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DETERMINATION OF PROXIMATE, MINERALS, VITAMIN AND ANTI-NUTRIENTS COMPOSITION OF *Solanum verbascifolium* LINN.

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ABSTRACT

The proximate, minerals, vitamins and anti-nutrients composition of *Solanum verbascifolium* Linn were determined. The proximate composition showed that moisture content was (85.5%), protein was (32.55%), lipid was (2.90%), ash was (7.20%), fibre was (4.80%), carbohydrate was (52.55%) and caloric value was (366.50%) respectively. This was found to be rich in protein and considerably high amount of carbohydrate. The anti-nutrient composition analysis revealed the presence of hydrocyanide (1.39mg/100g), Oxalate (114.40mg/100g), all of which are below toxic level except for oxalic acid. For mineral and vitamin compositions, potassium was significantly ($P>0.05$) higher than iron, sodium, calcium and phosphorus while vitamin A retinol was (371.72mg/100g) and vitamin C ascorbic acid (39.99mg/100g). Based on these findings the plant is recommended for consumption and for further investigation as a potential raw material for pharmaceutical industry.

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INTRODUCTION

Solanum verbascifolium Linn. (Family solanaceae). It is commonly called African Garden egg vegetable. It is a shrub 1 to 4 meters in height and is covered all over with dense, yellowish, grey, stellate hairs. The leaves are ovate, oblong-ovate, or elliptic-ovate, 10 to 23cm across, and in compact. The Calyx is grayish green, cup-shaped, about 15 millimeters long and very woolly, with short shaped and broadly triangular segments (1).

It has been reported that the plant and the fruit contain solanine, Mallic acid, colouring matter and saponins. They are heated and applied as an emollient on the forehead to relieve headache and are applied as poultices to ulcers and boils. A decoction of the leaves is drunk against vertigo (2). Vitamin D_3 compounds may play a function in angiosperms. Studies *in vitro* have shown that, like nitrogenic plant hormones, they stimulate root growth and differentiation through activation of the Ca^{2+} messenger system. Anti-nutrients are natural on synthetic compound that interfer with the absorption to nutrients. One common example is phytic and which interferes with the absorption to minerals from the diet and also form insoluble complexes with calcium, zinc, iron and copper. This study therefore examines the proximate, anti-nutrients, vitamins and mineral composition of *Solanum verbascifilium* so as to validate the numerous claims by earlier workers on the nutritive value of the plant.

MATERIALS AND METHODS

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Collection and Preparation of Plant Materials

Fresh leaves (2kg) of *Solanum verbascifolium* were collected from a local cultivar at Rumuokoro, Port Harcourt. The plant was authenticated by Mr. Edwin Wosu, a taxonomist in the Department of Plant Science & Biotechnology, University of Port Harcourt and Voucher specimen deposited at the Herbarium of the University. The leaves were air-dried at room temperature after which the materials were reduced to powdered form. The sample was then stored in an air-tight container, well labeled and kept in a cool dry place for further analysis.

Proximate analysis

Analysis of the nutrient content of *Solanum verbascifolium* was carried out using the method of (3).

Anti-nutritive Tests

The method of (3) was employed to determine the level of Hydrocyanide, Oxalate, phytate and tannins.

Determination of Vitamins Composition

Vitamin A Retinol was determined using the method of (4), vitamin C ascorbic acid was determined using the method of (3).

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Mineral analysis

Mineral contents were determined using UNICAM solar 969 Atomic Absorption Spectrophotometer to analysis for elements such as Mg, Fe, K, Na, Ca and P as described by (5).

RESULTS

The proximate composition was 85.58% moisture, 32.55% protein, 2.90% lipids, 7.20% total ash, 4.80% fibre, 52.55% carbohydrate and 366.50% caloric value (Table 1). Ant-nutritive analysis revealed Hydrocyanide 1.39mg/100g, Oxalate 114.40mg/100g, phytate 1.92mg/100g and tannins 0.98mg/100g (Table 2). Vitamin A retinol was 371.72mg/100g, Vitamin C ascorbic acid 39.99mg/100g (Table 3). Mineral analysis revealed 10.143mg/100g Magnesium (Mg), 31.126 Iron (Fe), 726.394 potassium (K); 3.848mg/100g (Na); 253.912 calcium, (Ca) and 19.90mg/100g phosphorus (P); Table (4).

Table 1: DETERMINATION OF PROXIMATE COMPOSITION OF *Solanum verbascifolium*

NUTRIENT	SAMPLE COMPOSITION (%)
Moisture content	85.58
Protein	32.55
Lipid	2.90
Ash Content	7.20
Fibre	4.80

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Carbohydrate	52.55
Caloric value (KCAL)	366.50

TABLE 2: ANTI-NUTRIENT COMPOSITION OF *Solanum verbascifolium*

ANTI-NUTRIENT	SAMPLE COMPOSITION (mg/100g)
Hydrocyanide	1.39
Oxalate	114.40
Phytate	1.92
Tannin	0.98

TABLE 3: DETERMINATION OF VITAMIN COMPOSITION OF *Solanum verbascifolium*

VITAMIN	SAMPLE COMPOSITION (mg/100g)
Vitamin A (Retinol)	371.72
Vitamin C (Ascorbic Acid)	39.99

TABLE 4: DETERMINATION OF MINERAL COMPOSITION *Solanum verbascifolium*

MINERAL	SAMPLE COMPOSITION (MG/100G)
Magnesium	10.1429
Iron	31.126
Potassium	726.394
Calcium	253.912
Phosphorus	19.90

DISCUSSION

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The result of the nutrient composition revealed that the caloric value (366.50%) was the highest while fibre was the least (4.80%).

Consumption of vegetables is one of the major sources of water for the cells of the body (6). Moistures or water is a universal solvent. It dissolves other substances, carries nutrients and other materials round the body, making it possible for every organ to perform its functions effectively (7).

Carbohydrates are plant products which are synthesized as the by-product of photosynthesis processes. This is consumed by man and animals as the major source of energy. Carbohydrates are hydrolyzed in the body to yield glucose, which can be utilized immediately or stored as glycogen in the muscles and liver for future use (8), (6). Ash content of a plant based food is the function of the mineral elements present (9).

Phytic acid, a hexaphosphate derivative of inositol is an important, storage form of phosphorus in plant. It causes calcium and zinc deficiency in man when in excess, the deficiency of these minerals results in Oteo-malacia, anaemia and rickets. However, it plays an important role in determining starch digestibility in food (10). High content of tannin decrease protein quality by decreasing digestibility and causes damage to the intending track (11). Dutta (12) said that tannins are responsible for the flavour in tea and it use in the treatment of skin eruption and for other medicinal purposes due to their astringent properties.

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Calcium (Ca) is an important factor in fibrinect in formation which forms fibrinogen and subsequently fibrin and collagen (13*).* Fibrin is a dotting factor responsible for homeostasis. Potassium and sodium ions are known activators of energy potentials across nerve membrane (13) together with calcium, ions may serve as replenishment in diarrheic conditions, maintenance of normal nervous function and gut peristalsis. Magnesium ions are known hormone activators in type 2 diabetes, their presence in leaves of this plant can be beneficial in managing this disease.

This study has, therefore, established the fact that *Solanum verbascifolium* Linn. contains highly beneficial contents which can be exploited beneficially in healthcare services and nutritional supplement.

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