Review Article

BIOCHEMICAL SCREENING OF FLUTED PUMPKIN LEAF

ABSTRACT

Fluted pumpkin leaf (*Telfairiaoccidentalis*) is a well known vegetable used in different parts of Nigeria. It is generally called*Ugu* in Igbo Language. This study was carried out in order to determine the biochemical(phytochemical) composition of *Telfairiaoccidentalis,* the widely eaten vegetable in Nigeria. The study was done using extract of fluted pumpkin leaf which was soaked in water and ethanol differently. At the end of the study under qualitative analysis, the phytochemical screening of the ethanolic extract revealed the presence of seven (7) out of the eight (8) phytochemicals determined with presence of alkaloids, flavonoid, glycosides, saponins, tannins, steroids and phenol compounds while terpenoids, is absent. The water extract showed the presence of five (5) out of the eight (8) phytochemicals determined with presence of alkaloids, flavonoid, steroid, glycosides, and phenol compounds while saponin, tannin and terpenoids were absent. Under quantitative analysis, the result for the quantitative phytochemical compositions of fluted pumpkin leaf showed flavonoid with the highest concentration (11.83mg/100g), followed by steroid (11.67mg/100g), saponin (4.58mg/100g), alkaloid (3.63mg/100g), terpenoids (3.56mg/100g), phenol (3.50mg/100g) while tannin have the lowest value (0.51mg/100g).

Keywords: BIOCHEMICAL, SCREENING, FLUTED PUMPKIN, LEAF

INTRODUCTION

The chemical constituents of plants are influenced by environmental factors and fluctuations just as many other polygenic traits. This study probes to reveal the qualitative and quantitative biochemical concentration of Fluted pumpkin leaf, through biochemical screening of the leaf. Biochemicals are chemical compounds found in living organisms. In plants it is called phytochemical. Phytochemicals are chemicals of plant origin(Breslin, Andrew., 2017). Phytochemicals (from the Greek word *phyto,* meaning "plant") are chemicals produced by plants through primary or secondary metabolism(Molyneux *et al.,* 2007; Harborne *et al.,* 1999). They generally have biological activity in the plant host and play a role in plant growth or defense against competitors, pathogens, or predators(Molyneux *et al.,* 2007). Phytochemicals generally are regarded as research compounds rather than essential nutrients because proof of their possible health effects has not been established yet(Corvallis, Oregon. 2017;). Phytochemicals under research can be classified into major categories, such as carotenoids and polyphenols, which include phenolic acids, flavonoids, and stilbenes/lignans(Heneman, Karrie and Zidenberg-Cherr, Sheri., 2008). Flavonoids can be further divided into groups based on their similar chemical structure, such as anthocyanins, flavones, flavanones, and isoflavones, and flavanols(Heneman, Karrie and Zidenberg-Cherr, Sheri 2008). Flavanols further are classified as catechins, epicatechins, and proanthocyanidins(Heneman, Karrie and Zidenberg-Cherr, Sheri., 2008). In total, there has been over 25,000 phytochemicals discovered and in most cases, these phytochemicals are concentrated in colourful parts of the plants like fruits, vegetables, nuts, legumes, and whole grains, etc.

1.2 Statement of the problem

Fluted pumpkin leave has proven to have numerous health benefits. This is the reason why many people include it in their diet. Pumpkin leaves are believed to be high in essential vitamins such as A and C. While vitamin A improves eyesight and promotes healthy skin and hair, vitamin C helps in healing wounds and forming scar tissue, as well as maintaining healthy bones, skin, and teeth. Studies have shown that pumpkin leaves contain a high amount of calcium, which is crucial for healthy bones and teeth. Women, especially, need enough calcium to prevent osteoporosis and maintain strong bones. Some studies have also shown that calcium may help reduce the risk of cardiovascular failure. These fibrous leaves are also high in iron, making them a healthy and beneficial addition to one's diet. Iron aids the muscles in storing and using oxygen, and also helps in carrying oxygen from the lungs to other parts of the body. Women and children, especially, need to maintain healthy levels of iron, and pumpkin leaves can help provide it naturally. The leaves are also believed to be rich in protein, making them an excellent supplement for enhancing the body's daily requirement. As

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fluted pumpkin leave has proven to have these properties, there is the need to carry out more studies in order to reveal more of it's content.

1.3. Aim of study

The aim of this study is to carry out biochemical screening on fluted pumpkin leaf(both qualitative and quantitative analysis).

1.4 Significance of Study

The plant kingdom represents a kingdom of untapped resources. Many plant species are composed of different chemical compounds which are highly beneficial to man and other organisms. The importance of this study therefore is to reveal the qualitative and quantitative biochemical composition of Fluted pumpkin leaf *(Telfairiaoccidentalis),* as one of the plant species that are beneficial to man.

1.5 Scope of the study

This study encompasses the biology of the plant Fluted pumpkin leaf *(Telfairiaoccidentalis)* (its description, Growth and habit, distribution, Cultivation and uses), and the qualitative and quantitative biochemical analysis.

LITERATURE REVIEW

2.1. Description of the studied species

Telfairiaoccidentalis(Fluted pumpkin leaf) is a tropical plant grown in West Africa as a leaf vegetable. Common names for the plant includes fluted gourd, fluted pumpkin, *ugu* in the Igbo language, *sokoyokoto* in Yoruba, *kabewa* in Hausa, and*Ikong-Ubong* in Efik and Ibibio languages. *T. occidentalis* is a member of the family Cucurbitaceae and is indigenous to southern Nigeria (Akoroda, M. O., 1990). The fluted gourd grows in many nations of West Africa, but is mainly cultivated in southeastern Nigeria and it is used primarily in soups and herbal medicines(Nwanna, Esther Emem, *et al.,* 2008). Although the fruit is inedible, the seeds produced by the gourd are high in protein and fat, and can, therefore, contribute to a well-balanced diet. The plant is a drought-tolerant, dioecious perennial that is usually grown trellised. The edible seeds can be boiled and eaten whole, or fermented and added to *ogili* (Badifu, Gabriel I.O., 1993). The fluted gourd has been traditionally used by indigenous tribes as a blood tonic, likely due to its high protein content(Akoroda, M. O. 1990). Flour produced from the seeds can be used for high-protein breads(Giami, Sunday Y., 2003). Furthermore, the shoots and leaves can be consumed as vegetables(Akoroda M.O., 1990). When T. occidentalis is prepared for herbal medicine, it is used to treat sudden attack of convulsion, malaria, and anaemia; it also plays a vital and protective role in cardiovascular diseases. The fluted gourd fruit is quite large; one study documented a range of 16–105 centimetres (6.3–41.3 in) in length, and an average of 9 cm in diameter(Okoli, Bosa E., and C. M. Mgbeogu., 1983). The same study found the seed count in larger gourds to reach upwards of 196 per fruit, typically measuring between 3.4 and 4.9 cm in length(Okoli, Bosa E., and C. M. Mgbeogu., 1983). In both the pistillate and staminate varieties, T. occidentalis flowers grow in sets of five, with creamy-white and dark red petals, contrasting with the light green colour of the fruit when young, and yellow when ripe(Okoli, Bosa E., and C. M. Mgbeogu.,1983). Dioecious flowering is most common in the fluted gourd, with very few documented cases of monoecious flowering.

Plate 1:*Telfairiaoccidentalis,* illustrated by

Joseph Dalton Hooker, 1877

2.2 Scientific classification of Fluted pumpkin leaf *(TelfairiaOccidentalis)*

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Eudicots

Clade: Rosids

Order: Cucurbitales

Family: Cucurbitaceae

Genus: Telfairia

Species: T. occidentalis

Binomial name: *Telfairiaoccidentalis*(By Sir Joseph Dalton Hooker)

2.3 Distribution

Fluted pumpkin occurs in the forest zone of West and Central Africa, most frequently in Benin, Nigeria and Cameroon. It is a popular vegetable all over Nigeria. It is rare in Uganda, and absent in the rest of East Africa. It has been suggested that it originated in south-east Nigeria and was distributed by the Igbos, who have cultivated this crop since time immemorial. It is, however, equally possible that fluted pumpkin was originally wild throughout its current range, but that wild plants have been harvested to local extinction and are now replaced by cultivated forms.

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2.4 Growth and habit

Seed size affects vigour, germination and seedling establishment. The viability varies from 63% for small seed (<11 g), up to 89% for the 22 g). Germination takes about 14 days in natural soil, but only 7 days in a sawdust medium. Vine length one week after emergence is on average 31 cm for large seeds, whereas small size seeds grow into a corresponding vine length of 16 cm. Larger seeds also show better growth potential in terms of number of leaves and number of branches, and show more uniformity in the seedling stand. The vegetative growth pattern of plants is sigmoidal and reaches its peak 6.5 months after planting under selective and periodic pruning of edible young leaves. Male plants flower about 3 months after planting, a month earlier than females ones. Flower opening starts from the base of the inflorescence. Male flowers have a noticeable scent around noon when pollinating insects, mostly bees of the genus Trigona, visit the flowers. The stigma of female

flowers is receptive in the afternoon. Hand pollination seems to be advantageous for fruit set as it resulted in 35% fruit set compared to 15% fruit set in open pollination. Fruit set is evidenced by a rapid growth of the ovary starting within 3 days after pollination. Fruit growth is sigmoidal over 8 weeks; growth is rapid between 1.5–5.5 weeks after successful fruit set. A white, waxy bloom develops on the surface of fruit a week after fruit set and gradually intensifies, but at maturity it becomes less intense. The maturing fruit sometimes suppresses fruits that set later. Female plants produce about 18 single flowers which set fruit, but only 1–4 develop into mature fruits. Out of the female plants of a population, only 35% bear fruits. A large variation occurs between and within plants in the number of seeds per fruit, from 6 seeds per fruit up to 196, with an average of 62 seeds. The seeds are also unequal in size, varying from 1 g to 68 g. Some seeds exhibit polyembryony. The seed is recalcitrant in nature and thus seed storage is difficult. The time to physiological maturity of the fruit is 9 weeks after fruit set. Identifying the female plants from either seeds or young seedlings has not been successful, but vine size 64 days after planting could be used as a sex indicator, because female plants are more vigorous than the male ones.

2.5 Cultivation

T. occidentalis is typically grown vertically on trestle-like structures; however, it can be allowed to spread flat on a field(Okoli, Bosa E., and C. M. Mgbeogu., 1983). A beneficial outcome of growing the gourd flat is the suppression of weeds, especially when intercropped with a tall, upright plant such as maize. The growing period begins in April or May when seeds are planted(Emebiri L. and Nwufo, M., 1990); the first leaves and shoots can be harvested after a month and can be collected every 2–4 weeks thereafter(Okoli, Bosa E., and C. M. Mgbeogu., 1983). Seeds are planted directly in the soil, typically in groups of three to increase output in a case of a failed germination(Okoli, Bosa E., and C. M. Mgbeogu., 1983). Fruit is typically harvested between October and December(Emebiri L. and Nwufo, M., 1990). The seeds are subsequently collected and dried; a portion of them are consumed, while the remainder are stored for the following planting season. Although dependent upon soil type, the fluted gourd is able to ratoon and subsequently produce many flushes of fruit over long periods(Aiyelaagbe, I.O.O, and A.A Kintomo., 2002). It is able to ratoon with the highest degree of success in well-drained soils(Akoroda, M. O., 1990). It is propagated using the seeds. Its seed is housed in

another greater covering or hard shell which protects it from harm. It survives drought and can retain its life in the root even after many years. It is a creeping plant and grows well if staked with bamboo sticks.

2.6 Uses

The leaves of fluted pumpkin leaf can be consumed as vegetables(Akoroda, M. O., 1990). It can also be used for herbal medicine. When *T. occidentalis*is prepared for herbal medicine, it is used to treat sudden attack of convulsion, malaria, and anaemia; it also plays a vital and protective role in cardiovascular diseases. Furthermore, the edible seeds can be boiled and eaten whole, or fermented and added to*ogili*(Badifu, Gabriel I.O., 1993). The fluted gourd has been traditionally used by indigenous tribes as a blood tonic, likely due to its high protein content(Akoroda, M. O., 1990). Flour produced from the seeds can be used for high-protein breads(Giami, Sunday Y., 2003).

MATERIALS AND METHODS

3.1 Description of the studied area

Uli is a town of historic importance situated at the extreme southeast corner of Ihiala local government area of Anambra state in Nigeria. Its closest neighbouring towns are Amaofuo, Ihiala, Amorka, Ubulu, Ozara, Egbuoma and Ohakpu. Uli town extends westward to the confluence of the rivers of Atamiri and Enyinja, and across Usham Lake down to the lower Niger region. Anambra State University is located in Uli. The major markets in Uli is NwkoUli and OrieUbahudara.

Plate2 :Uli Location in Nigeria map

Coordinates: 5°47′N 6°52′E

Country: Nigeria

State: Anambra State

LGA: Ihiala

Area: 99 sq mi (256 km2)

3.2 Materials

3.2.1 Equipment / apparatus

Beakers

Whatman Filter paper

Water bath.

Electronic weighing balance

Crucible

Conical flask

Electric hot plate

Spectrophotometer

Pipette

3.2.2 Reagents

Petroleum ether

Acetic acid

Ethanol

Ammonium hydroxide

Aqueous methanol

Sodium hydroxide

Phenolphthalein

Phenol

Distilled water

3.3 Samplecollection and preparation

The fresh fluted pumpkin leaves were collected from different locations within total market Ihiala in Anambra state Nigeria and the leaves were identified by my supervisor. The samples were dried in the shade at ambient temperate (28 – 30^{o}C), and was ground to powder.

200g of the flute pumpkin leave sample were weighed into labeled conical flasks.500ml of the solvents (ethanol and distilled water) were poured into the conical flasks to extract the phytochemicals. After 24hrs, the mixtures were filtered using what man filter paper (No.1) into conical flasks. The filtrates were concentrated by placing the flasks into water bath at 100^{o}C.The resulting filtrate were cooled to room temperature,

Qualitative test were then carried out on the cool solution.

3.4 Method

Qualitative phytochemical

Test for tannins

a. Ferric Chloride test:10 ml of extract was added to 5 ml with distilled water and a few drops (2-3) of ferric chloride was added and observed for any formation of precipitates and any colour change. The reaction mixture was observed for a brownish green or blue-black colouration for the confirmation of the presence of tannins.

b. Lead acetate test: The extract (50 mg) is dissolved in of distilled water and to this 3 ml of 10% lead acetate solution is added. A bulky white precipitate indicates the presence of phenolic compounds.

Test for saponins

(a) Demonstration of frothing: 2.5 ml of filtrate was diluted to 10 ml with distilled water and shaken vigorously for 2 mins, formation of froth which is stable for some minutes indicate the presence of saponin in the filtrate.

(b) Demonstration of emulsifying properties: 2 drops of olive oil was added to the solution obtained from diluting 2.5 ml filtrate to 10 ml with distilled water (above), shaken vigorously for a few minutes, formation of a fairly stable emulsion indicated the presence of saponins.

Test for steroids

(a) About 5ml of sample was dissolved in 2 ml of chloroform.0.2 ml of concentrated H_2SO_4 was carefully added to form a layer. A reddish-brown colour at the interface between the layer indicates the deoxy-sugar characteristics of cadenolides which indicates the presence of steroid

(b) 2 ml of acetic acid was added to 5ml of extract of the sample with 2 ml of concentrated H2SO4. The colour change from violet to blue or green in some samples is an indication of the presence of steroids.

Test for alkaloids

a. Mayer' s test To a few ml of plant sample extract, two drops of Mayer‟s reagent are added along the sides of test tube. Appearance of white creamy precipitate indicates the presence of alkaloids.

b. Wagner's test A few drops of Wagner‟s reagent are added to few ml of plant extract along the sides of test tube. A reddish- Brown precipitate confirms the test as positive.

Test for cardiac glycosides

a) 5 ml of each extract was treated with 2 ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1 ml of concentrated sulphuric acid. A brown ring at the interface indicated the deoxysugar characteristics of cardenolides. A violet ring may appear below the ring while in the acetic acid layer, a greenish ring may be formed.

b) 10 ml of 50 % H_2SO_4 was added to 1 ml of the filtrate in separate test tubes and the mixtures heated for 15 mins followed by addition of 10 ml of Fehling‟s solution and boiled. A brick red precipitate indicated presence of glycosides (Sofowora, 1993). .

Test for flavonoids

(a) 5 ml of dilute ammonia solution was added to a portion of the filtrate, followed by the addition of concentrated H_2SO_4. A yellow coloration was indicative of the presence of flavonoids.

(b) Few drops of 20 % sodium hydroxide solution were added to 1 ml of the cooled filtrate. A change to yellow colour which on addition of acid changed to colourless solution depicted the presence of flavonoids.

Phenolics

a. **Ferric chloride test:** 5ml of extract was added to 10 ml of distilled water.Then 1ml of ferric chloride solution was added. Formation of blue-black or brown colouration indicated the presence of phenol.

b. Gelatin test The extract (50 mg) is dissolved in 5 ml of distilled water and 2 ml of 1% solution of Gelatin containing 10% NaCl is added to it. White precipitate indicates the presence of phenolic compounds.

Quantitative phytochemicals

Steroids

One gram (1 g) of the extract was macerated with 20 ml of ethanol. Two milliters (2 ml) of chromagen solution was added to 2 ml of the filtrate and allowed to stand for 30 minutes. Absorbance was read at 550 nm. A standard was made following the same procedure at different concentrations using steroid hormone, a standard curve of absorbance vs concentration was plotted and the concentration of steroid in the extract extrapolated from the standard curve.

Alkaloid determination

5g of the sample will be weighed into a 250ml beaker and 20ml of 20% acetic acid in ethanol will be added and covered and allowed to stand for 4 hours at room temperature. This will be filtered with filter paper and the filtrate will be heated to one quarter of the original volume. 5ml of Concentrated ammonium hydroxide will be added drop wise until the precipitate will be complete. Then, filter with the pre weighed filter paper. The residue on the filter paper is the alkaloid, which is dried in the oven at 80^{o}C. The alkaloid content will be calculated and expressed

as a percentage of the weight of the sample analyzed. Then will be calculated using the formula.

% weight of alkaloid =

$$\frac{\text{(Weight of filter paper with residue)} - \text{(Weight of filter paper)} \times 100}{\text{Weight of the sample analyzed}}$$

Tannin determination by Titration

20g of sample will be weighed in a conical flask and 100mls of n hexane or petroleum ether will be added and covered for 24 hours. The sample will be then filtered and allowed to stand for 15 minutes for the solvent to evaporate. It will be then re-extracted by soaking 100mls of 1% acetic acid in ethanol for 4 hours. The sample will be then filtered and the filtrate collected.

25 ml of ammonium hydroxide will be added to the filtrate to precipitate the alkaloids. The alkaloid will be heated with electric hot plate to remove some of ammonium hydroxide still in solution. The remaining volume will be measured and 5ml of this will be taken and 20ml of ethanol will be added to it. It will be titrated with 0.IM NaOH using 1ml

of phenolphthalyne as indicator until a pink end point is reached. Tannin content will be calculated in percentage ($C^1V^1 = C^2V^2$) molarity

Data

C_1 = Concentration of Tannic acid

C_2 = Concentration of Base

V_1 = Volume of Tannic acid

V_2 = Volume of Base

Therefore $C_1 = \frac{C_2V_2}{V_1}$

% of tannic acid content = $\frac{C_1 \times 100}{\text{Weight of sample analyzed}}$

Determination of Saponins

20grams of the ground sample will be weighed into a thimble and transferred into the soxhlet extractor chamber fitted with a condenser and flask. 250 ml of methanol will be put into the flask. Extraction continued for 1hr, Thesaponin will be exhaustively extracted by heating the flask on a heating mantle. After the thimble and its content will be

removed and the methanol recovered leaving the saponin and little quantity of methanol in the flask. It will be then taken to an oven and kept at slanting position at a temperature of 70oC to evaporate the residual methanol. The flask and content will be weighed and the difference between the flask plus saponin and flask alone will be the mass of saponin extracted.

The saponin content will be weighed and calculated in percentage.

Calculation:

% Saponin= (Weight of beaker +sample) - (Weight of empty beaker) x 100

Weight of sample analyzed

Determination of Flavonoids

10g of the plant sample will be put in a beaker with 100ml of 80% aqueous methanol at room temperature and allow to stand for 2hrs. The whole solution will be filtered through what man filter paper. The filtrate will be later transferred into a crucible and evaporated into dryness over a water bath and weighed to a constant weight .

Calculation:

% Flavonoids =(Weight of crucible + residue) – (Weight of crucible) x 100

Weight of sample analyzed

Cyanogenic glycosides determination

One (1)g dry ground sample was weighed into a 250ml round bottomed flask. 200ml diluted water was added and allow to stand for 2 hours (in autolysis to occur fully) 250ml flask containing 20ml of 2.5ml was distilled and collected (150-170ml) of distillate. Anti-foaming agent (tannic acid befor) distillate was added to 100ml of the distillate containing cyanogenic glycosides. A. 8ml of 6 NHO B. 2ml of 15% potassium were added and titrated with 0.02N silver nitrate ($AgNO_3$) solution using micro burette against a black background permanent turbidity indicate and point cyogenic glycosides mg/100g

$$= \frac{\text{Titre value x 1.08 (g) x extract vol (m) x 100}}{\text{Aliquot vol. (ml) x sample wt (g)}}$$

Phenol

The extract (1 g) was weighed out and dissolved in 20 ml of 80% ethanol and filtered. To 5 ml of the filtrate was added 0.5 ml of Folin-Ciocalteu's reagent and allowed to stand for 3 minutes. This was followed by the addition of 2 ml of 20% sodium carbonate (Na_2CO_3).The absorbance of the mixture was read at 650 nm. A standard was made following the same procedure at different concentrations of gallicacid. A

standard curve of absorbance against concentration was plotted and the concentration of phenol extrapolated from the standard curve.

RESULT

4.1 Qualitative Phytochemical screening of Fluted pumpkin leaf extracts

Table 1: QUALITATIVE PHYTOCHEMICAL OF FLUTED PUMPKIN LEAF

Parameters	ETHANOL	WATER
SAPONIN	+++	-
FLAVONOID	+++	+
ALKALOID	+++	+
TANNIN	+++	_

STEROIDS	+++	++
TERPENIODS	-	-
GLYCOSIDES	++	+
PHENOL	+++	++

Key
+++ = Present in high concentration
= Present in moderate concentration
+ = Slightly or sparingly present
- = Absent.

The result of the qualitative phytochemical screening of different extracts of Fluted pumpkin leafare shown in table 1. The phytochemical studies of the ethanolic extract revealed the presence of seven (7) out of the eight (8) phytochemicals determined with presence of alkaloids, flavonoid, glycosides, saponins, tannins, steroids and phenol compounds while terpenoids, is absent. The water extract showed the presence of five (5) out of the eight (8) phytochemicals determined with presence of alkaloids, flavonoid, steroid, glycosides, and phenol compounds while saponin, tannin and terpenoids. The table above shows the level of concentration of the various phytochemicals analysed from the fluted pumpkin extract under qualitative analysis. From the ethanol extract saponin shows to be highly concentrated, while from the result of the water extract it shows to be absent. Flavonoid also shows to be highly concentrated from the ethanol extract while from the water extract it is slightly present. Alkaloid is also highly concentrated from the result of the ethanol extract while from the water extract it is slightly present. Tannin from the table above has high concentration from the ethanol extract while the water extract shows it's absence. Steroids is highly concentrated from the result of the ethanol extract while the water extract shows that it is moderately concentrated. Terpenoids is absent in both extract. Glycosides is moderately concentrated from the result of the ethanol extract while the result of the water extract shows that it is slightly or sparingly concentrated. Phenols is highly concentrated from the result of the ethanol extract while the result of the water extract shows that it is moderately concentrated.

4.2 Quantitative Phytochemical screening of Fluted pumpkin

TABLE 2: QUANTITATIVE PHYTOCHEMICAL OF FLUTED PUMPKIN LEAF SAMPLES

PHYTOCHEMICALS	MEAN VALUE(mg/100g)	Std. Deviation
ALKALOID	3.6333	$\pm$ 0.56862[b]
TANNIN	0.5167	$\pm$ 0.09452[c]
SAPONIN	4.5833	$\pm$ 0.38188[b]
FLAVONOID	11.8333	$\pm$ 0.28868[a]
TERPENOIDS	3.5600	$\pm$ 0.38223[b]
STEROID	11.6667	$\pm$ 0.57735[a]
PHENOL	3.500	$\pm$ 0.38223[b]

***Values are mean scores ± Standard deviation of three (3) replicates**
***Data in the same column bearing different superscript differ significantly ($p < 0.05$).**

The result for the quantitative phytochemical compositions of fluted pumpkin leaf is shown in table 2 above. The result showed flavonoid with the highest concentration (11.83mg/100g), followed by steroid (11.67mg/100g), saponin (4.58mg/100g), alkaloid (3.63mg/100g), terpenoids (3.56mg/100g), phenol (3.50mg/100g) while tannin have the lowest value (0.51mg/100g).

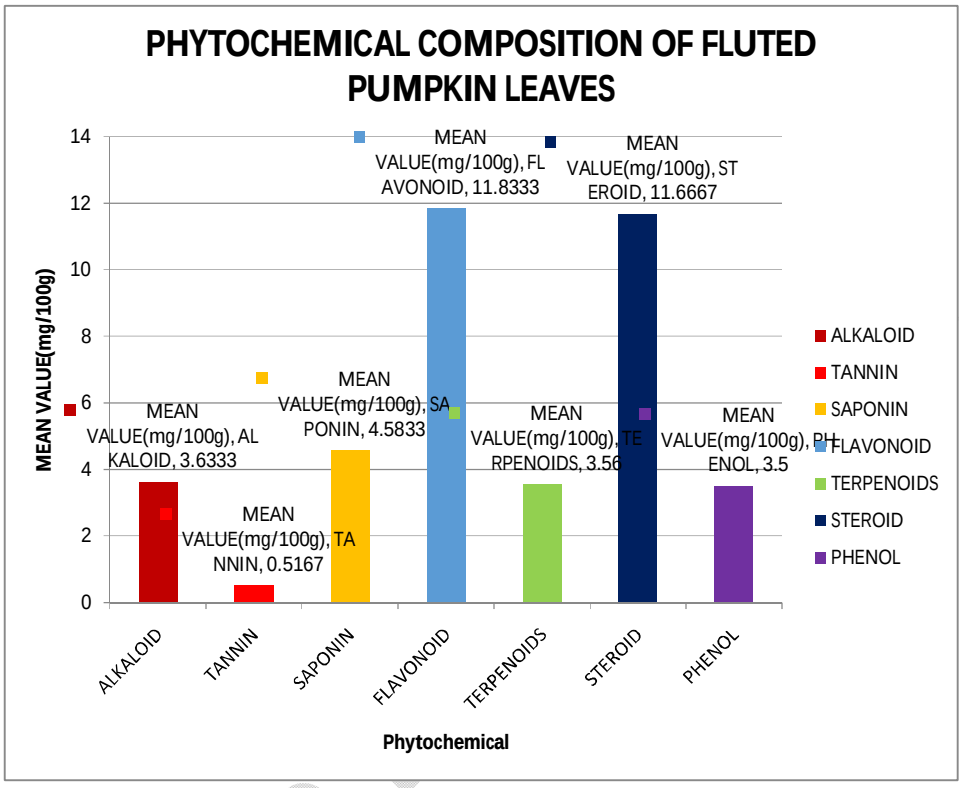

FIG 1: Bar chart for quantitative phytochemical of fluted pumpkin leaf

The histogram above expresses the result of the quantitative analysis of fluted pumpkin leaf. It shows flavonoid to have the highest concentration (11.83mg/100g), followed by steroid (11.67mg/100g), saponin (4.58mg/100g), alkaloid (3.63mg/100g), terpenoids (3.56mg/100g), phenol (3.50mg/100g) while tannin have the lowest value (0.51mg/100g).

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

Fluted pumpkin leave contain an array of important phytochemicals as shown in this study. This agrees with the work of Verla*et al.,* (2014) on phytochemical analysis of fluted pumpkin leave who reported the presence of alkaloids, flavonoids, phenols, saponins, and tannin in the leaves of T. occidentalis. This study also agrees with the earlier findings by Arowosegbe*et al.,* (2015) that pumpkin leave contains saponin, flavonoid, glycosides, alkaloids, and phenol. Hussaine *et al.,* (2012) also carried out the same work on Phytochemical analysis of fluted pumpkin leave and explained that most of the phytochemicals found in fluted pumpkin leaf such as alkaloids, saponin, flavonoid and glycosides are secondary metabolites that are result of metabolic activities in the plant. Findings from literature further presented evidences that flavonoid may inhibit inflammation, tumour growth, and boost production of detoxifying enzymes in the body. Manian*et al*. reported that tannin present in the pumpkin had the potency to attract xenobiotic compounds in animal blood as they are high molecular weight compounds attracting lower weight foreign substances in the blood. Ayoola and Adeyeye (2010) described alkaloids as the most effective phytochemical as the metabolite possesses antispasmodic, antibacterial, healing, and antimalarial effects as confirmed by studies conducted by Okwu and Okwu (2004); Stray (1998); Trease and Evans (1985). Cardiac glycosides are triterpenoids with capacity to regulate the contraction of the heart without increasing the demand for oxygen in the heart's muscle, Ayoola PB and Adeyeye A,(2010). Phenol present in both the sexes of the plants is an important secondary metabolite with antioxidant properties. Antioxidants create protective effects by neutralizing free radicals produced in the course of normal catabolic and anabolic processes within the cells. They act through hindering oxidative damage by bonding free radicals thus inactivating the radicals. Ruche*t al.,* 1989 and Motar*et al.*, 1985, disclosed that tannins are known to be useful in thetreatment of inflamed or ulcerated tissues and have remarkable activity in cancerprevention. Thus *T. occidentalis*containing tannins may serve as a potential source of bioactive compound in cancer prevention and treatment. Flavonoids are antiinflammatory, anti-tumor, anti-viral, anti-plateletes, these were revealed through the works of Corkan*et al,* 1998, Pourmorad *et al,* 2006). They also disclosed that flavonoids also are potent water soluble antioxidants and free radical scavengers, which prevent oxidative cell damage and have strong anticancer activity. Salahe*tal.*, 1995, Del-Rio *et al.,* 1997 and Okwu, 2004 carried out the same work and discovered that flavonoids, which contain hydroxyl groups are responsible for

the radical scavenging effects of most plants. Alkaloids are beneficial chemicals toplants serving as repellant to predatorsand parasites. This probably endows these group of agents its antimicrobialactivity. Alkaloids have been found to have microbiocidal effect and the major anti-diarrheal effect is probably due to their effects on small intestine and anti-hypertensive effect. Just *etal*, 1998; in their work on the phytochemical composition of plants disclosed that alkaloids are useful against HIV infection as well as intestinalinfection associated with AIDS. Also, the plant extract was revealed to contain saponins, known to produce inhibitory effect on inflammation. Saponins are known bioactive substances that can reduce the uptake of cholesterol and glucose in the gut throughintra-lumenal physiochemical interaction (Price *et al.,* 1987). Saponins as a class ofnatural products are also involved incomplexation with cholesterol to formpores in cell membrane bilayers (Francis *et al*., 2002) as such may be used asanticholesterol agents or cholesterollowering agent. The presence of these phenolic compounds in this plant contributes to their antioxidative properties and thus the usefulness of these plants in herbal medicament. Shahidi and Wanasundra, 1992; carried out a research to analyse some major phytochemicals of leaf vegetables including pumpkin leave and reported that Phenols could be useful in the preparation of some antimicrobial compounds such as dettol and cresol. They said that Phenols act as free radical chain reaction terminators thereby acting as antioxidant. They also suggested that Phenols also have a potential of combating oxidative stress syndrome, causative of some diseases and cardiovascular diseases.

5.2 Conclusion

The biochemical screening of fluted pumpkin leaf has confirmed the presence of some phytochemicals and has justified their concentration via qualitative and quantitative analysis of the leaf extract. However, further studies needs to be carried out to confirm its nutritional and medicinal values and to know it's level of toxicity to man and other organisms.

5.3 Recommendation

With respect to the fact that plants are of great importance to man, I recommend that more research should be done on plants through the collaboration of governmental organizations and that scientists should take it up as a challenge to explore the untapped potentials of the plant kingdom.

References

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