



SWEET POTATO TO FIGHT VITAMIN A DEFICIENCY AND REDUCE MALNUTRITION



Location: Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, South Africa, Tanzania, Uganda, and Zambia.

Orange-fleshed sweet potato varieties are poorly disseminated in Africa, but several important research-based initiatives are producing the crop and encouraging consumption to reduce undernourishment, especially Vitamin A Deficiency.

CHALLENGE

In 2014, Vitamin A Deficiency (VAD) prevalence was estimated at 42 percent among children under five in Africa,¹ which represents approximately 78 million affected children. It is also particularly severe among pregnant and/or lactating women. The deficiency increases children's vulnerability to common illnesses and impairs growth, development, vision, and immune systems. In severe cases, it results in blindness and death. Up to 500,000 preschool children go blind from VAD every year in Africa, and two-thirds die within a month of being blind. VAD also increases the risk of dying during pregnancy and the likelihood of giving birth to low weight babies and is believed to facilitate the spread of HIV/AIDS.²

Humans produce Vitamin A when there is sufficient beta-carotene in their bodies. Most people cannot afford expensive Vitamin A rich foods—fish oils, liver, milk, eggs and butter—that contain retinol (Vitamin A) that the body can use directly when it doesn't produce its own.

Supported by the World Health Organization and UNICEF, African governments have responded by distributing vitamin capsules and fortifying food. These efforts have had little effect on the prevalence of VAD,³ possibly because poor rural families cannot access facilities where supplements and food are distributed.

The biotechnology industry has been promoting genetically modified crops, such as rice and banana, to synthesize Vitamin A. However, none of these genetically modified crops is yet commercialized. Furthermore, there are significant biosafety, socioeconomic and regulatory issues with biotechnological solutions. Other approaches are safer, cheaper, and more appropriate, especially those rooted in diet diversification.⁴

RESPONSE

Growing and consuming crops with rich levels of beta-carotene are more promising solutions. The orange-fleshed sweet potato (OFSP) varieties have high beta-carotene content, offering an inexpensive complementary Vitamin A source. The crop is not new—it has traditionally played a vital role in combating hunger on all continents, including in East Africa's semi-arid plains, where it is called *cilera abana*, "protector of the children." It is not bred using genetic engineering; but by conventional breeding techniques.

Sweet potato is already an important staple for many Africans. It is adaptable and easy to grow. It is drought tolerant, has low nutrient demands, and provides reasonable yields during seasons where other crops would fail. Another advantage is that it can be harvested piecemeal to provide daily fresh food.

The major challenges to growing sweet potato are a dearth of planting materials and pests and diseases.⁵ There is ample room for yield improvement as average sweet potato yields in Africa—four to six tons per hectare⁶—are the lowest among any developing country. National programs have historically favored white-fleshed sweet potato varieties that have very low beta-carotene levels but strong farmer preference.⁷

The International Potato Centre (CIP) has actively promoted the OFSP, leading sweet potato research with a team of scientists from 25 countries. Specific efforts have focused on variety development for good yield performance, increased resistance to pests and diseases, improved nutrition, and proper post harvest handling methods. CIP and its partners have identified several improved orange-fleshed varieties, which have been farm-tested and accepted in Kenya, Uganda, Tanzania, and Mozambique.

CIP has also helped initiate international efforts to promote the increased production, use, and consumption of OFSP in Africa. Among these, the Vitamin A for Africa (VITAA) project was established in 2001. Partners include national agricultural research institutes, health and nutrition agencies, NGOs, community-based organizations, private businesses, and regional and thematic networks, including the Regional Programme for the Improvement of Sweet potato and Potatoes in East and Central Africa and the Southern Africa Root Crops Research Network. Through VITAA, a number of countries have collaborated to develop OFSP, including Ethiopia, Tanzania, Kenya, Uganda, South Africa, Ghana, Zambia, Rwanda, Nigeria, Malawi, and Mozambique.⁸

Three regional breeding hubs were established in SSA to overcome adaptability and acceptability challenges. These hubs produce seeds with regional specifications—virus resistance, for example—as well as the universally desirable traits of high yields and beta-carotene levels.

OFSP training and education is provided to extension service officers, local administration, farmers, and community-based organizations in conjunction with post harvest handling and processing technologies. Nutrition education programs in

different countries target consumers through mass media campaigns that raise demand for OFSP.⁹

RESULTS

Increased Availability of Improved Varieties¹⁰

In Uganda, a breeding station (or hub) was used to produce varieties for East and Central Africa, targeting high root yields, high beta-carotene content, high dry matter, and disease resistance. Since 2001, over 100,000 seeds have been produced per year. In Zambia and South Africa, breeding stations were used to generate varieties for the SADC region, targeting high root yields, high beta-carotene content, and drought and frost resistance. At least 50,000 seeds have been generated annually from the two crossing blocks. Breeding populations generated at CIP headquarters in Lima have been introduced and evaluated in the two regions.

In 2003, over 30 million vine cuttings were distributed and planted by farmers. The number has since increased annually, but this may be a gross underestimate of the distributed vines since farmers exchange a great deal of planting material that is not recorded. By the end of 2004, orange fleshed varieties were estimated to cover one to two percent of the planted area in the lake zone of Tanzania; five to ten percent in central Uganda; and ten to 15 percent in western Kenya.

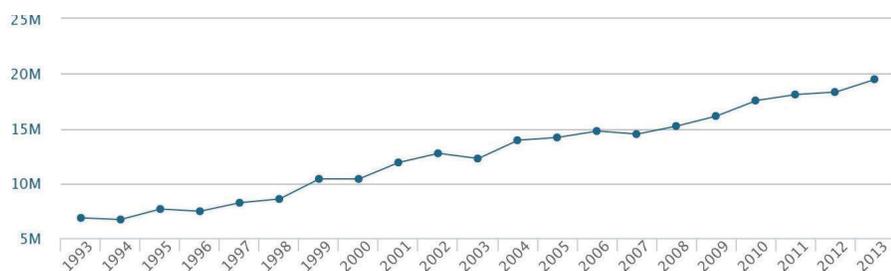
OFSP varieties introduced from other parts of the world or bred locally have been readily accepted in East African pilot areas. Between 2001 and 2006, VITAA introduced and disseminated more than 40 high-yielding varieties that are also relatively high in dry matter and beta-carotene.

Despite positive trends, the adoption of improved OFSP varieties has not yet created a significant improvement in African yields, which have recently stagnated at less than five tons per hectare.

Growth of Sweet Potato Production and Consumption in Africa

Sweet potato has seen exceptional growth in Africa since the late 1990s. The area planted with sweet potato crop covered around 2.9 million hectares in 2007.¹¹ In terms of volume, sweet potato production more than tripled from about 6 million tons in 1990 to more than 18 tons in 2012.¹² Though the white-fleshed varieties still predominate, the promotion of OFSP is facilitating rising adoption by farmers and consumers.

Figure 1: African Sweet Potato Increase in Production 1990-2013 (million tons)



Source: FAOSTAT

Orange Fleshed Sweet Potato’s Comparative Advantages in Fighting Hunger

CIP’s research shows that some orange-fleshed varieties have yielded 8,000 micrograms of beta-carotene per 100 g of fresh weight. Studies in Kenya and Uganda comparing different varieties, ranging from white to deep orange-fleshed, showed that just a small amount of OFSP—70-100g—satisfies daily Vitamin A requirements for adults as compared to the 9,000 g required from the white-fleshed variety.¹³

Research trials conducted in South Africa among children aged five to ten, consuming beta-carotene-rich OFSP show reduced morbidity, including fewer upper respiratory tract-related illnesses and skin-related conditions. The OFSP was well received and even popular among children, who liked its taste; two thirds of the study cohort stated they would eat more than the serving provided at school.¹⁴ In South Africa, researchers have concluded that adding as little as 125 g of OFSP to children’s daily diets could eliminate or significantly reduce VAD.¹⁵ Community level research among children in Mozambique indicated a median Vitamin A intake almost eight times higher among those eating OFSP as compared to the control group. OFSP consumption accounted for 35 percent of Vitamin A intake, 6 percent of energy intake, and resulted in a 15 percent decline in VAD prevalence.¹⁶

Studies show that even in isolation, VAD interventions can reduce overall mortality among children under six by nearly 23 percent. An ex-ante impact assessment study indicated that introducing the locally-preferred, new high beta-carotene cultivars would significantly benefit childbearing women and an estimated 50 million children under the age of six currently at VAD risk.¹⁷

On top of its naturally high beta-carotene concentration, sweet potato is already part of traditional African culture. Unlike cereals, sweet potatoes can be harvested year-round, providing a 365-day solution for VAD. OFSP consumption also provides crucial calories as well as Vitamins B and C (ascorbic acid) and other micronutrients such as iron.

Increased Awareness and Consumption

Awareness campaigns and nutrition education have created high demand for more planting materials, new varieties, and knowledge to increase and diversify OFSP usage. International institutions, government authorities and community level decision makers are also taking note of this “miracle” crop.



Participants holding sweet potatoes, Sinoko. © S. Quinn, CIP

“I make juices, doughnuts, cakes and chips from sweet potatoes that I sell from my kiosk. People like them very much. In Uganda, a single farmer can earn up to \$400 per month.”

– Joweria Sekiyanja, a Ugandan mother of eight



Sammy Emukule, decentralized vine multiplier, and Mama Sasha, participant, in Naitiri. © S. Quinn, CIP

Because OFSP is mainly used for domestic consumption, increased production has led to increased consumption by both urban and rural consumers in a number of countries.¹⁸ In Nigeria, the sweet potato consumption increased ten-fold between 1992 and 2011, from 4 to 39 grams per person per day. In Mali, consumption multiplied by almost 13 in the same period, from 4 to 51 grams per person per day.¹⁹

This case study was produced by the Oakland Institute. It is copublished by the Oakland Institute and the Alliance for Food Sovereignty in Africa (AFSA). A full set of case studies can be found at www.oaklandinstitute.org and www.afsafrica.org.

ENDNOTES

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Sweet potato harvest. © Aminah Jasho, KHCP

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