	**3**	**999**	**1,028**	**2,027**
Concern Universal	Dedza	Bembeke	1,025	990	2,015
		Kanyama	796	922	1,718
		Chafubwa LDSP	379	621	1,000
	Subtotal Dedza	**3**	**2,200**	**2,533**	**4,733**
	Phalombe	Waruna	63	643	706
		Naminjiwa	17	136	153
	Subtotal Phalombe	**2**	**80**	**779**	**859**
Millennium Villages Project	**Zomba***	Thondwe			**3,250**
Grand Total	**4**	**9**	**3,279**	**4,340**	**10,869**

4.2 Seed System Strategy

Each district is obviously situated in relatively different altitudes and has different rainfall distribution patterns. The air temperature and humidity also differ. The onset of the rainy season is determined in November in Dedza, Zomba, and Phalombe districts; Chikhwawa and some areas in Phalombe and Mulanje are experiencing unreliable rainfall.

The storage roots can be harvested 5 months after planting. However, it depends on the variety. Some varieties have already matured 3 or 3.5 months after planting. The OFSP Zondeni is mature after 5 months. The vines can be harvested 2 months after planting as they are needed as planting material. In the past, a shortage of planting material at the onset of the rainy season was common.

Owing to the unimodal rain distribution pattern, the shortage of vine cuttings can be worse. In fact, after six months of a drought spell, it was not easy to get access to clean planting material, ready for planting. In Year 1 of the project, the work was focused on the seed systems. A 1, 2, 3 seed system strategy was determined (Fig. 3).

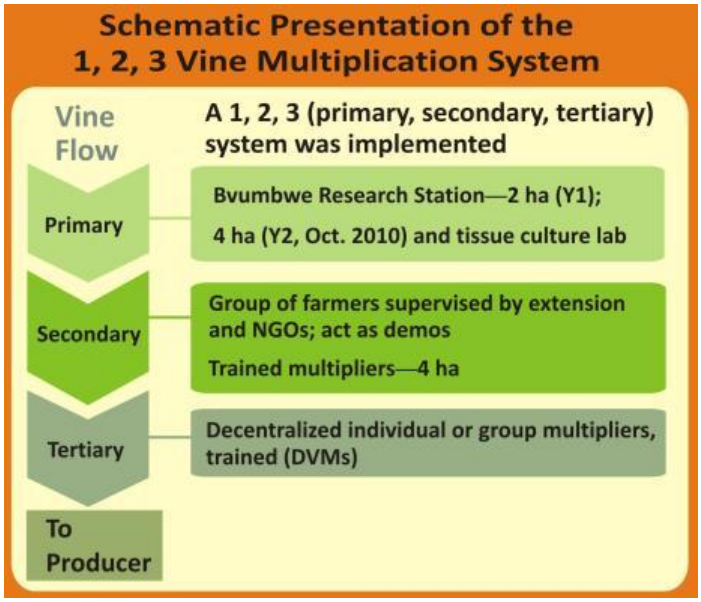

Figure 3. 1, 2, 3 seed system strategy.

This multiplication system is compatible with the low-input, sweetpotato production system that exists in Malawi. With the onset of the rainy season, farmers can focus on cultivating sweetpotato for root production. After harvest they can take the vines for further specialized vine multiplication. A 1, 2, 3 seed system strategy is followed by the government and NGO partners.

Primary multiplication is carried out at the research station where they highest quality standards can be maintained. The secondary and tertiary multiplications are on-farm and managed by farmers, either individually or in groups. In the first year of the project implementation 133 DVMs were established (see *Annual Report: Rooting out Hunger in Malawi*, September 2010). The 133 DVMs, together with the primary multiplication, could potentially provide clean OFSP vine cuttings to 23,000 households. Each household received 300 cuttings. Based on the experience of Year 1, a calculation was made to estimate the number of beneficiaries, amount of planting material needed, and expected area of production after completing the 4.5-year program (Table 4).

4.2.1 Primary multiplication

At the primary seed multiplication, the clean planting material should always be available. As Figure 3 shows, the primary seed multiplication is at BRS. Currently there are 6 ha of land under OFSP Zondeni. However, for managerial purposes, 4 ha of land are enough for backstopping the DVMs to provide the required number of cuttings annually (Fig. 3). A rapid multiplication technique is applied and the plants are irrigated during the dry spell. In June 2011, the sweetpotato breeder of DARS based at Bvumbwe will request the Committee Release Variety of Malawi to endorse a number of additional OFSP varieties for release and use by farmers in Malawi.

Table 4. OFSP Planting Material and Beneficiaries: Irish Aid Project after 4.5 Years

NGO	District	Subsidized Vouchers		Area of Production (ha)	
				Between Ridges	
		No. of Households*	No. of Planting Materials	75 cm	90 cm
CU	Dedza	26,000	7,800,000	175.5	210.6
CU	Phalombe & Mulanje	24,620	7,386,000	166.2	199.4
MVP	Zomba	26,450	7,935,000	178.5	214.3
CADECOM	Chikhwawa	26,027	7,808,100	175.7	210.8
After 4.5-year program		**103,097**	**30,929,100**	**695.9**	**835.0857**
Addition from free market		**11,903**	**3,570,900**	**80.4**	**96.4**
Total after 4.5-year program		**115,000**	**34,500,000**	**776.3**	**931.5**

*Based on realization of the project activities in 2009/2010 and the target of 2010/2011.

This project will backstop this effort by multiplying and virus testing of the varieties in the nursery at BRS. At least 0.5 ha of land will be used for this primary multiplication of each variety.

Primary multiplication is also supported by a tissue culture laboratory and a screen house. The tissue culture lab was re-activated for sweetpotato under this project. Currently, there are four clean varieties, all OFSP: Jewel, Resisto, Cordner, and Zondeni. The varieties Jewel, Resisto, and Cordner are used as parental material at the breeding block at BRS (Table 5). When plantlets first leave the tissue culture lab, they must be "hardened" in a screen house (Fig. 4) before being moved to the field for further multiplication.

Table 5. Number of Sweetpotato Plantlets per Variety in the Tissue Culture Growth Chamber through March 2011

Variety	Number of Plantlets	Comments
Jewel	185	24-into screen house for crossing block
Resisto	335	26- into screen house for crossing block
Cordner	170	24-into screen house for crossing block
Zondeni	4033	Received 4350 plantlets from the Kenyan Plant Quarantine Service on the 17th Dec 2010, some test tubes were not sealed as a result 135 plantlets had some contamination when we received them from Nairobi and 182 plantlets were too small. All of them died.

Figure 4. Primary multiplication at BRS: field, tissue culture laboratory, and screen house.

4.2.2 Decentralized vine multiplication: the secondary and tertiary multiplication

Table 6 clarifies the two types of multiplication in details. Our secondary multipliers tend to concentrate on the vine only approach, whereas the tertiary multipliers who are serving their local communities, on the dual purpose approach.

Table 6. The Different Approaches of the OFSP Decentralized Vine Multiplication

Clarification	Vine Multiplication	
	Principal Goal: Vine Production	**Principal Goal: Dual Purpose (roots +vines)**
Planting period	Shortly after the main harvest for storage root production. This could be in the last month of the rainy season.	Two months after the secondary multiplication. Apparently, multipliers will enter the month of dry spell.
Irrigation	Irrigation is needed	Irrigation is needed
Planting method	Rapid multiplication	Adjusted conventional multiplication
Technique of multiplication	Two or three nodes are needed, and then plant them in a manageable sized plot (i.e., 10 x 20 m with a planting distance of 10 x 20 cm).	Vine cuttings of 30 cm long are planted in ridges. Planting distance within plants is 30 cm and between ridges 75 or 90 cm, depending on the locality. The size of the plot is not necessarily standardized because the tertiary multipliers will sustain the secondary multiplication if the number of vine cuttings are not enough at the secondary multiplication. NGOs will decide this.
Main objective	Producing vine cuttings	Producing vine cuttings as well as storage roots for food security when facing the dry season.

4.3 Trainings, Visits, Meetings, Monitoring and Evaluation, and Field days

Training of the trainers and farmers, visits, and field days were planned and implemented. The training program consisted of training on how to grow sweetpotato, weeding, preparing the nurseries, utilization of storage roots, harvesting and postharvest handling, and nutrition. These activities were mostly organized by the IPs. However, to ensure further dissemination of this knowledge, trained staff is expected to train others. For example, in Chikhwawa and Phalombe, one trained secondary multiplier should train five tertiary multipliers. In Zomba, one woman/ household who was trained in utilization of storage roots promised to subsequently train 10 additional women. This system helps to increase our outreach on knowledge designed to maximize the productivity and use of the OFSP (Fig. 5).

Field days are organized by CIP, DARS, NGOs, and DAES. The objective of field days is to transfer appropriate technology through farmers observing demonstration plots and other demonstrations since *seeing is believing.* Of particular interest, is an example where one group of beneficiaries initiated and organized their own field day. On 23 March 2011, in Bembeke, Dedza District, 11 female beneficiaries, who received subsidized vouchers, held a field day for observing the new OFSP variety and others growing in the field and letting their neighbors taste and evaluate cooked sweetpotato leaves from different varieties (Fig. 6).

Figure 5. Training the trainers and farmers in the utilization of sweetpotato in Phalombe, trained by DARS and organized by CU-Phalombe. The products shown are mandazi, doughnut, muffins, biscuits, porridge, sweet beer, juice from the leaves, juice from storage roots, and sweetpotato leaf dishes.

Figure 6. Tasting cooked sweetpotato leaves in Bembeke on 23 March 2011.

Seventy-seven people participated in this palatability test of the cooked leaves. Farmers preferred lobe-shaped leaves. The leaves should be tasty, not sticky in the mouth when eating, quick cooking (taking not more than 5 minutes to prepare), creamy, non-fibrous leaves, no strong taste of sweetpotato (stinging), and a slightly sour taste. It was recorded during field observations that varieties with a good ground cover were ranked number one.

Visits to farmers' fields for evaluation and monitoring, and communications with stakeholders of each district by CIP staff occur from time to time. The Irish Aid team visited the fields a number of times: at least five times in Year 1 and once in Year 2. Farmers have remarked that they appreciate these visits. The project is making good progress towards achieving its project goals.

4.4 Demand Creation Campaign

An awareness campaign organized by CIP and NGO partners in each respective district was held throughout October 2010 (Annex 1; Fig. 7). This campaign sought to create demand through behavior change communication using theatre groups and dancers. Poetry, songs, banners, and speeches were performed. The campaign took place in 22 villages in five districts of Dedza, Zomba,

Machinga (during the World Food Day), Phalombe, and Chikhwawa. A professional theatre group from each district was hired. With the help of the NGO partner of each respective district, we have chosen the best theatre group in that area. We instructed the theatre group about the message to be given through drama (Annex 2). Two songs were especially composed for this campaign (Annex 3). Also poems and speeches about the benefits of consuming OFSP were performed. In addition, various products prepared from OFSP were exhibited. The nutrition specialists of DARS and NGOs for each district explained the importance of vitamin A to health and the amounts and benefits of pro-vitamin A in OFSP. The NGOs, traditional authorities, CIP, DAES, and DARS also explained the importance of food diversification concerning health of the children, pregnant women, and vulnerable people such as those with HIV. The campaign yell was: "Zondeni Oow yeea!" and "Batata ya Olenji (OFSP) Oow yeea!"

Figure 7. Awareness campaign held in October 2010.

4.5 Voucher System

The project introduced a voucher system to enable many resource-poor households to plant OFSP and allow them to benefit from the nutritious and pro-vitamin A rich-food. The diagram of the voucher system applied in Malawi is shown in Figure 8.

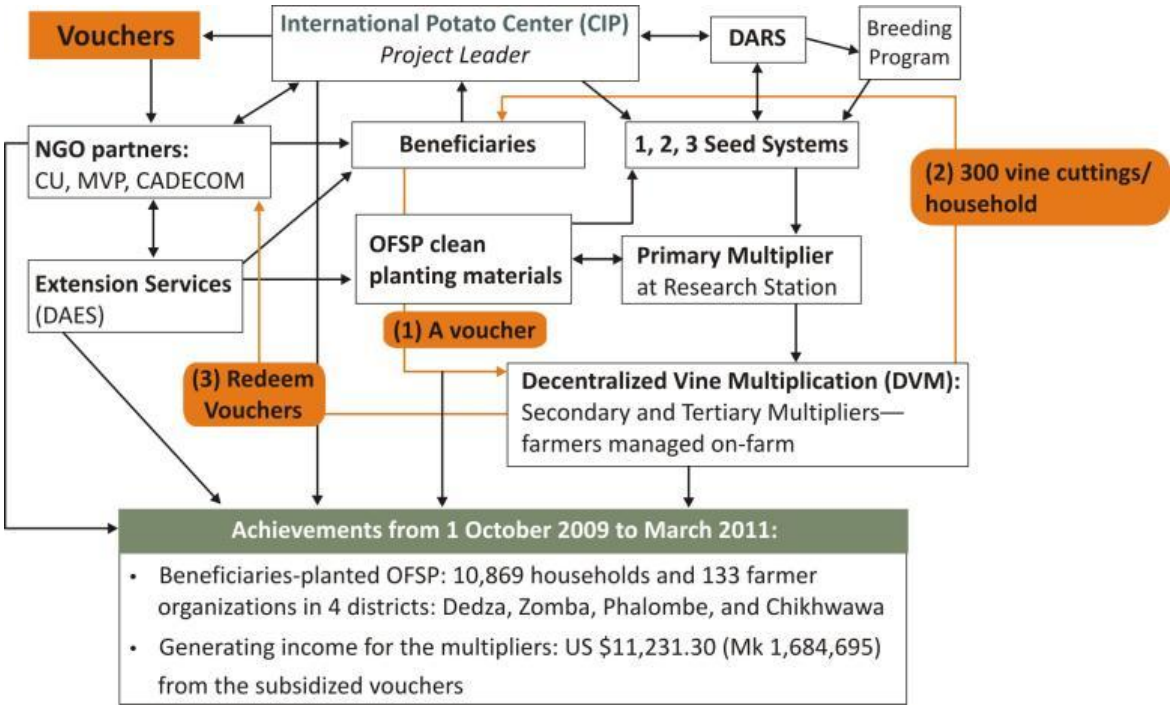

Figure 8. The voucher system mechanism for OFSP dissemination in Malawi.

4.5.1 Distribution of vouchers

CIP, NGOs, DARS, and DAES are the four actors that are involved in the design and implementation of the voucher system. Meetings with government and NGO partners were organized to discuss the work plan/framework and the number of beneficiaries to be targeted and to design the implementation plan based upon the 1, 2, 3 seed system strategy. The project leader calculated the number of sweetpotato cuttings needed. CIP and DARS also set up an area for primary multiplication. DARS are managing the breeding program to produce new OFSP varieties with a potential high yield and Felistus Chipungu, the sweetpotato breeder, has obtained a grant from the Alliance for a Green Revolution to support the breeding work.

The DVMs were identified by NGOs and DAES using a set of criteria that includes being easily accessible to beneficiaries in their respective communities. A major advantage of using vouchers is that the farmers redeem them when they are ready to plant; hence the cuttings are fresh and vigorous when farmers plant them in their plots. NGOs and DAES identified and registered the beneficiaries. A standard form for this purpose was prepared by CIP. The criteria of selecting the beneficiaries were based on those written in the project proposal. In addition, some criteria were added by NGOs and DAES based on local conditions. The beneficiaries only receive planting material once. Each beneficiary (household) is entitled to one voucher, which contains 300 cuttings (4 kg) with a value of Mk 155.00. After calculating the availability of planting material, the project leader approved the number of vouchers to be distributed. The vouchers were processed by CIP and the funds were transferred to the respective NGOs of each district.

Next, NGOs and DAES distributed the vouchers to the registered beneficiaries, who carried them to DVMs—Figure 8 (1). We strongly advised the beneficiaries to collect the planting material when the first rains came in their area and not at the moment they received the vouchers from the NGO or DAES. Furthermore, the multipliers would give 300 vine cuttings to a beneficiary who gave them a voucher—Figure 8 (2). Finally, the multipliers went to the respective NGOs to redeem their

vouchers received from beneficiaries—Figure 8 (3). DVMs should not sell or receive any vouchers from the beneficiaries when the rains had not yet arrived. They were to continue keeping their multiplication plots well managed. Hence the planting material remained healthy and fresh when distributed to beneficiaries. Primary multiplication at research station will supply new planting materials to the DVMs if their planting materials are not clean and no longer healthy. This message was clearly announced by the project leader during the awareness campaign in October 2010 and also during the consecutive visits by stakeholders (i.e., NGOs and DAES).

4.5.2 Determining the value of the voucher

The annual report of September 2010 described how we determined the value of the voucher taking into account: (1) the costs of multiplication of OFSP, (2) living costs of the multiplier, (3) the price of sweetpotato vines on the free market, and (4) the price given by the government. The price of a voucher currently given was slightly above the government's price and completely covered the production costs of the vine multiplication.

4.6 Product Development and Markets

During year 2, NGOs, DARS, and DAES were actively training trainers, farmers, and beneficiaries on various products of OFSP (leaves and storage roots). A protocol for postharvest handling has been delivered to NGOs and DAES (Annex 4).

Currently, research led by DARS and CIP scientists on the retention of beta-carotene in processed OFSP and during storage is also taking place. Different sweetpotato products such as juice, bread, and doughnuts will be produced. All of these end-products will be evaluated on the carotenoid contents retained after processing. Two storage methods will be assessed: open and in-pit.

There has been high demand for OFSP planting material, especially after the awareness campaign and sensitization meetings held with farmers by the NGOs and DAES. In this way, multipliers generated their income from these vine sales (Fig. 9). The positive response of multipliers and voucher beneficiaries to these efforts is helping to transform the image of sweetpotato from a "poor man's crop" into a higher value crop. This is not only a goal of this particular project, but the broader SPHI.

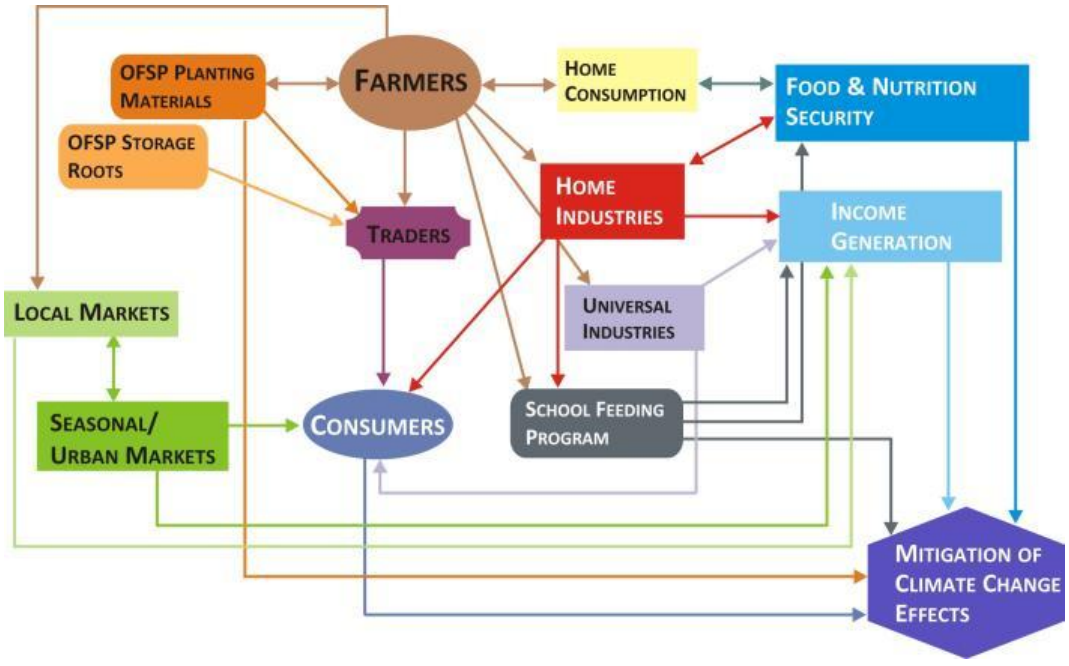

Figure 9. A complex scheme of market and product development of OFSP in Malawi. (NB: the three blue boxes to the far right show the impact.)

The School Feeding Program is also being considered as one potential market for smallholder farmers. However, this type of market cannot be found in all localities. This program already existed in Malawi a number of years and the feasibility of linking to the existing program will be investigated over the coming year. It may serve as an effective entry point for influencing young people to adopt better dietary habits.

5. ACTIVITIES CONDUCTED AND RESULTS

Detailed activities of every objective can be seen in Annex 5.

5.1 Objective 1: Establish in-vitro tissue culture capacity at Bvumbwe Research Station and successful production of at least 4 ha of clean primary material of Zondeni and other new OFSP varieties

In-vitro tissue culture capacity at BRS has been established. Two rooms have air conditioners, one in the maintenance chamber where the plantlets are kept and the other in the air-flow cabinet chamber where the activities of culturing plantlets take place.

Currently, there are 4 ha of land covered with clean planting material of Zondeni. The nursery for new OFSP varieties will be established after the release of a number of promising OFSP varieties in June 2011. A total of 1,446,000 clean vine cuttings of Zondeni from this primary multiplication site have been distributed to beneficiaries in the districts of Dedza, Zomba, and Chikhwawa.

5.2 Objective 2: Identify and establish at least 25 additional secondary vine multipliers 108 additional tertiary vine multipliers and use of vouchers as a distribution mechanism to reach 7,097 households by November 2010 and an additional 23,000 households by November 2011

In Year 1 of the project, 2009/2010, 25 secondary vine multipliers and 108 additional tertiary vine multipliers have been established. These multipliers are willing to continue supporting the program in Year 2. The 7,097 households have received the vouchers and have grown OFSP in their gardens. Through March 2011, a total of 10,869 households have been reached (Tables 2 and 3) and the project is on track to meet its target of 23,000 households by November 2011.

The demand for OFSP planting material is high. The selection of beneficiaries entitled to receiving subsidized vouchers for OFSP planting material is still going on in each district.

5.3 Objective 3: Implementation of Demand Creation Campaign

An awareness campaign was done in October 2010. More than 9,900 people came to the campaign (Annexes 1–3). Songs and the campaign itself were documented in a DVD. The documentation was only for local consumption as it was a homemade video. Another set of locally produced videos was prepared and intended for educational purposes. These videos were about "How to grow sweetpotato," "Weeding," and "Nutrition awareness." According to reports from the NGOs and DAES, these homemade videos were very useful for helping them on the ground. They could show the videos by using their laptop in a room during training of the farmers. Besides the DVD, a CD, a tape, and a leaflet were produced to supplement the diffusion of the message. A good quality documentary made by a professional videographer and meant for donors and other international audiences, will be prepared. This work should be done jointly with the Irish Communication Office of the Embassy. At the international fora (i.e., APA Triennial Conference held in Cape Town in December 2010 and a conference in India in February 2011), presentations or posters were made to promote the "Rooting out Hunger" activities in Malawi.

5.4 Objective 4: Integrated Crop Management and Postharvest Research

Three research activities currently underway are: (1) intercropping between maize and sweetpotato (Annexes 6, 6a–d, Fig. 10); (2) irrigation with fertilizers/manure versus non-irrigation of sweetpotato (in preparation); and (3) rely-cropping on-farm trials. For rely-cropping, sweetpotato is planted immediately after the maize harvest. An M.Sc. student from Malawi University will be involved in the research on the irrigation with fertilizers/manure trials as a part of her thesis.

Figure 10. Intercropping maize and sweetpotato demo trial at BRS.

6. ONGOING EVALUATION OF THE ROOTING OUT HUNGER PROJECT IN MALAWI

6.1 Food and Nutrition Security and Income Generation

Malawians are desperately poor, with 74% of the population living below the international poverty line of US $1.25 per day (Unicef 2008; http://www.unesco.org/education/wef/countryreports/malawi/rapport_2_1.html). In addition, according to information from the Malawian national report (GOM 2008), the income is Mk 44 ($0.29) per person per day, with 22.4% barely surviving. Socioeconomic indicators illustrate the depth and intractability of poverty. For example, the levels of malnutrition remain high, with 43.2% of under-five children stunted, 59% with VAD, and 22% underweight. The infant mortality rate and morbidity remain high, with 104 deaths per 1,000 live births in 2004/05 and 1,984 deaths per 100,000 births in 2004. There is also a high prevalence of HIV and AIDS, currently estimated at 12%.

The "Rooting Out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato" project was launched on 1 October 2009. After 1.5 years of implementation, the CIP sweetpotato team conducted a number of informal interviews were initially done to ascertain levels of adoption and farmers' satisfaction with the new variety. Multipliers and beneficiaries were visited at random. The first monitoring and evaluation of the distribution of vine cuttings occurred on 5 January 2011. The report is presented in Annex 7. Other results are described in this midyear report as well.

6.1.1 Success stories from OFSP program 2009 through March 2011

The stories recorded from DVMs

Dedza District (altitude: 1,900 masl)

The project in this district is under the management of CU.

- **Mr. Chimpikizo**. Mr. Chimpikizo was visited twice by the CIP sweetpotato team, CU, and extension staff. He lives in Kauye Village, Traditional Authority (TA) Kamenyagwaza, Bembeka Extension Planning Area (EPA). Kauye Village is situated 16 km from Dedza. The story of the first visit was reported in Annex 7, so it will not be described again in this section.

When we visited him, he had already sold the OFSP vine cuttings for the second time. He planted OFSP Zondeni on his own land of 0.1 ha. He received US $407 (Mk 61,000) from this sale. With the earned money, he plans to construct a new diffused light store for Irish potato seeds. Mr. Chimpikizo is also an Irish potato seed producer and participates in the CIP program of Irish potato seed production. He also practices crop diversification.

- **Mr. Friday Kazembe**. Mr. Kazembe lives in Malopa Village, TA Kasumbu, Kanyama EPA. The distance from Malopa Village to Dedza is 45 km. He received 92 vouchers and earned $95 (Mk 14,260). He is planning to continue multiplying and producing sweetpotato. He used the money to purchase home necessities such as soap, salt, sugar, and cooking oil.
- **Mzungu Irrigation Club**. Mzungu Irrigation Club of Mzungu Village, TA Kasumbu is in Kanyama EPA. The distance from Mzungu Village to Dedza is 40 km. The club received 125 vouchers and earned $129 (Mk 19,375). The club is planning to buy farm inputs (i.e., fertilizer for other crops) and establish a communal garden for sweetpotato production.

Zomba District (altitude: 1,141 masl)

The project in this district is under the management of MVP.

- **Upile Farmer Club** is one of the clubs under MVP in Majawa Village, TA Mlumbe, Thondwe EPA. The distance from Majawa Village to Zomba is 21 km. This club received 797 vouchers and earned $823 (Mk 123,535). Additionally, the club also sold 189 bags of 50-kg volume at Mk 250/bag. From this sale, they earned as much as $315 (Mk 47,250). These bags were sold to the Ministry of Agriculture and Food Security Machinga Agriculture Development Division. The club is planning to extend the multiplication of sweetpotato vines to 0.1 ha in this 2010/2011 season using existing irrigation equipment.

Chikhwawa District (altitude: 400 masl)

Another name of Chikhwawa District is the Lower Shire District. The district experiences unreliable rainfall and, when the heavy rains do arrive, some areas are flooded. The project in this district is under the management of CADECOM.

- Mr. Oxford Dimo is a tertiary multiplier. He lives in Mtondeza Village, TA Maseya, Mitole EPA. The distance from Mtondeza Village to Chikhwawa is 8 km. Mr. Dimo obtained the vine cuttings from Mr. Oris Tembo, the secondary multiplier, and received more vines from the Madalitso Club. He expanded the area of planting OFSP to 0.7 ha. He uses a motorized pump to irrigate the vines. He has sold the vine cuttings thrice. The first lot of 700 bundles of 5 kg each was sold to the Evangelical Lutheran Development Services and earned him $700 (Mk 105,000). From the second lot of 250 bundles of 5 kg each he earned $250 (Mk 37,500). The third lot of 60 bundles of 5 kg each he sold for $60 (Mk 9,000). With these earnings, he could buy two additional diesel pumps for irrigation. He is also implementing crop diversification in his garden. He plans to extend the area for OSFP vine multiplication and production (Fig. 11) in the future.

Figure 11. Mr. Oxford Dimo (right) and his garden, water pump, and irrigation scheme.

Phalombe District (altitude: 756 masl)
The project in this district is under the management of CU.

The Zondeni Sweetpotato leaves are a delicacy—the case of Mr. and Mrs. Tambala
"Zondeni sweetpotato leaves make a very good relish, it is not like our ordinary sweetpotato vines that we normally grew, Zondeni leaves are very delicious," Mr. Tambala narrated. "My three-year-old boy child likes it quite a lot; he likes to ask for Zondeni cooked leaves at least thrice a week, if you do not prepare it for him then you will be in hot soup." Mrs. Tambala concurred with her husband. Mrs. Tambala is currently cutting vines from her field in order to expand her field. She reported that she does not want to lose the variety.

The stories recorded from beneficiaries

Chikhwawa District (total number of subsidized beneficiaries = 2,027 households)
Mr. Adikleki Biliati lives in Chikalumpha Village, TA Katunga. The distance from Chikalumpha Village to Chikhwawa is 25 km. He planted 0.2 ha of sorghum but the crop failed due to drought. At the same time, he received 4 kg of OFSP Zondeni planting material from CADECOM. He planted the crop using the information written on the vouchers issued by CIP: 18 ridges of each 5 m long. He watered his garden with the water from a borehole. He used a drum to carry the water on a bicycle. Now, the sweetpotato field is doing better as compared to sorghum (Fig. 12). In this village, farmers have agreed to do a pass-on-program—that is, by passing on 4 kg of OFSP planting material to other beneficiaries in order to sustain and accelerate the distribution of vines for food security.

Figure 12. The garden of Mr. Bilitiati, a beneficiary from Chikhwawa District.

The Story about changing production patterns in response to climate change
Ganizo Nyandoro, 39, a subsistence farmer from Chikhwawa, says she has stopped growing maize, the country's staple food. "With the unpredictable weather patterns, I have had to start growing drought-resistant crops and early maturing crops because the rains the country is getting at the moment are no longer conducive to growing maize," she told IPS. Nyandoro says she now grows cassava, sweetpotatoes, cotton and rears goats. "For the past eight years, as far as I can remember, my area has been affected by droughts and floods. Most people in my community are moving away from growing maize," she added, explaining that her community still buys maize after selling the produce from their farming activities. "We are so used to eating the staple food that we have to buy it" (Interpress Service, 5 March 2011; http://ipsnews.net/africa/nota.asp?idnews=50572).

6.1.2 Facing the salinity challenge in parts of Chikhwawa District

Mr. Mailosi Anthuachino is one of 2,027 beneficiaries. He lives in Mtondeza Village, TA Maseya. The distance from Mtondeza Village to Chikhwawa is 7 km. He planted Zondeni on 18 ridges of each 5 m long. At first, the establishment was poor due to dry spells. He watered the plants with water from a borehole. But the salinity of the water was slightly high. When the rains came, the vines recovered and grew well (Fig. 13).

Figure 13. Mrs. and Mr. Mailosi Anthuachino, a beneficiary from Chikhwawa District.

6.2 Mitigation of Climate Change

Sweetpotato, with its creeping vines, provides good soil cover, protecting soils from erosion during peak rainfall events and conserving soil moisture between rains (Janssens 2001). The crop produces very well in favorable environments and reliably yields something under marginal conditions of drought (once it is well established) and low soil fertility. A wide range of sweetpotato cultivars are suitable for different soils and climates. The crop is grown in a variety of soils but well-drained light and medium-textured soils with a pH range of 4.5–7.0 are more favorable for the plant (Woolfe 1992, Ahn 1993). Lime does not need to be applied unless the soil has a high aluminum concentration. Sweetpotato is very sensitive to aluminum toxicity and will die about 6 weeks after planting if lime is not applied at planting in this type of soil (Woolfe 1992). Best growth is obtained with temperatures above 24^{o}C, abundant sunshine, and warm nights. Annual rainfalls of 750–1,000 mm are considered most suitable, with a minimum of 500 mm in the growing season. The crop is sensitive to drought at the tuber initiation stage 50–60 days after planting and is not tolerant to water-logging, as it may cause tuber rot and reduce growth of storage roots if aeration is poor (Ahn 1993).

If the ecological condition for sweetpotato mentioned above is met, it is thus an excellent food and nutrition security crop. Tolerance to environmental extremes can be improved through breeding.

7. FINANCIAL REPORT

The detailed financial report is separately reported and included with the submission of this technical report. The expenses made after 31 March are not included in the mid-year financial report.

8. LESSONS LEARNT AND RECOMMENDATIONS

8.1 Seed Systems—Malawian Model

The 1, 2, 3 seed systems developed in the first year of the project is most likely working well in Malawi and can be kept going smoothly in the second year and beyond. The structure of this system is clearly defined. Thus, the number of vouchers and vines can be easily calculated, but periodic review is required to adjust to the actual supply of vines which is determined by the growing

conditions in the particular season. We can accurately determine the number of vouchers to distribute once the supply of cuttings is determined at the DVM and primary multiplication sites.

DVMs can also evolve into demonstration sites for other improved sweetpotato practices. We will include communal plots for demonstration (i.e., newly released varieties, farmers' experimentation, etc.). Consideration will also be giving to demonstrating how to conserve different sweetpotato varieties at the communal DVM plots.

8.2 OFSP on Demand

Zondeni, an OFSP variety, appears to be becoming a popular sweetpotato variety in central and southern Malawi. Demand for OFSP vines through CIP OFSP vouchers exceeded the availability of initially distributed vouchers in each district. Demand continues to be high both within and outside the project area of each NGO partner. Access to irrigation facilities has helped DVM to raise OFSP vines production, which enabled them to meet the local demand and have a surplus, particularly in Phalombe and Zomba districts. In others, like Dedza and Chikhwawa, clean vine cuttings were provided from BRS to fulfill the high demand for OFSP planting material. At the same time, the decision was made to encourage dual purpose production for roots and vines simultaneously as well as promote sweetpotato leave consumption.

We believe that the awareness campaign has contributed to the growing demand for OFSP planting material. Through March 2011, the number of beneficiaries receiving vouchers was 35% higher compared with the number of beneficiaries registered before the campaign. All multipliers of the 133 DVMs were also growing the OFSP in their garden for production in the 2010/2011 rainy season. They also agreed to continue being multipliers in the consecutive years in large part because they are satisfied with the income they are making.

More OFSP varieties should be produced and released through a breeding program of DARS so that farmers have greater choice in agronomic characteristics. We note that farmers particularly prefer varieties that spread, as they want to have good ground cover. This lowers the weeding burden and may also contribute to preventing soil runoff (Ogbonna et al. 2007).

8.3 Example of How the Team Responds to Community Consultations

Irish Aid and the CIP team attended a community meeting in Chikalumpha Village TA Katunga, Chikhwawa, on 22 March 2011. This meeting was part of the monitoring visit by Irish Aid programmed in Chikhwawa. The meeting was attended by 21 men and 48 women from the community.

In a report about this meeting, compiled by CADECOM, the community members expressed their gratitude to CIP and Irish Aid for the voucher system that will enable farmers to grow OFSP. Community members further reported that conservation measures are considered during the sweetpotato vine multiplication process. It was also reported that many women took part in the activities, which was strongly supported by the DAES. One of the challenges highlighted was recurrent drought in the area that has been going on for four years. The community members requested assistance for watering cans to help irrigate sweetpotato vines in the nurseries. The extension officer shared this concern, but he encouraged people who will take part in growing OFSP vine to water their crop as Mr. Biliati did for their vines to survive. In the absence of a reliable source of water, it was advised to take the sweetpotato vines to the nearby wetland for multiplication.

The community members also decried the small number of targeted beneficiaries in the area. It appeared that only 11 beneficiaries were issued the vouchers. However, the farmers are optimistic that after multiplication the vines would be passed on to others. Many farmers, including the youths, were interested in growing OFSP and presented a special request to CIP for further support in releasing more vouchers. Nonetheless, the visiting team was informed that there were 140 households in their area. Realizing the large number of households, the project leader promised to consider further assistance to enable the communities' access to more sweetpotato vines. CADECOM was asked to coordinate the request by submitting a new beneficiary list for consideration. Action: on 8 April 2011, CIP has delivered 99 vouchers to CADECOM in order to fulfill this request. CADECOM will organize the vines from the local DVMs. If the vines are not enough, CIP will provide the vines from the primary multiplication at BRS.

Tikufunanji Youth Club, which also attended the meeting, reported that they planted 1,000 tree seedlings in the area. As a youth club, they were also prepared to take part in sweetpotato multiplication. Members reported that their club comprises seven boys and six girls. CIP advised the youth group to present and coordinate their initiatives at community level. Their request would be considered alongside the voucher system for the new beneficiaries.

8.4 The Culture of Free Seed

Despite the availability of OFSP vines, some farmers failed to buy with their own money because of the tradition of giving one another free seed, which is common in Malawi. However, after the awareness campaign, more farmers are eager to buy the sweetpotato vines and the demand is now high.

8.5 Gender Issues in Processing and Utilization

As noted in the report from Phalombe District concerning the training of both front-line staff and farmers in processing and utilization of sweetpotato, male trainees were far more passive than their female counterparts. This could be related to cultural norms where these activities are traditionally female roles. The uptake of training by farmers was strongly biased in favor of women. There is a need to mainstream gender in the project so that all activities receive support from both men and women.

8.6 The Use of Media and Radio Program

In general, Malawians like to listen to the radio or watch theatre. Radio listening clubs are communication hubs worldwide, including Malawian rural areas. From informal talks with farmers during a number of visits, Zodiac Radio Station was widely received by farmers in relatively remote areas in Malawi. Rural people will be able to use radio to listen and air their views on various project needs. Collaboration with Malawi Broadcasting Cooperation is being considered for future distribution efforts by the project.

8.7 Private Sector

After successfully building up the seed systems and reaching more than 10,000 beneficiaries who are cultivating the OFSP in the 2010/2011 rainy season, we can expect a substantial storage root production this year. Most of this will be consumed by the households themselves, which meets our nutrition goals. However, over time, we expect surplus production to increase and are exploring developing a commercial value chain through partnership with the private sector partner, Universal Industries. They are interested in working with the project for producing an OFSP processed product. We will also explore improving fresh root marketing systems.

Universal Industries will make biscuits and chips from the OFSP flour. For making the biscuits, a number of trials have been conducted. The remaining trial is to find out the influence of the temperature on the quality of pro-vitamin A in the OFSP flour. Each district will provide samples of OFSP flour to Universal Industries beginning this year.

Another opportunity of strengthening the collaboration with the private sector is in the area of vine multiplication and sweetpotato production. Involving the private sector will broaden the dissemination of the OFSP planting material in Malawi. This will be a useful tool to combat VAD and increase food and nutrition security. Moreover, the private sector can help meet Universal Industries' need to have a steady supply of OFSP flour as raw materials for producing biscuits.

8.8 Challenges

8.8.1 Technical matters

Owing to inadequate seed supply from the DVMs in Chikhwawa, additional seed had to be obtained from BRS, adding to the costs. The inadequate seed supply by DVMs was mainly due to drought. The prolonged dry spell in Chikhwawa affected the impact areas, delaying vine distribution using the voucher system.

In Dedza District, the multipliers have realized the high value of OFSP variety after the awareness campaign. Hence they decided not to exchange all their planting material with vouchers. In spite of that, they grew the OFSP vines in their own garden to multiply them and sold them for a high price. This happened particularly in the month of February when the demand for sweetpotato cuttings was high.

8.8.2 Administrative and financial constraints

The project has been expanded with an excellent achievement within a short period of time (1.5 years). However, to run the OFSP project more efficiently, a full-time assistant in administration and finance is urgently needed. The assistant should be based at BRS. Currently, the project has been supported by an accounts officer in Lilongwe. Furthermore, the budget should be increased for the administrative and operational activities as the technical activities have been broadened.

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