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COMPARATIVE STUDIES OF PROXIMATE COMPOSITION OF THE LEAVES AND ROOTS OF *Starchytarpheta cayennennsis* (L) VAHL

[1]Oruk, A. E.; [2]Echeme, J. O. & [1]Ibout A. A.
[1]Department of Science Technology, Akwa Ibom State Polytechnic, Ikot Osurua
[2]Department of Chemistry, Michael Okpara University of Agriculture, Umudike, Abia State,
Email: orukalbert@gmail.com
Correspondence: [1]Oruk, A. E.

ABSTRACT: The roots and leaves of *Stachytarphate cayennensis were* obtained from the School horticultural farm and was identified by a botanist in the Biological Science Unit of the Department of Science Technology, Akwa Ibom State Polytechnic, Ikot Osurua. The plant parts were subjected to proximate analysis using standard methods proposed by Association of Analytical Chemists (AOAC). The results in milligram per 100 grams (mg/100 g) on the leaves were: moisture content 45.12 ± 0.250, carbohydrate 74.69 ± 1.300, crude protein 17.66 ± 0.125, crude fibre 5.68 ± 1.001, crude fat 1.12 ± 0.130 and ash content 0.85 ± 0.007 while the concentrations on the root were moisture content 50.00 ± 0.110, carbohydrate 77.00 ± 0.501, crude protein 11.50 ± 0.162, crude fat 1.00 ± 0.331, crude fibre 5.50 ± 0.108 and ash content was 5.00 ± 0.131 respectively. The nutritional values on the leaves and roots were the main focus of this research.

keywords: Roots, Composition, Comparative, Studies *cayennesis, Stanchytarpheta,* Vahl. Proximate

INTRODUCTION

Medicinal plants are of great benefits to human race and the medicinal values of these plants lies in some chemical constituents that produces a definite physiological action on human system. Medicinal plants are natural products which sometimes have phaniacological or biological activity that can be of therapeutic benefit in treating diseases and as such, they are the active component not only of most traditional medicines but also many modern medicines. These chemical constituents isolated from the plants are produce by primary and secondary metabolites. Primary metabolites are essential to

both the plant and human's survival. Secondary metabolites are not essential for survival, but nevertheless provided organisms that produce them an evolutionary advantage (Marlstone *et al* 1992). Many secondary metabolites are cytotoxic and have been selected and optimized through evolution for use as chemical warfare against prey, predators and competing organisms (Hunter. 2008). However, some of the structural diversity of natural products exceeds that readily achievable chemical synthesis and synthetic analogs, they can be prepared with improved potency and safety. Natural products are often used as starting points for drug discovery, infact they are the inspiration for approximately one half of US food and drug administration approved drugs.

Starchytarpheta cayennesis is an herb commonly found in Nigeria as a weed of waste places, like road, anthropogenic site, weeds in field where crops are plant growing. *S. cayennesis* is known to possess pesticidal activity, it is used locally as a mosquito and insect repellant. It has been used by many localities as remedies to many ailments such as the treatments of dysentery, gonorrhea, ulcer, eye problem, children ear etc. *S. cayennesis* common names includes; the blue rat's tail, rough-leaved false vervian (English Name), Truamure, (Yoruba) Aran Umon, by Annang/Ibiobio and the Efik, Wulsigai Kusu (Hausa), Okeanwundeohia (Igbo) (Akobundu and Agyakwa 2002). Other names includes; Brazilian tea, Rooter comb, Blue porter, Snake weeds, Gervao according to the country of location.

S. cayennesis belongs to the family of verbenaceae which is also known as bastard verilian, its normally spread as ornamental plants, seed are also dispersed on vehicles, by soil movement, by rain water, by wind (Smith, 2002). It is a perennial clumping shrub that grows to 2m with tough stems and woody rootshock. Shallow tooted leaves with hairy underside flowers which can range from purple to violet, dark or pale blue to almost white with a long stiff snake like stem. Its seeds are dark brown or black and measure up to 5 mm long which

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are two seeded kernel or nutlet enclosed by a persistent calyx that is embedded in a shallow groove in the inflorescence axis.

Culinary uses of *S. cayennesis*

All parts of *S. cayennesis* can be used either direct or fresh to make pleasantly tasting infusion called Brazilian tea. It can equally be used for brewing foaming drink which is the same thing as porter kind of beers, that is where the name porter weed is taken from. Its ting flowers are edible, it has a bit of mushroom taste and can be used raw as a spice for salads, while other part of the plant are said to be eaten as boiled vegetable.

Traditional uses of *S. cayennesis*

S. cayennesis is widely known for its high medical importance in traditional and folk medicinal system in various countries, it has been reported to possess pharmacological effect due to the presence of various bioactive phytochemicals constituent (Suliman, 2009). In herbal medicine *S. cayennesis* has been known to function as antacia, analgesis, anti-inflammatory, hypetensive, anti-helminthic, diuretic laxative, lactagogue, purgative, sedative, spasmogenic, vasodilator, vulnerary and vermifige properties (Suliman, 2009). The plant has also been extensively used by the elderly as a cooling tonic for the stomach, the root is also consumed to stimulate the function of the gastro testinal tract or help in digestion. It is also used locally in treatment of asthma, cold, cough, arrhosis and hepatitis. The extract of the plant can be applied externally to clean cuts, wounds, and sores (Ramakrishnan 2004). In some part of Nigeria *S. cayennesis* is used by midwives to treat female complaints such as menstrual disorder, regulate bormonal balance and increase milk supply to breast-feeding mothers and others as their case may be. However, *S. cayennnesis* is not recommended for pregnant women or individual with low blood pressure since it is considered to have abortive and hypotensive effect. (Sivaranjani, 2013).

Antimicrobial and Antifungal

Antimicrobial and antifungal activities are infections disease emerge continuously and account for high proportion of health complications that affect the human population throughout developing countries. it has been reported that the main reason that explains this worsening situation is because of antibiotic resistance of micro-organisms.

According to Pulera and Arius Shazura (2010), micro-organisms have gained and developed their resistance against antibiotics through genetic alteration between themselves and other organisms. However, due to this, immense therapy problems in the treatment of infectious diseases have been risen and alternative tactics are needed to fight against micro-organism. (Pulera and Arius Shazura 2010).

Proximate: This is chemical method of accessing and expressing the nutritional value of a feeds, which the feeds is been divided into six to seven categories.

Composition: It is a nature of ingredients or constituent in which a whole or mixture is made-up.

Moisture Content

Water can be classified as nutrient; the chemical composition of water makes in good liquid for all biological system (Ababio 2000). The most important physical properties of water recognized by nutritionist are, the ability to exist in all three state of mater. The aim of estimating water/moisture content of a sample is to determine its shell life. The commonest analytical method approved for the determination of moisture content of food and material is the one described by A. O. A. C. (1990). The moisture content of any food is an index of its after activity (Frazier and Westoff 1998) and is used as a measured of stability to microbial contamination (Scott, 1980).

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MATERIALS AND METHODS

Starchytarpheta cayenennis was collected locally, the roots separated from the stems and the leaves. The roots were washed, cut into pieces and fresh weights for moisture content of root and leaves were recorded before sun drying for two weeks. The dried roots and leaves were grounded into a powdering form and each of the samples were digested and stored in a different conical flask and labeled. Both samples were subjected to proximate analysis using standard analytical procedures (A.O.A.C. 1990).

Determination of crude protein (A.O.A.C 1990)

0.5 g of the sample was accurately weighed into a standard 259 ml kjedhal flask containing 10 g Na_2SO_4 and 0.5g of $CuSO_4$. The digestive flask was placed in the heating mantle and was heated gently for some hours until a clear bluish colour solution was obtained. 30 ml portion of the digest was pipette into a semi-micro kjedhal distillation apparatus and treated with 20 mls 40% (w/w) NaOH solution. The ammonia evolved was stem distilled into a conical flask containing 10 ml solution of saturated boric acid to which 4 drops of tashirus indicator (double indicator) has been added and the solution, which it was distilled, and the distillation continued until about 2/3 of the original volume with obtained. The distilled was then titrated with 0.1 m HCl until a purple-pink end point was observed.

A blank determination was carried out in a similar manner, as described above except for the omission of the sample. The crude protein was obtained by multiplying the percentage of nitrogen content by the factor (6.25). crude protein = % of nitrogen x factor 6.25 from the data obtained the crude protein was calculated using the formula below:

$$N = \frac{(T - B)N \times 0.014}{0.5} \times \frac{50}{20} \times \frac{100}{1}$$

Where T = Sample titration reading
B = Blank titration reading

N = Normality of HCl

Determination of other parameters

Other parameters were carried out using the same standard methods but different reagents.

Table 1: The Proximate Composition of the Leaves of Stachytarpheta *cayennensis.*

Parameter	Concentration (%)
Moisture content	45.12 ± 0.250
Carbohydrate	74.69 ± 1.300
Crude protein	17.66 ± 0.125
Crude fat	1.12 ± 0.130
Crude fibre	5.68 ± 1.001
Ash content	0.85 ± 0.007

Data are mean ± standard deviation of triplicate determination on dry weight basis

Table 2: The Proximate Composition of the Roots of Stachytarpheta *cayennensis*

Parameters	Concentration (%)
Moisture content	50.00 ± 0.110
Carbohydrate	77.00 ± 0.501
Crude protein	11.50 ± 0.162
Crude fat	1.00 ± 0.331
Crude fibre	5.50 ± 0.108
Ash content	5.00 ± 0.131

Data are mean ± standard deviation of triplicate determination on dry weigh basis.

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DISCUSSION

When going through the results of both analysis in Table 1 and Table 2 using standard methods. Comparing the moisture content in table 1 and 2, leaves had 45.12 ± 0.250 while the roots was 50.00 ± 0.110, this shows that *S. cayennesis* has the capacity to sustain the water content of the body when compared to previous works reported by Ezeabara *et al* (2015), which was 42.75 ± 0.09 in the leaves of *S. cayennnesis* and 44.08 ± 0.110 in the roots Theancho and Uclebuani (2009). The variation in both results may be attributed to the environmental factor. Moisture content provides greater activity for water soluble enzymes and co-enzymes needed for metabolic activities in the body, while low moisture content may lead to dehydration. Anacho and Udebbvan (2009).

Carbohydrate: The leaves in Table 1 has 74.69 ± 1.300 while 77.00 ± 0.501 of the roots in Table 2. Going as the results of both parts of the plant, *S. cayennesis* is a rich sources of carbohydrate, when compared to 73.52 ± 1.200 and 76.01 ± 0.401, Ayoola *et al* (2012); Ezeabara *et al* (2015) respectively. Carbohydrate provide the body with fuel and energy that is required for daily activities and exercise. The human body need constant supply of energy to function properly and lack of carbohydrate in the diet may result in tiredness or fatique, mental malfunction and lack of endurance and stamina.

Crude protein: The crude protein values of 17. 66 ± 1.300 and 11.50 ± 0.162. Table 1 and 2 indicates that more protein are found in the leaves than the roots. The present values differ from those of Ayoola *et al* (2012) 16.73 ± 0.006 and 10.30 ± 0.004. Ezeabura *et al* (2015) respectively. Dietary protein plays important role in natural synthesis and maintenance require for healthy function. Proteins are substances having amino acid as their backbone, protein contain basically nitrogen, carbon, hydrogen and oxygen and has identified as substance that are of colloidal dimension and they hydrolyzed completely.

The amino acid units are linked together in definite sequence and in three dimensional configuration in their polymeric structure (Edem. 1983). All protein does not have the same biological value, because the biological value is found on the essential acid contains. Protein function as essential component of every living cell and it is utilized in the formation and regeneration of tissues. Plants are able to synthesize from inorganic source of nitrogen, water and carbon (iv) oxide present in the atmosphere which are assimilated by roots and leaves of plant while man depends in plants and animals for their protein intake (Tindall, 1983).

Crude fat: The content in the leaves was 1.12 ± 0.130 and 1.00 ± 0.331 of the roots comparing the two results in the previous work done by Ayoola *et al.* (2012) and Ezeabara *et al* (2015). 1.04 ± 0.000 and 4.30 ± 0.001 which is higher and though within the range and it is not a good source of fat. Dietary fat is a major determination for palatability of food vegetable fat and oil lower stored lipids has contributed to reduction in the occurrence of disease associated with damage of coronary artery (Onunoghu, 2002).

These are esters of fatty acid and glycerol. Most fats are solid at room temperature while oil is liquid. Almost all body function depends on fat because they provide an excellent source of energy and it also enhance transportation of fat soluble vitamins, insulate and protect internal tissues and also contribute to vital cellular processes. Excess of fatty acid with the corresponding shortage in the supply of essential poly-saturated fatty acid result in coronary thrombosis in man while high level of poly unsaturated fatty acid have prolifio tendency to reduce blood cholesterol level (Sofowora, 1980 and Evans, 2005).

Crude Fibre: Contained 5.68 ± 1.001 in the leaves while 5.50 ± 0.108 in the roots. It is higher here when compared to Ayoola *et al* (2012); Ezeabara *et al,* (2015) with 4.35 ± 1.001 and 4.50 ± 103 respectively. Crude fibre is the part of

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food that is not digested by human, but the normal functioning of the intestine tract depends upon the present of adequate fibre. It increases stool bulk and decrease the time that waste material spends in the maintenance of human health and has been known to reduce cholesterol level in the body (Bello *et al,* 2008). A low fibre in diet has been associated with heart disease, cancer of the colon, diabetes and constipation (Saldanha, 1995). Fibres are plant of fruit grain and vegetable which can either be digested nor absorbed by human system. Generally, dietary fibre function in the body is to slow down the rate of glucose absorption in the blood stream. They also reduce the level of plasma cholesterol and prevent colon cancer and cardiovascular disease. It improves bowel problem and relieves constipation in patient (Davidson *et al.* 1985 and Takashi *et al.* 1994).

Carbohydrate: Aldehyde or ketone or condensation product sometimes a derivative of these substances are all found in most food and all biological values in the plant kingdom. Carbohydrates are of different types such as monosaccharide, disaccharide, polysaccharide, oligosaccharide, while a complete carbohydrate is considered to be in food. Complete or total carbohydrate is that fraction of food when protein, fat, fibre and ash have been removed (Ababio, 2000). Carbohydrate function in energy provision, which our body need a constant supply of energy to function properly and lack of carbohydrate in the diet can cause tiredness or fatigue, mental malfunction, lack of endurance, and stamina while excessive intake of carbohydrate lead to obesity.

Ash content: The leaves contained 0.85 ± 0.007 in Table 1 while the root in Table 2 contained 5.00 ± 0.131. The above results show that they are lower than that of Ezeabara *et al* (2015) which was 10.03 ± 0.006 in the leaves while 9.02 ± 0.003. Ayoola *et al* (2012) in the root. The properties of the ash content is reflection of the mineral content present in food material. High ash content in a leafy vegetable would imply high mineral content, hence very nutritious

(Ukam, 2008). Ash content of a based food is the function of the mineral element present. Dietary ash, has proved helpful in establishing and maintaining acid, alkaline balance of the blood system and as well as in controlling hyperglucomenia condition (Sarbortha, 1980 and Gokani *et al.* 1992).

Caloric Value: The amount of energy available from an item of food when digested, mostly from carbohydrates and fats.

CONCLUSION

S. cayennesis is a plant of great importance to the health of individual and communities at large. The traditional uses of the plant has proved its medicinal values. The analysis of the proximate composition of the roots and the leaves shows the nutritional components of the plant and it potency of providing the required substituted primary metabolites, which can aid as a supplement to the body. The analysis also confirmed thus with slight different from the previous work done that *S. cayennesis* contained some important nutritional values such as crude fibre, carbohydrate, ash, crude protein, in and moisture which are daily requirement in the body. However, *S. cayennesis* can be used as food supplement, such as tea, soup, drugs, roughage and other traditional uses.

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