Assessment of Proximate Composition and Phytochemical Properties of Bitter Leaf (Vernonia Amygdalina) and Water Leaf (Talinum Triangular)

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***Abstract* —** Bitter leaf (Vernonia amygdalina) and (Talinum triangulare) are used in traditional medicine as therapeutic agents and it plays a vital role in the health of individuals and the communities. Nutritionally, they are very rich in vitamins C, E, Omega-3 fatty acids, calcium, magnesium, soluble fibers (Pectin), potassium, B-carotene, proteins and dietary fibres. Medicinal properties of Vernonia amygdalina and Talinum triangulare have been ascertained by researchers as being contained chemical substances like (flavonoids, alkaloids and tannins) that help in the managements of cardiovascular diseases, such as Stroke, Obesity. Its medicinal value lies in phytochemicals that produce definite physiological actions in the human body. This study was conducted to determine proximate composition and phytochemicals of Vernonia amygdalina and Talinum triangulare. Evaluation of Vernonia amygdalina for phytochemicals and proximate composition were conducted using standard methods. Result showed that Vernonia amygdalina contains alkaloids, tannins, flavonoids, saponins, triterpenoids, steroids, cardiac glycosides, and reducing sugar while tannins, flavonoids, saponins, flavonoids, steroids and alkaloids are phytochemicals present in Talinum triangulare. The proximate composition shows that Vernonia amygdalina and Talinum triangulare in percentage (%) contain moisture (9.85 ± 0.51 and 12.43 ± 0.01), ash (16.22 ± 0.06 and 7.34 ± 0.02), crude protein (21.72 ± 0.19 and 14.13 ± 0.13), crude fat (5.30 ± 0.02 and 1.90 ± 0.04), crude fiber (18.30±0.01 and 7.41±0.01) and carbohydrate (38.46 ± 0.04 and 69.22 ± 0.03). Quantitatively bitter and water leaves contained (mg/100) phenol alkaloids (12.48±0.05 and 9.38 + 0.03), tannin (0.55±0.01 and 0.11+ 0.02), saponin (2.31±0.02 and 0.94+ 0.003), flavonoids (2.31±0.02 and 0.86+ 0.01) and steroids (5.07±0.04 and 3.24 + 0.02) respectively. The presence of phytochemicals like saponins, tannins, alkaloids and flavonoids reveals the medicinal potentials of Vernonia amygdalina and Talinum triangulare leaves in therapeutic uses.

***Keywords*—** Vernonia amygdalina, Talinum triangulare; Proximate composition Phytochemicals; Qualitative and Quatitative.

I. INTRODUCTION

Plants contain many chemical compounds that are essential for biological functions, including defense against insects, fungi and herbivorous mammals while the compounds are also essentials in treatment of various human infectious diseases. Some of the pharmaceuticals currently available to physicians are derived from plants that have a long history of use as herbal remedies, including aspirin, digoxin, quinine, and opium (Swain and Tony, 1968).The use of herbs to treat disease is widespread in non-industrialized societies.

Medicinal plants are a source for a wide variety of natural antioxidants and phytochemicals that are used for the treatment of diseases throughout the world (Rafieian and baradaran, 2013).Some of these properties are antimicrobial (Sharafati et al., 2011), anti-cancer (Shirzad et al., 2012),anti-diabetic (Kazemi et al.,2010), antiatherosclerosis (Khosravi et al., 2011), immunomodulatory (shirzad et al.,2009), and evenreno-protectionor and Hepato-protective effects (Baradanran and Rafieian,2013).

Vernonia amygdalina is used in traditional medicine as therapeutic agents and it plays an important role in the health of individuals and the communities (Ojiako et al., 2006). Its medicinal value lies in phytochemicals constituents that produce definite physiological actions in the human body. These plant chemicals comprise alkaloids, tannins, flavonoids and phenolic compounds. Every part of Vernonia amygdalina contains complex active components such as anthraquinones, steroids and cardiac glycosides that are useful pharmacologically (Georgewill et al., 2010). The leaves are green with a

characteristic odor and bitter taste. In ethno medicine, the roots and the leaves can be used as antibacterial, active cancer, anti-parasitic anti-malarial agent and are used to treat fever, hiccups, kidney problems, vomiting, intestinal illness and stomach discomfort (Fatima et al., 2010, Ebong et al., 2011).

Waterleaf (Talinum triangulare) is one of the most popular leafy vegetables in Nigeria. As a result of its ability to survive drought, it is available almost throughout the year, even during the dry seasons. It is a perennial plant widely grown and consumed as a vegetable (Wilberforce, 2016). It has been reported by many scientists that it contains important nutrients and phytochemicals such as flavonoids and polyphenols, crude protein, lipids, essential oils, cardiac glycosides, omega -3-fatty acids, minerals, soluble fibres and vitamins (Swarnaj and Ravindhran, 2013). The availability and nutritional composition make it one of the most sought vegetables. In Edo State, Nigeria, Talinum triangulare is used as a diuretic, and for the management of gastrointestinal disorders (Mensah et al., 2008). It is also used to treat Shistosomiasis, scabies, fresh cuts, high blood pressure, and anemia (Ogunlesi et al., 2010).

Preliminary phytochemical studies reported the presence of carotenoids (Ogbonnaya and Chinedum, 2013), alkaloids, flavonoids, saponins, and tannins in the leaves (Wogu, and Chukwu, 2013) and leaf extract (Swarna and Ravindhran, 2013) of Talinum triangulare. All these studies reported the total quantities of these families of compounds, without elucidating the individual compounds that constitute them. An attempt to identify these individual components by de Oliveira Amorim et al. (2014), yielded campesterol, sitosterol, stigmasterol, scotenol, 3-(N-acryloyl, and N-pentadecanoyl) propanoic acid, allantoin, 3-O-bD-glucopyranosyl-sitosterol, 3-O-bD-glucopyranosyl-stigmasterol, (132S,17R,18R)-phaeophytin a, 17R,18R-purpurin18 phytyl ester, ficuschlorin D acid, talichlorin A, 31,32-didehydro-151-hydroxyrhodochlorin-15-acetic acid d-lactone-152-methyl-173-phytyl ester, and hydroperoxy-ficuschlorin D.

The traditional medicine from this herbs plant not widely spread or less awareness among the public users. This is because the public user still continuing taking the synthetic medicine without knowing the side effect of the artificial medicine. Most of the phytochemical compound of the plant contain chemotherapeutic agent and can help to secure or prevent the diseases such as antidiabetic and anticancer. The current study is focus on evaluation of proximate analysis as well as qualitative and quantitative phytochemical properties of Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf). The Objectives of this study includes determination of the proximate composition of bitter and water leaves leaves; Investigation of the qualitative and quantitative phytochemical constituents bitter and water leaf.

II. METHODS AND MATERIALS

A. SAMPLE COLLECTION

Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) leaves were plucked from parent trees at farms within Osun State College of Technology, Esa Oke, Osun State, and taken to the Laboratory at the Department of Science and Laboratory, Technology, Esa Oke.

B. SAMPLE PREPARATION

The leaves of Vernonia amygdalina and Talinum triangulare were washed to remove dirt, and sliced. The leaves samples were Sun-dry for 7 days and afterwards were pulverized to obtain finer ground powder, using an electric blender.

C. EXTRACTION PROCEDURE

AQUEOUS EXTRACT

The aqueous extract leaves powder ware separately homogenized with sterile distilled water at 1:8 w/v ratio in a pestle and mortar and filtered through muslin cloth. The filtrate thus obtained was further strained through Whattman No. 1 filter paper (Davis, 1956). The extraction was carried out at room temperature.

ETHANOLIC EXTRACT

Ethanolic extracts of the Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf)leaves were prepared by soaking 400g of the dry powdered plant leaves in 1000ml of absolute ethanol at room temperature for 48hrs. The extract was thereafter filtered first through a Whatmann filter paper No. 42 (125mm) and then through cotton wool. The extract was then concentrated using a rotary evaporator with the water bath set at 40◦C to one-tenth its original volume and finally with a freeze drier. The dried residue was then stored at 4ºC. Portions of the crude plant extract residue were weighed and dissolved in distilled water for experimental analysis.

D.PROXIMATE COMPOSITION ANALYSIS OF VERNONIA AMYGDALINA AND TALINUM TRIANGULARE

The freshly prepared samples of Vernonia amygdalina and Talinum triangulare were subjected to proximate nutrient composition analysis and components analyzed are moisture, ash, protein, fat and carbohydrate. This was done as previously described by the Association of Official Analytical Chemists (AOAC, 2002)

I. MOISTURE

5 g each of the grounded samples (Vernonia amygdalina and Talinum triangulare) were weighed and oven dried to a steady temperature of 70°C. The amount of moisture in the sample was expressed as loss in weight after cool weighing.

II. ASH CONTENT

5g grams of the samples were placed in a crucible and heated to 550°C to eliminate organic components. The crucible and its contents were then cooled and weighed, and the ash evaluated as a proportion of the original dry weight of samples.

III. CRUDE PROTEIN

This was carried out using the micro-Kjedahl method. The nitrogen proportion of the protein in 5 g of the sample was converted into ammonium sulphate by digestion with concentrated hydrogen tetraoxosulphate (VI) acid using copper sulphate as a catalyst. The liberated ammonia was collected in boric acid double indicator solution and the nitrogen quantified through standard hydrochloric acid titration until end point is reached. The amount of crude protein was then obtained by multiplying by a factor of 6.25.

IV.CRUDE FAT

Crude fat was extracted from the sample using 5 g of the plant samples, petroleum ether and soxhlet extractor apparatus. The weight of the fat obtained after evaporating off the petroleum ether from the extract gave the crude fat in the samples and this was expressed as a percentage.

V. CRUDE FIBER

Five grams of the defatted samples were used to determine the fibre contents in samples via extraction by acid digestion, filtration and base digestion. The resulting residues were eventually ignited at 550°C. Fibre content was then expressed as a percentage lost on ashing and initial weight.

VI. CARBOHYDRATE

The amount of carbohydrate in the samples was then stimulated as the difference from 100 of the sum of crude protein, fat, ash, and fibre.

E. PHYTO CHEMICAL SCREENING

Tests were carried out on the aqueous extract to identify the phyto constituents using standard procedures as described by Harborne (1973), Sofowara (1993) and Trease and Evans (1989).

A. QUALITATIVE ANALYSIS OF THE PHYTOCHEMICALS

I. TEST FOR TANNINS

0.5 g of dried powdered samples were boiled in test tube contained 20 ml of water. This was followed by filtration and addition of a few drops of 0.1% ferric chloride. Appearances of brownish green colour indicate the presence of tannins.

II.TEST FOR PHLOBATANNINS

An aqueous extract of the plant samples were boiled with 1% aqueous hydrochloric acid. Red precipitate appearance indicates the presence of phlobatannins.

III.TEST FOR SAPONINS

About 2 g of the powdered samples were boiled in 20 ml of distilled water in a water bath and filtrate was mixed with 5 ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was then mixed with 3 drops of olive oil and shaken vigorously. Formation of emulsion shows the presence of saponins.

IV. TEST FOR FLAVONOIDS

5 ml of the diluted ammonia solution was added to a portion of aqueous filtrate of plant extracts, this was followed by the addition of concentrated sulphuric acid. Appearance of yellow coloration shows the presence of flavonoids.

V. TEST FOR STEROIDS

2 ml of acetic anhydride was be added to 0.5 ml of ethanolic extracts, followed by 2 ml sulphuric acid. The color change from violet to green indicates the presence of steroids.

VI. TEST FOR TERPENOIDS

5 ml of the plant extracts were mixed with 2 ml of chloroform and 3 ml of concentrated sulphuric acid. Formation of reddish brown coloration at the interface indicates the presence of terpenoids.

VII.TEST FOR CARDIAC GLYCOSIDES

2 ml of glacial acetic acid containing one drop of ferric chloride was added to 5 ml of the plant extracts. This will be under layer with 1 ml of concentrated sulphuric acid. Formation of a brown ring at the interface indicates the presence of cardiac glycosides.

VIII.TEST FOR ANTHROQUINONES

0.5 ml of the extract will be boiled with 10 ml of sulphuric acid and filtered while hot. The filtrate will be shook with 5 ml of chloroform. The chloroform layer will be pipette out into another test tube and 1ml of diluted ammonia will be added. The resulting solution will be observed for colour change.

IX.TEST FOR ALKALOIDS

About 0.5g of each extract was stirred with 5ml of 1% aqueous hydrochloric acid on a steam bath; 1ml each of the filtrate was treated with a few drops of Mayer's reagent and a second 1ml portion was treated similarly with Draggendorff's reagent. Turbidity or precipitation with either of these reagents was observed as preliminary evidence for the presence of alkaloids in the extracts (Harborne, 1984; Evans, 1989).

XI.TEST FOR TRITERPENOIDS

0.5g of the extract was dissolved in 1ml of chloroform and 1ml acetic anhydride added, followed by the addition of 2ml of con-centrated H2SO4. Triterpenoids was indicated by formation of reddish violet colour.

B. QUANTITATIVE ANALYSIS OF THE PHYTOCHEMICALS

I. ESTIMATION OF ALKALOIDS

This was carried out by method described by (Harborne and Baxter, 1983). 5 g each of the samples was weighed into a beaker of 250 ml. This was preceded by addition of 200 ml of 10% acetic acid in ethanol and allowed to stand for 4 hours. The extract was concentrated on a water bath to one quarter of the original volume after filtration. Precipitation was done by addition of concentrated ammonium hydroxide drop by drop. The precipitate was collected after the whole solution was allowed to settle down and it (precipitate) was then washed with diluted ammonium hydroxide and filtered. The residue obtained is the alkaloids that is dried and weighed.

Formula = B - A × 100 / S

Where,

B = Weight of Whatman filter paper.

A = Weight of Whatman filter paper, after drying.

S = Sample weight.

II. ESTIMATION OF SAPONINS

Saponins were estimated by method described by Obadoni and Ochuko (2001). To a conical flask containing 100 ml of 20% aqueous ethanol, 20 g each of samples was added. With continuous stirring at about 55°C, the samples were heated over a hot water bath for 4 hours. The residue was re-extracted with another 200 ml of 20% ethanol after filtration of the mixture. This was followed by reduction of combined extracts to 40 ml over water bath at 90°C. 20 ml of diethyl ether was added and shaken vigorously after concentrates were transferred into a 250 ml of separator funnel. The purification process was repeated after recovered of aqueous layer and discarding of the ether layer. This is followed by addition of 60 ml of n-butanol extract, then washing twice of combined n-butanol (extracted) in 10 ml of aqueous sodium chloride. The remaining solution was heated in a water bath. After evaporation, the sample was dried in the oven to a constant weight after evaporation. The saponins content was calculated as percentage.

Formula = B – A × 100 / S

where,

B = Weight of Whatmann filter paper.

A = Weight of Whatmann filter paper with sample.

S = Sample weight.

iii. Estimation of Phenols

The method described by Malick and Singh (1980) was used for estimation of Phenols. To sterile test tubes, 0.5 ml of freshly prepared samples, 8 ml of distilled water and 0.5 ml of Folin's Ciocalteau reagent were added to all tubes. This was followed by incubation at 40°C for 10 minutes in Biological Oxygen Demand chamber. Then, the tubes were kept in the dark for incubation for one hour, after addition of 1 ml of sodium carbonate solution to all the test tubes. All the test tubes were read after spectophotometrically at 660 nm after development of colour. Standard curve was obtained using tannic acid as standard. Different concentrations of tannic acid were prepared and O.D was read at 660 nm in a shimadzu UV-1650 spectrophotometer. The concentrations of sample were calculated based on the standard curve.

IV. ESTIMATION OF TOTAL FLAVONOIDS

This was carried out using method described by Chun (2005). To little amount of distilled water, 100 mg of tannic acid was dissolved in it while with distilled water, the volume was made up to 100 ml. By appropriate dilution with distilled water, different concentrations of the standard were obtained. The concentration of the solution was 100 mg / ml. At zero time, 0.5 ml of aqueous extract sample was diluted with 3.5 ml of distilled water. This was followed by addition of 0.3 ml

of 5% sodium nitrate to the tubes. 0.3 ml of 10% aluminum chloride was added to all the tubes after five minutes. To the mixture, 2 ml of 1M sodium hydroxide was added after 6 minutes. Then, 2.4 ml of distilled water was used for dilution of the content of the reaction mixture and mixed thoroughly. Absorbance of the mixture was determined at 510 nm versus a prepared blank immediately. For quantification of total flavonoids as mg / 100g of edible portion, tannic acid was used as standard compound

V. ESTIMATION OF TANNINS

Tannins estimation was carried out using method described by Robert (1971). 100 mg of tannic acid was dissolved in a distilled water of 100ml. A stock solution of 5 ml was diluted to 100 ml with distilled water. 1 ml containing 50 µg tannic acid. For tannin extraction, 0.5 gm of the powdered tanninic material was weighed into 250 ml conical flask and 75 ml water was added. The flask was heat gently and boiled for 30 min centrifuge for 20 min at 2,000 rpm and this was followed by collection of supernatant in 100 ml volumetric flask and make up the volume. 1 ml of the sample extract was transferred To 100 ml volumetric flask containing 75 ml water, sample extract of 1 ml was added. Then, 5 ml of folin denis reagent, 10 ml of sodium carbonate solution were added and diluted to 100 ml of water. Shake well. The absorbance was read at 700 nm after 30 min. If absorbance is greater than 0.7 make a 1 + 4 dilution of the sample. A blank was prepared with water instead of the sample. A standard graph was prepared by using 100 mg tannic acid.

The tannins content of the sample was calculated as tannic acid equivalents from the standard graph.

STATISTICAL ANALYSIS

Data are expressed as mean ± standard deviation (SD) of triplicates

III. RESULTS AND DISCUSION

A. PROXIMATE COMPOSITION OF VERNONIA AMYGDALINA AND TALINUM TRIANGULARE

Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) leaves had relatively low moisture content (9.85±0.51 and 12.43± 0.01 %) Table1. The low moisture content would therefore hinder the growth of spoilage microorganisms and enhance shelf life (Adeyeye and Ayejuyo, 1994). The present study also reported high values of moisture content compared to low values reported for Ammaranthus hybridus leaves (6.1%) and Moringa oleifera leaves (4.2%) by (Adepoju et al., (2006).

The ash values recorded for Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) are 16.22±0.06 and 7.34 + 0.02%) % (Table 1) which is an indication of the mineral contents preserved in the plants leaf. The ash content obtained for Vernonia amygdalina compare favorably with the values reported for Vernonia colorate (15.86%) and Moringa oleifera (15.09%) (Anita et al., 2006) and lower than that of some leafy vegetables commonly consumed in Nigeria such as Talinum triangulare (20.05%) but higher than some other vegetables such as Occimum graticimum (8.00%) and Hibiscus esculentus (8.00%) (Anita et al., 2006) The result therefore suggests a high deposit of mineral elements in the leaves (Anita et al., 2006). In this study, Talinum triangulare had lower values for Ash content (7.34±0.02%) and this is similar to ash content reported for P. Soyansii (9.46%) as well as P .santalinoides (7.83%) reported by Ndukwe and Ikpeama (2013). The present result reported value of ash content (Talinum triangulare) as compared to Telfaria occidentalis (7.36+0.08%), Amaranthus hybridus(6.00+0.03%) and Sesamum indicum (7.34+0.05%) reported by Omale and Ugwu (2011).

The leaves of Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) contained crude protein value of 21.72±0.19% and 14.13 ± 0.13% respectively Table 1. This is in line with work of Yeap et al. (2010) that reported that Vernonia amygdalina contained 17 to 33% of crude protein out of dry matter. The value obtained for Talinum triangulare in this work is similar to work of Ndukwe and Ikpeama (2013) that reported 19.4% and 16.32%. Crude proteins for Pterocarpus soyansii and Pterocarpus santalinoides leave (leafy vegetables).

The present study showed crude fats of 5.30% and 1.90±0.04% for Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) respectively Table 1. This result is in agreement with work of Yeap et al. (2010) that reported crude fat value range of 2 to 15%. In related to the present work, Akindahunsi and Salawu, (2005) reported 4.34% for Vernonia amygdalina crude fat while Talinum triangulare had crude fat of 5.90%.

The leaves of Vernonia amygdalina (Bitter leaf) and Talinum triangulare (Water leaf) contained crude fibre value of 18.30±0.01% and 7.41±0.01% (Table 1).This is similar to reported crude fibre of between 6.5 to 29.2% by Yeap et al., (2010) for Vernonia amygdalina. In related vein, Anita et al., (2006) reported crude fibres of 7.20, 6.20, 6.40 and 7.0% for Ipomea batatas, T. triangulare, P. guineensis, and Corchorus olitorius respectively.

Vernonia amygdalina (Bitter leaf) and Talinum triangulare (water leaf) had carbohydrate values of 38.46 and 69.22 % respectively % Table 1. The high carbohydrate content recorded in this study play a significant roles in the highest Kilojoules to the energy value in Vernonia am ygdalina and Talinum triangulare.

Table 1: Proximate Analysis of Vernonia amygdalina Leaves

Proximate composition	***Vernonia amygdalina* (%)**	*Talinum triangulare* **(%)**
Moisture	9.85±0.51	12.43±0.01
Ash content	16.22±0.06	7.34±0.02
Crude protein	21.72±0.19	14.13±0.13
Crude fat	5.30±0.02	1.90±0.04
Crude fibre	18.30±0.01	7.41±0.01
Carbohydrate	38.46±0.04	69.22±0.03

B. QUANTITATIVE PHYTOCHEMICAL CONSTITUENTS OF ETHANOLICS EXTRACTS OF VERNONIA AMYGDALINA (BITTER LEAF) AND TALINUM TRIANGULARE (WATER LEAF)

The result of the phytochemical screening of the ethanolic leaf extract of Vernonia amygdalina (Bitter leaf) showed presence of Tannis, Phlobatannins, Saponins, Flavonoids, Steroids, Terpenoids, Cardiac Glycosides, Alkaloids, Teriterpenoids and absence of anthraquinones (Table 2) while Tannis, Saponins, Flavonoids, Steroids, Alkaloids are present in Talinum triangulare (water leaf). These phytochemicals exhibit various pharmacological and biochemical actions when ingested by animals and humans.

Flavonoids generation, quenching of free radicals, chelating transition metals and rendering them redox inactive in the fenton reaction by interfere with the activities of the enzymes involved in ROS (Omoregie et al., 2011).

Stimulation of phagocytic cells and host-mediated tumor activity is some physiological activities of tannins while they also have anti-microbial and a wide range of anti-infective actions (Haslam, 1996). Tannins are useful for treatment of inflamed or ulcerated tissues and in the prevention of cancer (Adegboye et al., 2008).

Most alkaloids are used by plant to defense against herbivore and attacks by microbial pathogens and invertebrate pests, all these actions was as a result of a strong bitter taste and its toxic nature. (Harbone, 1998)

Saponin is a natural product that form pores in cell membrane bilayers as a result of complexation with cholesterol, hence, they are useful cholesterol lowering agent as well as anti-cholesterol agents (Francis et al., 2002). Steroids are useful in pharmaceutical industries and they are essential compounds due to their relationship with compounds such as sex hormone (Aiyegoro and Okoh, 2010).

Cardiac glycosides are essential class of naturally occurring drugs that exhibit activity which helps in the treatment of congestive heart failure (Yukari et al., 1995).

Table 2: Qualitative analysis of Ethanolics extracts of Vernonia amygdalina (Bitter Leaf) and Talinum triangulare (Water leaf)

Phytochemical constituents	*Vernonia amygdalina* (Bitter leaf) Ethanolic leaf extract	*Talinum triangulare* (Water leaf) Ethanolic Leaf Extract
Tannins	+	+
Phlobatannins	+	-
Saponins	+	+
Flavonoids	+	+
Steroids	+	+
Terpenoids	+	-
Cardiac Glycosides	+	-
Anthroquinones	-	-
Alkaloids	+	+
Teriterpenoids	+	-

Legend:

- **= Absent**

+ **= Present**

C. QUANTITATIVE PHYTOCHEMICAL CONSTITUENTS OF VERNONIA AMYGDALINA (BITTER LEAF) AND TALINUM TRIANGULARE (WATER LEAF)

The Phytochemical analysis of Vernonia amygdalina (Bitter Leaf) and Talinum triangulare (Water leaf) showed high mean value of phenol alkaloids (12.48±0.05 and 9.38 + 0.03 mg/100g), tannin has the least composition of (0.55±0.01 and 0.11+ 0.02 mg/100g) saponin (2.31±0.02 and 0.94+ 0.003 mg/100g), flavonoids (2.31±0.02 and 0.86+ 0.01mg/100g) and steroids (5.07±0.04 and 3.24 + 0.02mg/100g) respectively as shown in Table 3. Saponin, flavonoids and alkaloids reported for this study were high compared to the values by Eleazu and Eleazu (2013) for Saponin (0.77+0.02%), flavonoid (0.33+0.01%), alkaloids (0.41+0.01%) while low tannin (0.11+0.02%) value was observed in T. triangulare compared to the report by Eleazu and Eleazu (2013) where tannin was (0.65+0.00%).

Chemical components	*Vernonia amygdalina* (Bitter Leaf) Composition (mg/100g)	*Talinum triangulare* (Water leaf)Composition (mg/100g)
Tannin	0.55±0.01	0.11±0.02
Saponins	2.31±0.02	0.86±0.03
Total Flavanoids	0.98±0.03	0.94±0.01
Phenols	5.07±0.04	3.24±0.02
Alkaloids	12.48±0.05	9.38±0.03

IV. CONCLUSION

Plants have played immense roles in the medical field. They are major source of most drugs used for treating infections in human and plants. The plant (V. amygaldalina and Talinum triangulare) used in this study was found to contain the important constituent needed to combat various kinds of infection in human. The distribution of nutrients and phytochemicals in the V. amygaldalina and Talinum triangulare leaves studied support and provide a basic rationale for their use in folk medicine. This study also reveals that, besides serving as good source of pharmacologically active phytochemicals, they are also useful as supplements in human and animal nutrition.The result of proximate analysis showed that V. amygaldalina and Talinum triangulare V. has more protein content, carbohydrate and also the presence of high content of alkaloid, tannin and flavonoid from the phytochemical analysis done is an indication that if further research can be done on those samples, novel bioactive compounds can be derived from them.

This study shows that bitter and water leaves are rich in phytochemicals constituents and that their utilization should be recommended for good animal and human health. Bitter and water leaves are rich in free radical scavenging molecules such as, tannins, terpenoids, vitamins, alkaloids phenolic acids, flavonoids and other metabolites, which are useful in antioxidant activities. It is pertinent to inform that these plant constituents can be genetically altered for yield enhancement and improvement.

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