Nutritional Content of Some Lesser-Known Vegetables (P. *crispum,* B. *pilosa,* L. *taraxacifolia and* V. *doniana)* In Jos, Plateau State

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Abstract

*The study identified and determined the nutritional content of four lesser-known vegetables in plateau state. The vegetables used were obtained from communities in Jos North and South Local Government Areas of plateau State and were identified at the botany department herbarium of the University of Jos as follows: Petroselinum crispum (Flat leaf parsley), Bidens pilosa (Beggerticks or cobbler peg), Launacea taraxacifolia (Wild lettuce) and Vitex doniana (Black plum). The leaves were sorted, cleaned and processed into powdered samples and extracts were derived using aqueous extraction. Generally, the moisture contents of the leaf extracts were more than 15% of WHO/FAO (2007) standard for high moisture content in food products meaning that they would not store well without spoilage. The crude protein content of the leaf extracts ranged from 25.97-51.34 (dry weight basis), with V. doniana having the highest content and L. taraxacifolia having the least. The protein values in the leaf extracts were high as they contained more than 5% of the standard reference for high protein foods depicted by Codex Alimentarius Commission (2009). The high crude fat values (5.19-2.87) of the leaf extracts in the present study means that they may not be recommended as part of weight reducing therapy for those suffering from obesity***.** *B.pilosa had the highest vitamin C and E content of 19.95 and 123.07mg/100g respectively. It (B.pilosa) also had the highest Beta carotene content of 2713.08mg/100g. Generally, the vitamin result showed that the extracts are good sources of beta-carotene, vitamin C and vitamin E. These are known as antioxidant vitamins. Thus, the high amounts of antioxidant vitamins in the diet could result to improved immune system and reduced oxidative stress. Results of the mineral analysis indicated that the iron contents of the leaf extracts were high. They ranged from 43.5-15.5mg/100g in B. pilosa and V. doniana respectively. B. Pilosa also had the highest Zinc content of 48.05mg/100g while V. doniana had the lowest value of 335mg/100g. The results showed that V. doniana had lower values for protein, fat, vitamins and phytochemicals but had high values for cadmium and antinutrients. Though the toxican and antinutrient contents of the vegetables were high, they are within safe recommended levels.*

Key words: Lesser known Vegetables, Phytochemicals, Anti-nutrients, Food habits

Introduction

Vegetables are indispensable part of human diet and offer the most rapid and lowest cost method of providing adequate supplies of vitamins, minerals and fiber to people. Vegetables play an important role in human nutrition. Most are low in fat and calories but are bulky and filling. Vegetables supply dietary fiber and are important sources of essential vitamins, minerals, and trace elements. Particularly important are the antioxidant vitamins A, C, and E. When vegetables are included in the diet, there is found to be a reduction in the incidence of cancer, stroke, cardiovascular disease, and other chronic ailments. Compared with individuals who eat less than three servings of fruits and vegetables each day, those that eat more than five servings have an approximately twenty percent lower risk of developing coronary heart disease or stroke (Harper, 2024). Vegetables can play an even more important role in the nutritional quality of diets. This can be accomplished through better dissemination about their nutritional value and through changes in eating habits that will benefit people, especially those on marginal diets. Nevertheless, vegetable production in developing countries, unfortunately, often takes a secondary role to high-calorie grain crops (Rubatzky & Yamaguchi 2012). Vegetables are used in food depending on the purpose to be achieved. They may be used as minor or major ingredients in the preparation of soups, sauces, stew, pottage, porridge and salad, to enhance the flavor of food, garnish prepared dishes, and serve as fillings for sandwiches, pies, Indian egg roll, vegetable pottage and vegetable parcels. Vegetables play a crucial role in food preparations, offering numerous benefits and uses including providing nutrient dense ingredients, flavor enhancement, meat substitute, healthy snacking (USDA, 2020).

The nutritional content of vegetables varies considerably though generally they contain little protein or fat and varying proportions of vitamins A, C, E and B6, provitamins, dietary minerals and carbohydrates as well as a great variety of phytochemicals. Phytochemicals has many health effects as antioxidants against many diseases or antibacterial, antifungal, antiviral, cholesterol lowering, antithrombotic, or anti inflammatory effects (Tulin & Kafkas, 2017). Phytochemicals are plant-based bioactive compounds produced by plants for their protection. They can be derived from various sources such as whole grains, fruits, vegetables, nuts, and herbs, and more than a thousand phytochemicals have been discovered to date. Some of the significant phytochemicals are carotenoids, polyphenols, isoprenoids, phytosterols, saponins, dietary fibers, and certain polysaccharides. These phytochemicals possess strong antioxidant activities and exhibit antimicrobial, antidiarrheal, anthelmintic, antiallergic, antispasmodic, and antiviral activities. (Ashwani *et al*, 2023). The terms phytochemical and phytonutrient are used interchangeably. Antinutrients, on the other hand, are natural or synthetic compounds that interfere with or prevent the absorption of nutrients. For example, phytic acid forms insoluble complexes with calcium, zinc, iron and copper.

Statement of the Problem

Food habits of people have deteriorated leading to high consumption of fatty foods and refined carbohydrates that increase incidence of obesity, diabetes, hypercholesterolemia, cardiovascular disease, high blood pressure and cancer that were previously rare in the society. People consume fewer vegetables in their diets that can protect them against diseases (Harper, 2024). Some of the vegetables are well known and well utilized but some are lesser- known, unpopular and mostly utilized on a small scale, restricted to only the places where they grow and indigenous to those areas. There is little information about the nutrient composition of such lesser known vegetables

Objective of the study

The study is aimed at identifying some of the lesser- known or neglected and underutilized indigenous vegetables in Plateau State and determining their nutritional contents.

MATERIALS AND METHOD

Research Design

The design of the study was a mixed method approach of both survey and experimental research design. Survey was carried out to identify the different indigenous, underutilized vegetables assumed to have healing properties while the experiment was carried out in laboratory analysis.

Sample and Sampling Technique

A Focus Group Discussion guide was

developed and prepared to obtain information on the underutilized indigenous vegetables and their assumed nutritional properties. The subjects, 50 adults aged 35 and above were randomly selected from the communities in Jos South. they provided information on the lesser-known vegetables in their communities. The information helped the researcher in selecting the vegetables to be used for the study. The focus group discussion guide was aimed to find out the names of different indigenous, lesser-known vegetables in Plateau State, and also to find out those vegetables assumed to have healing properties or are used in the treatment of illnesses.

Four vegetables were selected and harvested from the communities in Jos South Local Government Area of Plateau State and were identified at the Botany Department herbarium of the University of Jos.

Table 1: Names of the Four Identified Vegetables Selected for the Study

Local Name	English Name	Botanical Name
Langsir	Flat leaf parsley	Petroselinum *crispum*
Ciyap lad	Beggerticks, cobbler peg	Bidens *pilosa*
Vagal	Wild lettuce	Launacea *taraxacifolia*
Dinki (dinya)	Black plum	Vitex *doniana*

Sample preparation

The vegetables were sorted, washed and shade dried for two days then pulverized separately using a Gallenkamp mixer (Kenwood – MPR 201). The samples were then taken for laboratory analysis.

Method of data collection

Data was collected through laboratory analysis of the nutritional content of the four vegetables selected. The laboratory analyses carried out were as follows:

Proximate analyses

The proximate analyses of the samples for crude protein, crude fibre, total ash, moisture, and nitrogen-free extracts were carried out using the method described by AOAC 2005.

Mineral content

The mineral content of the vegetables was determined by the method of AOAC (2005). Calcium (Ca), magnesium (Mg), iron (Fe) copper (Cu) and zinc (Zn) of each vegetable sample was estimated by atomic absorption spectrophotometer (AAS) (model 30: 30 Perkin Elmer, Norwalk USA)**.** Pro vitamin A (B- carotene) was determined using the method adopted from International Vitamin A Consultative Group (IVACG). Vitamin C and E were determined using AOAC (2005) method.

phytochemical screening

Phytochemical constituents of the samples were analyzed using standard protocols as described by Lennox & John (2018).

Determination of alkaloids

Five grams (5g) sample was weighed in to a 250 ml beaker and 200 ml of 20 % acetic acid in ethanol was added and covered to stand for 4 hours. This was then filtered, and the extract concentrated using water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added dropwise to the extract until the precipitation is complete. The whole solution was allowed to settle, and precipitate was collected by filtration and weighed

Estimation of tannins

About 500 mg (0.5 g) of sample was weighed into a 100-ml plastic bottle. 50 ml of distilled water was added and shaken for one hour in a mechanical shaker. This was filtered into a 50-ml volumetric flask and made up to the mark. 5 ml of the filtrate was pipetted into a tube and mixed with 3ml of 01M of $FeCl_3$ in 0.1NHCl and 0.008M potassium ferrocyanide.

The absorbance was measured in a spectrophotometer at 120nm wavelength within 10 minutes. Blank was prepared and the colour developed was read at the same wavelength. A standard was prepared using tannic acid to get 100 ppm and measured (Lennox & John, 2018).

Determination of saponins

About 20 g of grinded sample was dispersed in 200 ml of 20 % ethanol in a 250-ml beaker. The suspension was heated over a hot water bath for 4 hours, with continuous stirring at 550 °C. The mixture filtered and residue re-extracted with another 200 ml of 20 % ethanol. The combined extract was reduced to 40 ml over water bath at 900 °C. The concentrate was transferred into a 250-ml separating funnel and 20 ml of diethyl ether was added and shaken vigorously, then aqueous layer was discarded. The purification process was repeated, and 60 ml of n-butanol was added. The combined n-butanol extract was washed twice with 10 ml of 5 % aqueous sodium chloride ($NaCl_2$). The remaining solution was heated in water bath. After evaporation, the sample was dried in the oven to a constant weight. The saponin content was calculated in percentage (%) (Lennox & John, 2018).

Determination of flavonoids

About 10 g of the plant sample was extracted repeatedly with 100 ml of 80 % aqueous methanol at room temperature. The whole solution was filtered through a 125 mm Whatmann filter paper. The filtrate was later transferred into a crucible and evaporated to dryness over a water bath and weighed (Lennox & John, 2018).

Antinutrients

Anti nutritional factors (tannin, oxalates and phytic acids) were determined in each of the plant samples using the method described by Pearson (1976). For the estimation of tannins, about 500 mg (0.5 g) of sample was weighed into a 100-ml plastic bottle. 50 ml of distilled water was added and shaken for one hour in a mechanical shaker. This was filtered into a 50-ml volumetric flask and made up to the mark. 5 ml of the filtrate was pipetted into a tube and mixed with 3ml of 0.1M of $FeCl_3$ in 0.1NHCl and 0.008M potassium ferrocyanide. The absorbance was measured in a spectrophotometer at 120nm wavelength within 10 minutes. Blank was prepared and the colour developed was read at the same wavelength. A standard was prepared using tannic acid to get 100 ppm and measured.

Oxalic acid in sample extract reacts with CaCl2 in acetate buffer to form calcium oxalate which is precipitated and reconstituted in aqueous sulphuric acid. When the sulphuric acid is titrated against KMnO4, the amount of oxalic acid present is proportional to the volume of KMnO4 used.

In the case of phytates, the phytic acid reacts with methol and ammonium molybdate in the presence of copper acetate buffer to form a blue complex, which absorbs at 470 or 640 nm. (Pearson, 1976).

Results And Discussion

The proximate composition of the aqueous leaf extracts showed that the moisture values of the leaf extracts are higher than 5.53% reported for *Cnidoscolus aconitifolius* leaf extract by Chukwu *et al*, (2018), 58.55% reported for fresh leaves of *Vitex doniana* as well as 16.66% reported for *Vitex doniana* fruit pulp. However, the moisture content of *L. taraxacifolia* and *P. crispum* leaf extracts in this study is comparable with 13.53% reported for fresh leaves of *Cnidoscolus aconitifolius*reported by Orji et al. (2016) as well as 11.35% reported for fresh leaves of *F. Capensis* by Ezeigwe et al. (2020). Generally, the moisture contents of the leaf extracts are more than 15% of WHO/FAO (2007) standard for high moisture content in food products meaning they would not store well without spoilage.

The crude protein contents of the leaf extracts were high as they contained more than 5% of the standard reference for high protein foods depicted by Codex Alimentarius Commission (2009). In comparison to previous literature, the protein contents of the leaf extracts were higher than 7.68% reported by Orji et al. (2016), 10.85% reported by Ezeigwe *et al.,* (2020) as well as 8.24% reported for *Cnidoscolus aconitifolius* leaf extract, *Ficus capensis* leaf extracts and*Vitex doniana* fruit pulp, respectively. The crude protein content of *Vitex doniana* leaf extract reported in this study is comparable with 15.46% reported for fresh leaf of *Vitex doniana* and for fresh leaves of *L. taraxacifolia*. The fairly high protein contents of the leaf extracts showed that they can be used basically for supplementation as a relatively high amount of protein is required for functional foods and nutraceuticals.

The crude fat content of the leaf extracts is higher than 0.80% reported for *Vitex doniana* leaves by Ifeanacho and Ogunwa (2021) as well as 1.20% fat reported for fresh leaves of *C. aconitifolius* (Lennox & John, 2018). The result, however, was very low compared with 34.62% reported for *Vitex doniana* fruit pulp. The high crude fat value of the leaf extracts in the present study means that they may not be recommended as part of weight reducing therapy for those suffering from obesity. Proximate analysis for the leaves of Vitex *doniana* revealed moisture content (7.04%), crude fibre (8.12%), crude protein (15.80%), ash (5.5%) fat (16.33%) and carbohydrate (11.21%) indicating high nutritional value (Ushie *et al*, 2022).

Table 2: Proximate Composition of Aqueous Extracts of the Leaves

Parameters (%)	***P. crispum***	***B. pilosa***	***L. taraxacifolia***	***V. doniana***
C/protein	35.92 ± 0.28	31.56 ± 1.12	25.79 ± 5.24	15.34 ± 1.53
Fat	3.74 ± 0.61	5.19 ± 1.38	3.28 ± 0.19	2.87 ± 0.12
Ash	14.24 ± 2.81	14.03 ± 0.43	17.25 ± 3.80	10.98 ± 1.80
Moisture	11.23 ± 0.52	7.99 ± 2.75	13.78 ± 1.91	9.91 ± 2.03
Carbohydrate	34.87 ± 0.26	41.23 ± 2.04	39.90 ± 2.19	60.90 ± 2.46

C/protein = crude protein. **P. *crispum*=** Petroselinum *crispum* **B. *pilosa*=** Bidens *pilosa* **L. *taraxacifolia*=** Launacea *taraxacifolia* **V. *doniana*=** Vitex *doniana***.** Values are mean ± standard deviation of duplicate determinations.

Table 3 showed that B. *pilosa* had the highest vitamin C and E content of 19.95 and 123.07mg/100g respectively and also the highest Beta carotene content of 2713.08mg/100g. The beta-carotene contents of the samples were high compared with 0.89 mg reported for *Vitex doniana* leaves by Ifeanacho and Ogunwa (2021), 143.20 µg/100g reported for *Cnidoscolus aconitifolius* leaf extract by Lennox and John (2018) as well as 13.21 µg/100g and 9.78 µg/100g reported for fresh tropical leafy vegetables (*B. alba* and *S. biafrae* respectively) by Borokini *et al*. (2017).

The vitamin C contents of the samples were lower than 35.58 mg reported for *Vitex doniana* fruit pulp as well as 24.70 mg and 27.20 mg reported respectively for *Solanum macrocarpon* and *Gnetum africanum* leaves by Davidson & Monulu (2018). However, the vitamin C contents of the samples (especially *B. pilosa* leaf extract) are comparable with 19.19 mg reported by Chukwu *et al.* (2018) for aqueous leaf extract of *Cnidoscolus aconitifolius*.

The vitamin E contents of the leaf extracts were higher than 49.89 µg reported for *B. alba* as well as 4.103 mg reported for *Vitex doniana* leaf but lower than 192.38 µg reported for *S. biafrae* by Borokini *et al*. (2017).

Vitamins are indispensable natural substances that are required in minute concentrations in the diets for normal functioning of the body, energy metabolism, red blood cell formation, growth and maintenance of body tissue. Generally, the vitamin result showed that the extracts are good sources of beta-carotene, vitamin C and vitamin E. these are known as antioxidant vitamins. Thus, the high amounts of antioxidant vitamins in the diet could result to improved immune system and reduced oxidative stress.

Table 3: Vitamin Composition of the Aqueous Extracts of the Leaves

Aqueous extracts	**Vit C (mg/100g)**	**Vit E (mg/100g)**	**Beta Carotene**
P. crispum	17.11 ± 0.02	117.31 ± 0.02	2567.51 ± 0.02
B. pilosa	19.95 ± 0.02	123.07 ± 0.02	2713 .08 ± 0.01
L. taraxacifolia	16.97 ± 0.01	116.97 ± 0.01	2531.11 ± 0.02
V. doniana	13.81 ± 0.02	114.88 ± 0.01	2469.10 ± 0.02

P. *crispum*= Petroselinum *crispum* **B. *pilosa*=** Bidens *pilosa* **L. *taraxacifolia*=** Launacea *taraxacifolia* **V. *doniana*=** Vitex *doniana***.** Values are mean ± standard deviation of duplicate determinations.

Table 4 indicated that the iron contents of the leaf extracts were high and values were by far higher than 5.20 mg reported for *Vitex doniana* fruit pulp , 0.0063 mg reported for *Cnidoscolus chayamansa* leaf extract by Jiyil *et al*. (2021) as well as 0.04 mg reported for *Cnidoscolus aconitifolius* leaf extracts by Chukwu *et al*. (2018). The results of the iron contents of the leaf extracts in this study are, however, lower than 125.50 mg reported for *Biden pilosa* leaves. Iron is critical for the formation of haemoglobin; the main components of red blood cells and iron deficiency results to anemia occurring mostly in children

Zinc contents of the samples are higher than 1.48 mg reported for *Cnidoscolus aconitifolius*leaf extract by Chukwu et al. (2018), 1.03 mg/100g reported for *Biden pilosa* leaf. Zinc participates as a co-factor of enzymes responsible for proteins, carbohydrates, and nucleic acid metabolism and also facilitates wound healing Zinc deficiency has been associated with anaemia and erythrocyte fragility.

The magnesium contents of the leaf extracts are higher than 408 mg reported for *L. taraxacifolia* leaf, 206.45 mg/100g and 104.53 mg/100g reported respectively for fresh leaves of *Biden pilosa* and *L. Taraxacifolia*, far higher than 20.10 mg reported for *Vitex doniana* fruit pulp, 41.0 mg reported for *Vitex doniana* leaf by Ifeanacho & Ogunwa (2021) as well as 25.13 mg/100g and 26.98 mg/100g reported respectively for dried leaves of *Launacea taraxacifolia* and *Bidens pilosa.* Magnesium is required for energy production, and also contributes to the structural development of bone (Fiorentini *et al*., 2021).

The calcium contents, on the other hand, is lower than 1050 mg reported for *Basella alba* leaves by Borokini *et al*. (2017) but higher than 73.0 mg/100g reported for fresh leaves of *Vitex doniana,* 30.27 mg/100g reported for *Vitex doniana* fruit pulp, as well as a range of 31.23-54.90 mg/100g reported for some leafy vegetables (*Biden pilosa*, *Celosia trygina*, *C. crepidioides*, *Launacea taraxacifolia*, *Solanum nigrum*). Calcium is an integral part of bone structure, providing a rigid frame that holds the body upright (Borokini *et al*, 2017)

The cadmium contents of the leaf extracts were higher than 0.01 mg reported for some leafy vegetables (*Celosia trygina*, *C. crepidioides*, Launacea *taraxacifolia* and *Solanum nigrum*). Cadmium (Cd) is a highly persistent environmental toxicant that exhibits higher rates of toxicity that leads to the kidney damage.

Table 4: Minerals Composition of the Aqueous Extracts of the Leaves

Parameters (mg/100g)	*P. crispum*	*B. pilosa*	*L. taraxacifolia*	*V. doniana*
Zinc	37.5 ± 1.12	48.0 ± 1.08	34.5 ± 1.20	33.0 ± 1.18
Copper	ND	ND	ND	ND
Iron	36.5 ± 0.16	43.5 ± 0.59	33.5 ± 1.27	15.5 ± 0.23
Calcium	244.0 ± 0.45	234.5 ± 0.79	145.5 ± 2.02	129.0 ± 1.54
Magnesium	1028.0 ± 0.45	1015.5 ± 0.52	998.0 ± 0.36	1004.5 ± 0.62
Cadmium	4.5 ± 0.54	4.2 ± 1.24	5.5 ± 0.25	7.5 ± 1.72

ND = not detected **P. *crispum*=** Petroselinum *crispum* **B. *pilosa*=** Bidens *pilosa* **L. *taraxacifolia*=** Launacea *taraxacifolia* **V. *doniana*=** Vitex *doniana***.** Values are mean ± standard deviation of duplicate determinations.

Results showed the presence of tannin, oxalate and phyate in the leaf extracts. The oxalate content of the leaf extract was higher than 1.17 mg oxalate reported for *B. alba* leaf by Borokini *et al.* (2017). Daily intake of 450 mg of oxalic acid has been reported to interfere with various metabolic processes via binding with minerals (Ca, Mg) and rendering them inaccessible to the body. The oxalate content of the leaf extract is below the level that can cause harm in man.

The phytate levels of the leaf extracts were within the recommended safe level of toxicity in food which is 25 mg/100g. In comparison to other studies, The phytochemical screening of the crude extract of Vitex *doniana* showed that flavonoids, steroids, phlobatannins, alkaloids, saponins were found to be present (Ushie *et al*., 2022). Phytic acid in the diet will form insoluble complexes with minerals such as zinc, calcium and iron resulting in a deficit in the absorption of the dietary minerals which could lead to their deficiencies.

The contents of tannin in the samples were somewhat comparable with 1.97 mg/100g reported for *Conyza sumatrensis* leaves as well as 1.45 mg/g reported for *S. biafrae* leaves by Borokini *et al.* (2017) but higher than 0.159 mg/100g reported for *Vitex doniana* leaves as well as 0.03 mg/100g reported for *Launacea taraxacifolia*. The precise toxic amount of tannin that can cause depression in human is not known (Ekpa & Sani, 2018). However, as an anti-nutrient, tannin forms insoluble complexes with proteins, in the process preventing protein absorption and metabolism and it also interferes with dietary iron absorption through the formation of insoluble anti nutritional-mineral complex that by passes the iron absorption pathway.

Table 5: Anti-nutrient Composition of the Aqueous Extracts of the Leaves

Parameters (mg/100g)	*P. crispum*	*B. pilosa*	*L. taraxacifolia*	*V. doniana*
Tannins	1.57 ± 0.04	0.61 ± 0.04	0.64 ± 0.10	1.52 ± 0.09
Oxalates	42.52 ± 1.06	92.50 ± 0.31	72.50 ± 0.32	122.53 ± 0.23
Phytate	18.72 ± 2.03	5.48 ± 0.21	22.14 ± 0.52	17.58 ± 0.32

P. *crispum*= Petroselinum *crispum* **B. *pilosa*=** Bidens *pilosa* **L. *taraxacifolia*=** Launacea *taraxacifolia* **V. *doniana*=** Vitex *doniana***.** Values are mean ± standard deviation of duplicate determinations.

The alkaloid values of the leaf extracts were all higher than 0.003 mg/100g and 0.120 mg/100g reported respectively for *Launacea taraxacifolia* and *Bidens pilosa* leaves but lower than 391.69 mg/100g total alkaloid reported for *Vitex doniana* leaves. In particular, the alkaloid content of *L. taraxacifolia* leaf extract in the present study was similar with 1.96 mg/100g mg reported for *Cnidoscolus aconitifolius* leaf by Orji *et al.* (2016). Alkaloids have a wide range of pharmacological activities including antimalarial, diuretic, antiviral, antiulcer and anti-inflammatory activities (Ushie *et al*., 2022).

The values for flavonoid in the leaf extracts were lower than 4974 mg/100g and 3439 mg/100g reported respectively for fresh leaves of *B. pilosa* and *L. taraxacifolia* as well as 14.22 mg reported for *F. Capensis* leaf by Ezeigwe *et al*. (2020). As a dietary component, flavonoids are thought to have health-promoting properties due to their high antioxidant capacity.

The study of phytochemical composition of Vitex *doniana* by Ifeanacho *et al* (2019) shows the abundance of numerous phytochemicals, thereby providing the scientific evidence behind the usage of V. *doniana* for various therapeutic purposes. The saponin contents of the leaf extracts were higher than 6.30 mg reported for fresh leaves of *Cnidoscolus aconitifolius* by Orji *et al*. (2016) as well as 0.67 mg/100g and 1.63 mg/100g reported respectively for *Launacea taraxacifolia* and *Conyza sumatrensis* leaves by Ruiz-Reyes (2022). Saponin has been reported to possess antibacterial, antiprotozoal and hypo-cholesterolaemic effects.

The steroid contents of the leaf extract are higher than 0.006 mg/100g and 0.120 mg/100g reported for *Launacea taraxacifolia* and *Bidens pilosa* leaves while the steroid content of *B. pilosa* leaf extract is particularly similar with 0.69 mg/100g reported for *Conyza sumatrensis* leaf as reported by Ruiz-Reyes *et al*, (2022). As a phytochemical, plant steroids might help reduce cholesterol levels by limiting the amount of cholesterol that is able to enter the body as well as reduce inflammatory activities in the body.

Table 6: Phytochemical Composition of the Aqueous Extracts of the Leaves

Parameters	*P. crispum*	*B. pilosa*	*L. taraxacifolia*	*V. doniana*
Alkaloids	14.96 ± 0.54	7.88 ± 0.74	1.74 ± 0.70	3.18 ± 0.02
Saponins	35.62 ± 0.51	29.08 ± 0.31	18.74 ± 0.28	31.5 ± 1.37
Flavonoids	5.73 ± 0.32	1.72 ± 0.21	0.48 ± 0.01	0.73 ± 0.01
Steroids	1.84 ± 0.41	0.68 ± 0.01	2.72 ± 0.03	0.94 ± 0.03

P. *crispum*= Petroselinum *crispum* **B. *pilosa*=** Bidens *pilosa* **L. *taraxacifolia*=** Launacea *taraxacifolia* **V. *doniana*=** Vitex *doniana*. Values are mean ± standard deviation of duplicate determinations.

Conclusion and Recommendations

All the vegetables are rich in micronutrients especially *P. crispum* which is high in the nutrients and phytochemicals but low in antinutrient. On the other hand, *V. doniana* is generally low in nutrients but high in antinutrients, and also high in carbohydrates (which is mainly in the form of fibre in vegetables) which is very essential to the body. Based on the result, the following recommendations are made:

1. Awareness on the nutritional benefits of these lesser-known vegetables should be carried to enable better acceptance and use
2. The therapeutic function of the extracts of the selected vegetables to manage diabetes mellitus and hypercholesterolemia induced rats should be investigated.

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