PHYTOCHEMICAL AND PROXIMATE COMPOSITION OF *LAUNAEA TARAXACIFOLIA, BASELLA ALBA, SOLANUM MACROCARPON, CNIDOSCOLUS ACONITIFOLIUS AND CREPIDIODES*

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ABSTRACT

Vegetables are protective food as their consumption can prevent and cure several diseases. The proximate and phytochemical composition of Launaea taraxacifolia, Basella alba, Solanum macrocarpon, Cnidoscolus aconitifolia and Crassocephalum crepidioides was evaluated fresh leaf samples were obtained from local farms in Oyo state. Ethanol extracts of samples were used to do the analyses using the AOAC (2005) standard analytical procedures. The content of the samples ranged from, moisture (10.7 to 15.27%) protein (10.05 to 42.69%), crude fibre (2.98 to 15.27%), fat (10.05 to 18.17%), ash (10.42 to 20.03%) and carbohydrate (16.20 to 38.18%). Findings showed that tannins (1.03±0.05 to 3.64±0.12), phenol (0.36±0.11 to 2.11±0.13), phytate (15.32±0.07 to 22.36±0.45), oxalate (0.36±0.2 to 2.15±0.2), saponin (2.04±0.11 to 4.53±0.01), alkaloid (0.98±0.11 to 2.11±0.05), flavonoids (0.605±0.01 to 1.12±0.07), and terpenoid (0.15±0.01 to 0.79±0.10) were present in mg/100g. The leaf vegetable samples examined contained an appreciable proximate and bioactive compound responsible for nutritional importance and therapeutic properties necessary to maintain good health, proper functional mechanism in the body. It is therefore recommended that, since these vegetables have been in existence but is under-utilized. For domestic consumption, people should be encouraged to plant these vegetables in their various gardens and introduce them to neighbors.

Keywords: Indigenous vegetables, polyphenols, tannin, consumption

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INTRODUCTION

Vegetables are called protective food as their consumption can prevent and cure several diseases. Green leafy vegetables, also called dark green leafy vegetables, leafy greens, or greens, are edible plant leaves which are sometimes accompanied by tender petioles and shoots, either cooked or not cooked as parts of major dishes or salad (Abbas *et al.,* 2020). Vegetables maybe tasteless, sweet or bitter which are source of essential and trace elements which play a major role in the normal functioning of body system, maintaining regular metabolic processes and repair of worn-out cells and tissues in man (Bruijnzeel *et al.,* 2010).

Some fruit and leafy vegetables for human use are not preferred due to bitter taste or unpleasant odor (Ishola *et al.,* 2017), or lack of knowledge about nutritional and medicinal properties. In Africa, especially in Nigeria, vegetables can be cultivated on home garden and other agricultural farmland, making them available year-round. Vegetables contain minerals, vitamins, protein, bioactive compounds, and phytochemicals, especially antioxidants which help reduce risk of chronic diseases (Caidan *et al.,* 2014; Kumari *et al.,* 2017). Vegetables when eaten play an essential function as a source of nutrient in sustaining good health which they are usually in small quantity in diets (Monhammed and Sharif, 2011) Vegetables consumption plays a significant role in human nutrition especially as a source of carotene, ascorbic acid, riboflavin, folic acid (vitamin B_9), and minerals which are important for the maintenance of life and for the caloric requirements of the body (Peironi and Soukand, 2019). Leafy vegetables are rich in micro-element such as copper, manganese and zinc. According to Misra and Misra (2014) leafy vegetables are a valuable part of the dietary regimen of Africans, providing essential minerals and vitamins needed for body growth, development and maintenance of optimal health.

Medicinally, since ancient days till recent, medicinal plants are traditionally use to cure various human ailments all over the world because they contain various biological active compounds such as glycosides, alkaloids, sterols, flavonoids, tannins, terpenoids. Phytochemicals are secondary metabolites found in most plants, medicinal and nutritional alike. Phytochemicals are naturally occurring compounds thought to be largely responsible for protective health benefits in plant-based foods and beverages beyond those conferred by their vitamins and minerals contents (Webb, 2013). Phytochemicals are known to function as immunemodulators and may exhibit antioxidant, anti-inflammatory, anticancer, antimalarial and antimicrobial properties (Sadat *et al.,* 2017). Phytochemicals are also referred to as phytonutrients and are classified according to their chemical structures and functional properties. Proximate analysis refers to the determination of the major constituents of leave extract. The analysis partitions nutrients into six components: moisture, ash, crude protein, lipid (crude fat), crude fiber and Nitrogen free extractives (NFE).

This study will provide information on nutritional potentials of underutilized leafy vegetables (*Launaea taraxacifolia, Basella alba, Solanum macrocarpon, Cnidoscolus aconitifolia and Crassocephylum crepidioides*). In addition, it will address under exploitation and promotes optimal utilization of leafy vegetables with high minerals, vitamins, fiber and phytochemical constituent. The specific objectives were to determine the proximate composition and phytochemical composition of *L. taraxacifolia, B. alba, S. macrocarpon, C. crepidioides and C. aconitifolius*)

MATERIALS AND METHODS

Five leafy vegetables viz. *Launaea taraxacifolia* "efo yanrin", *Basella alba* "efo amunututu"; *Solanum macrocarpon* "efo igbo/igbagba"; *Cnidoscolus aconitifolius* "efo iyana-ipaja"; *and Crassocephylum crepidioides* "efo ebolo" were obtained fresh from a local farm, and some were purchased from grocery stores located in Akesan Ajegunle in Oyo town, in Oyo State. The samples were identified at the Department of Plant Science and Biotechnology, Federal University of Oye-Ekiti, Ekiti State. The image of each sample is shown in Plates a to e. Fresh leaves of each plant sample were destalked, sorted, and air dried at room temperature for three weeks until a constant weight was attained. Dried leaves were milled using electric blender.

Method of extraction

20 g of powdered plant samples of each vegetable were weighed using analytical weighing balance, then it was poured into 250 ml beaker. Absolute ethanol was added to the samples and stirred. After 2 minute, the samples were sieved with sieve cloth while the samples residues were left to dry off. The extracts were taken to laboratory for phytochemical and proximate analysis at Federal University of Technology, Akure.





(a) (b) (c) (d) (e)

Plate a: *Crassocephylum crepidioides* (Efo ebolo) Plate b: *Launaea taraxacifolia* (Efo yanrin)
Plate c: *Solanum macrocarpon* (Efo gbagba/igbo) Plate d: *Cnidoscolus aconitifolius* (Efo iyana ipaja)
Plate e: *Basella alba* (Efo amunututu)

Determination of proximate composition

Moisture content determination

The percentage moisture content of each sample was determined as follows:

A foil paper was weighed (W_1). The sample was added and weighed again (W_2). The foil paper and the sample were put in the thermosetting oven for three days at 65°C. This was later removed, cooled in the desiccators removed and weighed immediately (W_3).

$$\% \text{ Moisture} = \frac{\text{Loss in weight of sample}}{\text{Weight of Sample before drying}} \times 100$$

$$= \frac{W_2 - W_3}{W_2 - W_1} \times 100$$

Determination of ash content

For each plant sample, empty crucible was weighted (W_1) and later with samples (W_3), then the crucibles and its content were transferred into muffle furnace for three hours at 800°C after which it was removed to cool in the desiccators and then weighed (W_3).

$$\% \text{ Ash} = \frac{\text{Weight of Ash}}{\text{Weight of Sample}} \times 100$$

$$= \frac{W_3 - W_1}{W_2 - W_1} \times 100$$

Determination of fat content

For each plant sample, a filter paper was weighed (W_1) and then weighed again with a sample added to it (W_2). Then it was properly tied with thread. A round bottom flask was filled with petroleum ether up to about two over three of 500 ml flask. The samples were placed in the Soxhlet

extractor and the source of heat was adjusted so that the solvent boiled gently and left to siphon for 5-6 hours. The filter papers were removed from the extractor and placed in the oven and later put in the desiccators to cool and weighed (W_3).

$$\% \text{ Fat} = \frac{\text{Weight of sample } (W_2-W_1) - \text{Oven dried weight } (W_3-W_1)}{\text{Weight of Sample } (W_2-W_1)} \times 100$$

Determination of Crude fiber

For each plant sample, 1 g of the sample was weighed into a conical flask (W_1) and boiled with 1.25 % H_2SO_4 (200 ml) for 30 minutes. The residue was removed after filtration and put into another conical flask, boiled again with 200 ml of 1.25 % NaOH for 30 minutes. Thereafter, it was littered through poplin cloth for 4 times with distilled water once with 10 % HCl and lastly in twice with ethanol (organic solvent). The residue was put into a crucible and put into the oven for 1 hour to remove moisture. Allowed to cool in the desiccators and weighed (W_2). It was placed in the muffle furnace at 300°C for 30 minutes, cooled and weighed (W_3).

$$\% \text{ Crude fiber} = \frac{\text{Loss in weighed oven dried sample } (W_2-W_3)}{\text{Weight of sample used } (W_1)} \times 100$$

Crude protein determination

This involved three stages namely digestion, distillation and titration

a. Digestion: about 0.5 g of each plant samples were weighed into 500 ml kjeldahl flask. Concentrated H_2SO_4 (10 ml) with selenium catalyst was added and boiled until the sample turned into clear solution. It was cooled and made up to 50 ml with distilled water. The samples were stored inside bottle.
b. Distillation: 5 ml of 2 % Boric acid (H_2BO_3) was put into put the conical flask and 2 drops of mixed indicator were added. The receiving flask was placed so that the top of the condenser tube was below the surface of the boric acid. About 5 ml of the samples were pipette into samples container with 10 ml of 40 % NaOH and this was washed with distilled water. The joints were tightened and distillation was done till a volume of 50ml was reached in the receiving flask.
c. Titration: the distillate was titrated with 0.01M HCl until the end point (pink color) was reached.

$$\% \text{ Nitrogen} = \frac{\text{Molarity of acid} \times \text{Titer value} \times 0.014 \times V_1/V_2 \times 100}{\text{Weight of Sample}}$$

$$\% \text{ Crude protein} = \% \text{ Nitrogen} \times 6.25$$

Where V_1 = volume of digest (50ml)

V_2 = volume of digest used (5ml)

Molarity of the acid used is 0.1mol Nitrogen free extract

This refers to the soluble carbohydrate in the sample and it is obtained by differences.

Determination of Saponin Contents

Saponin content was determined using method described by Obadoni and Ochuko (2001). 2 g of each plant samples were weighed into a conical flask and 100 cm^3 of aqueous ethanol was added. The suspension was heated over a water bath for 4 hours with continuous stirring at about 55^0C.

The mixture was filtered and the residue re-extracted with another forty 200ml of twenty percent (20 %) ethanol. The combined extracts were reduced to two 40 ml over a water bath at 90^0C.

The concentrate was transferred into a 250 ml separator funnel and 20 ml of di-ethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated; twelve (12) ml of n-butanol was added. The combined n-butanol extracts were washed twice with 10 ml of 5 % aqueous sodium chloride. The remaining solution was heated in a water bath; after evaporation, the samples were dried and weighed. Saponin content was calculated in percentage.
(%) Saponin = absorbance of sample x gradient factor x dilution factor/ Weight of sample x 10,000

Determination of Flavonoid
Flavonoid was determined in the leafy vegetable samples as described by (Vukovi *et al.*, 2007). About four (5) g of the plant sample were extracted repeatedly with forty 100 ml of 80 % aqueous methanol at room temperature. The whole solution was filtered through Whatman filter paper. The filtrate was later transferred into a crucible and evaporated to dryness over a water bath and was weighed.

Determination of Tannin
About 0.5 g of the dried powdered samples was boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1 % ferric chloride were added and observed for a brownish green or blue-black coloration indicating the presences of tannin.

Determination of Terpenoids
Salkowski's test was used: To $1cm^3$ of each of the extracts, 3 cm^3 of chloroform was added. The resultant solutions were carefully mixed with $2cm^3$ concentrated tetra-oxo-sulphate iv acid. The formation of a reddish-brown color at the interface was an indication of the presence of terpenoids.

Determination of Phytate
About 0.5 g of the sample was mixed with 2 ml of 2 % HCl solution. It was filtered and two drops 0.3 % ammonium thicynate (NH_4SCN) solution and 2 ml of distilled water were added and shaken. 3 to 4 drops of 10 % $FeCl_3$ solution were added. Yellow coloration indicates the presence of phytate. Extract was equally screened.

Determination of Alkaloid
Alkaloid was determined using alkaline precipitation gravimetric method (Harborne, 2008). About four (4) g of the sample were weighted into 250 ml beaker and 160 ml of 20 % acetic acid in ethanol was added and covered to stand for four (4) hours at 28°C. This was filtered and the extract was concentrated using a water bath to one-quarter of the original volume. Concentrated ammonium hydroxide was then added drop wise to the extract until the preparation was complete. The whole solution was allowed to settle down and the precipitate was collected by filtration and was weighed.

Determination of Phenol

Ferric chloride test: The extracts were dissolved in about 10 cm^3 of distilled water. To 2 cm^3 of each extract few drops of 2 % ferric chloride solution were added. The formation of a dark green color was an indication of the presence of phenolic compounds.

Determination of Oxalate

Oxalic acid was extracted from the sample and precipitated as calcium salt. The oxalate was dissolved in H_2SO_4sulphuric acid and concentrations of oxalate in the solution determined by titration with $KMnO_4$ for a faint pink end point.

Statistical Analysis

All data obtained were analysed with the use of analysis of variance (ANOVA). In addition, Duncan multiple range test was used to determine the significance level at 0.05 among the samples.

RESULTS

Proximate Analyses

The result obtained from this study showed that fat content of *C. aconitifolius, L. taraxacifolia, B. alba and C. crepidioides* and *S. macrocarpon* are significantly ($p \leq 0.05$) different the same while those of (Table 1). Also, the results showed that the protein content of *L. taraxacifolia, B. alba,C. crepidioides, C. aconitifolius* and *S. macrocarpon* differed among the five vegetables The magnitude of ash content among the vegetables *(L. taraxacifolia, S. macrocarpon B. alba* and *C. crepidioides) were not the same in magnitude. The ash content in the leaves was highest in B. alba while C. aconitifolius had the least ash content in the leaves. The magnitude of the fat content was highest in S. macrocarpon but low in C. crepidioides. The* moisture content of *C. aconitifolius, L. taraxacifolia and S. macrocarpon* were similar in magnitude, but differed from *B. alba and C. crepidioides.* As shown in Table 1, the protein content was highest in *C. aconitifolius*, followed by *S. macrocarpon*. The magnitude of carbohydrate content in the leafy vegetables were not the same. *B. alba* performed best for this nutrient, followed by *L. taraxacifolia. In contrast, S. macrocarpon marked had the least carbohydrates in the leaves.*

Phytochemical Analyses

As shown in Table 2, the tannins content among the leafy vegetables were not the same. The tannin content in the leaves was highest in *B. alba*.

Also, the results showed that the phenol content showed similar response in B. alba and *C. crepidioides. The phenol content in the leaf sample was highest in C. aconitifolius.*

The result of phylate content of this study showed that *C. aconitifolius, S. macrocarpon* and *C. crepidioides* were not significantly different from each other. S. macrocarpon recorded the highest phytate content in the leaves. The results of the laboratory analysis showed that the oxalate content in *L. taraxacifolia, B. alba and C. crepidioides* showed similar response. While *C. aconitifolius had the highest concentration of oxalate in the leaves.* The saponnin content of *L. taraxacifolia, B. alba and C. crepidioides* are statistically the same while only *C. aconitifolius* and *S. macrocarpon* is differ significantly different from other leafy vegetables. *C. aconitifolius* recorded the highest saponin content in the leaves, this was followed by *L. taraxacifolia.*

The alkaloids content in the leaves showed that *C. aconitifolius, L. taraxacifolia* and *C. crepidioides* were significantly the same while those of *B. alba* and *S. macrocarpon* are significantly different. The result obtained from this study showed that flavonoids content of *C. aconitifolius* and *S. macrocarpon* are quite significantly the same while those of *B. alba, L. taraxacifolia and C. crepidioides* are statistically the different. However, the terpenoids content showed that only *L. taraxacifolia* and *C. crepidioides* are quite significantly the same while those of *B. alba, C. aconitifolius,* and *S. macrocarpon* are significantly different.

DISCUSSION

Proximate composition

The results presented in Table 1 indicates that the proximate composition of the leafy vegetable showed different response among the leafy vegetables. *B. alba* had the highest moisture content of 15.27 %, followed by *S. macrocarpon* (11.82 %), *L. taraxacifolia* has (10.88 %), *C. aconitifolius* (10.71%). In contrast, *C. crepidioides perfomed poorly for* for leaf moisture content. In another study, Margaret *et al.,* (2016) reported similar moisture content in a local vegetable. Also, the mean value recorded for *C. aconitifolius* in this study were larger in magnitude compared to those reported by Yusuf, *et al.,* 2022). The high moisture content of vegetables indicates freshness and perishability, as well as indicating that they play a key role in aiding the digestion of food (Adepoju and Oyewole, 2008). *C. crepidioides* had the highest ash content (20.05%), next was *B. alba* (18.77%), *S. macrocarpon* has (16.69%), *L. taraxacifolia* (15.15%) while C. *aconitifolius* performed poorly for ash content (10.43%). The foregoing is higher than the magnitude reported by Arawande *et al.,* (2013) in *C. crepidioides* as (13.27%).

The ash content of a plant part is a reflection of its mineral elements. The values recorded for the mineral nutrients of the study leaves suggest that the vegetables are had high abundance of nutritionally important minerals, such as potassium, calcium, sodium, magnesium, phosphorus, zinc, copper, iron and selenium. Minerals are utilized by the body in many ways and they play vital roles in the nutritional development of humans and animals (Rahman *et al.,* 2014). *C. aconitifolius* has the highest protein composition (42.69 %), followed by *S. macrocarpon* (28.31 %), *B. alba* has (15.27 %) and *L. taraxacifolia* has (23.8 %) *C. crepidioides* has the least crude protein which is (10.05 %). Proteins are building block units and the food protein is needed to make vital hormones, important brain chemicals, antibodies, digestive enzymes, and necessary elements for the manufacture of DNA. Some proteins are involved in structural support, while others are involved in bodily movement, or in defense against germs (Bailey, 2008). *B. alba* recorded the highest carbohydrate composition (38.18 %), followed by *L. taraxacifolia* (31.49 %), *C. crepidioides* has (30.2 %), *C. aconitifolius* has (21.70 %) and *S. macrocarpon* has the least carbohydrate content which is (16.20 %).

Carbohydrates produced by plants are one of the three main energy sources in food, along with protein and fat. When animals eat plants, energy stored in carbohydrates is released by the process of respiration, a chemical reaction between glucose and oxygen to produce energy, carbon dioxide, and water. *B. alba* has the highest fibre composition (15.27 %), followed by *C. crepidioides* (10.05 %), *S. macrocarpon* (8.86 %), *L. taraxacifolia* (7.33 %) and *C. aconitifolius* has the least fiber content which is (2.98 %). Plants with high fiber content are used for the treatment of obesity, diabetes, cancer, and gastrointestinal disorders (Ibironke, 2013). *S. macrocarpon* has the highest

fat composition (18.17%), followed by *C. aconitifolius* (11.53%), *L. taraxacifolia* has (11.42%), *B. alba* with (15.27%) and *C. crepidioides* has the least fat which is (10.05%). They are important not only because of their energy value, but the fat soluble, vitamins and essential fatty acids contained in the fat of natural foods. Dietary fats also increase the palatability of food by absorbing and retaining flavour (Antia *et al.,* 2006; Ilodibia *et al.,* 2014).

PHYTOCHEMICAL COMPOSITION

The phytochemical constituents of the leafy vegetable samples suggest the presence of bioactive components. The flavonoid composition of the leafy vegetable samples ranged from 0.605 to 1.12. *C. crepidioides* had the highest mean value for flavonoid in the leaves, next was C. *aconitifolius*, *S. macrocarpon, L. taraxacifolia* while *B. alba* had the least composition of flavonoid. Flavonoids in plants possess medicinal benefits which includes antioxidant and anti-inflammatory activities (Saxena *et al.,* 2012). They have the ability to scavenge hydroxyl radicals, super oxide anions and lipid peroxy radicals (Okwu and Josiah, 2006). Therefore, supports its antioxidant activity. The flavonoid content of the leafy vegetables supports its use for protection against diseases such as cancer, inflammation and atherosclerosis (Onyeka and Nwambekwe, 2007). Saponin composition of the vegetables ranged from 4.53 to 2.04. *the saponon content was maximum in C. aconitifolius* followed by *B. alba* , *C. crepidioides* , *L. taraxacifolia* while *S. macrocarpon* has the least saponin content value . Leafy vegetables such as *L. taraxacifolia, B. alba, S. macrocarpon, C. crepidioides and C. aconitifolius* leaves are thus said to possess antimicrobial property attributed to saponins and other phytochemicals present. Saponins, from recent evidence seem to possess hypocholesterolemia, immunostimulatory and anticarcinogenic properties. In addition, they reduce the risk of heart diseases in humans (Gemede and Ratta, 2014). However, alkaloid composition of the leafy vegetables was highest in *B. alba* while *S. macrocarpon* has the least alkaloids content value.

The presence of alkaloids in these leafy vegetables supports the findings by Oyeleke *et al.,* (2008), that is the antibacterial activity of this plant may be attributed to the presence of alkaloids. Alkaloids have been reported to possess various pharmacological activities including antihypertensive effects, antiarrhythmic effect, antimalarial and anticancer activity (Saxena *et al.,* 2013). Also, Tannin content of the leafy vegetables was highest in *B. alba* The presence of tannins in the leafy vegetables confers the leaves to be a good source for the treatment of wounds emanating from varicose ulcers and hemorrhoids. Plants that contain tannins are used as astringents, against diarrhea, as diuretics, against stomach and duodenal tumors (Saxena *et al.,* 2013). The phenol content of the leafy vegetables was best in *C. aconitifolius*

The presence of these phytochemicals (phenol) in the vegetables is an indication that the plant can be a potential source of precursors in the development of synthetic drugs. Phenolics are reported to possessed antioxidant property which prevents oxidative damage of cell due to present of free radical scavengers (Okechukwu *et al.,* 2013). The phenolics lower the risk of heart diseases and provide anti-inflammatory activity due to their ability to neutralize or scavenge free radicals (Omale and Okafor 2008). Additionally, *Launaea taraxacifolia* had the highest terpenoid content, followed by *C. crepidioides , B. alba , S. macrocarpon* while *C. aconitifolius* has the least terpenoid content with the value of . Terpenoids are said to help in preventing metabolic disorders, fight cancer and exert antiaging benefits. As phytochemicals, terpenoids are responsible for a wide

variety of flavors and aromas, and have been found to possess analgesic, antiimflammatory, anti-fungal, anti-microbial, anti-viral and anti-parasitic properties (Mercola, 2017). *S. macrocarpon* had the highest phylate content, followed by *C. aconitifolius , C. crepidioides , B. alba ,* while *L. taraxacifolia* has the least phylate content with the value of . According to Igile *et al.,* (2014) a diet containing phytate in the range of 1-6% for a long period of time tends to decrease the bioavailability of mineral elements in mono-gastric animals.

However, some researcher reported that phytate had been linked to the prevention of kidney stones, dental decay and calcification of blood vessels. Phytic acid is known to be a very potent chelator, forming protein and mineral-phytic acid complexes thereby decreasing protein and mineral bioavailability. *C. aconitifolius* is promising for oxalate content, followed by *B. alba C. crepidioides , S. macrocarpon , L. taraxacifolia*. The presence of oxalate in foods or vegetables above acceptable levels causes irritation in the mouth and the lining of the gut (Gemede and Ratta, 2014).

CONCLUSION

Leafy vegetable samples analyzed in the laboratory contained an appreciable proximate and bioactive compound responsible for nutritional importance and therapeutic properties necessary to maintain good health, proper functional mechanism in the body. S. macrocarpon is a reliable source of fat, *C. crepidioides* for ash, B. alba for fibre and *C. aconitifolius* for leaf protein, both B.alba and *L. taraxacifolia* performed best for carbohydrates. The leafy vegetables demonstrated varying concentration for tannin, oxalate, phenol, phytateoxalate, saponon, alkaloid and flavonoid. these vegetables are very effective in boosting the body's immune system. Understanding phytochemical composition and nutritional potentials, some of these vegetables may encourage their utilization for pharmaceutical purposes. People should be encouraged to plant these vegetables in their various gardens and introduce them to neighbors.

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Table 1: Proximate compositions of the extracts of *C. crepidioides, L. taraxacifolia, S. macrocarpon, B. alba and C. aconitifolius.*

Plant samples	Moisture (%)	Fat (%)	Ash (%)	Fibre (%)	Protein (%)	Carbohydrate (%)
C. aconitifolius	10.7±0.47^{b}	11.53±0.04^{c}	10.42±0.03^{c}	2.98±0.07^{d}	42.69±0.07^{a}	21.70±0.24^{c}
L. taraxacifolia	10.88±0.87^{b}	11.42±0.06^{c}	15.13±0.05^{b}	7.33±0.07^{c}	23.8±0.07^{b}	31.46±0.60^{b}
S. macrocarpon	11.81±0.21^{b}	18.17±0.03^{a}	16.68±0.03^{b}	8.86±0.03^{c}	28.30±0.02^{b}	16.20±0.07^{d}
B. alba	15.27±0.40^{a}	15.27±0.03^{b}	18.77±0.06^{a}	15.27±0.05^{a}	15.27±0.05^{c}	38.18±0.19^{a}
C. crepidioides	5.55±0.40^{c}	10.05±0.03^{c}	20.03±0.06^{a}	10.05±0.05^{b}	10.05±0.05^{c}	30.2±0.19^{b}

Samples with different superscripts within the same column were significantly different ($p<0.05$).

Table 2: Phytochemical compositions of the extracts of *C. crepidioides, L. taraxacifolia, S. macrocarpon, B. alba and C. aconitifolius.*

Phytochemical Composition	*C. aconitifolius*	*L. taraxacifolia*	*S. macrocarpon*	*B. alba*	*C. crepidioides*
Tannins (mg/100g)	1.32±0.02^{c}	1.03±0.05^{b}	2.23±0.007^{b}	3.64±0.12^{a}	2.57±0.23^{b}
Phenol (mg/100g)	2.11±0.13^{a}	0.36±0.11^{c}	0.77±0.34^{b}	0.54±0.45^{b}	0.39±0.00^{b}
Phytate (mg/100g)	19.89±0.12^{a}	15.32±0.07^{c}	22.36±0.45^{a}	18.52±0.23^{b}	19.73±0.15^{a}
Oxalate (mg/100g)	2.15±0.22^{a}	0.36±0.2^{b}	0.555±0.76^{c}	1.2±0.54^{b}	1.12±0.67^{b}
Saponnin (g/100g)	4.53±0.01^{a}	3.22±0.03^{b}	2.04±0.05^{c}	3.98±0.00^{b}	3.32±0.08^{b}
Alkaloids (g/ 100g)	1.23±0.01^{b}	1.13±0.02^{b}	0.98±0.11^{c}	2.11±0.05^{a}	1.22±0.00^{b}
Flavonoids (g/ 100g)	0.895±0.01^{b}	0.725±0.02^{b}	0.86+0.05^{b}	0.605±0.01^{d}	1.12±.0.07^{a}
Terpenoids (mg/100g)	0.15±0.01^{d}	0.79±0.10^{a}	0.43±0.02^{c}	0.65±0.00^{b}	0.73±0.11^{a}

Samples with different superscripts within the same row were significantly different ($p<0.05$).