

An Orphan Crop, The Orange-Fleshed Sweet potato, in West Africa: Can We Reposition it?

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ABSTRACT

Sweet potato (*Ipomoea batatas* L.) was not an important crop in Ghana, Burkina Faso and Nigeria, West Africa, in the past decades. An effort has been made to reposition the sweet potato crop in West Africa. Orange-Fleshed Sweet potato (OFSP) cultivar was used as an entry point while properly designing a market-driven approach in the research project, 'Jumpstarting OFSP in West Africa through diversified markets'. The project was implemented in these three countries in the period of April 2014 throughout March 2017. There is a clear indication that sweet potato is shifted from an orphan crop into a commercial one in these project areas. Obviously, the sweet potato crop has significantly become an important crop among other commercial agricultural commodities in the localities. Additionally, as the OFSP cultivars have already well known for its contribution to food and nutrition security, as well as to a wealth. Hence, the sweet potato crop will give great opportunities to people to improve their livelihood along with healthy life, particularly in the drought-prone regions where the homes of most resource-poor farmers, and where the sweet potato crop is grown and consumed most. Establishment of various market models evidently played an important role to support this effort.

INTRODUCTION

Orange-fleshed sweet potato (OFSP) has gained prominence due to its potential to help sustainably combat vitamin A deficiency [1-4]. As compared to eastern and southern Africa, promotion of OFSP in West Africa has been relatively limited. In the period of April 2014 through March 2017, a proof-of-concept project, 'Jumpstarting orange-fleshed sweet potato in West Africa through diversified markets' has been implemented in Ghana, Burkina Faso and Nigeria. This project was led by the International Potato Center (CIP) based in Ghana. It was aimed at evaluating the potential to simultaneously develop value chains for OFSP and maximized nutritional benefits to vulnerable populations. Different structured and informal markets were targeted at pilot sites across the three countries where sweet potato varied in importance in the farming and food systems. In Kennedougou Province of Burkina Faso, a thriving fresh market for white-fleshed sweet potato was targeted; In Osun State, Nigeria, the successful school feeding program served as a market entry point; and in Ghana, markets targeted were rural and urban fresh markets, processed products (particularly sweet potato puree as a wheat flour substitute in baked products) and stimulation of demand through the Ghana Health Service's antenatal and infant and young child counselling programs (CIP, 2017; project report to donor, unpublished).

METHODOLOGY APPROACH

Designing the Market Model for Creating Demand on Sweet Potato in West Africa

To evaluate the possibility of establishing value chains for nutritious OFSP, we started with the establishment of commercial planting-material growers targeting root producers who in turn targeted specific market opportunities for OFSP roots, including

structured and informal markets. Two basic assumptions were (i) that increased awareness of the nutritional value of OFSP will generate increased market demand for OFSP roots and hence for good quality planting material of preferred varieties, and (ii) that the demand chain can be strengthened and accelerated through improved supply chains of quality OFSP planting material. Based on these assumptions, the project worked with partners to develop specific Theory of Change (ToC) to determine market models that can ‘jumpstart’ OFSP value chains in different socio-economic and agro-ecological environments in the three participating countries. At the outset of the project, target markets in each country were determined through actor-centered ToC exercises. In Burkina Faso, OFSP was not yet found in the markets, though there were well-established commercial markets for the white-fleshed varieties. With iDE-Burkina Faso, a nongovernmental organization (NGO), and Institut National de L’Environnement et de Recherches Agricoles (INERA), the national agricultural research system (NARS) partner, we targeted the informal (non-contractual) production and marketing system in Kénédougou Province (Southwestern Burkina Faso) for the OFSP intervention. INERA worked to establish the commercial seed system, and iDE focused on producer group organization and market linkages. In Nigeria, the O-Meals school-feeding program presented a more structured (but still non-contractual) market in Osun State. In Kwara State, efforts focused on stimulating demand in informal (local) markets. The National Root Crops Research Institute (NRCRI), the NARS in Nigeria, worked with state extension staff to develop commercial seed system and OFSP storage roots production in both states. In Ghana, the focus of production activities was in pilot areas of the Northern Region (NR) and Upper East Region (UER), where a mix of structured and informal market approaches was used, including (i) informal rural and urban markets; (ii) a brief pilot with the structured market presented by the Ghana School Feeding Program (GSFP) in Northern Region; (iii) nutrition counseling of pregnant and lactating women by the GHS, a market stimulated through donations of vines and roots; (iv) introduction of OFSP puree as a substitute for wheat flour in bread; and (v) markets served by an aggregator in Accra who supplied supermarkets (Shoprite), embassies, and a few bakeries.

RESULTS AND DISCUSSION

In each country, we established decentralized vine (commercial) clean planting-material growers, linking them to root producers while consecutively identifying and/or stimulating market opportunities for OFSP roots, including structured and informal markets. Capacity building exercises for producers and their households focused on both production and utilization to ensure that they understood how to use this nutritious new product in their traditional foods. Overall, 60 vine multipliers (14% women) and 61 groups of OFSP root producers (30% women) sold vines and roots under the project (CIP, 2017, project report, unpublished). Furthermore, it was also reported that marketing and sales of clean planting material was successful across countries, with planting material valued at over \$100,000 sold by multipliers over the course of the project. Over 50% of the revenue obtained by multipliers came from non-subsidized vine sales (**Table 1**).

Table 1. Revenues from vine sales taken in the three seasons (rainy seasons in 2015 and 2016, dry season in 2016) in target areas of the Jumpstarting project.

Country	Revenue from Vine Sales (US\$)	Various interventions linking to market model	Percentage from total Vine Sales (%)	Was it Subsidized? (Yes/No)
Burkina Faso	55,362	Informal markets through open markets (rural and urban)	55.4	No
		Increased number of decentralized vine multipliers (DVMs); this is a formal market because funds came from Jumpstarting project through INERA.	44	Yes
		Food security, a formal market through the Catholic Relief Services and Ministry of Agriculture bought vines from NAFASO, a commercial seed company and distributed the OFSP vines to farmers (farmers got free planting material) meanwhile NAFASO got free planting material from INERA only to start with, and no free planting material received afterwards.	0.6	Yes/No
Nigeria	27,230	Formal market for storage root sales to the school-feeding program and vine sold by DVMs to root producers	100	No
Ghana	21,989	Informal markets (open markets)	56	No
		Formal market (GHS), a willingness-to-pay study in this report will show interesting results	27	Yes
		Increased number of DVMs (formal markets), the initial free vines came from the Jumpstarting project through ACDEP	1	Yes
		Establishment of root producers, a formal market from the Jumpstarting project through ACDEP and CIP/Ministry of Food and Agriculture. The initial vine cuttings given to DVMs free of charge to create root markets at GSFP (formal market)	16	Yes
		Bakeries, OFSP golden bread, product development; formal market	-	-
		Local markets	-	-
Total	104,581	Through diversified markets? YES, a commercialized planting material can be encouraged		

Commercial seed systems are a major element in the development of value chains. The information on quality declared planting material production and sales were important to understand in the project area of intervention. Through this project, we initially subsidized development of commercial seed producers, with the assumption that this would be short-lived as commercial demand developed. Data collected from routine monitoring and evaluation (M&E) reported by implementing partners were compiled and are presented in **Table 1**. The data from Burkina Faso, Nigeria, and Ghana were from three seasons between 2015 and 2016. The assumption was that the vines can be sold when farmers have a market for their OFSP storage roots. Various markets were created through the OFSP value chains and institutional markets to give opportunities for root producers to sell their OFSP storage roots. From **Table 1**, it is concluded that the planting materials were valued by farmers due to this market-driven approach through several market models. In Burkina Faso, 55.4% farmers bought planting materials, 56% in Ghana and 100% in Nigeria. This shows that we could change the status of sweet potato crop, from an orphan crop into important crop of which farmers can generate income from vine sales. In the early literatures, it was reported that farmers got planting materials for free, from neighbors, families and friends ^[5-8]. Mostly the quality of the vines was poor, therefore, it was yielding poorly. This might contribute to that the sweet potato crop was a less interesting crop by farmers. Nonetheless, several references indicate that a yield gain of 30% to 50% could be obtained through healthy planting material ^[9]. This situation evidently changed the mindset of farmers to reposition the sweet potato to become an important crop among other preferred crops.

Market Models

In Ghana, we focused on developing local demand through the nutrition counseling program of the Ghana Health Service for pregnant and lactating women. We also conducted a 2-month pilot incorporating OFSP into meals for 788 pupils at 2 schools in the Northern Region with good results; all actors are ready to re-start the program when payment by the Government to caterers can be assured. Markets opportunities were also identified and created in the capital city Accra, where an aggregator marketed OFSP through supermarkets, high-end green grocers, embassies, and processed OFSP in bread and gari. Finally, more than 80 bakers were trained on using OFSP purée in bread baking, and at least three bakers (Volta Region and Greater Accra) produce sweet potato bread for which there is a growing demand.

The nutrition counselling work conducted with the Ghana Health Service reached a total of 8,437 pregnant or lactating women with counselling and OFSP vines through clinics and volunteers in districts located in UER and NR of Ghana, where the project was involved with vine multipliers and root producers. We used the counselling as an opportunity to conduct a willingness-to-pay study, providing OFSP planting material to 5,060 mothers, and roots to 4,110 mothers. From the end line survey conducted in Dec 2016, we found that about 15.5% to 16% (n-UER=282; n-NR=137) subsequently bought vines and storage roots. This intervention to create additional demand for OFSP was well-appreciated by producers and partners and presents an attractive opportunity for scaling-out to other locations. In all 72 decentralized vine multipliers (16% women), 134 groups of root producers (26% women), and with a total of 53,215 household beneficiaries benefited from our combined efforts in the last 3 years.

In Burkina Faso, OFSP was not found in the markets at the beginning of the Jumpstarting project. By the end of the project, commercialization of OFSP was well-established, with producers in the southwestern production zone targeted under the project serving markets in both Burkina Faso and Mali, and with customers including diverse small-scale processors as well as the fresh-boiled and fried root market vendors previously only selling white-fleshed sweet potato. Wholesalers were aware of the market potential of OFSP, and producers and vine multipliers, backed by the national program, embraced OFSP. In addition to private producer demand for planting material, there was significant and expanding demand from NGOs and the Ministry of Agriculture, promoting new OFSP varieties for food security and livelihood improvement in other parts of Burkina Faso.

In Nigeria, the O-Meals school-feeding program in Osun State presented an attractive market entry point at the beginning of the project. Starting with a pilot effort in 8 schools in January 2015, the program expanded to 186 schools in 24 Local Government Areas (LGAs) by the project's end, with more than 41,000 school children getting at least one provitamin A-rich OFSP meal weekly. Sweet potato bread was also accepted as a menu item and served on a different day of the week in several schools. Recognizing the potential for OFSP, the Osun Youth Empowerment Scheme (O-YES) encouraged and assisted program members to take up sweet potato farming and marketing as an enterprise, and these represent a new group of producers supplying O-Meals. They are also selling through other market channels to have alternative markets when schools go on vacation. Challenges of acceptance of the unfamiliar OFSP meal by students were best overcome by promotional children's songs. Availability of quality planting material of the newly released OFSP variety was assured through involvement of staff from the National Root Crops Research Institute, operating from a sub-station in Osun State.

The profitability of the diverse sweet potato enterprises established under the project was assessed through interviews with value chain actors to determine returns on investment. All enterprises were found to be profitable. Cost and benefits to vine multipliers and root producers per hectare are shown in **Tables 2 and 3**.

Table 2. Cost and returns per hectare to vine multipliers in Ghana, Nigeria and Burkina Faso (source: Endline survey in 2016, Jumpstarting project; CIP project report, 2017, unpublished).

Countries	Ghana USD	Nigeria USD	Burkina Faso USD
Total cost/ha	877	2164	2089
Total revenue/ha	2477	4542	3338
Gross margin	1599	2379	1250
Benefit relative to cost incurred	182%	110%	60%

Table 3. Cost and returns per hectare to root producers in Ghana, Nigeria and Burkina Faso (source: Endline survey in 2016, Jumpstarting project; CIP project report, 2017, unpublished).

Countries	Ghana USD	Nigeria USD	Burkina Faso USD
Total cost/ha	191	483	285
Total revenue/ha	761	1515	464
Gross margin/ha	570	1031	179
Benefit received in relation to cost incurred	299%	213%	63%

CONCLUSION

Mindset of people could be changed if a market-driven effort could be included in the project frame-work. Through the Jumpstarting project, this market-driven endeavor was designed and tested, and it resulted some valuable findings. Local/urban and structured markets were created. Knowledge of people were improved by training them on OFSP processing and utilization. Introducing OFSP in the ingredients of bread, gari, and local foods, has given an enormous impact to lift up the status of this crop. Across the countries, major urban markets have appeared, with consumers hungry for affordable, nutritious and tasty foods, and with a great many untapped opportunities that enterprising individuals could capitalize on OFSP crop.

Continued advocacy and demand creation using multichannel communication is critical for ensuring market-led expansion of OFSP. This will be backstopped by competent research and extension programs, bringing benefits to millions, as an important part of diversified and resilient African food economies.

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