



# **Rooting Out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato**

**Year 2 Annual Report  
(1 October 2010–31 October 2011)**

*Prepared for:*  
Irish Aid

*Submitted by:*  
International Potato Center (CIP)

# **Rooting Out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato**

**Year 2 Annual Report  
(1 October 2010–31 October 2011)**



*Ireland's minister of Trade and Development visited OFSP farmers' fields on 14 June 2011 in Dedza District*

**Submitted by:  
Putri Ernawati Abidin, Project Leader  
International Potato Center**

**October 2011**

# Table of Contents

ABBREVIATIONS AND ACRONYMS .....	III
EXECUTIVE SUMMARY .....	IV
1. INTRODUCTION .....	1
1.1 WHY SWEETPOTATO? .....	1
1.2 THE PROJECT AND ITS POLICY CONTEXT .....	2
2. OVERALL GOAL AND OBJECTIVES .....	5
3. TARGET GROUPS .....	6
4. ACTIVITIES CONDUCTED AND RESULTS .....	6
4.1 STRENGTHENING PARTNERSHIPS AND ITS REVELATIONS .....	7
4.2 SWEETPOTATO FARMING AND SEED SYSTEM ESTABLISHMENT IN MALAWI .....	12
4.3 TRAININGS, VISITS, MEETINGS, MONITORING AND EVALUATION, AND FIELD DAYS .....	15
4.4 INTERCROPPING MAIZE AND SWEETPOTATO: A DEMO ON-STATION TRIAL .....	16
4.5 FORMATIVE RESEARCH: A KEY NOTE TAKEN FROM THE REPORT OF DR. BEATRICE MTIMUNI .....	18
4.6 BASELINE SURVEY .....	19
4.7 NUTRITION EDUCATION AND COMMUNICATION STRATEGY .....	23
4.8 POSTHARVEST HANDLING AND TRIPLE S .....	23
4.9 AWARENESS CAMPAIGN .....	24
5. LESSONS LEARNED AND NARRATIVE BY IMPLEMENTING DISTRICTS .....	25
5.1 DEDZA DISTRICT (1900 MASL) .....	25
5.2 ZOMBA DISTRICT (1141 MASL) .....	26
5.3 PHALOMBE AND MULANJE DISTRICTS (756 MASL) .....	27
5.4 CHIKHWAWA DISTRICT (400 MASL) .....	28
5.5 SALIMA DISTRICT (514 MASL) .....	30
6. FINANCIAL REPORT .....	31
7. GENERAL DISCUSSION AND CONCLUDING REMARKS .....	31
7.1 VOUCHER SYSTEM .....	31
7.2 INTEGRATED SWEETPOTATO PRODUCTION AND SEED SYSTEM IN MALAWI .....	31
7.3 FUEL SHORTAGE .....	32
7.4 REVOLVING FUNDS: A SUGGESTION FROM CU-PHALOMBE AND CU-MULANJE .....	32
7.5 MEDIA, TELEVISION, AND RADIO .....	32
7.6 VEHICLE AND MOTOR BIKE PROJECT EQUIPMENT .....	33
7.7 ADMINISTRATIVE ISSUES .....	33
8. REFERENCES .....	33
9. ANNEXES	
1A PARTNERSHIP HEALTH CHECKUP	
1B REPORT ON CIP REGIONAL TECHNICAL SUPPORT FOR NUTRITION INFORMATION EDUCATION AND COMMUNICATION (IEC) ACTIVITIES AND PARTNERSHIP ASSESSMENT	
2 NURTURING A SUSTAINABLE SEED SYSTEM FOR SWEETPOTATO IN MALAWI: A LEARNING PROCESS (8 <sup>TH</sup> APA CONFERENCE ABSTRACT)	
3 LETTER FROM THE MINISTRY OF AGRICULTURE AND FOOD SECURITY ABOUT IFPRI CONFERENCE	
4A HOW AGRICULTURE CAN CONTRIBUTE TO NUTRITION AND HEALTH OUTCOMES (NOTE PRESENTED AT IFPRI CONFERENCE)	
4B ROOTING OUT HUNGER PROJECT: SECOND ANNUAL TECHNICAL OFSP MEETING	

5	KACHELE FARMERS CLUB–SALIMA DISTRICT
6	CU–DEDZA DISTRICT
7	CADECOM–CHIKWAWA DISTRICT
8	CU–PHALOMBE AND MULANJE DISTRICTS
9	MVP–T/A MLUMBE, ZOMBA
10	IMPACT ON SCALING OUT SWEETPOTATO PRODUCTION UNDER SMALLHOLDER FARMERS IN BEMBEKE AND KANYAMA EPAs (RESEARCH REPORT)
11	INTERCROPPING MAIZE AND ORANGE-FLESHED SWEETPOTATO AT BVUMBWE RESEARCH STATION
12	TRIPLE S (ENGLISH VERSION)
13	TRIPLE S (CHICHEWA VERSION)
14	ROOTING OUT HUNGER PROJECT BROCHURES
15	RADIO PROGRAMS
16	AWARENESS CAMPAIGN

## ABBREVIATIONS AND ACRONYMS

APA	African Potato Association
ASWAp	Agricultural sector-wide approach
BRS	Bvumbwe Research Station
CADECOM	Catholic Development Commission
CU	Concern Universal
CIP	International Potato Center
EPA	Extension planning area
DAES	Department of Extension Services, MoAFS, Malawi
DARS	Department of Agricultural Research Services, MoAFS, Malawi
DVM	Decentralized vine multiplier
FEWS NET	Famine Early Warning System Network
G0, 1, 2 seed	Generation 0, 1, 2 seed
GoM	Government of Malawi
IA	Irish Aid
ICM	Integrated crop management
IEC	Information, education, and communication
IFPRI	International Food Policy Research Institute
IP	Implementing partner
MGD	Millennium development goal
MGDS	Malawian Growth and Development Strategy
MIM	Malawi Institute of Management
MoAFS	Ministry of Agriculture and Food Security
MVAC	Malawi Vulnerability Assessment Committee
MVP	Millennium Villages Project
NASFAM	National Association Smallholder Farmers of Malawi
NECS	Nutrition education and communication strategy
NGO	Nongovernmental organization
OFSP	Orange-fleshed sweetpotato
OPC	Office of the President and Cabinet, Malawi
PPP	Public-private partnership
SPHI	Sweetpotato for Profit and Health Initiative
SR	Storage root
SSA	Sub-Saharan Africa
SUN 1000 Special Days	Scaling Up Nutrition 1000 Special Days
UIL	Universal Industries Limited
WALA	Wellness Agriculture for Life Advancement
YPE	Yield plot estimate

## ACKNOWLEDGMENT

We sincerely acknowledge Irish Aid for its support toward promoting the development and dissemination of orange-fleshed sweetpotato in Malawi.

CIP in partnership with relevant Malawian Government Departments and NGOs instituted a 4.5 year program in October 2009. Without a strong commitment from each partner, this annual report of Year 2 would not have been prepared. We appreciate their excellent effort and support to the success implementing of the project.

## EXECUTIVE SUMMARY

The sweetpotato is mostly grown in small plots by subsistence farmers in low-input agricultural systems. A wide range of cultivars is suitable for different soils and climates. Well-drained light- and medium-textured soils with a pH range of 4.5–7.0 are more favorable for the plant. Best growth is obtained with temperatures above 24°C, abundant sunshine, and warm nights. Annual rainfalls of 750–1000 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. A good yield is responding to better management, which is the key factor that is driving its expansion in Sub-Saharan Africa.

In Malawi, maize is the most important food crop, followed by cassava, sweetpotato, Irish potato, and sorghum. However, sweetpotato is currently one of the most widely grown crops. The crop is becoming a major food source and increasingly contributing to the food basket, especially in the months where maize is scarce or the price is too high for poor people. The sweetpotato crop is also becoming a source of cash and employment to many farmers. The role of sweetpotato is becoming more important and substantial because the government has recognized the significant contribution to food security, especially in densely populated areas where landholding size is severely constrained. In terms of total production, sweetpotato is now the third most important food crop in the country.

All sweetpotato varieties are good sources of vitamins C, E, and K, as well as several B vitamins, but only orange-fleshed sweetpotato (OFSP) has pro-vitamin A. Research in South Africa has demonstrated the efficacy of OFSP as a bioavailable source of vitamin A. In July 2011, Malawi launched the Scaling Up Nutrition (SUN) 1000 Special Days movement. This initiative has included OFSP in the national program to combat vitamin A deficiency and to provide a source of nutrition to children less than 5 years of age. Using OFSP is strikingly cheap compared with other fortification methods, thus helping to address both VAD and undernutrition. All parts of sweetpotato are edible: the leaves, petioles, and storage roots.

The Irish Aid-funded project *Rooting Out Hunger in Malawi with Nutritious Orange-fleshed Sweetpotato* is a 4.5-year, multipartner effort to improve vitamin A and energy intake for at least 115,000 households with young children (the group most vulnerable to vitamin A deficiency) using 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%.

There is good alignment between the objectives of the Rooting Out Hunger project and the objectives of the Agricultural Sector-Wide Approach (ASWAp) of the Government of Malawi. The project is 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).

Most of the planned milestones of the Rooting Out Hunger project have been achieved during the first and second years. In the first year, the project was mainly focusing on capacity building, including building up the “1, 2, 3” seed multiplication scheme. In the second year (through March 2011), 10,689 households received OFSP planting materials through subsidized vouchers. These beneficiaries together with multipliers reported to have grown OFSP in the 2010/2011 rainy season and produced roots for consumption and sale. Detailed reports from Concern Universal

(CU), Millennium Villages Project (MVP), and Catholic Development Commission (CADECOM) are included in the annexes of this report.

A month before harvest, the International Potato Center (CIP) conducted training on postharvest handling and yield plot estimate (YPE) in the four districts. Government and NGO implementing partners (IP) trained farmer leaders. Three farmers' fields were chosen at random in each district for assessing the yield performance at the farm level. NGOs and extension services helped farmers assess yields at harvest. The average yield from four districts was 18 t/ha, which is significantly higher than the average yield of 6 t/ha in Malawi.

In the 2011/2012 rainy season, the vouchers will be issued from the budget of year 2 (1 October 2010 to 30 September 2011). The IPs will complete registration of beneficiaries at the end of October. They are on a track to achieve the target of 24,000 households to deliver large amounts of OFSP planting material from nearby multiplication sites to producer households at risk of VAD. Now, farmers are preparing their land and awaiting the rains expected in November 2011. The Rooting Out Hunger project has to budget and transfer US \$24,000 to the IPs at the end of October 2011.

Because the demand for growing the OFSP is high, in year 3 (1 November 2011 to 31 October 2012), we may slightly adjust the voucher system from a fully subsidized voucher to a half- or nonsubsidized voucher. The budget proposed for year 3 is US \$9,960, which is adequate to reach 10,000 beneficiaries.

A partnership health check-up was done by CIP partnership specialist Margaret McEwan during June–August 2011. Questionnaires were sent to each person involved in the Rooting Out Hunger project. On average, the results were good. However, efforts to strengthen the partnership will continue.

CIP currently works in partnership with three NGO IP partners, CADECOM, CU, and MVP, with direct links to the private sector, Universal Industries (UI), and government IPs Department of Research Services (DARS) and Department of Extension Services (DAES). From November 2011, another NGO, Wellness Agriculture for Life Advancement (WALA), will join the CIP partnership. A community-based farmer's organization, Kachele Club, in Salima District joined the OFSP multiplication scheme in September 2011. Hence, this club is already part of the CIP partnership.

The project participated in a number of fora at national and international levels organized by the international research organizations, government of Malawi (GoM), and partners. Mostly these fora were attended by key policymakers from various organizations, governments, donors, and private sectors. In August 2011, the project participated at the Working Session for Finalization Nutrition, Education, and Communication Strategy 1000 Special Days Movement organized by the Department of Nutrition, HIV, and AIDS at the Office of the President and Cabinet (OPC). This participation bore an important result for the project. The orange-fleshed sweetpotato, a biofortified crop, was accepted by the forum to be in the national program to combat vitamin A deficiency. Lastly, coproject managers from DARS at Bvumbwe Research Station (BRS), CADECOM, MVP, CU, and some farmer leaders attended various international and national conferences/workshops and exchanged visits and open days. They were sponsored by the Rooting Out Hunger project.

In the beginning of October 2011, the Rooting Out Hunger project organized the second annual technical meeting. The meeting was opened by Dr. Mary Shawa, the principal secretary for

Department of Nutrition, HIV, and AIDS at OPC. Hence, the Rooting Out Hunger project will be aligned with the SUN 1000 Special Days movement.

In September 2011, FEWS NET reported about critical events in Malawi based on the seasonal calendar timeline. Critical events are expected from December 2011 to March 2012, where some populations will miss food entitlements in parts of Chikhwawa, Nsanje, Phalombe, Zomba, Chiradzulu, Blantyre, Balaka, Neno, and Mwanza Districts in the south and Ntcheu District in the center. The established “1, 2, 3” seed multiplication system fits in the sweetpotato production system in Malawi with its unimodal rainfall distribution pattern. It is likely that the integrated sweetpotato production and “1, 2, 3” seed system planting calendar is in synch with the critical events anticipated from December 2011 to March 2012. The proposed sweetpotato farming model could fill in the gaps of these hungry months.

Intercropping sweetpotato with other crops is could be practiced in Malawi where land is limited due to high population. However, intercropping sweetpotato and maize is not yet in the research agenda. A demo trial was conducted on-station at BRS. All IPs and farmers from five districts (Dedza, Zomba, Phalombe, Mulanje, and Chikhwawa) were invited to two field days at BRS. The first field day was on 9 May 2011, attended by 52 participants, and the second was on 22 August 2011, attended by 72 participants. The results were reported and discussed during the Horticulture In-House Meeting on 5–6 September 2011. Participants were impressed to see the results of this intercropping demo trial. Most farmers wanted to try this intercropping cultural practice in the coming rainy season.

Formative research, a baseline survey, and a nutrition study have been conducted. Each will produce a report that will be submitted separately. The OFSP can be associated with the national nutrition policy. M. McEwan proposed activities related to information, education, and communication (IEC). A budget was proposed to conduct workshops and trainings at the district level as well as to produce training materials.

The year 2 project went smoothly. All IPs and farmers are likely eager to continue working with the OFSP program for Malawi. Some challenges were met during implementing the project and have discussed.



## 1. INTRODUCTION

### 1.1 Why Sweetpotato?

The sweetpotato is widely grown in tropical, subtropical, and temperate areas between 40° N and 32° S (Purseglove, 1991; Woolfe, 1992; Ahn, 1993). The crop is mostly grown in small plots by subsistence farmers in low-input agricultural systems. A wide range of cultivars is suitable for different soils and climates. Though sweetpotatoes are grown on a variety of soils, well-drained light- and medium-textured soils with a pH range of 4.5–7.0 are favorable for the plant (Wolfe, 1992; Ahn, 1993). Sweetpotatoes are very sensitive to aluminum toxicity and will die about six weeks after planting if lime is not applied to this type of soil at planting (Woolfe, 1992). Best growth is obtained with temperatures above 24° C, abundant sunshine, and warm nights. Annual rainfalls of 750–1000 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 rots and reduce growth of storage roots if aeration is poor (Ahn, 1993).

Furthermore, Villordon et al. (2009) has done a study on Beauregard sweetpotato variety to understand its phenological stages to improve resilience (Fig. 1). They have found that the air temperature and water are critical at storage roots (SR)1 (1–4 days) and SR2 (14–21 days). The air temperature in these critical periods is between 20°C and 30°C. Initial adventitious roots (AR) will become storage roots, so damage to them can reduce yield. Stress at SR2 can result in failure of storage root induction (pencil roots). There are clear differences among genotypes with respect to the ability to tolerate stress and reliably yield, which is important to farmers. The breeding program led by DARS based at BRS is backstopped by CIP's Southern Africa Breeding Program Platform. The program focuses on breeding for drought tolerance and pest incidence.

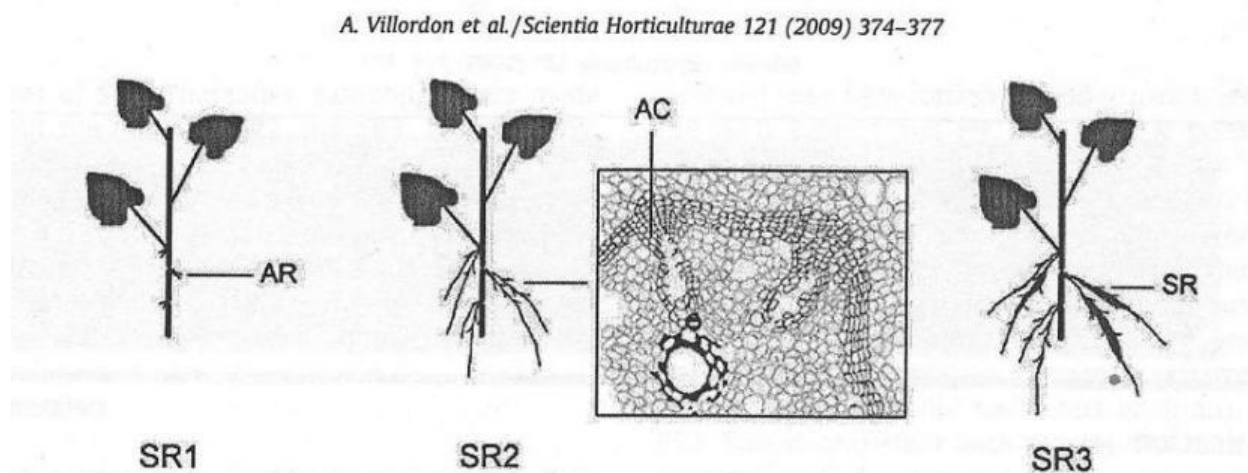


Fig. 1. Phenological stages of Beauregard variety. AC (anomalous cambium) is an indicator of SR initiation.

The ability of sweetpotato to produce relatively good yields under the marginal conditions is one of the highlights of the Malawian breeding program. A good yield responds to better management, which is the key factor driving its expansion in Sub-Saharan Africa (SSA) (Carey et al., 1998; Abidin, 2004; Ebregt et al., 2004; Low et al., 2005). The flexibility of planting and harvesting times of sweetpotato can provide roots and leaves during the hungry season. Women play a major role in

cultivating the sweetpotato. Compared with many other crops, sweetpotato requires few inputs and relatively less labor, making it particularly suitable for households threatened by migration, civil disorder, or diseases such as HIV and AIDS (Jayne et al., 2004).

In Malawi, maize is the most important food crop, followed by cassava, sweetpotato, Irish potato, and sorghum. However, sweetpotato is currently one of the most widely grown crops. The Malawi Vulnerability Assessment Committee (VAC) reported that in September 2011, 201,854 people in parts of Chikhwawa, Nsanje, Phalombe, Zomba, Chiradzulu, Blantyre, Balaka, Neno, and Mwanza Districts in the south and Ntcheu District in the center would miss entitlements this consumption year (beginning in April). An estimated 5000 MT of maize equivalents would be required to meet the missing entitlements (FEWS NET, 2011). Therefore, sweetpotato is becoming a major food source and increasingly contributes to the food basket, especially in the months where maize is scarce or the price is too high for poor people. The sweetpotato crop is also becoming a source of cash and employment to many farmers. The role of sweetpotatoes is becoming more important and substantial, as the government has recognized the significant contribution to food security, especially in densely populated areas where landholding size is severely constrained. In terms of total production, sweetpotato is now the third most important food crop in the country.

All sweetpotato varieties are good sources of vitamins C, E, K, and several B vitamins but only orange fleshed sweetpotato (OFSP) has pro-vitamin A. Research in South Africa (Jaarsveld et al., 2005) has demonstrated the efficacy of OFSP as a bioavailable source of vitamin A. Community-level research in Mozambique has shown that an integrated approach using OFSP can reduce VAD within a resource-poor population (Low et al., 2007). In July 2011, Malawi has launched the SUN 1000 Special Days movement. This initiative has also included the OFSP to combat Vitamin A deficiency and provide a source of nutrition for children less than 5 years of age. Using orange-fleshed sweetpotato is strikingly cheap compared with other fortification methods. Moreover, all parts of sweetpotato are edible (leaves, petioles, and storage roots).

It is worth reiterating that OFSP, as a staple food, has an advantage over most vegetables. It can supply significant amounts of vitamin A and energy simultaneously—thus helping to address both VAD and undernutrition. OFSP is an example of a biofortified crop, in which the micronutrient status of staple foods is enhanced through plant breeding to the point where impact on micronutrient status can be achieved (Bouis, 2002). Because the poorest households typically obtained over 60% of their energy needs from food staples, this strategy is particularly suited to poor rural households that cannot access purchased fortified food products but could grow OFSP.

## **1.2 The Project and Its Policy Context**

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 Routing Out Hunger project, a 4.5-year multipartner effort to improve vitamin A and energy intake for at least 115,000 households with young children (the group most vulnerable to vitamin A deficiency) by using OFSP and an innovative approach to scaling up dissemination of planting material. The project also seeks to improve income-generating opportunities for some producers of OFSP and increase their average sweetpotato yield 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 (MGD).

The MGDs represent 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 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 undernutrition
3. To improve governance and policies to ensure that hunger is addressed effectively

The Government of Malawi recognizes the importance of a combined effort to combat malnutrition and thus, is developing a nutrition education and communication strategy (NECS). This strategy aims at mobilizing the population into a movement. NECS is planned to focus on the first 1000 days of human life; that is, from conception to 2 years of age. Food diversification at the production and consumption levels is one of the most important concepts to disseminate at every opportunity in the SUN movement. This could be a natural entry point for orange-fleshed sweetpotato.

Table 1 presents the alignment of the objectives of this project with those of the ASWAp (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. Objectives and achievements (1 October 2009–31 October 2011) of the Rooting Out Hunger project corresponding to Malawi's ASWAp strategic objectives**

Rooting Out Hunger project objectives	Corresponding ASWAp strategic objectives	Rooting Out Hunger project achievements (1 October 2009–31 October 2011)
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.	<b>1.2.1.c:</b> Increase productivity of cassava, sweet and yellow potato and Irish potato in relevant areas <b>1.2.2.a:</b> Promote dietary adequacy <b>1.2.2.b:</b> Improve quality of diets for the most vulnerable groups <b>1.2.2.c:</b> Intensify nutrition education	<b>1.2.1.c:</b> Number of farmers has cultivated the OFSP in Dedza, Zomba, Phalombe, and Chikhwawa Districts in the 2010/2011 rainy season was 10,869 households with the area of production 73.4 ha. The estimate yield of the OFSP Zondeni currently planted is on average 18 MT/ha. Implementing partners are on track. By the end of October 2011, They are going to have registered at least 24,000 households based on our target, to receive subsidized vouchers that they can grow sweetpotato in the 2011/2012 rainy season. <b>1.2.2.a:</b> An awareness Campaign was conducted in October 2010 in 22 villages of the four districts mentioned above. CIP has backstopped the nine radio programs organized by Irish Aid and NASFAM. Each

Rooting Out Hunger project objectives	Corresponding ASWAp strategic objectives	Rooting Out Hunger project achievements (1 October 2009–31 October 2011)
		<p>radio program is aired every Wednesday afternoon from 16:15 to 16:30 from 14 Sep to 9 Nov 2011. The diffusion of the message about the production, where to get the planting material, nutritious value of OFSP as well as various recipes has reached the wide audience in Malawi. A high demand of OFSP planting material was met. A number of multipliers have already generated income out of sales of the OFSP planting material.</p> <p><b>1.2.2.b and 1.2.2.c:</b> Nutrition Awareness through the sensitization, training and field days on the utilization of storage roots and leaves is taking place at the district and extension planning area (EPA) levels</p>
2. Increase effective demand by changing the perception of sweetpotato and develop fresh root marketing chains for orange-fleshed sweetpotato in the Blantyre market and reduce fluctuations in overall sweetpotato supply to the fresh market.	<p><b>Key support service 1.a:</b> Institutional strengthening and development</p> <p><b>Key support service 1.b:</b> Capacity building</p> <p><b>Key support service 2.a:</b> Conducting results and market oriented research on priority technology needs and provision of technical and regulatory services</p> <p><b>Focus area 2.3.a:</b> Improve the public/private partnerships for broader growth of the agriculture sector</p> <p><b>Focus area 3.1:</b> Sustainable agricultural land management</p>	<p>-CIP marketing specialist will be soon coming to Malawi to help develop a marketing model including the OFSP value chains.</p> <p>-Universal Industries, a private sector, has committed to support the value chain and market strategy from 2011. They are testing different varieties provided by DARS.</p> <p>-Decentralized Vine Multiplications were built up in each district above-mentioned. These are managed by trained farmers with access to irrigation. Furthermore, a new DVM has been expanded to Salima District. This DVM is managed by Kachele Club, as a community-base multiplication. The members of 10 men and 37 women are from 4 villages, Simaewa 1, Simaewa 2, Kafota and Chenyama. The club has a solid commercial orientation.</p>
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	<p><b>1.2.1.c:</b> Increase productivity of cassava, sweet and yellow potato and Irish potato in relevant areas</p> <p><b>Key support service 1.a:</b> Institutional strengthening and development</p>	<p>-a 1, 2, 3 vine multiplication strategy aims at ensuring surplus production for sale and decrease the length of the hungry season.</p>
4. Increase the capacity of DARS to produce clean, tissue culture sweetpotato plantlets, maintain primary multiplication sites, and design and conduct seed systems and integrated crop management research	<p><b>Key support service 1.a:</b> Institutional strengthening and development</p> <p><b>Key support service 1.b:</b> Capacity building</p> <p><b>Focus area 2.3.a:</b> Improve the public/private partnerships for broader growth of the agriculture sector</p> <p><b>Focus area 3.1:</b> Sustainable</p>	<p>-The primary multiplication is based at Bvumbwe Research station. This multiplication is managed by DARS and backstopped by CIP. The capacity of DARS is strengthened by renovating a tissue culture laboratory and a screen house and maintenance of the 4 ha of land covered by Zondeni OFSP variety. Another 0.5 ha will be covered by the 5 newly released OFSP varieties. The primary multiplication</p>

Rooting Out Hunger project objectives	Corresponding ASWAp strategic objectives	Rooting Out Hunger project achievements (1 October 2009–31 October 2011)
	agricultural land management	<p>fully backstopped by CIP can keep producing clean planting materials when needed any time in various agro-ecological zones in Malawi.</p> <p>-Secondary and tertiary multiplication are decentralized on farms and managed by farmers. Tertiary multiplication sites serve for both storage root and planting material production, contributing to food and nutrition security during the hungry season.</p> <p>-Initial research on intercropping between maize and sweetpotato as on station demo plots was conducted. Implementing partners and representative farmers were invited to Bvumbwe Research Station and have given some judgment from their observation.</p> <p>-Relay cropping between maize and sweetpotato is being conducted. For year 2011, we have selected the Mulanje District.</p> <p>-Research on irrigation and fertilizers/manure will be carried out by an MSc student supervised by the University of Malawi, DARS, and project management. The project proposal is still under discussion but we plan to begin in the 2011/2012 rain-season area of Zomba District and drought prolonged area of Chikhwawa District.</p>

## 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 by 50%.

In year 2, specific activities include:

1. Establish in-vitro tissue culture capacity at 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 DARS for official release by September 2011, with the 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, performed in each target district four times.
4. Implement integrated crop management (ICM) research (particularly related to fertility and possibly water management) at the on-farm trial/demonstration sites in each district. Also implement at these sites research/demonstration activities on appropriate storage and processing techniques aimed at providing a more consistent supply of fresh roots to use for fresh market sales over an extended marketing season or to use 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 to 5 years of age) in sweetpotato-producing areas. Each NGO partner will include additional specific criteria, such as income, health status, and access to water, for 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 periurban 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. ACTIVITIES CONDUCTED AND RESULTS**

Most of the planned milestones of the Rooting Out Hunger project have been achieved during the first and second years. In the first year, the Rooting Out Hunger project mainly focused on capacity building, including building up the “1, 2, 3” seed multiplication scheme (CIP, 2010). In the second year, through March 2011, the achievement was reaching 10,689 households who received OFSP planting materials through subsidized vouchers (Table 2). These beneficiaries together with multipliers reported to have grown OFSP in the 2010/2011 rainy season. The second mid-year activities from 1 October 2010 to 31 March 2011 were reported in April 2011 (CIP, 2011). The Rooting Out Hunger project will be completing its second year activities on 30 September 2011, with an extension to 31 October 2011. Now, farmers are preparing their land and awaiting the rains that are expected in November 2011. The IPs will complete registration of the beneficiaries at the end of October. They are on a track to achieve the target of delivering large amounts of OFSP planting material from nearby multiplication sites to 24,000 producer households at risk of VAD. Successful dissemination of OFSP to more than 10,000 households was identified by using an implementation strategy based on six integrated components: (1) strengthening the partnership with the government, NGOs, and the 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 beneficiaries with subsidized vouchers, area of production achieved in years 1 and 2 of the project (1 October 2009–31 March 2011), yield estimate plot (YEP) on-farm at harvest in May/June 2011, and registered beneficiaries targeted for 2011/2012 rainy season based on planning meeting in November 2010.**

NGO	District	Subsidized vouchers through March 2011 (Source: CIP, 2011)		Based YEP on farm at harvest in May/June 2011	Registered beneficiaries targeted for 2011/2012 rainy season
		No. of Households	Area of Production (ha)	Yield (t/ha)	
Concern Universal	Dedza	4,733	32.0	16	6000
Concern Universal	Phalombe	859	5.8	20	6000
Concern Universal	Mulanje	-	-	-	6000
Millennium Villages Project	Zomba	3,250	21.9	18	6000
Catholic Development Commission	Chikhwawa	2,027	13.7	18	6000
<b>Total</b>	<b>4</b>	<b>10,869</b>	<b>73.4</b>	<b>18</b>	<b>30,000</b>

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. The total area of production was estimated based on these assumptions (Table 2). All farmers, including the decentralized vine multipliers (DVM), were instructed to make use of the 2010/2011 rainy season for the production of storage roots. This was possible because of the “1, 2, 3” seed system strategy already built up in the first year of project implementation (1 October 2009–30 September 2010). Furthermore, accurate figures of the OFSP Zondeni yield (t/ha) at the farm level were also obtained (Table 2). The average yield of Zondeni in four districts was 18 t/ha, which is relatively good. It is significantly higher than the average sweetpotato yield of 6 t/ha in Malawi. A month before harvest, CIP conducted training on postharvest handling and YEP in the four districts. Government and NGO IPs trained farmer leaders. Three farmers’ fields were chosen at random in each district for measuring the yield at the farm level (Table 2). The protocol for this yield estimate can be read in the midyear report (CIP, 2011).

#### 4.1 Strengthening Partnerships and Its Revelations

A partnership health check-up was done by CIP partnership specialist M. McEwan in June–August 2011. A questionnaire was sent to each person involved in the Rooting Out Hunger project. On average, the results are good (Annex 1A). Efforts of strengthening partnerships will continue.

##### 4.1.1 Participation in fora

The project participated in a number of fora at national and international levels that were organized by international research organizations, GoM, and partners. Mostly, these fora were attended by key policymakers from various organizations, governments, donors, and private sectors. For instance, in December 2010, we participated at the 8<sup>th</sup> African Potato Association (APA) Conference. The abstract was then published (Annex 2). In August 2011, the project participated at the Working Session for the Finalization of Nutrition, Education, and Communication Strategy 1000 Special Days Movement organized by the Department of Nutrition, HIV, and AIDS at the Office of the

President and Cabinet. An important result for the project was borne of this participation. The principal secretary for the Department of Nutrition, HIV, and AIDS at OPC was interested in the involvement of the Rooting Out Hunger project with the SUN 1000 Special Days movement. OFSP, a biofortified crop, was accepted in the national program to combat Vitamin A, as resource-poor farmers can easily get and grow the crop. In September 2011, we participated at a high-level policy conference organized by the Ministry of Agriculture and Food Security (MoAFS) of Malawi and the International Food Policy Research Institute (IFPRI) in Lilongwe (Annex 3). The presentation is available at the IFPRI website and summary note is in Annex 4A. We also participated and displayed the OFSP products at the Knowledge Fair at this conference (Fig. 2).

In the beginning of October 2011, the Rooting Out Hunger project organized the second annual technical meeting (Annex 4B). The meeting was opened by Dr. Mary Shawa, the principal secretary for the Department of Nutrition, HIV, and AIDS at OPC (Fig. 3). Hence, the Rooting Out Hunger project will be aligned with the SUN 1000 Special Days movement that was launched in July 2011.



*Fig. 2. OFSP at the right time with the right people.*



*Fig. 3. Dr. Mary Shawa (in pink suit with OFSP-wrapped cloth).*

The Department of Nutrition, HIV, and AIDS 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 is our right step of year 3. 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.

In mid-October, the management of the project participated in the 10<sup>th</sup> African Crop Sciences Society Conference held in Maputo, Mozambique. The information from exchange knowledge among the scientists could gain the Rooting Out Hunger project, as we are implementing the project activities based on the research and development approach. A number of applicable technologies for resource-poor farmers can be taken home to Malawi. Some information is important for extension staff and IPs. For example, a research conducted in Uganda by Nampeera and her team is concerning the sweetpotato weevils. Nampeera, et al. (2011) suggested that planting onion and



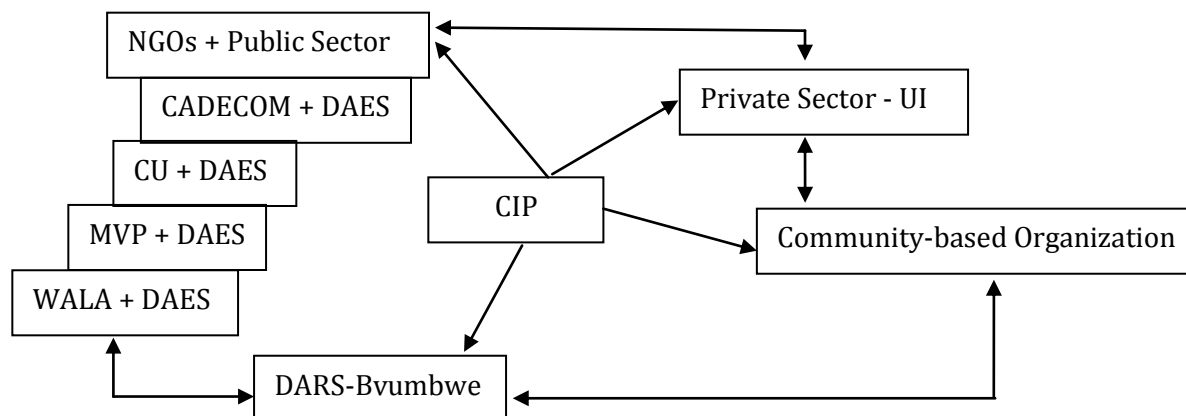
maize, the nonhost crops for *Cylas* spp (sweetpotato weevils) as crop barriers in sweetpotato fields, can reduce the sweetpotato weevil infestation on stem and storage roots. The findings can be practiced in Malawi and it is a significant source of information for farmers. In fact, this culprit is one of the major pests in the Rooting Out Hunger project areas.

In addition, the co-project managers from DARS at Bvumbwe Research Station, CADECOM, MVP, CU and some farmers' leaders got opportunities to attend various international and national conferences/workshops, exchange visits and open days. They were sponsored by the Rooting Out Hunger project.

#### **4.1.2 Public-private partnership and community-base approach model**

CIP currently works in partnership with three NGO IPs—CADECOM, CU, and MVP—with direct links to the private sector, UI, and DARS and DAES, the government IPs. From November 2011, the NGO WALA will be part of this partnership scheme of CIP (Fig. 4).

CIP in partnership with DARS at BRS, will take a lead into coming up with improved varieties that can undergo scale up to vine multiplication and dissemination. On 8 September 2011, the Committee Release Varieties of Malawi has accepted 7 new sweetpotato varieties requested by DARS, 5 are OFSP varieties. CIP will backstop DARS on seed multiplication and demo plots on-farms and on-stations at various agro-ecological zones in year 3.



*Fig. 4. CIP partnership scheme: Public-private partnerships and community-based organizations.*

Moreover, the demand force on products for UI will be integrated into scientific multiplication of planting materials by CIP and DARS, as primary multiplication. The multiplication scheme of “1, 2, 3” seed multiplication has established. The secondary and tertiary multiplications are done by farmers with the support from the project IPs who are working directly with the government (i.e., DAES). CU is working with farmers in Dedza, Phalombe, and Mulanje. CADECOM is working with farmers in Chikhwawa, and MVP with farmers in Zomba.

UI will be supporting 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. Producing crisps from OFSP are also included in the plan. 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, UI has estimated that 20 tons of sweetpotato flour a day is needed. The feasibility assessment is taking place this year. Five OFSP varieties, Mugande, LU06/0252, LU06/0527, LU06/0428, and Zondeni are suitable for good quality of crisps.

In September 2011, a community-based approach began in Salima District with Kachele Club, a community-based farmers' organization. The current priority is to build up DVMs related to the project's plan in year 3 to scale up OFSP activities. We intend to slowly move to the Central Region, and later on reach the Northern Region. The Kachele Club aims to produce OFSP planting materials with a commercial orientation. The planting materials will be multiplied to produce planting materials and vegetables and to provide food and nutrition security. The excess will be sold in the free local market (Annex 5).

CIP is supervising the technical and agronomic measurements and is working closely with partners who are the managers on the ground. As we have reached more than 10,000 households through March 2011 and these households have already grown and harvested the OFSP this year, there may be a surplus of produce. CIP needs to provide a strong agricultural marketing/economic specialist who will coordinate the marketing functions, as it links with the public-private partnership. Moreover, the specialist will explore further partnerships to enhance effective marketing for both vines and storage roots.

The partners are having a constant review and planning meetings. In this way, a partnership is well structured. The private sector, UI, and community-based organizations participate in these meetings. The project has had two annual technical meetings in November 2010 and in October 2011. All partners, and the public and private sectors attended these two meetings. The first meeting was reported in the midyear report submitted in April 2011 (CIP, 2011). The second annual meeting report is available in Annex 4B.

Various subgrants were given to each IP. The amount was based on their activities on the ground and their complimentary budgets when implementing the OFSP project. The department of extension services is under the budget allocated to the relevant NGO IP of each area. A total of US \$91,000 was disbursed in years 1 and 2. Over time, additional financial support was given to the NGOs who needed more funds based on various activities beyond their grants. For example, two treadle pumps, one sprayer, and pesticides were given to Kachele Club in Salima (Figs. 5 and 6 and Annex 5); in CU-Dedza, an expenditure was needed for a small-scale irrigation scheme in a number of DVMs (Annex 6); seven treadle pumps were given to CADECOM-Chikhwawa (Annex 7); chipping machines were given to three IPs this year [CU-Phalombe and Mulanje (Annex 8), MVP-Zomba (Annex 9), and DARS at Bvumbwe]. Frying stoves for making chips were given to CU-Dedza, MVP-Zomba, and DARS at Bvumbwe. In year 3, we plan to give more items to the IPs who did not receive them.



*Fig. 5. At Kachele Club in Salima, weeding at mulched beds and two treadle pumps from CIP.*



*Fig. 6. A trained CIP field assistant, John Kazembe, teaching farmers about “pesticide safety for users” at Kachele Club in Salima.*

DARS at Bvumbwe Research Station did not directly get the subgrant. However, we focused on building up its capacity by renovating the tissue culture laboratory. We bought two air-conditioners in year 2 and another in year 3; repainted the tissue culture laboratory and covered its floor with vinyl; purchased lab shoes and chemicals; organized clean OFSP plantlets from Nairobi; built a screen house; and maintained primary multiplication. These activities were accounted to the budget of the Rooting Out Hunger project. To sustain the OFSP program at DARS, we also support the revolving funds scheme. If OFSP clean planting materials are needed from the IPs or elsewhere, the project will buy the planting material from DARS and then disseminate them to the requesting institution. The government’s price of Mk 300/50 kg bag in volume is used. DARS has used these funds to support their sweetpotato breeding activities. Furthermore, at least 2181 people who are living near the station could earn some money as laborers. They indicate that income generated this work could pay school fees for their children and support their household needs. Casual laborers are needed to maintain the 4 ha of land for primary multiplication, to work at the screen house, and to maintain the intercropping maize and sweetpotato demo at Bvumbwe station in the 2010/2011 planting season. A total of US \$45,525 was given to DARS from the budget of year 2. In total, US \$147,205 has been spent by the project to support the government and NGO IPs. Not included in the amounts above are requests for Horticulture In-House and Roots and Tubers platform meetings, trainings, and field days organized by DARS (Bvumbwe and Chitedze Research Stations); for purchasing ingredients to prepare recipes that promote OFSP products in special events, like the visit of the minister of Trade and Development from Ireland on 14 June 2011 in Dedza (Fig. 7); for producing a documentary video of the SUN 1000 Special Days movement in Dedza and recording nine radio programs organized by Irish Aid and NASPAM in Zomba (Fig. 8); and for the Knowledge Fair at the IFPRI Conference organized by the Ministry of Agriculture, Irrigation and Water Development and IFPRI in Lilongwe (Figs. 2 and 9), and the field day organized by DARS in Mulanje.





*Fig. 7. Visit of Ireland's minister of Trade and Development on 14 June 2011 in Dedza (left). OFSP French fries (middle). Blessings Botha—Irish Embassy, Erna Abidin (CIP), and Ireland's minister (right).*



*Fig. 8. Making Queen Cake, one of the recipes featured in the radio program.*



*Fig. 9. OFSP stand at Knowledge Fair (left). CIP crew with two farmers from Zomba who participated in the Knowledge Fair (middle). A healthy little girl is enjoying a golden doughnut, an OFSP product (right).*

#### **4.2 Sweetpotato Farming and Seed System Establishment in Malawi**

Sweetpotato has become one of the important crops in Malawi, and it is aligned with the Government's policy on food and nutrition security. In Sub-Saharan Africa, sweetpotato planting materials are most likely scarce at the onset of rainy season. Farmers usually get their planting materials from their previous garden, their neighbors, or the market. Because of these factors, farmers usually plant sweetpotato late (Smit, 1997; Abidin, 2004; Ebreget, 2007).

The "1, 2, 3" seed multiplication system was established in year 2 and will be continued for the coming planting seasons. Primary ("1") multiplication is carried out at the research station where the highest quality standards can be maintained. The secondary ("2") and tertiary ("3") multiplications are on-farm and managed by farmers, either individually or in groups. The clarification of the "1, 2, 3" seed multiplication scheme can be read in the Rooting Out Hunger in Malawi, CIP Annual Report 2010 and Midyear Report 2011 at [www.sweetpotatoknowledge.org](http://www.sweetpotatoknowledge.org).

Because of the “1, 2, 3” seed multiplication, household beneficiaries received the OFSP planting materials on-time and they grew sweetpotato at the onset of the 2010/2011 rainy season (November 2010).

FEWS NET (2011) reported on the critical events from the seasonal calendar timeline in Malawi (Fig. 10). The critical events are expected from December 2011 to March 2011 where there will be some population with missing food entitlements in parts of Chikhwawa, Nsanje, Phalombe, Zomba, Chiradzulu, Blantyre, Balaka, Neno, and Mwanza Districts in the south and Ntcheu District in the center.

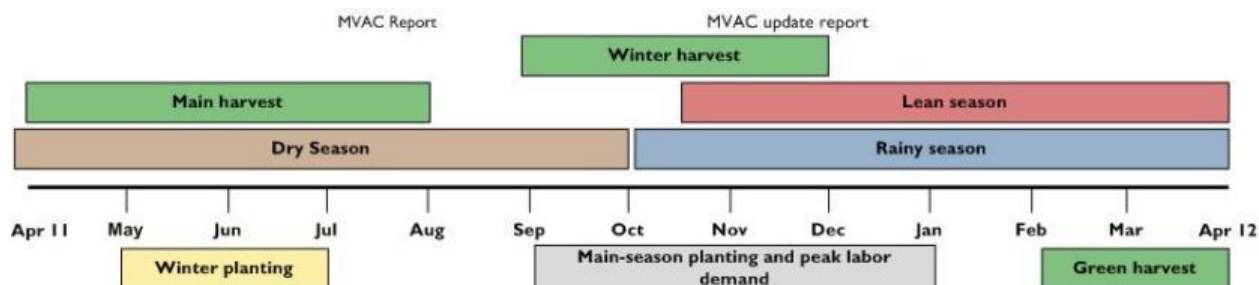


Fig. 10. Seasonal calendar and critical events timeline from the MVAC (Source: FEWS NET, Sep 2011).

Malawi has unimodal rainfall distribution. Food diversification is at the core of the agricultural policy that is giving an opportunity for the sweetpotato crop to be in second ranking after maize. On the basis of project implementation experience in years 1 and 2, we could create a farming calendar for sweetpotato farming system in Malawi (Fig. 11). An integrated sweetpotato production and “1, 2, 3” seed multiplication scheme can be introduced as a model for sweetpotato farming system in Malawi. The calendar of the sweetpotato farming system can fit with the critical events timeline foreseen by the Malawi Vulnerability Assessment Committee (MWAC) in September 2011 to fill in nutritional gaps for the hungry (Fig. 10)(FEWS NET 2011). The calendar of integrated sweetpotato production and the “1, 2, 3” seed multiplication system can be seen in Fig. 11.

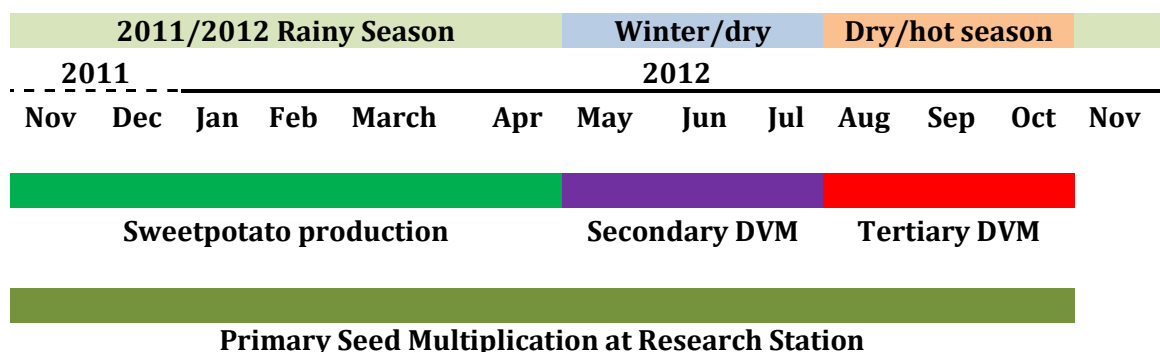


Fig. 11. Integrated sweetpotato production and seed system in Malawi.

#### 4.2.1 Primary multiplication

The primary seed multiplication is at BRS. Currently there are almost 6 ha of land under OFSP Zondeni. A rapid multiplication technique is applied, and the plants are irrigated during the dry spell. On 8 September 2011, the Committee Release Varieties in Malawi has accepted the request of the sweetpotato breeder of DARS based at Bvumbwe to release 7 sweetpotato varieties. Five out of seven are the orange-fleshed sweetpotato varieties. These are BV07/028 (suggested name “Ana

akwanire,” which means “enough for children”) and LU06/0252 (“Kadyaubwelele,” which means “eat and come back to eat again”) both with deep orange flesh; LU06/0146 (“Mathuthu,” which means “big heap of roots”), LU06/0428 (“Kaphulira,” which means “early maturity”), and LU06/0527 (“Chipika,” which means “big log”). The Rooting Out Hunger project is backstopping DARS for multiplication and bringing them to the screening process of sweetpotato virus diseases in Nairobi. An additional 0.5 ha of land is prepared for seed multiplication at primary site at BRS.

As reported earlier (CIP, 2011), primary multiplication is supported by a tissue culture laboratory, a screen house, and a nursery garden. They are ready to provide clean planting materials when needed (Fig. 12).



Fig. 12. Primary multiplication at BRS. CIP lab assistant, Mrs. Chadzala, working with the clean OFSP Zondeni in the screen house.

#### 4.2.2 Decentralized vine multiplication: secondary and tertiary multiplication

The two types of multiplication were described in the CIP Midyear Report submitted in April 2011 (CIP, 2011). The secondary multipliers tend to concentrate on the vine-only approach, whereas the tertiary multipliers who serve their local communities use one dual-purpose approach. Each IP has developed the DVM based on situations and conditions in their implementing areas. Two weeks before harvest, farmers who participate in secondary multiplication begin to harvest their vines, which will be planted at the secondary DVMs. Harvesting vines 14 days before harvest aims at making the sweetpotato roots more durable and less susceptible to postharvest damage (van Oirschot, 2002, <http://www.new-ag.info/02-6/focuson/focuson5.html>). Preharvest pruning has the added benefit of significantly improving shelf life by reducing the occurrence of rot. Two months later, farmers can harvest their vines again for planting at tertiary DVM plots. Table 3 clarifies the two DVMs, and Fig. 11 illustrates a proposed model of the integrated sweetpotato production and the “1, 2, 3” seed multiplication in the sweetpotato farming system in Malawi.

Table 3. Different approaches of the OFSP decentralized vine multiplication

Clarification	Vine Multiplication	
	Secondary Multiplication <i>Principal Goal: Vine Production</i>	Tertiary Multiplication <i>Principal Goal: Dual Purpose (Roots and Vines)</i>
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	Vine cuttings of 30 cm long are planted in ridges. Planting distance within plants is 15 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



Clarification	Vine Multiplication	
	Secondary Multiplication	Tertiary Multiplication
	<i>Principal Goal: Vine Production</i>	<i>Principal Goal: Dual Purpose (Roots and Vines)</i>
	10 x 20 cm). Each DVM/farmer may have a bed of 1 x 20 m.	secondary multiplication if the number of vine cuttings is 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 and nutrition security when facing the dry season in the critical events of the year.

The DVM have been chosen based on access to irrigation. Water is crucial during a certain period of sweetpotato growth to produce a good yield (Villordon et al., 2009). At this point, the Rooting Out Hunger project wants to support this irrigation. A number of irrigation kits have been ordered, and they will be distributed in the areas where rainfall is scarce. The detailed numbers of DVMs of each location in all the districts can be read from the reports of each NGO partner (Annexes 5–9). Furthermore, Mr. Enock Mthepheya, a district agriculture officer from Dedza, has done a study. His contribution from his diploma study to the project is on the DVM scheme. His report is entitled “Relating the impact on scaling out sweetpotato production under smallholder farmers in Bembeke and Kanyama EPAs.” He received his Diploma Certificate in July 2011 from the Natural Resources College in Malawi. Part of the research was sponsored by the Rooting Out Hunger project. The results of his study are available in Annex 10.

### 4.3 Trainings, Visits, Meetings, Monitoring and Evaluation, and Field Days

Training of trainers and farmers, visits, and field days were planned and implemented. The training activities on how to grow sweetpotato, weeding, preparing the nurseries, utilization of storage roots, harvesting and postharvest handling, and nutrition were mostly conducted by IPs, and the reports can be found in Annexes 1–9. Visitors from Ireland visited the project areas often. These visits were described in the CIP Midyear Report. Farmers in Dedza District received an honorable guest from Ireland on 14 June 2011. This type of visit had an extraordinary impact on everyone involved in the OFSP program. Fig. 13 is of the Hunger Task team, the latest visitors from Ireland. They visited Dedza District on 29 September 2011. CIP backstopped the CU team in Dedza to prepare the OFSP products.



Fig. 13. Visit of Hunger Task team from Ireland to Dedza on 29 Sep 2011. OFSP DVM (left), OFSP products (middle), and pit storage small scale trial (right).

#### 4.4 Intercropping Maize and Sweetpotato: A Demo On-Station Trial

Intercropping sweetpotato with other crops is one of the opportunities could be practiced in Malawi as a highly populated country (see Table 10). However, intercropping sweetpotato and maize was not yet on the research agenda; hence, this practice approach could not be conducted on-farm. However, we got a solution to do it on-station. As mentioned in the CIP Midyear Report, “*seeing is believing*” is our motto for transferring technology to farmers. Conducting field days is one best-practice approach. Two field days about intercropping maize and sweetpotato were organized at BRS. The first one was on 9 May 2011 and the second on 22 August 2011 (Figs. 14–17). The results were reported and discussed during the Horticulture In-House Meeting on 5–6 September 2011 (Annex 11). On the first field day, 52 people from five districts attended, and on the second field day, 72 people from five districts visited BRS. The participants were field managers of NGO partners, government extension staff, and farmers’ representatives. Because of limited transportation and the relatively long distance to Bvumbwe, we could not invite many farmers to BRS.



Fig. 14. Field day on 9 May 2011. Dr. Felistus Chipungu (DARS) and happy labors with soft drink.



Fig. 15. Field day on 22 August 2011. Screen house visit (left), OFSP Zondeni harvested at seven months after planting (middle), and Hazel from CU Dedza receives a slicer from the project leader (right).



Fig. 16. Field day on 22 Aug 2011 at BRS. Tasty bites from OFSP French fries and diffusion of knowledge from CIP and DARS scientists.



At the first field day when both crops were still in the field, we collected the perception of participants who ranked all treatments. Table 4 shows the results. The participants ranked “1” on the treatment in which we planted two rows (ridges) of maize and one row of OFSP (Treatment 3). It is an indication that maize is the first crop in Malawi. Ranking “2” went to the treatment in which we had two rows of sweetpotato and one row of maize (Treatment 1). This ranking implies that sweetpotato becomes the second crop after maize.

**Table 4. Result collected from participants’ opinions on treatments and their ranking at the field day on 9 May 2011**

Treatment No.	Description	No. of Participants	Treatment Rank
1	2 ridges Zondeni and 1 ridge maize	13	2
2	1 ridge Zondeni and 1 ridge maize	12	3
3	1 ridges Zondeni and 2 ridges maize	24	1
4	1 maize plant and 3 Zondeni plants on same row (intraplanting)	3	4
Total		52	

The gross margin was analyzed (Table 5). In contrast to the ranking results, Treatment 1 (two rows sweetpotato and one row maize) has shown the best to generate income, followed by Treatment 4 and 2. Interestingly, Treatment 3 (one row of sweetpotato and two rows of maize) is seemingly having the least profit. As we were doing the trial in one season and one location, we cannot draw a conclusion for a research recommendation. We need to repeat this type of trial for two more planting seasons. This remarkably initial finding can be further found in Table 6 and Fig. 16. The yield was also compared among the three different periods of sweetpotato harvest. Maize was harvested once at four months after planting (MAP). It is likely that sweetpotato has slowly taken some advantages from this intercropping with maize. As we can see from the yield results recorded (Table 6).

**Table 5. Gross margin analysis for intercropping maize and OFSP Zondeni per ha (in USD)**

	Treatment 1	Treatment 2	Treatment 3	Treatment 4
<b>A. Income</b>				
Maize yield (shelled after drying) (t/ha) ( $p < 0.01$ ; LSD 5% = 0.6)	5.1	5.3	4.6	4.1
Zondeni marketable yield (t/ha) ( $p < 0.05$ ; LSD 5% = 6.6)	28.8	21.2	19.5	26.5
Sale of maize (Mk 35/kg)	1,081.8	1,124.2	975.8	869.7
Sale of OFSP (Mk 100/kg)	17,454.6	12,848.5	11,818.2	16,060.6
<b>Total Income</b>	<b>18,536.4</b>	<b>13,972.7</b>	<b>12,793.9</b>	<b>16,930.3</b>
<b>B. Expenditures</b>				
Maize seed	108.9	108.9	108.9	108.9
OFSP vine cuttings	116.0	116.0	116.0	116.0
Labor (land preparation, planting, weeding, fertilizer application)	1,964.1	1,964.1	1,964.1	1,964.1
Fertilizer for maize only	101.8	105.2	101.1	105.2
<b>Total Expenditures</b>	<b>2,290</b>	<b>2,294.2</b>	<b>2,290.1</b>	<b>2,294.2</b>
<b>Profit</b>	<b>16,246.2</b>	<b>11,678.5</b>	<b>10,503.8</b>	<b>14,636.1</b>

Table 6 shows that high significance is met on weight of marketable roots and total yield. There was no significant difference between harvesting at 5 and 6 MAP, but the difference was significant at 7 MAP. Number of roots was increasing at 6 MAP. This could be possible because the sweetpotato did not compete with maize, as maize had been harvested two months earlier. Furthermore, seeing the results at 7 MAP, the storage roots were becoming bigger, thus, the marketable weight and total yield were significantly high. Because we did not standardize the size when judging the roots for nonmarketable and marketable uses, it is possible that the criteria for marketable size and nonmarketable size have changed. We saw that the number of marketable roots per plot at 7 MAP is less compared with the number at 6 MAP. Additionally, the roots (Fig. 17) and vines (stems) at seven MAP were noticeably clean; no sweetpotato weevil incidence was recorded. In that period, the weevil population was obviously maturing. We saw other sweetpotato fields that were attacked by weevils. We suggest that the clean roots and vines (stems) were due to intercropping with maize. This initial observation could be confirmed with the findings by Nampeera, et al. (2011) that the nonhost sweetpotato weevil crops could be useful as crop barriers to reduce weevil infestation on sweetpotato stem and storage roots. They suggested planting maize and/or onion next to sweetpotato fields. As we have a big problem with sweetpotato weevil in Malawi, which the baseline survey confirmed (Fig. 19), we could advise multipliers and farmers to grow maize or onion as crop barriers. This advice can help secondary and tertiary multipliers (DVM) produce clean OFSP planting materials.

**Table 6. OFSP harvest at 5, 6, and 7 months after planting (MAP)**

Harvest	Number of Marketable Roots Per Plot	Wt Marketable Roots (t/ha)	Total Yield Storage Roots (t/ha)
5 MAP	277	10.8	12.5
6 MAP	401	15.9	18.7
7 MAP	292	45.2	50.7
P-value	(*)	**	**
LSD	(90.8)	5.74	5.60
Grand mean	323	24.0	27.3
cv (%)	40.1	28.3	24.2



*Fig. 17. Clean OFSP storage roots from a plot intercropped with maize harvested on 22 Aug 2011 at 7 MAP. (The size of the storage roots depicted does not show the big roots).*

#### **4.5 Formative Research: A Key Note Taken from the Report of Dr. Beatrice Mtimuni**

In year 1, a formative research was planned as a part of an MSc study. The result could create a strategy for conducting a demand creation campaign of OFSP. However, the project did not succeed

in identifying a MSc student in Malawi to carry out the research. The funds were brought forward to year 2, and Dr. Beatrice Mtimuni from Bunda College was contracted to do the research. A report will be submitted by the project separately. The following paragraph is a key note from the report.

The national policies and strategies in agricultural and health components are essential on the promotion of new initiatives like inclusion of OFSP in people's diets since the policies offer guidance of what can legitimately be implemented or not. In Mozambique, the integration is promoted at service delivery points including hospitals. Furthermore, efforts were made to ensure that the messages given to individuals do not conflict against each other in any way. The Malawi Growth and Development Strategy (MGDS) is a guiding document for achieving strong and sustainable economic growth, building a healthy human resource base, and protecting the vulnerable groups. It also advocates for economic empowerment and food security at the household level using harmonized messages. The government of Malawi realizes that nutrition is not an issue for the Ministry of Health alone. Therefore, in the operationalization of both the National Nutrition Policy and Strategic Plan and the Infant and Young Child Nutrition Policy, several partners have been outlined, including Ministries of Agriculture and Food Security, Education, Trade, Women and Child development, and many more. Roles and responsibilities for each of the ministries are clearly outlined. Integration of nutrition and health components and indeed other components like education are taken into consideration at every level. This therefore already creates a favorable environment for implementation of the nutrition programs.

## **4.6 Baseline Survey**

A delay occurred in conducting the baseline survey. It was supposed to be conducted in year 1 of project implementation. However, the baseline survey could begin only in November 2011. Some interruption occurred during preparing the survey report as well. The person who was responsible for this survey suddenly got another job, although he completed the survey. Nevertheless, we needed to request Dr. Kirimi Sindi from CIP-Nairobi to finalize it. He led a team in analyzing data and writing the report. The baseline survey report will be submitted separately. The key findings of the baseline survey are briefly described in the following section.

### ***4.6.1 OFSP baseline survey design: note from Owen Sopo, former CIP marketing staff from Malawi***

CIP-Malawi conducted the baseline survey over a 4-week period in October-November 2010. This is a critical lean period in terms of sweetpotato availability in production areas and local markets. However, it is also the period that sweetpotato is readily available in some parts of Chikwawa where it is grown using residual moisture from Shire River and its tributaries flood areas.

The baseline survey was designed to

1. Collect baseline values of impact indicators and other information that will help the project to refine its implementation approaches;
2. Include quantitative household indicators in relation to food and nutrition security and capacity and potential for improving or modifying OFSP production and consumption;
3. Capture indicators that must be comparable to a final evaluation; and

4. Be completed within the first few months of the project so that the baseline information is affected to a minimum extent by project interventions.

### ***Study areas***

The study was conducted in Dedza in central region and Zomba, Chikwawa, and Phalombe Districts in the southern region of Malawi. In Dedza, the study was done in Bembeke and Kanyama extension planning areas (EPA); Thondwe EPA in Zomba; Livunzu, Mbewe and Mitole EPAs in Chikwawa; and Naminjiwa and Waruma EPAs in Phalombe. A total of 71 villages were targeted across these eight EPAs. There are insignificant variations in the farming systems within an EPA, which usually comprises an extensive area with similar ecological conditions, farming practices, and livelihood patterns.

### ***Survey data***

The baseline survey used a structured questionnaire to gather data from respondents. The questions were designed to measure (1) population socioeconomic characteristics and targeting criteria, (2) impact and process indicators (both health and well-being status, access to information, and potential for integrating OFSP in their farming and consumption systems and practices), and (3) outcome indicators (household and individual production and feeding behaviors). Subsequent evaluation studies will also analyze data on level of exposure to project interventions and activities.

### ***Sample size and sampling procedures***

The sample size was planned to be adequate to obtain baseline information not only for the whole project area but also for a particular district. The individual sample size must provide results that can be interpreted for a particular IP's geographic target levels. A total sample size of 500 was determined, with 250 beneficiaries and 250 nonbeneficiaries. Except Chikwawa, which had larger geographical and population coverage, 120 respondents were targeted in each district. In Chikwawa, 140 respondents were targeted. Due to reasons like nonresponse and uncompleted interviews, only 482 households were interviewed (Table 7).

**Table 7. Distribution of respondents by district**

District	No. of Beneficiaries	No. of Nonbeneficiaries	Total
Dedza	63	53	116
Chikwawa	62	50	112
Phalombe	66	62	128
Zomba	67	59	126
<b>Total</b>	<b>258</b>	<b>224</b>	<b>482</b>

The sampling frame consisted of two groups of farmers, namely, OFSP beneficiaries and nonbeneficiaries. The list of villages where the project IPs are working for the OFSP project were provided by the respective NGO in each district, namely, Concern Universal (CU) in Dedza and Phalombe; Millennium Villages Project (MVP) in Zomba; and Catholic Development Commission (CADECOM) in Chikwawa. These villages formed the sampling frame for first-stage sampling of beneficiaries. A similar list of villages where these IPs are not working and do not intend to work in the next few years was provided by the IPs in collaboration with public extension agents working in those areas. These formed the sampling frame for the first stage of nonbeneficiaries.

### ***Beneficiary sampling***

Within each project village, the respective IP NGOs provided a list of identified OFSP beneficiaries, which included details like whether the household had children less than 5 years of age,

lactating/pregnant women, orphans, person living with HIV and AIDS, and other vulnerability indicators. In the second stage, villages were sampled using simple random sampling. Within each sampled village, purposive sampling was used to sample households with children less than 5 years of age. Thereafter, enumerators used a random walk to select the households.

### ***Nonbeneficiary sampling***

From the list of nonproject villages provided by the partner NGOs in collaboration with public extension agents, an equal number as was sampled in beneficiaries' villages was selected using simple random sampling. Because there was no complete village listing and this was not possible within the limited time and resources available, a random walk was again used to select nonbeneficiary households with children less than 5 years of age.

### ***Survey measurement units and respondents***

Measurement units and survey respondents per the indicators data collected. For most of the indicators, the measurement unit was a household and respondents were knowledgeable household adults. For example, some quantitative indicators relate to the household as a whole, and therefore, the unit was the household and the respondent was any knowledgeable household adult available at the time of the survey. However, some measurement units and respondents were children within the household, and hence, their caregivers/mothers were specifically targeted to provide information about the children.

#### ***4.6.2 Preliminary results from the OFSP baseline survey: Note from Christine Kiria and Kirimi Sindi (CIP-Nairobi)***

Issues with the data collection period:

- Data was collected when the OFSP intervention and awareness campaign had already started in Dedza, Zomba, Phalombe, and Chikhwawa.
- Data was collected in November 2010, a year in which the dry spell was prolonged. Thus, this was a period when most households were involved in land preparation, so they had only minor harvest of sweetpotato that affected their consumption pattern.
- Consumption of sweetpotato at this period was expected to be low.

A few results are reported here; a full report will be submitted separately.

The demographic data can be seen in Table 8. From the household interviewed, 12% were female-headed households. The household heads were relatively young, with an average age of 36 years. The level of education of the respondents was pretty low, with an average of 6 years of education.

**Table 8. Demographic data**

	Dedza	Zomba	Chikhwawa	Phalombe	Overall
Female-headed household (%) (N = 484)	14.4	16.5	8.0	8.7	12.0
Mean age of household head in years (N = 435)	35.6	36.0	38.5	35.2	36.2
Mean education level of household head in years (N = 478)	4.8	6.9	5.6	6.3	6.0

Marital status of household heads is shown in Fig. 18. The results demonstrate that a family unit is still very important in the study area. This finding will guide the type of messages that should be crafted in promoting OFSP. Table 9 shows the value of household assets. The average asset value was US \$82 and the median US \$48.

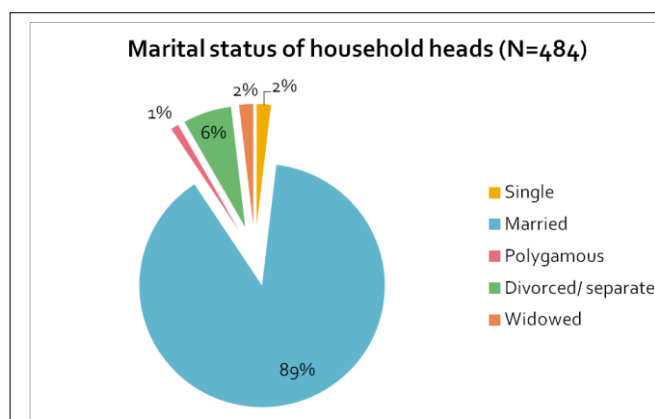


Fig. 18. Marital status of household heads from the five districts in Malawi

Table 9. Household assets value (N = 463)

District	Mean (Malawi Kwacha)	Mean (US \$)	Median (Malawi kwacha)	Median (US \$)
Dedza	16,888	111	8700	57
Zomba	12,907	84	7850	51
Chikhwawa	11,243	74	7300	48
Phalombe	9,385	61	6555	43
Overall	12,566	82	7275	48

From Fig. 19, it can be concluded that majority of the households had grass thatch roofs that might indicate a high poverty incidence (or low accumulation of wealth).

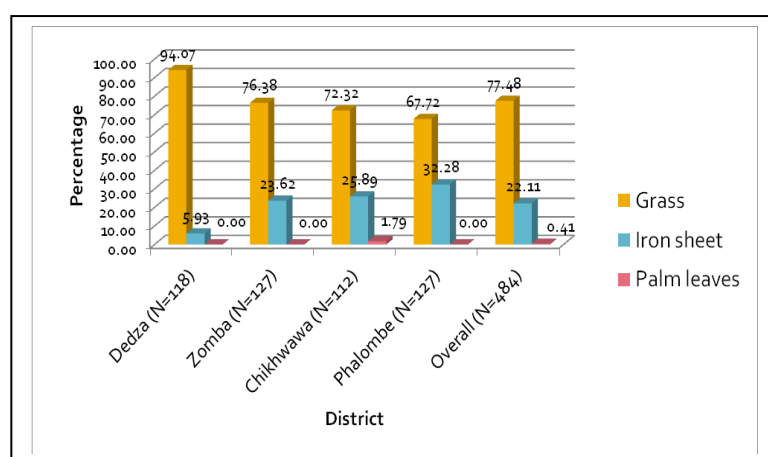


Fig. 19. Percentage of households with different types of roofing for main house (by district).

Table 10 shows land ownership and utilization. A high percentage of the land was used for crop production. The implication is that sweetpotato or any other new crops have to be competitive to get space in the household enterprise because something else has to be sacrificed. It is suggested that there is a need for effective communication to beneficiaries of the importance of OFSP in terms of vitamin A. Furthermore, an introduction of cultural practices, like intercropping with OFSP, could be one of the best options (see section 4.4 of this report and Annex 11).

**Table 10. Land ownership and utilization**

District	Mean Land Ownership (ha)	Mean land Utilization (ha)	Proportion of Land Used (%)
Dedza	1.45	1.42	97.93
Zomba	0.91	0.89	97.06
Chikhwawa	1.35	1.27	94.08
Phalombe	1.28	1.27	99.06
Overall (N = 484)	1.24	1.20	97.10

Sweetpotato weevil was a significant problem in the intervention areas in Malawi. The initial observation about using a nonhost of the sweetpotato weevil as a barrier was discussed in an earlier section.

#### **4.7 Nutrition Education and Communication Strategy**

Margaret McEwan, CIP nutritionist and partnership specialist based in Nairobi, contributed to the project by providing results on the “partnership health check-ups” (Annex 1A), working with Dr. Beatrice Mtimuni on the Formative Research Study, and making a proposal on the information education and communication (IEC) activities. She recommended that the project conduct workshops and training on nutrition as well as produce IEC materials (Annex 1B). For the graphics work on the IEC materials, she suggested that this could be done by the CIP communication specialist based in Lima, Peru. She proposed a budget of US \$30,335 for these activities. The budget is planned and allocated in year 3 project implementation. The proposal is now with Mrs. Ruth Butao Ayoade, Irish Aid’s hunger and nutrition advisor, for review. Mrs. Catherine Mftlodze, a national member of the SUN 1000 Special Days movement based in Zomba (MVP), is breaking down the budget calculated by M. McEwan. As mentioned earlier, that the Rooting Out Hunger project is now focusing its activities on the nutrition education and communication.

#### **4.8 Postharvest Handling and Triple S**

As mentioned in the CIP Midyear Report (CIP, 2011), a month before sweetpotato harvest, CIP staff trained NGO IPs, extension staff, and a few farmer leaders and beneficiaries on postharvest handling and on taking samples for assessing the yield estimate plot. The training was also about pit storage and triple S (roots store in the sand and sprouting). Average yield was calculated, and the results are summarized in Table 2. The average yield was 18 t/ha. The performance of the OFSP yield is good, and it is better than the average yield of 6 t/ha in Malawi. The results from pit storage and triple S observations cannot be captured in this report because the observation is still going on (Fig. 20 and Annexes 12 and 13).





*Fig. 20 CIP-Malawi field assistant John Kazembe training the triple S (left), triple S being practiced by farmers (middle), and pit storage adopted by farmers (right).*

#### **4.9 Awareness Campaign**

The OFSP awareness campaign is preferably done over a month, shortly before farmers begin to prepare land for cultivation. It is believed that information can be strategically and effectively disseminated during this period.

The OFSP awareness campaign is targeting the politicians, policymakers, people who are working in education, etc. Our participation in the Knowledge Fair and IFPRI conference on 26–27 September 2011 is an example. There were 130 people who attended the conference, including the Irish ambassador, Irish Aid team, U.S. ambassador, ministries of finance, health, and agriculture, IFPRI Uganda and Malawi, and people at international and national organizations and universities. The Rooting Out Hunger project presented in a panel discussion and displayed OFSP foodstuff (e.g. juice from leaves and roots, doughnuts, queen cake, crisps, golden buns); strips, banners, and brochures about SPHI and the Rooting Out Hunger project (Annex 14), the Irish potato and sweetpotato poster, and OFSP recipes (Fig. 21).



*Fig. 21. Rooting Out Hunger participated in a high-level policy conference on 26–27 September 2011 in Lilongwe.*

The conference aimed at bringing the three sectors (agriculture, nutrition, and health) together to unleash the potential for agriculture—as a supplier of food, a source of income, and an engine of growth—to sustainably reduce malnutrition and ill health.

##### **4.9.1 Promotional material**

Chitenje is a wrapping cloth particularly for women in Malawi. Three thousand pieces of chitenje have been designed and manufactured in Blantyre (Fig. 22). In Malawi, a chitenje is very important to women. The cloth is used for wrapping a woman's body when she goes to a meeting, market, church or mosque; works in the field and at her community base; visits friends, family, and cooks at home, etc. It is also a traditional way to give respect to people when she visits them. Therefore, the chitenje is an important tool to promote OFSP. Supported by a strong message written on it, "The Vitamin A Power Food Once a Day, The Healthy Way" in both English and Chichewa (the local



language), we expect that this message can be disseminated very easily to a wide scope of Malawians. The message and design were inspired by Dr. Jan Low, the SPHI leader of Sub-Sahara Africa based in Nairobi. We are planning to make a revolving fund out of selling this cloth using its basic price. We like to give away the first chitenje for free, but the second, third, and fourth ones are not free. Each chitenje is 2 m long.



Fig. 22. Chitenje: fashion dress, wrapping cloth, and chef's cloth.

Brochures/leaflets about the Rooting Out Hunger project were distributed widely. Governmental and nongovernmental IPs and other institutions and individuals interested in sweetpotato activities in Malawi have received OFSP brochures. Seven hundred brochures about the Rooting Out Hunger project have been given away (Annex 14) and 200 brochures about both the potato and sweetpotato Irish Aid-funded projects in Malawi were distributed.

#### 4.9.2 Radio Program

Working with Irish Aid Communication Advisor Laura Lalor and NASFAM, the Rooting Out Hunger project set up nine radio programs. The program is from 14 September to 9 November 2011. The program content is in Annex 15.

#### 4.9.3 Challenges

The main challenge is the continuous fuel crisis that started in October 2010. We had to adjust the awareness campaign activities by concentrating only at the district level. Annex 16 is an example of the awareness campaign done in Phalombe District where the adoption of growing OFSP was low in Year 2. We focused on a critical area where people still had little knowledge about the OFSP and its nutrition.

## 5 LESSONS LEARNED AND NARRATIVE BY IMPLEMENTING DISTRICTS

### 5.1 Dedza District (1900 masl)

Managed by Concern Universal. The full report from Dedza is in Annex 6.

On benefits, the project received reports that more farmers have sold and realized Mk 120,000 (US \$800) after selling sweetpotato tubers. One farmer, Mr. Chimpikizo, won contract in South Africa to supply sweetpotatoes. The buyer agreed to buy each bag of 50 kg at MK 8,000 (US \$53). As a result, Mr. Chimpikizo plans to increase his production to meet the market requirement. He lives in Kauye Village, Traditional Authority (TA) Kamenyagwaza, Bembeka extension planning area (EPA). Kauye Village is situated 16 km from Dedza. The CIP Midyear Report (CIP, 2011) reported that Mr.

Chimpikizo generated as much as US \$429 income from selling OFSP vines (from vouchers US \$28 out of US \$429).

The project issued sweetpotato vines to over 3000 households in Kasumbu, Chafumbwa, and Bembeke EPAs. The project estimated a total of 918 as indirect beneficiaries who got seed through sharing with relations and friends. Currently, the project has raised 618; out of that number, 217 are tertiary, and the rest are secondary multipliers for 2011/2012 growing season. Many farmers have opted for individual nursery development, as some members do not show much commitment to group nursery development. At Nangantani, the group planted 3.5 ha of land of sweetpotatoes for both seed and food production.

In the 2010/2011 rainy season (through March 2011), the Rooting Out Hunger project issued vouchers worth US \$4,890.80 to CU-Dedza. This amount was for the DVMs to redeem costs of maintaining their nurseries (CIP, 2011).

### ***Challenges and solutions***

Frost damaged a great number of farmers' nurseries, which forced them to replant sweetpotato vines. The project needs to look into the issue and possibly come up with an alternative variety that is frost resistant. At Nangantani irrigation site, farmers failed to control goats that, as a result, destroyed the 3.5 hectares of land planted with Zondeni sweetpotatoes. Communities failed to tie up the goats as they are tethered to ropes during rainy season. Efforts to resolve the issue failed due to lack of cooperation from the surrounding village leaders who do not participate in the initiative.

### ***Lessons learned***

Most farmers have realized that selling of Zondeni sweetpotato vines is a way of generating income. Most vine multipliers have doubled the size of their nurseries compared with last year. It was pleasing to note that, although most of them faced frost damage, they reestablished their nurseries. The project has noted that Zondeni is selling like hot cakes at the markets. Most people prefer using Zondeni tubers and leaves compared with other varieties.

## **5.2 Zomba District (1141 masl)**

Managed by MVP. The full report is available in the Annex 9.

In partnership with CIP, MVP has managed to encourage more women to join OFSP utilization and processing groups, which are enhancing their skills on meal preparation and have become a means of generating income by producing various products. A total of 628 "students" have been trained, and each in turn trained five more women.

The women groups have had the chance to display their products at events such as the National Agriculture Fair, IFPRI conference, World Food Day, and field days, which has given them a platform to exchange knowledge with others.

The OFSP vine multipliers club has generated income for its members. They noticeably made as much as MK 350,000 (US \$2,333). They were able to buy iron sheets and bicycles, and some have built houses. The club has noticed that the OFSP business is more profitable than growing maize and tobacco.

Sixteen groups on vine multiplication (comprising of 112 men and 198 women) have 2.5 ha of nurseries. From these nurseries, they provide 18,000 kg of vines distributed to 4500 farmers

covering 45 hectares in all seven clusters. Of the 4500 farmers, 2900 were women and 1100 men. Moreover, two schools from Dindi and Katete received 300 kg of vines for school garden program. The project also trained 350 farmers on vine multiplication, root storage, and pest and disease control.

In the 2010/2011 rainy season (through March 2011), the Rooting Out Hunger project issued vouchers worth US \$3,358.30 to MVP. This amount was for the DVMs to redeem costs of maintaining their nurseries (CIP, 2011).

### **Challenges**

- No information education and communication (IEC) materials on OFSP production, utilization, processing, and storage
- Increase in women groups has increased the equipment requirements (e.g., solar dryers)
- An overwhelming demand for the OFSP vines is due to the awareness campaigns; however, there is not enough seed to meet demand
- No postharvest technologies for storage of the roots

### **Opportunities**

- Develop IEC material on production, postharvest handling, and nutrition
- Research storage of roots
- Increase the land of all vine multipliers to meet demand
- Buy more solar dryers or source material to make locally
- Conduct more awareness and sensitization on OFSP
- Roll out OFSP utilization to the four remaining clusters

## **5.3 Phalombe and Mulanje Districts (756 masl)**

Managed by CU under the MOBI+LISE project based in Mulanje. The full report is in Annex 8.

Noting that there was a surplus of OFSP vines in the nursery, the project managed to establish the demand for OFSP vines. It was discovered that there was a very big demand for OFSP vines both within and outside of project impact area; however, there were no coupons to distribute to farmers then. The demand within the Concern Universal project impact area was at 973 households, of which 635 farmers were female, and 338 farmers were males. Noting that these farmers had abundant water supply and land, the project recommended supporting these farmers because they could be a good source of OFSP vines in the 2011/2012 rainy season to achieve a target of 6000 beneficiaries.

After selling vines through a voucher system, the project sought a market for the surplus vines. These vines were bought by the USAID Mount Mulanje MOBI+LISE project using direct cash from USAID. The USAID project procured 773 bags weighing 8 kg (or 1546 bundles weighing 4 kg), which was equivalent to MK 239,630.00 or US\$ 1598.00. These vines were then distributed to additional households both within the CIP-targeted beneficiary villages and outside the villages. A total of 559 beneficiaries (194 males and 365 females) benefitted from MOBI+LISE support. All DVMs were happy to see their vines procured by MOBI+LISE project.

Field visits in all 16 secondary vine nursery sites were conducted to assess the progress of the OFSP vines. It is very encouraging to note that all secondary vine multipliers have planted vines and that some are taking very good care of them. Most vine multipliers planted as early as May, whereas some planted in June, July, or August. It is worth mentioning that some secondary vine multipliers

have a deficiency of vines; hence; they need extra seed. However, some DVMs neglected to follow recommended practices for rapid seed multiplication. These DMVs were advised to follow recommended practices, such as fertilizer and manure application, uprooting infected plants, planting at a recommended spacing of 20 cm by 10 cm, planting on a pure stand (i.e., not mixing with other crops), and planting OFSP vines away from other varieties. Despite these challenges, a few secondary vine multipliers who have followed recommended practices have a very good stand of vines (Fig. 23).



*Fig. 23. Mr. Andack Kapenuka irrigating his OFSP nursery using a watering can (background is Mulanje Mountain).*

In the 2010/2011 rainy season (through March 2011), the Rooting Out Hunger project issued vouchers worth US \$887.60 to CU-Phalombe (in December 2010). This amount was for the DVMs to redeem costs of maintaining their nurseries (CIP, 2011).

### **Challenges**

**Pests.** The major pests that caused a reduction of the plant population were ground worms. They cut sweetpotato roots, killing the plant. This was noted by most of the vine multipliers. As a solution, farmers were advised to apply tamalon or liquid actellic to get rid of underground worms or to rotate a nursery site. Further investigation of the pest incidence will be done in the coming year, so this observation could be visibly defined.

**Diseases.** The major disease that poses a big threat to quality vine multiplication was sweetpotato viral disease, which affects the growth of the plant. As a solution, farmers were encouraged to uproot any infected plant and rotate nursery site to reduce spreading the disease.

**Cold weather.** Some vines wilted due to cold weather in some soils; this might be caused by icing of plant water. There is a need to delay planting vines in such soil conditions until early summer.

**Waterlogged soil.** Some soils are water logged, which either kills or stunts vines. In addition, well-established vines died with too much water, conditions that start as early as December. This situation requires transferring all vines before the soils become flooded.

## **5.4 Chikhwawa District (400 masl)**

Managed by CADECOM. The full report is in Annex 7.

CADECOM works in three EPAs, namely, Livunzu, Mbewe, and Mitole. We conducted farmer training on sweetpotato production for 90 selected farmers. The training sessions were conducted at EPA levels for the AEDCs and their staff. The aim of the training was to impart knowledge to farmers on how to produce Zondeni sweetpotatoes through either summer cropping or the irrigation system.

The course covered the importance of sweetpotato as a crop; sweetpotato varieties and yield potential; criteria for sweetpotato site selection and land preparation; selection and preparation of planting materials; planting procedures and field management; sweetpotato diseases and pests; harvesting sweetpotatoes and sweetpotato vines; seed multiplication; and management of sweetpotato planting materials.

CIP procured and distributed seven moneymaker treadle pumps to farmers in Mitole EPA who applied for the service. These will go to clubs in the EPA, especially to those who have water sources for irrigation. The pumps arose from the supervisory visit by Laura Blessings and Dr. Abidin Erna Putri, who came to the area to see the progress of sweetpotatoes production through summer cropping. During their visit, the communities requested treadle pumps and sweetpotato vines for the Fombe area. An approval was made on the day, and a request for 99 farmers to benefit from sweetpotato vines was made thereafter. This consignment was bought from Mr. Exford Shukudu Dimo in the Mitole EPA. The vines were intended for production and multiplication through nursery establishment. Each of the farmers received 4 kg of sweetpotato vines.

In the 2010/2011 rainy season (through March 2011), the Rooting Out Hunger project issued vouchers worth US \$2,094.60 to CADECOM-Chikhwawa. This amount was for the DVMs to redeem costs of maintaining their nurseries (CIP, 2011).

#### **5.4.1 Mitole EPA**

The EPA targeted 600 farmers on sweetpotato vine multiplication sensitization. There were 529 farmers who received seed vouchers from CIP. The vouchers were issued to 282 men and 247 women. The EPA established 5 hectares of sweetpotato vines. Additionally, 99 farmers in the Fombe area received sweetpotato vines for multiplication. The area also established two nurseries for sweetpotato vines.

The EPA conducted two farmer field days on sweetpotato multiplication. The field days were attended by 63 men and 156 women. One of the decentralized farmers, Mr. Dimo, was able to sell vines to various organizations. He realized around MK 200,000 (US \$1,333). With other organizations buying from the decentralized farmers, it was essential to follow up on the farmers who eventually received vines as part of the multiplier effect of OFSP.

#### **Challenge**

Dry spells affected the area, resulting in low yields per unit area and loss of sweetpotato vines.

Research trials at Mr. Dimo's farm were undertaken. Yields for Zondeni were very low compared with other orange varieties. The research findings might help provide some recommendations on Zondeni variety production.

#### **5.4.2 Mbewe EPA**

Mbewe EPA has two decentralized farmers. They were able to sell 15 bundles of good-quality sweetpotato vines at MK 160 (US \$1.10) each. The EPA identified 658 farmers to benefit from seed multiplication, but only 557 received sweetpotato vines for multiplication through the voucher

system. The EPA established 5.5 ha of sweetpotatoes garden. It conducted farmer field days on OFSP production and multiplication at Mangulenje and Malemia.

### ***Challenges***

Some of the challenges the EPA met included:

- Drought affected the area, especially in the upper land, and most of the vines were scorched.
- Fuel shortage made supervision and follow-up difficult.

### **5.4.3 Livunzu EPA**

There were 64 secondary vine multipliers identified in the area. They were encouraged to plant for production instead of multiplication in the 2010/2011 rainy season. Livunzu received 941 vouchers for beneficiaries to receive 4 kg of sweetpotato vines for both production and multiplication. The EPA established 10 ha of sweetpotatoes for both primary and secondary multipliers. In addition, the EPA conducted two farmer field days at Mtendere and Liphangwi sections attended by 343 farmers.

### ***Challenges***

- Dry spell that affected production. Few farmers doing well in that many lost their seed due to drought that hit the EPA.
- It was encouraging to note that there were vines available at a decentralized farmer amounting to 0.1 hectare. The vine multiplier was able to irrigate his land using treadle pumps. Other farmers were able to source vines at MK 300 (US \$2) per 50 kg bag. In this EPA Zondeni production was noted to be low if use of residual moisture. Production was, however, higher if grown under irrigation (i.e., Mapelera section).

## **5.5 Salima District (514 masl)**

Managed by community-based Kachele Club. Detailed information about this club is in Annex 5.

Kachele Club is in the area of Traditional Authority Kalonga, about 10–12 km Central East of Salima District. It is located in the village headman Simaewa 2. The club was started in 2001 by local farmers for the following reasons:

- The farmers had problems reaching places where they could easily get vegetables to feed their families because the markets were very far.
- Because they are in a remote area where the source of money is limited, it was very difficult for people to sustain their lives. They decided to grow vegetables to feed their families and sell the excess in the market.

The club has 47 members from four villages: Simaewa 1, Simaewa 2, Kafota, and Chenyama. The club has 10 men and 37 women.

The local farmers at Kachele Club are very happy with the CIP's involvement. CIP has introduced orange-fleshed sweetpotato farming. The sweetpotato crop was left behind for a long time in this area.

In September, CIP has given five bags of vine cuttings to start with. CIP has provided some training on how to make good nurseries and recommended dimensions for each bed (1 m by 20 m). From these vine cuttings, they have managed to make five beds. Soon after planting, the vines were watered and mulched to protect the vines from the sun, as the air temperature is relatively hot in Salima. According to Mr. Phiri, the plants have grown well (the average length of stem is 60 cm) and

are suitable to make another multiplication (personal communication 26 October 2011). We instructed them to start another series of rapid multiplication. They started developing another 25 beds, so they will have 30 beds altogether. Each bed has 1000 plants. At Kachele Club, they could manage to have the multiplication rate of 1:5, meaning that out of one plant can produce five other cuttings after one month. They applied the optimum nursery management skills.

By 2012, they hope to reach half of the communities with these sweetpotato vines. As we are also working with primary schools, the club is going to introduce the program so that each school can have at least a small garden. With help from CIP, they are also hoping to reach all of Salima and to be able to sell OFSP vines to FAO, in addition to self-consumption for food and nutrition security.

## **6 FINANCIAL REPORT**

The detailed financial report is reported separately for submission with this technical report.

## **7 GENERAL DISCUSSION AND CONCLUDING REMARKS**

### **7.1 Voucher System**

A subsidized voucher is a useful tool for reaching the many poor, nutritionally at-risk households. Moreover, a voucher significantly assists multipliers in developing their OFSP nurseries for generating income to sustain their livelihood.

We started issuing a voucher system for beneficiaries who were planting the OFSP for the first time in the 2010/2011 rainy season (November 2010). The vouchers that were distributed were budgeted from year 1 project funds. In a voucher scheme, each beneficiary carried a voucher with a value of Mk 155 (US \$1.03) and gave it to a DVM in exchange for 300 vine cuttings (OFSP planting material). Meanwhile, the DVMs were built up using the project budget of year 1 (1 October 2009 to 30 September 2010). Further information on the voucher system can be read in the project reports by CIP in 2010 and 2011. Since the rains kept coming up to March, the IPs made use of the rains by enlarging the numbers of beneficiaries, thereby reaching 10,869 households (Table 2; CIP, 2011). Regarding these numbers, the total amount of vouchers through March 2011 was US \$11,231.30 (CIP, 2011). The project disbursed this amount from the committed project funds of year 1.

For the coming 2011/2012 rainy season that is expected in November 2011, the vouchers will be issued from the budget of year 2 (1 October 2010 to 30 September 2011). The IPs are on track with 24,000 beneficiaries registered and ready to plant OFSP in the 2011/2012 rainy season. This means that the Rooting Out Hunger project has to budget the amount of US \$24,000 to be given to the IPs in October 2011.

Because the demand for growing the OFSP is high, in year 3 (1 November 2011 to 31 October 2012), we may slightly adjust the voucher system from a fully subsidized voucher to a half- or nonsubsidized voucher. The budget proposed for year 3 is US \$9,960, which is adequate to reach 10,000 beneficiaries.

### **7.2 Integrated Sweetpotato Production and Seed System in Malawi**

On the basis of the unimodal rain distribution pattern, food and nutrition security considerations, and project experience in years 1 and 2, we suggest that the integrated sweetpotato production and the “1, 2, 3” seed multiplication scheme can be introduced in Malawi (Fig. 11 and Section 4.2).

### 7.3 Fuel Shortage

The fuel problem started in October 2010 and became significantly worse this year. A number of activities have been cancelled or adjusted, especially in areas where we need to consume more fuel (see reports from CU and CADECOM). Visits and supervision from project management were reduced as well. Some supervision could be handled by using the telephone or email. Consequently, this could influence the increase of telephone bills. To some extent, transportation for vines to DVMs and farmers is also a problem because it increases the budget for fuel. The hired vehicle for transporting vines is also more expensive, which can significantly increase project expenses.

### 7.4 Revolving Funds: A Suggestion from CU-Phalombe and CU-Mulanje

A type of revolving funds is suggested by CU in Mulanje and Phalombe. We are going to discuss this proposal on how we are going to work on it and reach the project goals.

#### ***Fertilizer***

Some vine multipliers were unable to procure fertilizer for their vines; therefore, their vine nurseries are poorly established. There is a need to start a fertilizer revolving scheme or a fertilizer loan for vine multipliers so that deductions are made during payment of their vines. Vine multipliers are looking for a fertilizer loan for their vines and other crops and are requesting that this project should be a guarantee for loan repayment.

#### ***Water lifting and pumping devices***

Some vine multipliers are on upstream fields and rely heavily on irrigation to grow their vines. Some are requesting project support with water-lifting devices, such as canes, whereas others are requesting water pumping devices, such as treadle or motorized pumps, on loan. They could repay their loan through deductions from their vine sales.

With respect to the matter raised by CU Phalombe and Mulanje, the Rooting Out Hunger project has distributed nine treadle pumps to areas, Chikhwawa (Annex 7) and Salima (Annex 5), where the drought spells are pronounced. Moreover, 450 drip irrigation kits suitable for small-scale farmers are being ordered (Fig. 24). The irrigation kit will be introduced to nurseries and home gardens during the dry season.



*Fig. 24. Drip irrigation kit.*

### 7.5 Media, Television, and Radio

In November 2010, shortly after the awareness campaign that was conducted in October 2010, a Malawi Broadcasting Cooperation (MBC) radio program aired OFSP activities in its journal after the 5 PM news program. On 12 January this year, while farmers were enjoying the rains for planting their crops, the Rooting Out Hunger project sent a program to MBC television. The title of this



program was “How to Grow Sweetpotato.” In September 2011, Irish Aid, NASFAM, and CIP worked on nine radio programs on OFSP and recipes (Annex 15). The programs went to MBC radio 1 (Section 4.9.2). We still need to monitor and evaluate the impact of these three programs. Nonetheless, in September, the FAO approached us. They wanted to learn more about the OFSP program, and if possible, to bring some OFSP planting materials to their communities in Northern Malawi. FAO agreed to buy the OFSP planting materials from the community-based Kachele Club in Salima (Section 5.5 and Annex 5). The principal secretary for the Ministry of Agriculture invited us to participate in the IFPRI conference held on 26–27 September (Annex 3). The OPC Department of Nutrition, HIV, and AIDS interested in including OFSP in the national program for the SUN 1000 Special Days movement. Hotel Victoria, Chez Maky Lodge in Blantyre, and Kara ‘OMula Lodge in Mulanje wanted to use OFSP on their menus. These are indications that information about OFSP in Malawi is already spreading broadly. There will be opportunities to determine a strategy on marketing and value chains so that farmers who are growing OFSP can exploit this opportunity.

## **7.6 Vehicle and Motor Bike Project Equipment**

At present, the Rooting Out Hunger project has been equipped by one vehicle, a Nissan Patrol, and one motor bike to run the project. A Toyota Land Cruiser with 13 seats (the ambulance model) was purchased. The new vehicle will arrive in Malawi in January 2012. The two vehicles and one motor bike can help the project run smoothly; we are very pleased and acknowledge Irish Aid for equipping the project with these vehicles. With them, we can easily reach many beneficiaries who live in remote areas with various road conditions in Malawi. The challenge is now the fuel crisis.

## **7.7 Administrative Issues**

During year 2, there were changes in administrative personnel at CIP, Irish Aid, Concern Universal, and Millennium Villages Project offices, which led to some delays in implementation but which could be organizationally managed.

The perspective of the sweetpotato project was related to the lack of alignment in timelines of the potato and sweetpotato projects, both funded by Irish Aid. The sweetpotato project period for one year is from 1 October to 30 September, whereas the potato project runs from 1 June to 31 July. Irish Aid tends to forget the two different timelines and to ask for reporting and proposal submission dates for both projects at the same time, in line with the normal reporting times of the potato project. This tends to create confusion and is inconvenient for effective implementation of the sweetpotato project. It is suggested that the two projects begin in the same month (preferably January) in year 4.

# **8 REFERENCES**

- Abidin, P.E. 2004. Sweetpotato breeding for northeastern Uganda: Farmer varieties, farmer-participatory selection, and stability of performance. PhD thesis Wageningen University, Wageningen, 152 pp. ISBN:90-8504-033-7.
- Ahn, P.M. 1993. Tropical soils and fertilizer use. *Intermediate Trop. Agric. Series*. Longman Scientific and Tech. Ltd. UK.
- Carey, E.E., H.M. Kidanemariam and P.T. Ewell 1998. Farmers’ varieties and farmer based seed systems: Aspects of CIP’s work on sweet potato and potato improvement in eastern, central and southern Africa. In the proceedings of the USC Canada/Seeds of Survival (SoS), 9th International Training Workshop On Sustainable Management, Development and Utilization of Plant Genetic

- Resources February 9-18, 1998, Lesotho Agricultural College, Maseru, Lesotho, pp. 86-97. Unitarian Service Committee of Canada, Ottawa, Canada.
- CIP. 2011. Rooting Out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato. Mid year Sweetpotato Project Report: Year 2. Prepared for Irish Aid, Abidin, P.E. (ed). Submitted by CIP in April 2011, CIP Malawi, 31 pp.
- CIP. 2010. Rooting Out Hunger in Malawi with Nutritious Orange-Fleshed Sweetpotato. Annual Sweetpotato Project Report: Year 1. Prepared for Irish Aid, Abidin, P.E. (ed). Submitted by CIP in September 2010, CIP Malawi, 48 pp.
- Ebregt, E. 2007. Are millipedes a pest in low-input crop production in north-eastern Uganda? Farmers' perception and experimentation. PhD thesis, Wageningen University. The Netherlands, 168 pp. ISBN: 978-90-8504-733-9.
- Ebregt, E., P.C. Struik, P.E. Abidin and B. Odongo 2004. Farmers' information on sweetpotato production and millipede infestation in north-eastern Uganda. I. Associations between spatial and temporal crop diversity and the level of pest infestation. *NJAS-Wageningen Journal of Life Sciences* 52-1: 47-68.
- FEWS NET 2011. Household food security for the poor begins to deteriorate as maize prices rise in southern district markets. Malawi Food Security Outlook Update September 2011. USAID. Farming Early Warning System Network (FEWS NET). 3 pp.
- Government of Malawi 2010. The Agriculture Sector-wide approach (ASWAp): Malawi's prioritized and harmonized agricultural development agenda. Ministry of Agriculture and Food Security, Republic of Malawi. Lilongwe, Malawi.
- Jaarsveld Pv, M. Faber, S.A. Tanumihardjo, P. Nestel, C.J. Lombard, A.J. Benade 2005. Beta-carotene-rich orange-fleshed sweet potato improves the vitamin A status of primary school children assessed with the modified-relative-dose-response test. *The American Journal of Clinical Nutrition* 81:1080-1087.
- Jayne T., M. Villareal, M. Pingali, G. Hemrich 2004. Interactions between the agricultural sector and the HIV/AIDS pandemic: Implications for agricultural policy. In: International Development Working Paper. pp. <http://www.aec.msu.edu/agecon/fs2/index.htm>. East Lansing, Michigan, USA.
- Low J.W., J. Lynam, B. Lemaga, C. Crissman, I. Barker, G. Thiele, S. Namanda, C. Wheatley, M. Andrade 2005. Sweetpotato in Sub-Saharan Africa. In: Loebenstein, G. and G. Thottappilly (eds.). *The Sweetpotato*, pp. 359-390, Springer Science & Business Media B.V. Dordrecht, The Netherlands.
- Low J.W., M. Arimond, N. Osman, B. Cunguara, F. Zano, D. Tschirley 2007. A food-based approach introducing orange-fleshed sweet potatoes increased vitamin A intake and serum retinol concentrations in young children in rural Mozambique. *J Nutr* 137:1320-1327.
- MoAFS of Malawi 2008. The Agricultural Development Programme (ADP): Malawi's prioritised and harmonised Agricultural Development Agenda: 2008-2012. Ministry of Agriculture and Food Security (MAFS) of Malawi. Lilongwe, pp. 195.
- Nampeera, E.L., H. Talwana and M. Potts 2011. Effects of nonhost crop barriers on *Cylas* spp. sweetpotato infestation and damage (abstract). In: Annon (ed). From soil to soul: crop production for improved African livelihoods and a better environment for future generation, pp 112, Entomology Session D3. 10<sup>th</sup> African Crop Science Society Conference in Maputo, Mozambique, pp. 338.

- Purseglove, J.W. 1991. Tropical crops. Dicotyledons. Longman Scientific and Technical. John Wiley and Sons. Inc. NY.USA.
- Smit, N.E.J.M. 1997. Integrated pest management for sweetpotato in Eastern Africa. PhD thesis. Wageningen University. The Netherlands.
- Villordon, A. et al., 2009. Phenological stages of Beauregard variety. *Scientia Horticulturae* 121: 374-377.
- Woolfe, J.A. 1992. *Sweetpotato: an untapped food resource*. Cambridge, UK: Cambridge Univ. Press and the International Potato Center (CIP).