



Africa Rising: Orange-fleshed Sweetpotato Scaling Out in Zambia with new varieties in the pipeline

In 2016/17, 6,000 households received orange-fleshed sweetpotato (OFSP) planting material during the rainy season. Through radio adverts, over a million listeners were reached with OFSP nutrition, production and marketing adverts. In collaboration with Zambia Agricultural Research Institute (ZARI) two clones - NC 09-350MUSG and Zambezi/2 were identified as elite genotypes based on farmers' evaluation of agronomic and organoleptic attributes.



Fig1 Grading of cleaned roots in preparation for transporting to RoseBloom in Zambia

What is the problem?

The Ministry of Agriculture through the ZARI in partnership with the International Potato Center (CIP) is developing new and improved OFSP varieties that will meet consumer preferences and preferred agronomic characteristics of farmers. These varieties, which are conventionally bred, will add to the existing varieties and complement the food-based approach adopted by the Republic of Zambia to combat micronutrient deficiency. Due to their high levels of pro-vitamin A, OFSP varieties contribute to the reduction of Vitamin A deficiency among children under the age of five, pregnant and lactating mothers. However, currently, only three varieties namely Olympia, Chunfwa and Chiwoko are being promoted for production by farmers. More varieties are needed to provide farmers of Zambia with a wider choice of pro-vitamin rich and high performing varieties.



Fig. 2 Women learn to prepare OFSP dishes for their young children

What do we want to achieve?

With funding from the United States Agency for International Development (USAID), CIP, through Africa RISING/International Institute of Tropical Agriculture (IITA) is scaling up the dissemination of the OFSP varieties and associated production technologies in the Eastern Province of Zambia. Our overall goal is to improve diet diversity, increase vitamin A intakes and reduce food insecurity. We do this by availing more and preferred high yielding OFSP varieties with high beta-carotene content, and that are resistant/tolerant to major diseases and pests.

Where are we working?

We are disseminating OFSP in four districts of the Eastern Province of Zambia, namely Lundazi, Chipata, Katete, Sinda and Petauke.

How are we going to make it happen?

We have partnered with ZARI to develop and disseminate OFSP varieties whose agronomic and organoleptic performance is preferred. We have adopted an innovative approach, in which Africa RISING/CIP and partners are scaling up vine multiplication, dissemination and demonstration of associated technologies that were developed and validated from 2011 to 2015 under the Feed the Future Zambia project. This approach involves a model, which integrates agriculture, nutrition behavior change and marketing (Fig. 1). Our activities include:

- Vine propagation and maintenance of nuclear seed in a screen house at ZARI Msekera for further multiplication before use in root production;
- Training of stakeholders and selected farmers on rapid vine multiplication and preservation in communities through decentralized vine multiplication;
- Support for some decentralized vine multipliers (DVMs) to establish agro-dealerships within communities and linking them to other DVMs through a clustering approach. This is anticipated to sustain vine availability within communities;
- Awareness creation on nutrition information and marketing through installation of billboards in designated places in Chipata and Petauke and airing of radio programs and adverts to ensure knowledge dissemination on OFSP production and nutritional benefits;
- Demonstration of released OFSP varieties and associated production technologies;
- Continued development of OFSP varieties to meet end user needs.



Fig. 3 With good management and the right variety, high yields are attainable



Fig. 4 Promising new clone NC 09-350 MUSG

Who are we working with?

- ZARI to maintain nuclear seed for OFSP, variety and technology development;

- The Department of Extension through District and Camp officers on technology dissemination and facilitation of on-farm evaluation in the process of technology development;
- Rural Initiative for Children's Hope Foundation (RICH) and CARE to recruit and train vine multipliers;
- SAIOMA to empower some of the vine producers as agro-dealers and linking DVMs to agro-dealers. This system assures demand driven supply of fresh vines;
- Community Markets for Conservation Agriculture (COMACO) for value addition. Products in the pipeline are sweetpotato flour and biscuits;
- Catholic Relief Services (CRS) Mawa, Total Land Care (TLC) and Carol Trust for community training on nutrition and diet diversification (Fig 2).

What have we achieved so far?

- During the 2016/17 rainy season, 6,000 households received OFSP planting material. Through radio adverts, over a million listeners were reached with OFSP nutrition, production and marketing adverts.
- Six advanced OFSP breeding clones introduced from the Zambia national roots and tuber improvement program were evaluated at ZARI Msekera in the 2016/17 rainy season. Four of these promising clones were evaluated in Lundazi,

Katete, Chipata and Petauke districts on-farm.

- In collaboration with ZARI, two clones - NC 09-350MUSG and Zambezi/2 were identified as elite genotypes based on farmers' evaluation of agronomic and organoleptic attributes. The yield performance of these clones at Msekera is presented in Table 1. While the variety Olympia provided the highest yield (44.25t/ha), the promising genotypes NC 09-350MUSG (39.89t/ha) and Zambezi/2 (33.42t/ha) equally provided high yields. This shows the high potential of the clones under good climate and high level of management (Fig. 3).
- Based on the potential yields achieved at Msekera, a cost/benefit analysis was performed on the promising genotypes and checks (Olympia and Chunfwa) using the prevailing market prices of sweetpotato. Table 2 presents the analysis.
- Using a Participatory Varietal Selection (PVS) process, 874 farmers evaluated the candidate varieties across the five districts for acceptability in terms of fiber content, texture, color, sweetness and aroma. The most preferred varieties were NC 09-350 MUSG (Fig 4) and ZAMBEZI/2.

What's next?

The selected clones will be submitted to the national release system. CIP will facilitate cleaning of these promising genotypes to ensure maintenance of disease free nucleus seed.

Table 1. Root yield (t/ha) of testing clones at ZARI Msekera in 2016/17 season

Sr/No	VARIETY/GENOTYPE	MEAN YIELD
1	OLYMPIA	44.25
2	EXCEL 8	42.67
3	MUSG 0616-161/27	40.39
4	NC 09-350 MUSG	39.89
5	MUSG 0616-24/32	38.53
6	MUSG 0616-161/11	37.51
7	ZAMBEZI/2	33.42
8	CHUMFWA	29.75
9	MUSG 0614-24/15	28.67
	Mean	37.22
	Coefficient of Variation	9.71%
	I.s.d at 0.05 alpha level	6.29

Fig. 3 Preference ranking of genotypes by farmers during PVS

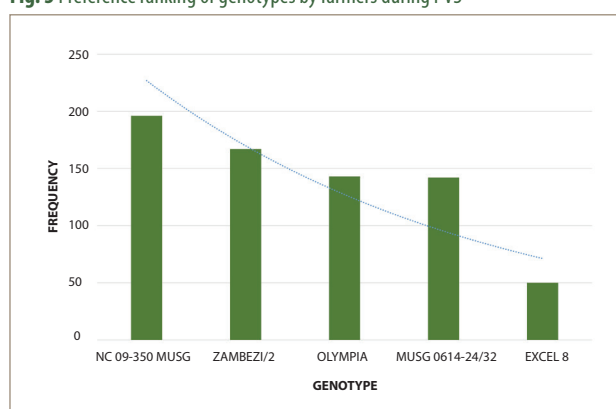


Table 2. Cost benefit analysis for OFSP production using yields at Msekera

	OLYMPIA	EXCEL 8	NC 09-350 MUSG	ZAMBEZI/2	CHUMFWA
Average yield(50 Kg bags/ha)	885.00	853.40	797.80	668.40	595.00
Adjusted yield (50 Kg bags/ha) (Average yield*10%)	796.50	768.06	718.02	601.56	535.50
Price (K/50kg bag)	60.00	60.00	60.00	60.00	60.00
Gross field benefit (K/ha)	47,790.00	46,083.60	43,081.20	36,093.60	32,130.00
Variable Input Costs (K/ha)					
Vine quantity/ha (bundles)	333.30	333.30	333.30	333.30	333.30
Vine costs (@K7 per bundle/ha)	2,333.10	2,333.10	2,333.10	2,333.10	2,333.10
Empty 50kg bags (@K2 per bag)	1,593.00	1,536.12	1,436.04	1,203.12	1,071.00
Labor costs:					
Ridging	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Planting	500.00	500.00	500.00	500.00	500.00
Weeding	500.00	500.00	500.00	500.00	500.00
Harvesting	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Total variable input costs (K/ha)	6,926.10	6,869.22	6,769.14	6,536.22	6,404.10
Gross margin analysis (k/ha)	40,863.90	39,214.38	36,312.06	29,557.38	25,725.90
Benefit cost ratio (BCR)	5.90	5.71	5.36	4.52	4.02

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