# SWEET POTATO (*Ipomoea batatas* L.) PRODUCTION IN NIGERIA: A SYNOPTIC REVIEW OF ITS IMPORTANCE, PROBLEMS AND PROSPECTS.

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**ABSTRACT**

Sweet potato (*Ipomoea batatas* L.) originated in South America and was introduced by Christopher Columbus to Spain in 1492. Its cultivation in Africa first started in Sao Tome in 1520 and was brought to Nigeria between 1694 and 1894 by Portuguese traders. The crop belongs to the family of Convolvulaceae with more than 1000 species of which *Ipomoea batatas* remains the most important species. It is a trailing crop with varying leaf shapes, colour and sizes which are subject to varieties. Sweet potato economic roots could be cream, yellow, purple, red, or white fleshed. In Nigeria today, eleven varieties of sweet potato have been isolated by National Root Crop Research Institute, Umudike and given to farmers. Sweet potato is a short duration crop that thrives within three to five months after planting and its temperature requirement ranges between 20 to 28 ºC while annual rainfall is between 500 to 1250 mm. Sweet potato has several benefits of economic values as it is highly rich in vitamin A and other important minerals needed for proper functioning of human body. It also has low glycemic index. However, its production in Nigeria has been confronted with enormity of plights ranging from poor funding to outbreak of sweet potato virus disease, nevertheless, its potential prospects are clearly seen as it is a source of bio-fuel and food fortification.

**Keywords:** Antinutrients, nutrients, problems, production, prospects, sweet potato
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## Origin and taxonomy of sweet potato

Sweet potato (*Ipomoea batatas* L.) originated in South America and Christopher Columbus took it from America to Spain in 1492 [1]. Sweet potato cultivation was introduced to Africa by Sao Tome in 1520, while Portuguese traders along the coast of Nigeria brought the crop into the country around 1694-1894 [2]. Sweet potato belongs to the family of Convolvulaceae and it is in the Genus *Ipomoea*. There are over 1000 species, but only sweet potato is of economic importance to human and animals.

The crop is a creeping annual vine with dark green leaves, soft heart-shaped to deeply indented leaves with various sizes on some plants. The flower is funnel –shaped, white to red or purple in colour. Through contrarious vegetative multiplication in the tropics, sterile flowers developed. Sweet potato seeds which are eventually formed are only useful for breeding purposes. Sweet potato tubers could be cream, yellow, purple, red, white skin/flesh and develop in the upper 20 cm soil depth through thickening of adventitious roots. Mature tubers contain sugar (1.5 %), protein (1.5 %), low fat (0.2 %) but above all, starch (20 %). The local types and varieties could be grouped into:

i. Tubers with majorly yellow flesh, which are powdery and mealy after cooking.
ii. Tubers with white or strongly yellow colour flesh that is soft and sweet after cooking and produce watery and gelatinous pulp.
iii. Tubers which are only useful as fodders.

However, eleven cultivars of sweet potato have been isolated by the National Root Crop Research Institute, Umudike, for high tuber yields. The cultivars are as follows: Anioma, Dokobo, TIS 2352, TIS 146, TIS 3092, TIS 2534, BIS 23 and TIS 2421, Umuspo-1, 3 and Umuspo-4 [3].

## Climate and soil requirements

Sweet potato does best in the tropics and subtropical climates as stated by Scott [4]. During its vegetation period of 3.5-5 months, its average temperature requirement ranges between 20 – 28 ºC [5]. Sweet potato does not tolerate shade, particularly the young growth stages require high moisture. In West Africa, rainfall of 500-1250 mm is required [6]. The best soil for sweet potato cultivation is well drained sandy loamy soil with high organic matter contents and good drainage. Optimum soil pH for the crop is 5.8 – 6.0. Sweet potato can be cultivated in high elevations as high as 1500 m above sea level in the tropics [7].

## Agronomic practices of sweet potato

**(i) Soil preparation:**

Soil depth of 20 cm is satisfactory. Planting is done on heaps, ridges, flat or beds.

**(ii) Plant spacing and population:**

Plant spacing of 100 x 30 cm gives optimum plant population of about 33,333 stands per hectare. Some practice 45-120 cm along rows of 30 – 60 cm width. Plant spacing of 45 x 45 cm gives 49000 plants/ha while 60 x 120 cm = 13,000 plants/ha and 30 x 60cm = 55,000 plant/ha.

**(iii) Weeding**
Sweet potato does not require elaborate weeding owing to the fact that its growth habit aids to control weeds as a cover crop, nevertheless, the sweet potato farm should be kept weed free six weeks after planting. Ensure the vines are not soil covered during weeding.

**Production trends**
Currently, China is the world's largest producer of sweet potato with 788 million tonnes per year with an average yield of 22 t/ha [5]. Nigeria is the highest producer of sweet potato in Africa with an annual output of 3.46 million tonnes and globally the third largest producer after China and Malawi, respectively [6].

**Importance of sweet potato**
All the plant parts, roots, vines, and young leaves of sweet potatoes are used as food, feeds and traditional medicine around the world [7]. The following are some of the benefits you can accrue from including sweet potatoes in our diet.

**a. Good source of carbohydrate for man**
Most of the dry matter in sweet potatoes consists of carbohydrate primarily starch and sugars and to a less extent pectins, cellulose and hemicellulose. The average dry matter content of sweet potato is between 13-45 % as reported by Tsou and Hong [8]. The starch comprises of 60-70 % of the total dry matter, the starch granules are made up of amylose (20 %) and amylopectin. Starch pasting temperatures are usually in a range of 60-70 $^{o}$C [9].

b. **Potential Source of nutrients**
On dry weight basis, sweet potato leaves contain 25-37 % protein, 42-61 % carbohydrate, 2-5 % crude fat, 23-38 % total dietary fibre, 60-200 mg/100 g ascorbic acid, and 60-120 mg/100 g carotene [10].

**c. Excellence source of Beta carotene, an antioxidant precursor of vitamin A.**
Vitamin A deficiency is a serious issue especially in developing nations around the world. The health repercussions of vitamin A deficiencies are grave and can include decreased resistance to infectious diseases, increase in infections, morbidity, dry eye as well as increased mortality for both pregnant and lactating women and their children [11]. Sweet potatoes are extremely important source of Vitamin A because they contain high levels of red-carotene, beta-carotene is transformed into Vitamin A in our livers with every molecule of beta-carotene producing two molecules of Vitamin A [12]. Cooked orange fleshed sweet potatoes was reported by many researchers to contain wide range of B –carotene content that ranged from 6.7 – 16.0 mg/100 g fresh weight [13]. An epidemiological study indicated the beneficial effects of high carotene diets in reducing the risks of cancer, age related muscular degeneration and heart diseases [14].

d. **Good source of anthocyanins and total phenolics**
Research on nutraceutical properties of purple fleshed sweet potato indicated that the extracted anthocyanin's exhibited strong radical scavenging activity, antimutagenic activity and significantly reduced high blood pressure and liver injury in rats [15]. Other Physiological functions of anthocyanin includes, anti-inflammatory activity, anti-microbial activity, ultra-violent light protection, reduction in memory impairment effects and colorectal cancer [16]. A study on healthy adult men with borderline hepatitis indicated that purple-fleshed sweet potato beverage intake (400 mg anthocyanins/day) may have a potential capacity for protection of liver against oxidative stress [17].

**e. Sweet potato can help in regulating blood pressure**
Sweet potato can help in controlling blood pressure because they are rich in both magnesium and potassium. And studies have shown that a higher intake of potassium results in a decrease in blood pressure, which then significantly reduce the chance of an individual developing a stroke or a coronary problem.

**Problems and proffered solutions of sweet potato production in Nigeria**

a. **Poor/marginal soils resulting in low yield.** There is a need to match released varieties with appropriate locations and use of sweet potato as a cover crop can lead to higher yields in the production system.

b. **Lack of agricultural equipment:** Inadequate agricultural equipment affects the production output, thus leading to reduced quality produced by farmers. In the light of the above, Ugonma *et al.* [18] suggested that the following strategy should be used to improve the above challenge. The use of modern agricultural equipment to enhance mass production of high-quality sweet potato which could lead to export of sweet potato to other countries should be encouraged.

c. **Inadequate funding of research work**: Lack of funds in carrying out research work on sweet

potatoes inhabits the findings of solutions to the problems faced by farmers. There is need to encourage more research work on the poor variety of seeds that is currently used by farmers. The existing research centres established by the government for sweet potato research such as National Root Crops Research Institute, Umudike, (NRCRI) should be strengthened (more funds) to achieve their mandate.

d. **Farmer practices (fallow systems):** Because of the population pressure, on land, the length of fallow period has been reduced and this has led to soil fertility decline as well as low yield even when inorganic fertilizers are applied. Farmers should practice improved fallow system, crop rotation with leguminous crop and use of manure for soil improvement.

e. **Inadequate supply of good quality seeds**: The quality of seeds available in the country affects the yield of sweet potato tuber produced. The improved variety of seeds which was imported into the country has been used for a number of times as the potency is reduced. Breeders of NRCRI given mandate by the government should stand up to their responsibility to ensure high quality varieties are develop and released.

f. **Problems of sweet potato virus diseases (SPVD):** Sweet potato virus diseases (SPVD) cannot be controlled, but can be resisted [19]. Therefore, crop breeders in collaboration with crop physiologist, pathologists and entomologists should team up to produce hybrids that will be resistant or tolerant to this disease to bring the potentials of this crop to limelight.

**Prospects of sweet potato production in Nigeria**

Human food and livestock feed have remained the target of sweet potato producers in the past and at present in Nigeria. But the future will include its use in Vitamin A enrichments and ethanol production for food beverages and in bio-fuels. As flour, sweet potato can replace wheat flour in bread, and confectionaries for food beverages, as focus can also be redirected towards the development of sweet potato starch for the emerging noodle industry in Nigeria. These will no doubt impact positively on the socio-economic life of our people through increased employment, also reduction in the foreign exchange spent on the importation of wheat for the confectionary industry in Nigeria. The establishment of advanced bio-technology laboratory with advanced equipment should be sought to user in the unlimited ability by bio-technology in the improvements through breeding, seed multiplication, tissue culture, plantlets, disease control mechanisms, etc. of sweet potato.

## CONCLUSION

The need for the cultivation of sweet potatoes by every household in Africa cannot be over stressed for the reasons arising from its numerous nutritional benefits to man and livestock as well as industrial applications. Besides, it is easy to cultivate and manage as it does not require several weeding regimes owing to the fact that it is a good cover crop and does not require staking unlike yam.

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