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Phytochemical and Proximate Analysis of Leaves and Stem of an under Exploited Medicinal Plant, *Maesobotrya barteri* (Baill) Hutch.

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Abstract

Maesobotrya barteri (Baill.) Hutch. (Bush Cherry), belongs to the family Euphorbiaceae. It is an under exploited medicinal plant, also used for culinary purposes. The fruits of this plant is valued more than the other parts of the plant because of its high medicinal value, as such, parts like stem, leaves, roots are neglected. Therefore, this study was carried out to determine the phytochemical and proximate compositions of the leaves and stem of this plant species using standard procedures. Phytochemical results showed that the leaves contain a higher percentage of hydrogen cyanide (HCN) (3.31%), flavonoid (5.53%), alkaloid (2.19%), terpenoid (4.53%), Tannin (1.24%), compared to that found in the stem (1.55%, 3.02%, 0.65%, 3.33%, 0.34%, 0.38% and 25.28%) respectively. Proximate composition indicated that the leaves contain higher percentage of moisture (10.72%) Ash (11.36%), fat (2.00%), Crude protein (16.46%) and carbohydrate (27.74%), compared to the percentage in the stem (7.65%, 4.16%, 1.87%, 5.25% and 4.08%) respectively, but the stem had a higher percentage of crude fibre (77.00%) compared to the leaves (31.73%). These phytochemicals and nutrients could be harnessed by pharmaceutical industries for medicinal and culinary purposes.

Keyword: Euphorbiaceae, *Maesobotrya barteri*, Medicinal plant, Phytochemistry, Proximate, Composition.

Introduction

Euphorbiaceae (Spurge family) is a family of flowering plants, containing some 6,745 species in 218 genera. In common English, they are sometimes called *Euphorbias*, which is also the name of a genus in the family. Most spurges such as *Euphorbia paralias* are herbs, but some, especially in the tropics, are shrubs or trees, such as *Hevea brasiliensis*. Some, such as *Euphorbia canariensis*, are Succulent and resemble cacti because of convergent evolution. This family occurs mainly in the tropics, with the majority of the species in the Indo-Malayan region and tropical America a strong second. A large variety occurs in tropical Africa, but they are not as abundant or varied as in the two other tropical regions[1].

The Euphorbiaceae were traditionally classified into five subfamilies: Phyllanthoideae, Picrodendroideae, Acalyphoideae, Crotonoideae, and Euphorbioideae. The first two subfamilies have two ovules per carpel (biovulate) and have been elevated to family rank, Phyllanthaceae and Picrodendraceae, respectively (in the Malpighiales). Within the Euphorbiaceae as delimited here,[2] recognized nine mono-phyletic infrafamilial groups, including the newly recognized subfamilies Peroideae and Cheilosoideae and a monophyletic Euphorbioideae; the traditional Acalyphoideae and Croto-noideae are paraphyletic. Members of the Euphorbioideae have latex and reduced stamina flowers, culminating in the highly specialized and characteristic cyathium in some members of the subfamily[3].

The leaves are alternate, seldom opposite, with stipules. They are mainly simple, but where compound, are always palmate, never pinnate. Stipules maybe reduced to hairs, glands, or spines, or in succulent species are sometimes absent. The plants can be monoecious or dioecious. The radially symmetrical flowers are unisexual, with the male and female flowers usually on the same plant. The family contains a large variety of phytotoxins (toxic substances produced by plants), including diterpeneesters, alkaloids, and cyanogenic glycosides (e.g.root tubers of cassava). The seeds of the castor oil plant *Ricinus communis* contain the highly toxic carbohydrate-binding protein ricin[4].

A milky latex is a characteristic of the subfamilies Euphorbioideae and Crotonoideae, and the latex of the rubber tree *Hevea brasiliensisis* the primary source of natural rubber. Euphorbiaceae are monoecious and open pollinatedand so self-incompatibility is rare, although it has been reported in the past apparently this was in error. It is confirmed to be absent or incomplete in herbaceous *Chamaesyce, Hevea and Manihot*[5].

Plants of Euphorbiaceae are economically very important. They provide nutritious food (*Manihot esculentus*, *Emblica officinalis*), drug (*Ricinus communis*, *Phyllanthus niruri*, *Acalypha indica*, *Jatropha gossypifolia* etc), rubber (*Hevea brasiliensis*), dyes (*Mallotus philippensis*) and oil (*Ricinus communis*, etc).

Maesobotrya barteri is a broad-leafed plant of about 10m long, found mainly in the Southern and Eastern parts of Nigeria, Sierra leone and West Africa. In Nigeria, the Benin people locally called it "Oruru" the Efik/ Ibibios, called it Nyanyatet and the Yorubas called it "Odun or Obomodu". It bears fruits from April to June. The fruits are about 1cm long, ovoid and distinctly pointed, bearing succulent black-purple berries that are edible and stain the tongue[6].

The plant is highly cherished by the people of south eastern Nigeria, not just for its succulent edible fruits but also for its acclaimed medicinal effect on most ailments[7]. For a very longtime, various parts of *M. barteri* have been in used in the local communities for the treatment of diarrhea, dysentery, urethral discharge, jaundice, cough, measles and others. Also, in the eastern and southern Nigeria, the stem is preferentially used as chewing stick and as an important raw material for juicemaking[8].

The fruits of *M. barteri* enhance waste removal and the fibers help lower cholesterol absorption by preventing plaque formation[9]. The seeds are often with a conspicuous caruncle, with the endosperm present or absent. However, this plant remains under-exploited globally as a result of lack of useful information on its potential as sources of substances that are vital to humans with respect to nutrition and medicines[10].

Phytochemicals are chemical compounds produced by plants, generally to help them resist fungi, bacteria and plant virus infections, and also consumption by insects and other animals. They are chemicals produced by plants through primary or secondary metabolism. They generally have biological activity in the plant host and play a role in plant growth or defense against competitors, pathogens, or predators[11,12].

Some phytochemicals are known phytotoxins that are toxic to humans; for example, aristolochic acid is carcinogenic at low doses. Some phytochemicals are anti-nutrients that interfere with the absorption of nutrients. Others, such as some polyphenols and flavonoids maybe pro-oxidants in high ingested amounts. Non-digestible dietary fibers from plant foods, often considered as a phytochemical, are now generally regarded as a nutrient group having approved health claims for reducing the risk of some types of cancer and coronary heart disease[13-15]

Eating a diet high in fruits, vegetables, grains, legumes and plant-based beverages has long-term health benefits, but there is no evidence that taking dietary supplements of non-nutrient phytochemicals extracted from plants similarly benefits health. Phytochemical supplements are neither recommended by health authorities for improving health nor approved by regulatory agencies for health claims on product labels[16].

Phytochemicals found in Euphorbiaceae species include diterpenoids, terpenoids, flavonoids, alkaloids, tannins, neriifolins, also found in oleander, cycloartenol, lectin, and taraxerol, among others[17,18].

Proximate analysis in plant is the evaluation of the nutritional value and organic content of the plant materials, achieved by the measure of percentage proximate composition which includes the qualification of the amount of protein, lipid, carbohydrate, moisture, fiber and Ash using the official methods of analyses[19].

It is commonly used in the food industry to refer to the six components of moisture, crude protein, ether extract, crude fiber, crude ash, and nitrogen free extracts, which are expressed as a percentage of the feed.

Researchers have carried out phytochemical and nutritive analysis of the fruits of this plant and reported it to be highly medicinal and nutritious, but no research work has been done on the leaves and stem of this plant to determine if the leaves and stem possess the wealth of phytochemicals discovered in the fruits, hence the need for this research.

Materials and Methods

Collection of Plant Materials: The species used for this study was freshly collected in the early hours of the day from Faculty of Agriculture Research and Teaching Farming Rivers State University, Nkpolu-Oroworukwo, Port Harcourt, Nigeria. The samples were carefully uprooted to avoid damaging the plant species collected. Identification and authentication of the plants was done by a Plant taxonomist of the Department of Plant Science and Biotechnology, Rivers State University. Voucher specimens were deposited in the University herbarium.

Preparation of Sample: The fresh leaves and stems of the collected and identified bush cherry were labeled accordingly and air- dried in the laboratory at ambient temperature (28-30^{o}C) for 30days. They were ground into fine powder using an Electric blender and placed into two different well labeled conical flasks respectively, till used.

Quantitative Phytochemical Analysis: Determination of Flavonoids: This method is as described by Kumaran, A. and Karunakaran, R.[20]. The method is based on the formation of the flavonoids- Aluminum complex which has an absorptivity maximum at 415nm. 100µl of the sample extracts in methanol (10mg/ml) was mixed with 100µl of 20% aluminum trichloride in methanol and a drop of acetic acid, and then diluted with methanol to 5ml. The absorption at 415nm was read after 40 minutes. Blank samples were prepared from 100ml of sample extracts and a drop of acetic acid was added and then diluted to 5ml with methanol. The absorption of standard rutin solution (0.5mg/ml) in methanol was measured under the same conditions. All determinations were carried out in triplicates.
Calculation:

Flavonoid (%) =	flask with residue – weight of empty flask	100
	Weight of sample	1

Determination of Alkaloids: This method is as described by Harborne, J.B.[21]. 5g of the sample were weighed into a 250ml beaker and 200 ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 hours. The mixture was filtered and the extract was concentrated on a water bath to one-quarter of the original volume. Concentrated NH_4OH was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitate was collected and washed with dilute NH_4OH and then filtered. The residue is the alkaloid, which was dried and weighed.
Calculation:

Alkaloid (%) =	filtered with residue – weight of dried filter paper	100
	Weight of sample	1

Determination of Total Saponin: This method is as presented by Obdoni, B. and Ochuko, P. [22]. The samples were ground and 20g of each were put into a conical flask and 100cm^3 of 20% aqueous ethanol were added. The samples were heated over a hot water bath for 4 hours with continuous stirring at about 55°C. The mixture was filtered and the residue reextracted with another 200ml 20% ethanol. The combined extracts were reduced to 40ml over water bath at about 90°C. The concentrate was transferred into a 250ml separator funnel and 20ml of diethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated. 60ml of n-butanol was added. The combined n-butanol extracts were washed twice with 10ml of 5% aqueous sodium chloride. The remaining solution was heated in a water bath. After evaporation the samples were dried in the oven to a constant weight; the saponin content was calculated.
Calculation:

Saponin (%) =	weight of conical flask with residue – weight of empty conical flask	100
	Weight of sample	1

Determination of Total Tannin: This method is as presented by Van-Burden, T. and Robinson, W.[23]. 500mg of the sample was weighed into a 50ml plastic bottle. 50ml of distilled water was added and shaken for 1 hour in a mechanical shaker. This was filtered into a 50ml volumetric flask and made up to the mark. Then 5ml of the filtered was pipetted out into a test tube and mixed with 2ml of 0.1M $FeCl_3$ in 0.1N HCl and 0.008M potassium ferrocyanide. The absorbance was measured at 120 nm within 10 minutes.
Calculation:

Tannin (mg/kg) =	Gradient of tannin x absorbance of sample x 1000

Determination of Total Phenol: 1g of the powdered sample was weighed and poured into a conical flask, 10ml of ethanol was then added into the conical flask containing the sample and plugged with aluminum foil. The mixture was then shaken vigorously and left to stand for 30min for proper extraction. The mixture was centrifuged to obtain a clear supernatant. The supernatant was used for the total phenolics essay.
Calculation:
Phenol content mg/kg (TAE) = Conc. Obtained in mg/l × volume of sample × DF Sample weight, DF: Dilution factor, if not diluted, then DF=1

Determination of Total Terpenoid: 0.4g of the sample was weighed into a conical flask, then 9ml of ethanol was added and was allowed to soak for 24hrs then the mixture was filtered using a funnel, filter paper and a conical flask. 20ml of petroleum there was extracted using a separating funnel, and then 10ml of distilled water was added to the extract. The sample was then added to a pre-weighed moisture can and dried in the oven for 1hrat 150^{o}C for complete dryness.
Calculation:
Terpenoid = Can+Solvent-Can weight,
% Terpenoid = Total Terpenoid×100 Sample weight

Determination of HCN: 5g of the sample was weighed into a conical flask and 50ml of distilled water was added and allowed to stand overnight before it was filtered. 2ml of titrate was pipetted into a test tube, then 4ml of alkaline picrate solution was added and the tube was corked. The mixture was incubated in a water bath for 5min at 80 degrees Celsius until a color change was observed from yellow to reddish brown. The absorbance was read at 510nm.
Calculation:

mg/kg HCN = Conc. Obtained in mg/l × Vol. of sample × dil. Factor (if any)
Sample weight × 1000

Screening for Proximate Content in Plant: Determination of Moisture Content: 2g of the sample was weighed into a metallic moisture can previously washed, dried and weighed using weighing balance (model No. AE223). The weighed sample was then transferred to preheated oven (Model No. DHG9140A) to dry for 1hr at 130^{o}C or 3hrs at 105^{o}C. The dried sample was brought out from the oven using forceps and transferred into the desiccator to cool for 15–20 minutes.
Calculation:

$$\% \text{ Moisture} = \frac{\text{Weight of fresh sample –weigh of dried sample} \times 100}{\text{Weight of sample used}} \quad 1$$

Determination of Ash: 1g of the sample was weighed into a crucible previously washed, dried and weighed using weighing balance (MODEL NOAE223). The weighed sample was transferred to a muffle Furnace (MODELNOSXL) then allowed to ash for 3hrs at 550^{o}C. The crucible was transferred into a desiccator and allowed to cool for 30 minutes and then weighed.
Calculation:

$$\% \text{ Ash} = \frac{\text{Weight of crucible+Ash sample–weight of crucible} \times 100}{\text{Weight of sample}} \quad 1$$

Determination of Fat: 2g of the sample was weighed into a thimble and covered with cotton wool, the thimble and the sample then transferred into the soxhlet extractor. 150ml of hexane was added to the thimble and mounted on the extraction unit. The sample was allowed to extract for 3 hours. The thimble was removed and the solvent was recovered. The extraction flask was transferred to the oven, to evaporate residual solvent at 105^0C for 30min. Then allowed to cool (Desiccator), the sample was weighed and the weight was recorded.
Calculation:

$$\% \text{ Lipid} = \frac{\text{Weight of flask and extract} - \text{weight of empty flask} \times 100}{\text{Weight of sample extracted}} \quad 1$$

Determination of Protein: This was done using the Kjeldahl method. Stage 1. Digestion: Firstly, 0.1gram of the sample was weighed into a clean conical flask of 250ml capacity, 3 grams of digestion catalyst were added into the flask and 20ml concentrated sulphuric acid was also added and the sample was heated to digest. The content changed from black to sky-blue coloration. The digest was cooled to room temperature and was diluted to 100ml with distilled water.

Stage 2. Distillation: Diluted digest of 20mls was measured into a distillation flask and the flask was held in place on the electro-thermal heater. The distillation flask was attached to a Liebig condenser connected to a receiver containing 10mls of 2% boric acid indicator. 40mls Sodium hydroxide was injected into the digest via a syringe attached to the mono-arm steel head until the digest became strongly alkaline. The mixture was heated to boiling and the distilled ammonia gas via the condenser into the receiver beaker. The color of the boric acid changed from purple to greenish as ammonia distillate was introduced into the boric acid.

Stage 3. Titration: The distillate was titrated with Standard 0.1N Hydrochloric acid solution back to purple from greenish. The volume of hydrochloric acid added to effect this change was recorded as titer value.
Calculation:

$$\% \text{ Organic nitrogen} = \frac{\text{Titer value} \times 1.4 \times 100 \times 100}{1000 \times 20 \times 0.1} \quad 1$$

Where: titer value = the volume of HCl used in titrating the ammonium is tillate. 1.4 =Nitrogen equivalent to the normality of HCl used in the titration 0.1N. 100 =the total volume of digest dilution. 100 =percentage factor. 1000 = conversion factor from gram to milligram. 20 =integral volume of digits analyzed or distilled. 0.1 =the weight of sampling ram digested.

Determination of Crude Fibre: 0.5g of moisture free sample was extracted for 3 hours with petroleum ether using soxhlet apparatus. The fat free material was placed in a 100ml beaker and 25ml of 1.25% sulphuric acid was added and covered with a watch glass. The content of the beaker was heated gently on a Gerhardt hotplate for 5mins (Acid hydrolysis). The content of the beaker was filtered under vacuum through a buchner funnel fitted with filter paper (Whatman No. 40) and then washed with boiling water until the washings was no longer acid to litmus. The residue was washed back into the beaker with1.25% NaOH and covered with wash glass and then boiled the content for 5minutes. The resulting insoluble material was transferred to a dried weighed ash less filter paper and washed thoroughly with hot water until the washing was no longer alkaline to litmus. The filter paper and content were dried for 1 hour at 105^oC. The filter paper and content were incinerated to an ash for 1hr at 550^oC using SXL muffle furnace. The ash was cooled using desiccator and weigh. The weight of ash was subtracted from the increase of weight on the paper due to the insoluble material and the difference reported as fibre.
Calculation:

$$\text{Crude fibre (\%)} = \frac{\text{Weight of fibre} \times 100}{\text{Weight of sample}}$$

Determination of Carbohydrate: Sample size 0.1g was weighed into a 25ml volumetric flask, 1ml distilled water and 1.3ml of 62% perchloric acid was added and shaken for a period of 20mins to homogenize completely. The flask was made up to 25ml mark with distilled water and stopper. The solution formed was filtered through a glass filter paper or allowed to sediment and decant. 1ml of the filtrate was collected and transferred into a 10ml test tube, this was diluted to volume with distilled water. 1ml of working solution was pipetted into a clean test tube and 5ml Anthronere agent was added. 1ml distilled water and 5mls Anthrone reagent was mixed. Similarly, and the whole mixture wereread at 630nm wavelength using the 1ml distilled water and the 5mls Anthrone reagent prepared as blank. Solution glucose of 0.1ml was also prepared and was treated as the sample with Anthronere agent. Absorbance of the standard glucose was read and the value of carbohydrate as glucose was calculated using the formula below;

$$\% \text{ CHO as glucose} = \frac{25 \times \text{absorbance of sample x } 100}{\text{Absorbance of standard glucose} \times 1}$$

Statistical analysis: The value of all the parameters determined are expressed as MEAN ± SD for triplicate determination and all data were analyzed using one-way ANOVA. The level of significance was placed at $p < 0.05$. All statistical analyzes were performed using SPSS version of 16.0.

Results and Discussion

Quantitative Phytochemical Screening of the Plant Species Studied: The result of the phytochemical composition of the leaves and stems of Bush cherry as Presented in Table-1 revealed the presence of Hydrogen Cyanide (HCN), Flavonoid, Alkaloid, Terpenoid, Tannin, Phenol and Saponin.

There was higher quantity of HCN in the leaves of Bush cherry which was 3.31 mg/kg than in stems which was 1.55mg/kg. Analysis of variance indicated that there was no significant difference between the quantity of phytochemical parameter assessed for both samples, P=0.05.

The result of flavonoid showed that there was lesser quantity of flavonoid in the stems of Bush cherry which was 3.02% than in the leaves which was 5.53%. Analysis of variance indicated that there was no significant difference at P=0.05 between the quantity of phytochemical parameter assessed for both samples.

There was higher quantity of alkaloid in the leaves of Bush cherry which was 2.19mg/kg than in stems which was 0.65%. Analysis of variance indicated that there was no significant difference between the quantity of phytochemical parameter assessed for both samples at P=0.05.

The result of terpenoid showed that there was higher quantity of terpenoid in the leaves of Bush cherry which was 4.53% than in the stems which was 3.34%. Analysis of variance indicated that there was no significant difference at P =0.05 between the quantity of phytochemical parameter assessed for both samples.

The result of tannin showed that there was higher quantity of tannin in the leaves of Bush cherry which was 1.24mg/kg than the stems which was 0.34mg/kg. Analysis of variance revealed that there was no significant difference at P = 0.05 between the quantity of phytochemical parameters assessed for both samples.

There was higher quantity of phenol in the leaves of Bush cherry which was 3.61% than in stems which was 0.38%. Analysis of variance indicated that there was no significant difference between the quantity of phytochemical parameter assessed for both samples at P=0.05.

The result of saponin showed that there was lesser quantity of saponin in the stems of Bush cherry which was 25.28% than in the leaves which was 26.08%. Analysis of variance indicated that there was no significant difference at P = 0.05 between the quantity of phytochemical parameter assessed for both samples.

Proximate Analysis of the Plant Species Studied: Proximate composition of the leaves and stems of Bush cherry as presented in Table-2, revealed the presence of Moisture, Ash, Fat, Crude protein, Crude fibre and Carbohydrate.

There was higher Moisture content in the leaves of Bush cherry which was 10.72mg/kg than in stems which was 7.65mg/kg. Analysis of variance indicated that there was no significant difference between the quantity of proximate composition assessed for both samples, P=0.05.

The result of ash showed that there was lesser quantity of ash in the stems of Bush cherry which was 4.16% than in the leaves which was 11.36%. Analysis of variance indicated that there was a significant difference at P=0.05 between the quantity of proximate composition assessed for both samples.

There was higher amount of fat in the leaves of Bush cherry which was 2.00mg/kg than in stems which was 1.87%. Analysis of variance indicated that there was no significant difference between the quantity of proximate composition assessed for both samples at P=0.05.

The result of Crude protein showed that there was higher quantity of crude protein in the leaves of Bush cherry which was 16.46% than in the stems which was 5.25%. Analysis of variance indicated that there was a significant difference at P = 0.05 between the quantity of proximate composition assessed for both samples.

The result of Crude fibre showed that there was lesser quantity of crude fibre in the leaves of Bush cherry which was 31.73mg/kg than the stems which was 77.00mg/kg. Analysis of variance revealed that there was a significant difference at P = 0.05 between the quantity of proximate composition assessed for both samples.

The result of Carbohydrate showed that there was lesser quantity of carbohydrate in the stems of Bush cherry which was 4.08% than in the leaves which was 27.74%. Analysis of variance indicated that there was a significant difference at P = 0.05 between the quantity of proximate composition assessed for both samples.

Table-1: Phytochemical composition of Bush Cherry Leaves and Stems.

Sample	HCN (mg/kg)	Flavoniod	Alkaloid (mg/kg)	Terpenoid (%)	Tannin (mg/kg)	Total Phenol (%)	Saponin (%)
Bush Cherry leaves	3.31±0.03	5.53±0.34	2.19±0.30	4.53 ± 1.02	1.24 ± 0.58	3.61 ± 0.71	26.08 ± 0.00
Bush Cherry stem	1.55±0.10	3.02±0.73	0.65 ± 0.07	3.34 ± 0.58	0.34 ± 0.11	0.38 ± 0.03	25.28 ± 0.00

Table-2: Proximate composition of Bush Cherry Leaves and Stems.

Sample	Moisture Content (%)	Ash (%)	Fat (%)	Crude Protein (%)	Crude Fibre (%)	Carbohydrates (%)
Bush Cherry leaves	10.72 ± 0.91	11.36 ± 0.03	2.00 ± 0.00	16.46 ± 0.00	31.73 ± 0.70	27.74 ± 0.18
Bush Cherry stem	7.65 ± 0.88	4.16 ± 0.22	1.87 ± 0.44	5.25 ± 0.00	77.00 ± 0.95	4.08 ± 0.29

Discussion: The amount of saponin was highest in the plant, though the amount of saponin in leaves of *M. barteri* was higher than in stem, the difference between them was not significant (P=0.05). Saponin in plants have the ability to protect against hypercholesterolemia and also has antibiotics properties and can lower the risk of human cancers by inhibiting the growth of cancer cells[24]. The amount of phenol in the leaf was higher than that of the stem; the difference between them was not significant.

Phenol group offers potent antioxidant activity due to its redox potential, which plays an important role in scavenging free radicals, in neutralizing the reactive oxygen species or act as an electron donor to peroxide radical[25].

The amount of flavonoid in the leaf was higher than that of the stem, the difference between them was not significant. Flavonoids are known to have antioxidant effects and have been shown to inhibit the initiation, promotion, and progression of tumors[26].

The amount of alkaloid in the stem is lesser compared to the leaf which was higher. Analysis of variance showed that there was no significant difference between the quality of phytochemical parameter assessed. Alkaloids in plants helps in managing diabetes induced oxidative stress. Steroids are important in pharmacy as they possess compounds like sex hormones and can be used for drug production[27].

The terpenoid percentage was higher in the leaves than the stem the difference between them was not significant. Terpenoids are antibacterial, anticancer, anti-diabetic and anti-inflammatory in nature[28].

The percentage of tannin was higher in the leaves than that of the stem, the difference between them was not significant. Tannins are regarded as anti-nutrient, but some tannins have been known to have medicinal properties. Lower concentrations of tannins in plants have been found to decrease the activity of digestive enzymes[29,30]. The presence of tannin in the medicinal plant suggests the ability of these plants to play key roles as antifungal, antidiarrheal, antioxidant and anti-hemorrhoidal agent[31].

Proximate Analysis showed that the plant had crude fibre content as the highest content found more in the stems of the plant species. *M. barteri* is a great source of crude fibre when consumed because adequate intake of dietary fibre can lower the serum cholesterol level, heart disease and breast cancer[32].

Moisture content was found to be more in the leave than the stem of the plant. The quantity of proximate composition assessed showed no significant difference. Moisture content in the plant helps to speed up the growth of micro-organisms and lifespan of stored samples would below[33].

Proximate analysis showed that Ash content was more in the leaves than the stem. The plant contained an appreciable amount of minerals because ash content is a reflection of the number of mineral elements present in the samples[33].

Protein was more in the leaves than the stem, it shows a significant difference at P = 0.05. Plant proteins have also been studied for their potential as functional foods. Numerous studies have been conducted to examine the impact on cardiovascular risk, glycemia[34].

Carbohydrate content was found to be more in the leaves than the stem of the plant. The quantity of proximate composition assessed showed that there was a significant difference. Carbohydrate constitutes a major class of naturally occurring organic compounds that are essential for the maintenance and sustenance of life in plants and animals and also provide raw materials for many industries[35].

Conclusion

Phytochemicals are chemical compounds produced by plants generally to help them resist fungi, bacteria and plant virus infections, and also consumption by insects and other animals. They are chemicals produced by plants through primary or secondary metabolism. The study revealed that *M. barteri* contained appreciable amounts of phytochemicals and nutrients (Proximate), and that determined the nutritional value of the leaves and stems. This shows that the leaves and stems are nutritionally and medicinally important, and their consumption can provide essential nutrients needed by the human body. The result of this research through investigation of their phytochemistry has established that they have commercial potential in the industries, especially in pharmaceutical industries. *M. barteri* is greatly overlooked because it is not well known but from this research it has been observed that parts of the plant species contain important and very useful phytochemicals and nutritive components. Therefore, Further research on the active compounds in the plant should be carried out to discover more components and how they can be applied in pharmaceutical industries in the production of drugs and supplements needed by humans. and the concerned authorities.

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