



Orange Fleshed Sweetpotato: A Road Map to Good Health and Wealth Creations Among Developing Nations

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Abstract

The income generation and employment status of sweetpotato in Africa and beyond presently are not a paradox per se but a reality because production and processing of sweetpotato have secured jobs for the majority of youths in the rural areas. Orange-fleshed sweetpotato (OFSP) varieties, being the offshoot of sweetpotato, have the complementary capacity to diversify the Nigerian economy into multiple facets for nation-building. Therefore, they are the entry points for development through income and employment generation. In rural settings like some villages in Nigeria and other African countries, the majority of households cannot afford food products rich in Vitamin A that play a vital role for child development, and this gave rise to the introduction of bio-fortified agricultural innovations such as OFSP varieties (OFSVs) and other crops to fill in the gaps. Vitamin A deficiency is a major risk factor working against children and pregnant and lactating women. Also, if care is not taken, it can lead to premature death as well as untimely blindness. However, research has proved that sweet potatoes (OFSP) have several health benefits, such as protecting against chronic diseases, fighting inflammation, regulating blood sugar levels, and supporting weight loss. In light of this, this paper used an analytical approach to review the following: the wealth implications of orange fleshed sweetpotato among developing nations, the health benefits associated with orange fleshed sweetpotato consumption, and the tips for marketing the orange fleshed sweetpotato value chain.

Keywords: potentials, consumption, health implication, wealth creation, orange fleshed sweetpotato.

Introduction

Sweetpotato (*Ipomoea batatas*) belongs to a dicotyledonous plant and morning glory family (Convolvulaceae) that produces edible roots (Yahaya *et al.*, 2015; Udemezue *et al.*, 2021). The morning glory family is a crop used for both food security and famine relief, including the sweetpotato. It has the ability to thrive in less fertile soils, but above this, the broad agro-ecological adaptability of the crop makes it a food security and staple crop because it can be grown in all 36 states in Nigeria (eHealth Africa, 2016; Maru, 2017; Sugri *et al.*, 2017).

OFSP, like other breeds of sweetpotato, is grown in all parts of the country, but commercial cultivation appears to be large in the northern, semi-arid agro-ecological zone of the country, covering Benue, Nasarawa, Plateau, Kogi, Kwara, and Niger states (Nyor *et al.*, 2017). Sweetpotato has a number of agricultural and industrial uses as well (Udemezue *et al.*, 2021).

Sweetpotato, which used to be one of the underutilized food crops in Nigeria before, has now attracted people's attention globally to feed the low-income earners across the world (Adesina *et al.*, 2019). This is because the special nutrition needs of people have shifted their focus to the adoption of orange-fleshed sweetpotato (OFSP), which is an

offshoot of sweetpotato for consumption due to its high content of beta-carotene. Sweetpotato appears in more than 400 different types. In countries like India, Bangladesh, Vietnam, Indonesia, the Philippines, and the Pacific Islands, sweet potato is a significant source of bio-energy, and significant quantities of vitamins and minerals can be found in both the leaves and the roots (Joseph, 2023). As regards a food-based strategy, orange-fleshed sweet potatoes (OFSP) help to reduce vitamin A insufficiency.

As a staple crop, OFSP has been fortified with essential vitamins, such as vitamin A and minerals, whose deficiency in most rural diets can cause a very serious threat to human health and economic development (Chah *et al.*, 2020; Udemezue *et al.*, 2021). Vitamin A deficiency (VAD) is a major risk factor that works against pregnant and lactating women. VAD can cause visual impairments such as exophthalmia, corneal scars, and corneal xerosis (Tariku *et al.*, 2016). Consequences of this led to premature death in children and pregnant women (United States Agency for International Development, 2016).

In sub-Saharan Africa (SSA), it has been proven that 43 million children below the age of 5 are vitamin A deficient (Stathers *et al.*, 2018). In Nigeria, the occurrences of VAD affect 29.5% of her population, resulting in the World Health Organization listing Nigeria as one of the high burden countries (eHealth Africa, 2016) with the highest risk of VAD (Kuku Shittu *et al.*, 2016). In rural Nigeria, majorities of the households have a limited income to assess food products rich in Vitamin A, and this gave rise to the introduction of bio-fortified agricultural products like orange-fleshed sweetpotato (OFSP) varieties (OFSVs) (Babatunde *et al.*, 2019).

Orange Fleshed Sweetpotato (OFSP) is an improved breed of sweetpotato (*Ipomoea batatas* Lam.) cultivated in tropical and semi-tropical regions of the world for food and as a source of income, especially among the rural dwellers (Adebisi *et al.*, 2015; Nyor *et al.*, 2017). Therefore, OFSP, as rich in beta-carotene, can be a relevant means to curb the scourge of vitamin A deficiency in developing countries (David, 2022). According to research, scientists at the International Potato Center (CIP) and National Root Crops Research Institute, Umudike, Nigeria, identified a group of orange-fleshed sweetpotato varieties (OFSVs) with high content of β -carotene (a chemical element used by the body to generate Vitamin A) and sufficient dry matter to satisfy consumer preferences and taste in the 1990s (Udemezue *et al.*, 2021).

The first variety of OFSP was released in December 2012, and the second variety was in June 2013 in Nigeria. The orange fleshed sweetpotato varieties available in Nigeria are: Solo Gold (UMUSPO4), and this was officially released in July 2018. The other two are *UMUSPO3*, referred to locally as “Mothers Delight,” and *UMUSPO1*, which is known as “King J.” Solo Gold has special characteristics preferred by farmers, such as a higher dry matter when compared to Mothers Delight and much higher beta-carotene content when compared to King J. Also, it is tolerant to sweetpotato weevil and resistant to sweetpotato viral disease. It matures in 3–4 months.” These characteristics make Solo Gold a good candidate for farmer and consumer adoption across Nigeria.

Orange-fleshed sweetpotato can be consumed as a vegetable (boiled, fried, or roasted) as well as in different products through processing and value addition for improved household food intake. These foods include amala (swallows), puff-puff, chips, cake, garri, vegetable soup, doughnut, porridge, bread, chin-chin, juice, and kunu. OFSP products can be commercialized for income generation, job creation, and wealth creation for all, especially women and youth (Sweetpotato knowledge portal, 2020). In view of the above, this paper used available literature to review orange fleshed sweetpotato as a road map to good health and wealth creation among developing nations.

Wealth Implications of Orange Fleshed Sweetpotato Among Developing Nations

The income generation and employment status of root and tuber crops in Nigeria today cannot be overlooked because they have secured about 50% jobs for the majority of youths in the rural areas. Root and tuber crops have the complementary capacity to diversify the Nigerian economy into multiple facets for nation-building. Therefore, root and tuber crops are the entry points for development through income and employment generation as well as poverty reduction (Udemezue *et al.*, 2021).

The goal of every farmer is to sustain his/her livelihood and make profits in any business. Every farmer requires spending less and gets more in any farming system; based on this, OFSP requires less water and labor inputs than most staple grains, hence a strong asset for resource-poor smallholder farmers. Therefore, OFSP holds significant potential to alleviate poverty among smallholder farmers and improve vulnerable populations’ food and nutrition security, especially in reducing vitamin A deficiency. Sweetpotato vines, leaves, and roots are used for animal feed for sheep, goats, and rabbits (Nyor *et al.*, 2017). Sweetpotato can also be used for ethanol and biofuel production. Sweetpotato can be processed to yield about 137 liters of ethanol per metric ton of sweetpotato tubers (Nyor *et al.*, 2017).

OFSP is an essential ingredient in the bakery industry through puree innovations because it can substitute up to 60% of wheat flour, and this is also a considerable opportunity to reduce baking production costs and environmental impact

through local supply since approximately 80% of wheat is imported. However, orange fleshed sweetpotato technology has a triple 'S' approach. This implies that it can be "stored in sand and sprouting", which brings about a steady and natural supply of seeds for farmers to reduce production costs. This climate-smart method stores OFSP roots in the sand during dry months, allowing them to sprout and create planting materials. The planting materials are thereafter planted when the rainy season begins. Hence, this type of project offers great opportunities for positive impacts on food security, nutrition, and income generation (David, 2022).

Sweetpotato value chains provide enough information on sweetpotato production and processing as a guide for future investment in the sector. Investment in the sweetpotato sector is more profitable than other sectors in Nigeria since it has the potential to alleviate a nation from poverty states. Its value chain comprises input suppliers, farmers/farmers' cooperatives, processors, traders, collectors, intermediates, and final consumers within and outside the region. Sweetpotato crops can be used as a springboard to wriggle out of the menace of unemployment in the country since their production is increasing at an alarming rate every day. Therefore, the sweetpotato value chain has the capacity to create new jobs and generate increased income and employment in the economy if the potentials are properly harnessed (David, 2022).

The global food security index that accessed a country's ability to feed people on the basis of food security based on affordability, availability, and quality in 2011 ranked Nigeria as the 80th food-unsecured nation out of 105 countries investigated. Moreover, 65% of Nigerians seem to be food insecure; this implies that they do not have sufficient access to the amount and variety of food for a healthy and productive life, while 64% of the population is reported as living below the international poverty line of \$1.25 per day (Udemezue *et al.*, 2021). This could be linked with the consequence of a very long neglect of the agricultural sectors by the various governments in the country, but with the arrival of sweetpotato value chains and other food crops, the aforesaid problems can be reduced (Udemezue, Chinaka, and Okoye, 2019).

Food security allows all human beings physical and economic access to the basic foods needed to lead active and healthy lives. Therefore, Orange Fleshed Sweetpotato has the ability to transform a country from a poverty state to self-enrichment through employment and income generation, especially at the stages of production, processing, industrial utilization, and marketing (Anyaeibunam *et al.*, 2016). This implies that increased generation of employment, which is required for growth, lies with increased industrial processing, marketing, and utilization of sweetpotato products.

Health Benefits of Orange-Fleshed Sweetpotato

Deficiency of Vitamin A is a prevalent health challenge in Nigeria, especially in sub-Saharan Africa (SSA). The consequences of VAD have been attributed to a 23% increase in pre-school mortality in areas with endemic vitamin A deficiency (VAD) (Babatunde *et al.*, 2019). VAD is also widespread among young children in the developing world, with approximately 127 million children under 6 years of age estimated to be affected. Vitamin A deficiency can limit growth, weaken immunity, cause xerophthalmia leading to blindness, and increase mortality (Babatunde *et al.*, 2019). Poor households typically cannot afford to consume the highly bioavailable animal foods on a regular basis, so they prefer to go for the plant sources, one of which is OFSP.

OFSP is a medicinal crop containing a high level of pro-vitamin A that improves vision, strengthens the immune system, and helps the body to fight the disease; as an antioxidant, it detoxifies the body of free oxygen radicals that damage body cells, DNA, proteins, and lipids. Through its antioxidant activities, it prevents accelerated aging (Afube, 2021). Sweetpotato roots vary in color, with the OFSP being particularly rich in β -carotene. It is one of the starchy staple crops that contain ascorbic acid and amino acid lysine that is deficient in cereal-based diets like rice.

It also contains soluble fiber, which helps in reducing cholesterol concentration, and antioxidant nutrients, which can inhibit the development of coronary heart disease (Adebisi *et al.*, 2015; eHealth Africa. SweetPotatoes, 2019). The fiber contents are also useful in maintaining the health of the digestive tract. The leaves of OFSP contain chlorogenic acids, a phenolic compound responsible for suppressing obesity in humans. Orange-fleshed sweetpotatoes also contain reasonably higher amounts of minerals such as phosphorus, nitrogen, potassium, magnesium, copper, iron, and zinc than what is contained in commonly cultivated vegetables (Afube, 2021). OFSVs have recently gained great attention as a means of reducing common health-related problems associated with VAD in low-income communities. This variety is believed to be the least expensive source of dietary Vitamin A available to poor families (Babatunde *et al.*, 2019; Udemezue, 2021).

Beta-carotene is an organic, strongly colored red-orange pigment abundant in plants and fruits. Beta-carotene is what gives OFSP an orange color and is converted to Vitamin A in the body after consumption. The orange color of OFSP is an indication of the level of beta-carotene present; the more intense the color, the more Vitamin A present. It also has powerful antioxidants that help prevent cancer, as well as natural sugars, which are slowly released into the bloodstream,

helping to ensure a balanced source of energy without the spikes in blood sugar that are sometimes associated with fatigue and weight gain (Sass, 2023). In a nutshell, research has found that sweet potatoes have several health benefits, such as protecting against chronic diseases, fighting inflammation, regulating blood sugar levels, and supporting weight loss (Sass, 2023).

Tips For Marketing and Popularizing Orange Fleshed Sweeypotato

Orange-fleshed sweetpotato can be marketed and promoted through radio or TV programs or jingles, billboards, Community Theater, songs or short videos with sticking messages that bear, posters, and promotional materials with an inscription of OFSP production and utilization. It can also be promoted via social media. Other approaches are using the orange color to create brand images, such as creating market stalls for selling OFSP, OFSP product labels and outfits for trained OFSP extension staff, establishing variety demonstration plots, organizing product tasting events, painting slogans on vehicles, caps, T-shirts and wraps worn by women, organizing stakeholder meetings with local leaders or health service professionals, running group nutrition sessions, cooking demonstrations and counseling sessions with parents of malnourished children, organizing field days and advertising campaigns with subsidized new OFSP products and planting materials, integrating OFSP information, and planting material vouchers and food-based nutrition training into child health days when Vitamin A capsules are being distributed. This can help promote more sustainable nutritional behavior for the whole family, all of whom require Vitamin A as well as other micronutrients as part of a healthy diet (Udemezue *et al.*, 2021).

Conclusion

Creating an atmospheric condition with which farmers use the limited resources available is essential for increasing production, productivity, household income, food security, poverty reduction, health benefits, and overall economic growth. An efficient OFSP value chain will attract more investment since the crop has the potential to diversify the farming system, reduce the risks of food insecurity, and provide income opportunities for the most vulnerable people in particular and the nation at large. Research has supported that sweetpotatoes have several health benefits, such as protecting against chronic diseases, fighting inflammation, regulating blood sugar levels, and supporting weight loss. Therefore, if commercialization efforts are to be put in place towards orange value chain, then the majorities of the African nations would be better off in terms of combating income generation problems, malnutrition, and food insecurity. Based on these parameters, this paper reviewed the wealth implications of orange-fleshed sweetpotato among developing nations, the health benefits associated with orange-fleshed sweetpotato consumption, and the tips for marketing the orange-fleshed sweetpotato value chain.

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