NUTRITIONAL ASSESSMENT OF *Urena lobata* LEAVES

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Abstract: The aim of this study is to evaluate the nutritional qualities of *Urena lobata* leaves consumed in Katsina State, Nigeria. The sample was analyzed using the methods recommended by the Association of Analytical Chemists. The proximate compositions of the sample analyzed were ash content (9.12 ± 0.40), moisture content (7.39 ± 0.06), carbohydrate (47.64 ± 0.57), crude fibre (6.33 ± 0.03), crude protein (19.28 ± 0.41) and fat (10.33 ± 0.09) %. The leaf has a calorific value (360.65 Kj/100g). The sample was found to have reasonable amount of mineral content particularly potassium (1650.01 ± 1.53), calcium (34.19 ± 0.46), phosphorus (905 ± 1.97) and magnesium (66.11 ± 0.19) mg/100g. The anti-nutrients such as oxalates, alkaloids, tannins, flavonoids, saponins and cyanogenic glycosides were analyzed, though the values obtained from this constituent are within the WHO limit and they are safe for human consumption. Amino acids like histidine, leucine, aspartic acid, serine, valine, alanine, and tryptophan were all accounted for. Essential amino acid Aspartic acid with a concentration of 8.25 g/100g protein was found to be the highest while non-essential amino acid tryptophan with a concentration of 1.01 g/100g protein was found to be the least.

Keywords: *Urena lobata*, mineral, amino acids, proximate, anti-nutritional

Introduction

Food is any substance which after consumption by animals is capable of being digested, absorbed and utilized by body, and could be described as nutrients. Foods are materials that enable growth, maintenance and reproduction in animals. Food contains chemicals in different combination which are essential to life, as water and oxygen which are also important constituents of food (Vigil, 1992).

Food has a wide array of functions generally in every single organisms. Food is also responsible for the production of materials from which all the components of the living cell are generally assembled. Living organisms are different in the various substances that they ingest as food, in the manner in which they produce and absorb food substances from the su rrounding environment, and in the functionality of these important substances in their cells (Konkon, 2008).

The leaf of *Urena lobata* are commonly consumed among local people in Katsina and locally prepared in a way similar to green beans which has a pleasant sour taste. The flowers can be consumed when cooked and have a mushroom-like taste. The leaf is also given to lactating woman who have problem of producing milk as it induces milk production (Konkon, 2008). The present study was, therefore, initiated to determine the proximate composition, minerals, anti-nutritional and amino acids content of the leaf *Urena lobata*.

Material and Methods

Collection of samples

The leaves of Caesar weed was obtained from the market in Katsina State, Nigeria. Sample was air dried for one week under room temperature. The dried seed sample was pounded into fine powder using pestle and mortar. The ground sample was sieved to obtain a fine powder and stored in an air tight container for further analysis.

Determination of proximate composition

The modified method of the Association of Official Analytical Chemist (AOAC, 2006) was used for determination of moisture, crude fibre, protein, ash and fat content of the samples. All determinations were carried-out in triplicate. Total soluble carbohydrate was estimated by the difference of the sum of all the proximate composition from 100% (Mathew *et al*., 2014).

Mineral analyses

The method described by Association of Official Analytical Chemists (2006) was used for mineral analysis.

Amino acid analysis

The amino acid profile was determined using the method described by Sparkman *et al*. (1958). Each sample was dried to a constant weight, defatted, hydrolyzed, evaporated and loaded into the techno sequential multi-sample amino acid analyzer (TSM) which is designed to separate and analyze free acidic, neutral and basic amino acids of the hydrolysate. The tryptophan contents of the samples were determined after hydrolyzing with 4.2 mol/dm^{3}NaOH solution (Valoran and Jeffrey, 2002).

Phytochemical properties of the samples

The anti-nutritional content of the samples: phytate, cyanides, oxalate and alkaloids was determined by the methods described by Edeoga *et al.* (2005). Saponins, glycoside and tannins was be determined using the modification methods described by Harborne (1998).

Results and Discussion

The result of the proximate composition of *Urena lobata* L. leaves is shown in Table 1. The amount of carbohydrates was 47.64 ± 0.08%. This is slightly higher than the findings of Abolaji *et al.* (2007) reported for (44.09%) *Bligia sapida* leaves. The plants crude protein value was 19.28 ± 0.41; which is higher when compared with 17.50% reported for *Gnetum africana* leaves by Ekop (2007). The plant contained 10.33 ± 0.09% of crude fat which was comparable to *Baseila alba* leaves (8.71%) reported by Akindahunsi and Salawu (2005). Fat increases food palatability via the process of absorption and retention of flavours (Antia *et al.*, 2006). The ash content obtained was 9.12 ± 0.40% which is lower than 20.05% for leaves of *T. triangulare* as reported by Ladan (1996). The crude fibre content of *Urena lobata* L. leaves is 6.33 ± 0.03%. Similar value was reported for *I. batatas* (7.20%) thus compares favourably as reported by Akindahunsi and Salawu (2005). The major drawbacks to the use of vegetables in human nutrition is their high fibre content which invariability causes intestinal irritation and lower nutrient bioavailability, hence large quantities of plant vegetables have to be consumed to provide adequate levels of

nutrients (Vadivel and Janardhanan, 2000). On the other hand, intake of dietary fibre can lower the serum cholesterol level, risk of coronary heart disease, hypertension, constipation, diabetes and breast cancer (Ramula and Rao, 2003). The moisture obtained is 7.39 ± 0.06%, though it was relatively lower compared to the value of 81.4 -90.3% reported byIfon and Bassir (1980) in some Nigerian green leaf vegetables.

Table 1: Proximate analysis and calorific value of *Urena lobata* leaf

Parameters	Value
Ash	9.12 ± 0.40
Carbohydrate	47.64 ± 0.57
Crude fibre	6.33 ± 0.03
Crude protein	19.28 ± 0.41
Fat	10.33 ± 0.09
Moisture content	7.39 ± 0.06
Calorific Value	360.65

Table 2: Mineral Analysis of *Urena lobata* L. leaves

Parameters (mg/100g)	Value
Calcium	34.19 ± 0.46
Magnesium	66.11 ± 0.19
Potassium	1650.01 ± 1.53
Sodium	849.25 ± 0.42
Manganese	23.19± 3.00
Phosphorus	905 ± 1.97
Copper	14.04 ± 0.10
Zinc	52.41 ± 0.50

Table 2 shows the results of concentration of minerals. The sodium concentration of this sample was 849.25 ± 0.42 mg/100g which is higher compared to 122.49 mg/100g for *Momordica balsamina* L. reported by Hassan and Umar (2006). The high value in this sample is an indication that *Urena lobata* can serves as dietary supplement for sodium.The potassium content was 1650.01 ± 1.53 mg/100g which is higher when compared with 1320.00 mg/100g reported by Hassan and Umar (2006) for *Momordica balsamina* L. Adequate intake of this mineral from the diets could lower blood pressure by antagonizing the biological effects of sodium (Einhorn and Landsberg, 1988). The zinc concentration was 52.41 ± 0.50 mg/100g. This result is similar to most values reported for green leaf vegetables (Ibrahim *et al.*, 2001).The phosphorus content of was 905 ± 1.97 mg/100g, and is higher than 166 - 640 mg/100g found in some green leafy vegetables consumed in Sokoto (Ladan *et al.*, 1996). The content of magnesium obtained from this work was 66.11 ± 0.19 mg/100g. The value was lower compared to 220 mg/100g obtained for *M. balsamina* L. as reported by Hassan and Umar (2006). Magnesium is an important mineral element in connection with circulatory diseases such as ischemic heart disease and calcium metabolism in bone (Ishida *et al.*, 2000). The concentration of calcium was 34.19 ± 0.46 mg/100g. This value was lower when compared to 941 mg/100g reported by Hassan and Umar (2006) for *M. balsamina* L.Copper is an essential trace element in human body where it exists as an integral part of copper proteins ceruloplasmin, which is concerned with the release of iron from the cells into the plasma and is involved in energy metabolism (Adeyeye, 2002). The copper content obtained from this work was 14.04 ± 0.10 mg/100g. The value obtained from this work was higher than 2.32 mg/100g found in bitter leaf (*Vernonia amygdalina*) reported by Ibrahim *et al.* (2001). Manganese is a microelement essential for human nutrition; it acts as activator of many enzymes (McDonald *et al.*, 1995). The concentration of manganese was 23.19± 3.00 mg/100g which was lower when compared to 15-115 mg/100g reported in some leafy vegetables found in Cross Rivers State, Nigeria (Ifon and Bassir, 1979), but within the range of 0.98 - 38.0 mg/100g as reported by Sena *et al.* (1998).

Table 3 showed the values of amino acids concentration of the analyzed leaves of *Urena lobata* L.The observed nonessential amino acids (alanine, arginine, aspartic acid, glutamic acid, glycine, histidine, proline and serine) are higher in concentration (55.73%) compared to essential amino acids (isoleucine, leucine, lysine, methionine, cysteine, phenylalanine, tyrosine, threonine, valine) which constitute 44.27% of the total amino acids analyzed. Similar values were reported for nonessential amino acids in concentration of about 59% and essential amino acids which were about 41% by Hassan and Umar (2006) for *M. balsamina L.* The leaves are rich in both essential and non-essential amino acids with aspartic acid the highest value of 8.25 and tryptophan recorded as the least amino acid concentration present in the leaves.

Table 3: Amino acid content of *Urena lobata* L. leaf

Amino acid	Concentration g/100g proteins
Tryptophan	1.01
Lysine	4.59
Histidine	1.92
Arginine	5.52
Aspartic acid	8.25
Threonine	2.95
Serine	4.10
Glutamic acid	12.27
Proline	2.34
Glycine	3.80
Alanine	3.61
Cysteine	1.19
Valine	4.31
Methionine	1.20
Isoleucine	3.62
Leucine	7.48
Tyrosine	2.38
Phenylalanine	4.39

Table 4 Phytochemical composition of *Urena lobata* L.leaves

Parameters	mg/100g
Alkaloids	2.90 ± 1.02
Cyanogenic glycosides	12.28 ±0.62
Flavonoids	1.96 ± 0.17
Oxalates	3.90 ± 0.25
Saponins	2.72 ± 0.43
Tannins	1.80 ± 0.70

Table 4 showed the result of anti-nutritional composition of *Urena lobata* L. leaves. The alkaloidscontent was 2.90 ± 1.02 mg/100g and relatively lower compared to 3.54 mg/100g of *Amaranthus hybridus* L. leaves reported by Akubugwo *et al.* (2007). Alkaloids have been found to have anti-diarrheal and microbiocidial effects, this is due to their actions on the small intestine and anti-hypertensive effects (Trease and Evans, 1995). The concentration of flavonoids was 1.96 ± 0.17 mg/100g and is relatively higher compared to 0.83 mg/100g reported for *Amaranthus hybridus* L. leaves by Akubugwo *et al.* (2007). The oxalic acid content was 3.90 ± 0.25 mg/100g and is relatively lower than 5.36l±0.14 mg/100g for *V. amygdalina* reported by Richard *et al.* (2007). The cyanogenicglycoside obtained from this sample was 12.28 ±0.62 mg/100g. This value was low compared with 16.99 mg/100g for *A. hybridus* L. leaves reported by Akubugwo *et al.* (2007). The concentration of tannin was 1.80 ± 0.70

mg/100g and is relatively higher compared to 0.49 mg/100g reported for *A. hybridus* L. leaves by Akubugwo *et al*. (2007). The concentration of saponnin was 2.72 ± 0.43 mg/100g. This value was high compared to the value of *V. calvoana* Var. non bitter (1.905±0.191 mg/100g) by Richard *et al.* (2007)

Conclusion

The study shows that *Urena lobata* L. is rich in carbohydrate, protein, fats and oil and some essential elements such as potassium, calcium, phosphorus and sodium. The leaves are rich in essential amino acids such as histidine, lysine, valine, methionine and leucine and non-essential amino acids such as alanine, arginine, aspartic acid, glycine and proline. Aspartic acid is the most abundant amino acid present in this sample while tryptophan being the least available. However, anti-nutritional factors obtained indicated that, the sample may be free of some of these anti-nutritive substances. Therefore, the nutritional compostion of *Urena lobata* is high enough for its inclusion in the diets of Nigerians as staple food.

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