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Snake Gourd (*Trichosanthes cucumerina L.*): An Underutilized Crop with Great Potentials

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A B S T R A C T

Snake gourd plant is a crop of great potentials. It is a crop that grows well in a tropical climate. The crop can be cultivated for personal consumption or for commercial purpose. The esfruit is highly nutritious and good source of vitamins. It has been proofed that it improves appetite and used in the treatments of disease like fever, head ache, alopecia, skin rachises etc. For the potential of this crop to be harness, more research should be encouraged on its mechanization and utilization which will eventually promote its commercialization. This paper therefore describes the origin, distribution, botanical characteristics, cultivation, nutrition, economic values and the need of exploring the nutritional and economic potential of snake gourd.

Introduction

It has been reported that western and central African sub region have several underutilized crops that are very useful to the local people (FAO, 1998; Abukutsa- Onyago, 2003).

The world health organization has reported a high presence of malnutrition level among the rural duelers in Africa. Jildeh *et al.,* 2010 reported high deficiency in protein for over 100 million people in Africa. Researchers has reported importance of some indigenous but neglected edible plants in nutrition of the rural populations in Africa (Adebooye *et al.,* 2001, Abutkutsa-onyago, 2003).

One of these plant is Snake gourd plant that has been reported as source of high nutrient plant which could serve as a supplement for rural dwellers that cannot afford milk and other expensive nutritional product.

The seed has been reported to have high quality of vegetable oil which could be used as food and other industrial purposes.

Origin and Distribution of Snake gourd

Snake gourd (*Trichosanthes cucumerina L.*) is generally believed to have originates from India (Echo, 2006). It originated in a wild state, but later domesticated. The wild specie could still be found in India and other part of South East Asia, Australia, West Africa, Latin America and the Caribbean (Echo, 2006). Snake gourd has 70 genera and over 700 species. The snake gourd (Fig. 1) is known by different names in different part of the World. In Nigeria it is known as snake tomato, *pathakaya* in India, *pakupis* in Philippines, *baup ngu* in Thailand, *pudalankaai* in Tamil, *paduvalakaayi* in Kannada and *padavalanga* in Malayam (Echo, 2006).

Botanical Characteristics of Snake gourd

The snake gourd belongs to the family *cucurbitacea*. The crop is a climber that can grow to 5 metres (Brickell, 1990). It climbs by means of tendrils. The Snake gourd has slightly twining stem (Grey-Wilsonand Mathews, 1983). It is commonly called snake gourd, viper gourd, snake tomato or long tomato (Ojiako and Igwe, 2008). Onagoruwa (2002) noted that there are two types of snake gourd in Nigeria. Both types have long fruits but they differ in colour. One is of deep green while the other is of light green. The flowers of snake gourd are mondecious, but both female and male flowers can be found on the same plant. These flowers are white, aromatic and always open late in the day.

Cultivation of Snake Gourd

Snake gourd can be grown twice in a year in a tropical climate like Nigeria. The first cultivation is between April to July, while the second is August to November (Oloyede and Adebooye, 2005). Irrigation may be needed in climates with seasonal droughts. The crop can thrive on sandy, sandy loam and light clay soils (Huxley, 1992).

However, the soils should be well drained. The average growth temperature is 30-34℃ (Echo, 2006).

Oloyede and Adebooye (2005) noted that plant spacing of one metre between rows and one metre within rows is adequate for snake gourd.

Seeds should be planted two per hole and three weeding during the life of the crop are recommended. Avoidances of high dosage of nitrogenous fertilizer should be observed. It was observed that excess nitrogen in the soil would produce crop with excess vines and less fruits.

Snake gourd takes about 16 weeks from planting to maturity (Hedrick, 1972; Huxley, 1992). During growth the crops vines and long fruits can be supported by bamboo trellis of about 1.5 m high or a small trellis of concrete reinforcement wire of 100 cm^2 meshes.

The vines may also be allowed to either grow up poles. Over hatched rooftops or over walls.

Harvesting and Post-Harvest Handling of Snake Gourd

Harvesting and post-harvest handling of snake gourd are done manually. The matured fruits are ready for harvesting 12-20 days after fruit set. The fruit turns yellow if not harvested immediately (Figure 2).

In countries like Nigeria where matured fruits are used as soup additive the fruits are harvested when they begin to change from green to orange or red colour. Snake gourds do not keep well after harvest. However, they can be stored for 10- 14 days at a temperature of 16-17^{o}C and a relative humidity of 85-90%.

Fig.1 Snake gourd fruit

Source: LAUTECH Agricultural Engineering Farm

Fig.2 A fully matured ripe snake gourd fruit

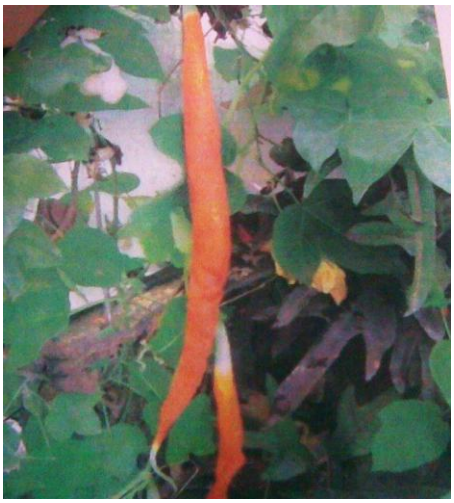

Fig.3 Snake Gourd Seed

Table.1 Nutritional Facts of Snake Gourd Fruit

S/N	Food Property	Composition
1	Calories	86.2
2	Total Fat	3.9g
4	Saturated Fat	0.5 g
5	Polyunsaturated Fat	1.6 g
6	Monounsaturated Fat	1.6 g
7	Total Carbohydrate	12.5 g
8	Dietary Fiber	0.6 g
9	Sugars	0.6 g
10.	Pantothenic Acid	3.0 %
11.	Vitamin B_{12}	0.0 %
12.	Vitamin B_6	11.3 %
13.	Vitamin C	30.5 %
14.	Vitamin D	0.0 %
15	Vitamin E	1.1 %
16.	Calcium	5.1 %
17.	Copper	4.4 %
18.	Folate	5.6 %
19.	Riboflavin	2.7 %
20.	Selecnium	3.1 %
21,	Thiamin	5.2 %
22	Sodium	33.0 mg

Source: DrHealthBenefits.com

Table.2 Nutrient Composition of *T.cucumerina* Seeds

Nutrients	**Composition**
Crude protein	26.2-26.6g/100g
Fat	44.6-57.2g/100g
Phosphorus	78.0-81.5mg/100g
Calcium	41.0-46.7mg/100g

Source: Oloyede and Adebooye (2005)

Table.3 Major vegetable oilseeds, their average oil content and estimated World production for the year 1995- 1999 (Anonymous 1995)

Oilseed and fruit (million metric tonnes)	Oil content (%)	Oil production
Soybean	21	19.3
Cottonseed	23/33*	3.59
Rapeseed	42	9.8
Peanut	42	3.97
Sunflower	44	7.77
Coconut/copra	65	3.08
Palm kernel	33/45*	1.98
Palm	37/66**	14.2
Olive	30	1.67

*dehulled ** dry basis

Uses of Snake Gourd

The snake gourd fruit comprises essentially the pulp and the seed. Unlike most oil producing crops, both the pulp and the seed are narratively useful. The pulp is used as a substitute in soup to solanaceous tomato because of its sweet taste, aroma and deep red endocarp colour when fully ripe (Adebooye *et al.*, 2007; Deepa, 2017). The presence of high ascorbic acid which is higher than that of popular solanaceous tomato varieties suggest the possibility of utilizing snake gourd in the industrial production of tomato paste and puree. The seeds when dried is used in alternate medicine for treating anthelmintic and diarrhea. It has been reported that the seed contain anti-bacterial (Yusuf *et al.,* 2007) which may make it a potential insecticide. The proximate composition of the fruit (Table 1) while Table 2 present the reported proximate composition of the seed.

The seed (Figure 3) is a good source of edible oil. Many researcher have observed that the presence of antioxidant, such as, carotenoids, flavoriods, lycopene, phenolics and β-carotene in the oil, helps in protection against diseases like cardiovascular, diabetes, and so on (Velioghu *et al.,* 1998; Loheu *et al.,* 2000; Liu *et al.,* 2000; Knakt, 2002, Sweeney *et al.,* 2002; Amin *et al.,* 2004; Sahin *et al.*,2004; Zharg and Hemauzy, 2004). Perhaps the most interesting news is that the AIDS drug Compound Q is a refined protein called trichonanthine which is derived from the trichosanthes (snake gourd) family. It has been shown that the protein has the ability to kill an HIV infected cell without affecting surrounding tissue.

The snake gourd seed oil contains 26.2-26.6% crude protein, 44.6-57.7% fat, 7.8-8.15% phosphorus and 0.012-0.026% anti-nutritional oxalate (Adebooye, *et al.,* 2005). Idowu 2015 reported 45% oil content for the seed. The oil content of the seed compared favorably with that of most seed oil (Table 2). They noted that this anti-nutritional oxalate is low and safe for humans. Skumarlabot (2007) notes that other parts of snake gourd, such as, shoots, tendrils and leaves are eaten as vegetables. However, it was recommended that these parts should be boiled before eaten to remove some unpleasant odours (Echo, 2006). It has been reported that the plant contains some pharmacological impotance like antidiabetic, hepatoprotective, hepato-protective, cytotoxic anti-inflammatory, larvicidial effect (Kritikar and Basu 2006; Sathesh *et al.,* 2009).

Generally the plant was believe to be of high value because of the presence of carotenoidds, flavonoids, lycopene, phenolics and B-carotene (Anuradha and Bhide, 1999: Khare, 2007: Swamy *et al.,* 1998: Yadava and Syeda 1994 ;Yusuf *et al.,* 2007).

Challenges to Agricultural Engineers and other Agriculturist

The ability of a particular oil seed to fit into the growing industries depends on its utilization potential, rate of production and availability of the processing technology. It had been proofed that the utilization potential of snake gourd is high but its production and processing technologies are low. Although, Idowu and Owolarafe (2014) has reported effect of moisture content on the seed engineering properties; Idowu and Owolarafe (2013) on the aerodynamic properties of the seed; Idowu (2015) on the effect of seed washing on the snake gourd oil yet a lot is still needed to be done to encourage production. The agricultural engineers should work with the soil scientist, agronomist and breeders to evolve production technologies of high yielding varieties of snake gourd. Also, agricultural engineers should work with other food scientist to develop machinery and

processing procedure to produce essential products from snake gourd.

The economic potentials of snake gourd were very high but its production and processing technologies are low. The present global food crises call for an urgent coordinated research in some useful but neglected crops, in which snake gourd is one. The successful outcome of these research works can create job, increase foreign exchange of the country or countries involved, increase food production and possibility improve the health of the people.

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