Proximate Analysis Phyto - Chemical Screening and Mineral Composition of Water Leaves (Talinum Triangulare) Harvested in Oyo State College of Agriculture and Technology Igboora

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Abstract

This study examined the proximate composition, phytochemical components and mineral elements of Talinum triangulare (Water leaf). Laboratory analyses were carried out using standard methods. The results of proximate analysis indicate that the plant contained some important nutrients such as protein 14.65±0.37%, moisture content 12.87±0.01%, Crude fibre (7.92±0.02%) and Ash (7.92±0.02%) content while the least component was fat content 1.98±0.01% respectively. The phytochemicals analyzed were Saponin 0.99±0.003 mg/100g, flavonoids 0.98± 0.01mg/100g, Alkaloids 7.93±0.01mg/100g, Tannin 0.11±0.00mg/100g, Phenol 11.42±0.003mg/100g and Phytate revealed 9.76±0.003mg/100g respectively. Mineral elements analyzed were Copper 9.00±0.03%, Zinc 115.00±0.33%, Iron 610.00±0.33% while Lead was detected below limit. The findings indicate that Talinum triangulare is a potential source of highly nutritious feed stuff and phytomedicine

Keywords:

Proximate, biochemical properties, mineral contents, Water leaf.

I. INTRODUCTION

Many vegetables all over the world serve several purposes such as green leafy vegetables, condiments, herbs, spices and flavourings. Most of them are nutritious diets to mankind, animals and aquatic creatures. Water leaf is botanically known as *Talinum triangulare*, is an edible leafy vegetable that belongs to the family Portulaceae [1]. It is herbaceous perennial plant that normally has its stem evident above ground. As the name connotes, this green leafy vegetable is reffered to as water leaf due to its high moisture contents of approximately 90.8g/gm of the leaf [2]. Nutritionally, water leaf is very rich in vitamins C, E, Omega-3 fatty acids, calcium, magnesium, soluble fibres (Pectin), potassium, B-carotene, proteins and dietary fibres [3]. Water leaf is highly reached in crude proteins, crude fibres. All minerals present contribute to high anti-oxidant values of water leaf [4]. Medicinal properties of water leaf have been ascertained by many researchers as being contained chemical substances like (fl flavonoids, alkaloids and tannins) that help in the managements of cardiovascular diseases, such as Stroke, Obesity [5,6 and 7]. It also helps in treating liver disease, suitable for hepatic ailment, enhances cerebral functioning [8, 9 and 10]. As a result of its resounding health benefits, this study examined phytochemical, proximate and nutrient analysis of the water leaf harvested in Oyo State College of Agriculture and Technology, Igboora

II. MATERIALS AND METHOD

A. Sample Collection and Preparation:

The fresh leaves of water leaf (*Talinum triangulare*) was collected from the botanical garden of Oyo State College of Agriculture and Technology in Igboora and was identified by botanist in the Department of Botany, University of Ibadan, Ibadan, Nigeria. The leaves were destalked, washed and sundried. The water leaf was ground to a powdery form with a blender and sieved into fine powder.

B. Determination of Proximate Analysis:

Moisture content was measured using air-oven according to official methods of Association of Official Analytical Chemists [11]. Sample was dried with oven for 4 hours at 105°C. It was allowed to cool and weighed.

$$\% \text{ moisture} = 1 - \frac{\text{weight of dry sample}}{\text{Weight of wet sample}} \times 100$$

C. Crude Fibre Determination:

1g of sample (W1) was added with 50ml of 0.128 MH_2SO_4, 2-4 drops of octanol was added to prevent foaming and was heated to boiling for 30 minutes, then remove KOH in the water leaf. The sample was poured into a pre-weighed crucible for 2hrs at 130°C and weighed again (W2). The sample was ashed in the crucible inside the furnace at 500°C for 3 hours and re-weighed as (W3).

$$\% \text{ crude fibre} = \frac{W2-W3}{W1} \times 100$$

D. Fat Determination:

An empty flask was weighed as (W1), 0.5g of the sample was weighed as (W2). 112.5ml of pet ether was added, shake for 5 minutes, put in hot water for 10-15 seconds, allowed it to cool, filtered and re-weighed as (W3).

$$\% \text{ fat} = \frac{W2-W1}{W3} \times 100$$

E. Ash Determination:

An empty crucible was weighed (W1), 1g of sample was weighed into pre-weighed crucible as (W1). The furnace and pre-ash was put in for 30 minutes at 550°C, it was allowed to cool and taken out of the furnace and re-weighed as (W3).

$$\% \text{ Ash} = \frac{W3-W2}{W1} \times 100$$

All methods used above were according to [12].

F. Determination of Phytochemicals and Minerals

Phytochemical analysis of Saponin, Flavonoid, Alkaloid, Tannin, Phenol and Phytate were determined using the methods described by Sofowora [13], Harbone [14] and [11]. Mineral elements of the water leaf such as Iron, Copper, Zinc, and Lead were determined using Atomic Absorption Spectrophotometer (UVAAS) [15] and their absorption were compared with absorption of standard of these minerals.

G. Statistical Analysis

All determinations were carried out in triplicate. The data generated from the analysis were subjected to statistical analysis using descriptive statistics of Excel 2007 format to interprete the results obtained.

III. RESULTS

Table 1: proximate analysis of water leaf

Parameters	Composition (%)
Protein	14.65 ± 0.37
Crude fibre	7.92 ± 0.02
Ash content	7.92 ± 0.01
Fat content	1.98 ± 0.01
Moisture content	12.87 ± 0.01

Values are expressed as mean±SEM for triplicate experiment

Table 2: Phytochemical composition of water leaf

Parameters	Composition (mg/100g)
Saponin	0.99 ± 0.003
Flavonoids	0.98 ± 0.01
Alknoids	7.93 ± 0.01
Tannin	0.11 ± 0.00
Phenol	11.42 ± 0.003
Phytate	9.76 ± 0.003

Values are expressed as mean ± SEM for triplicate experiments

Table 3: Mineral composition of water leaf

Parameters	Composition
Copper (Cu)	9.00 ± 0.03
Zinc (Zn)	115.00 ± 0.33
Iron (Fe)	610.00 ± 0.33
Lead (Pb)	BDL

Values are expressed as mean ± SEM of triplicate experiment
BDL: below detectable Limit

The result of the proximate analysis of water leaf (*Talinum triangulare)* is summarized in table 1. The result revealed the presence of protein, Crude fibre , Ash content , Fat and Moisture content as well as phytochemical composition such as Saponin ,Flavonoids , Alkaloids , Tannin, Phenol and Phytate . The results also revealed mineral compositions like Copper, Zinc, Iron, and Lead. The results of proximate composition indicates that protein has high

values (14.65 ± 0.37) %, followed by moisture content (12.87 ± 0.01) % , Ash (7.92 ± 0.02%) and crude fibre (7.92 ± 0.01 %) respectively. Mean fat content of the triplicate experiment was 1.98 ± 0.01% as shown in table 1.

The Phytochemical analysis of water leaf showed high mean value of phenol (11.42 ± 0.00mg/100g), tannin has the least composition of (0.11± 0.00 mg/100g) saponin (0.99± 0.003 mg/100g) , flavonoids (0.98± 0.01mg/100g), alkaloids (7.93 ± 0.01mg/100g) and phytate (9.76 ± 0.003mg/100g) respectively as shown in table 2. The minerals present in *T. triangulare* are presented in table 3. Copper revealed (9.00 ± 0.03mg/100g), Zinc (115.00 ± 0.33mg/100g) , Iron (610.00 ± 0.33mg/100g), while Lead was detected below the limit.

IV. DISCUSSION

The protein content of water leaf (14.65 ± 0.37%) Showed very low value compared to some leafy vegetables as reported by Ndukwe and Ikpeama [16] for Pterocarpus soyansii (19.4%) and Pterocarpus santalinoides leaves (16.32%). This result also deviated from the report of Margaret et al., [17] who reported higher values of protein content in some leafy vegetables like Ficus glumosa (51.67 ± 0.32 %), Vitex doniana (55.60 ± 0.13%), Basella alba (49.93±0.71%) e. t. c. This finding showed higher values of protein composition in water leaf (14.65 ± 0.37%) as compared to the report of some vegetables by Omale and Ugwu [18] for Telfaria occidentalis (0.15±0.01%), Amaranthus hybridus (1.07±0.06%), Vernonia amygdalina (0.04± 0.03 %) and Sesamum indicum (2.27 ± 0.01%) respectively

The water leaf revealed moisture content of (12.87 ± 0.01 %) as compared with the report of Ekumankama [19] who observed high moisture values for leafy vegetables of Oha (83.75%) and Nturukpa (80.75%) respectively, but low values for Oha (11.35%) and Nturukpa (10.74%) as reported by Ndukwe and Ikpeama [16]. The present study also reported high values of moisture content compared to low values reported for Ammaranthus hybridus leaves (6.1%) and Moringa oleifera leaves (4.2%) by (Adepoju et al., [20]. High value of moisture content was reported for raw T. triangulare (89.82±0.11%) by Eleazu and Eleazu [21]. This may be attributed to environmental factors at the planting sites. The present study is similar to the report of Adeyeye and Ayejuyo [22] who opined that low moisture content of the leave would resist the growth of microbes and shelf or storage life will be elongated.

Crude fibre (7.92%) and Ash content (7.92%) of the water leaf revealed lower values as compared to the ash content reported for P. Soyansii (9.46%) but higher than that of P. santalinoides (7.83%) as reported by Ndukwe and Ikpeama [16]. The present result reported high value of ash content as compared to Telfaria occidentalis (7.36±0.08%), Amaranthus hybridus (6.00±0.03%) and Sesamum indicum (7.34±0.05%) while high values (12.53±0.17%) were reported for Talinum triangulare and (8.00±0.01%) for Vernonia amygdalina by Omale and Ugwu [18]. Low value of ash content was reported for Talinum triangulare (7.34±0.05%) by Eleazu and Eleazu [21] which could be attributed to climatic factors in different localities. The present study revealed as low as (1.98%) fat content for T. triangulare leaves which is very low compared to the values reported by Akindahunsi and Salawu [23] for T. triangulare leaves (5.90%) and Amaranthus hybridus (4.80%). According to Oloyede [24]), the presence of biological components shows high levels of its possible medicinal and dietary values. Saponin, flavonoids and alkaloids reported for this study were high compared to the values by Eleazu and Eleazu [21] for Saponin (0.77±0.02%), flavonoid (0.33±0.01%), alkaloids (0.41±0.01%) while low tannin (0.11±0.00%) value was observed in T. triangulare compared to the report by Eleazu and Eleazu [21] where tannin was (0.65±0.00%). The phenol and phytate values of T. triangulare were (11.42±0.003%) and (9.76±0.003%) respectively and comparatively higher compared to (0.08±0.01%) and (0.15±0.01%) as reported for P. soyansii and P. santallinoides leaves by Ndukwe and Ikpeama [16]. Mineralization of water leaves revealed that copper in T. triangulare (9.00±0.03%) was comparatively higher than (0.01mg/100g) in Diospyros mespiliformes as reported by Hassan et al., [25], 1.28mg/100g in T. terrestris leaves [26] and 1.37±0.01mg/100g in Launaea taraxacifolia leaves by Adinortey et al., [27]. The finding of this study on Zinc in T. triangulare (115.00±0.33) mg/100g disagreed in value to 6.85mg/100g observed in Cassia siamea leaves by Hassan and Ngaski [28]. Also, more than range reported for Mucuna flagellipes leaves (2.24-8.52mg/100g) by Ihedioha and Okoye [29]. This Zinc result also disagree with Zinc values reported by Omale and Ugwu [18] for Telfaria occidentalis (3.40±0.06) mg/100g, Amaranthus hybridus (5.45±0.14) mg/100g and Sesamum indicum leaves (13.22±1.00) mg/100g. The Iron content of water leaves had considerable higher value (610.00±0.33) mg/100g compared to (40.05 mg/100g) for Launaea taraxacifolia leaves by Adinortey et al., [27] for spinach (1.6mg/100g), Lettuce (0.7mg/100g) and cabbage (0.3mg/100g) by Turan et al., [30]. Lead in T. triangulare was found to be below detectable limit which deviated from the values reported by Omale and Ugwu [18] for

Vernonia amygdalina (22.2±1.13mg/100g), Sesamum indicum (2.33±1.55mg/100g), Telfaria occidentalis (4.00±0.01mg/100g), Amaranthus hybridus (3.54±0.34mg/100g) and Talinum triangulare (5.85±0.04mg/100g) respectively.

V. CONCLUSION

This study revealed that *T. triangulare* biochemical contents varies compared to several authors reports and could be traced to environmental factors and processing methods. It also revealed that *T. triangulare* studied is a good source of minerals and phytochemical components; hence the water leaves have high nutritional values as revealed by the proximate analysis carried out. The low values of tannin present in *T. triangulare* revealed its inability to cause lethal poisoning. Therefore, *T. triangulare* studied is a good source of leafy vegetables that provide adequate biochemical constituents needed for human growth

REFERENCES

[1] R. R. Schippers, (2000). African Indigenous Vegetables. An Overview of the cultivated species. Natural Resources Institute/ ACP. EU Technical Centre for Agricultural and Rural Cooperation, Chatham, United Kingdom. P. 214.

[2] O. Blessing, (2016). Fifteen worthy benefits of water leaf (Talinum triangulare).pp 1-12.

[3] M. O. Ezekwe, S. A. Besong, and P. E. Igbokwe, (2001). Beneficial influence of purslane and water leaf supplement to Humans. FASEB Journal; 16: A639.

[4] Enete, and U. E. Okon, (2010). Economics of water leaf (Talinum triangulare) production in Akwa Ibom State, Nigeria. Field Actions Science Reports (online), 4:1-5.

[5] H. M. Burkill, (1985). The Useful Plants of West Tropical Africa 4: 1-4

[6] J. S. Siemonsma, and P. Kasem, (1993). Plant Resources of South-East Asia Vegetables. Pidoc Scientific Publishers, Wageningen, Netherlands. 8: 268-269.

[7] P. M. Aja, A. N. C. Okaka, P. N. Onu, U. Ibinin, and A. J. Urako, (2010). Phytochemical composition of Talinum triangulare (Water leaf) leaves. Pakistan Journal of Nutrition 9(6): 527-530.

[8] D. A. Ofusori, A. E. Adelakun, A. O. Ayoka, O. P. Oluwayinka, E. O. Omotoso, S. A. Odukoya, and D. O. Adeyemi (2008). Water leaf (Talinum triangulare) Enchance Cerebral functions in Swiss albino mice. Journal of Neurological sciences (Turkish) 25: (4)17:239-246.

[9] D. Liang, Q. Zhou, W. Gong Y. Wang, Z. Nie, H. He J. Li, J. Wu, C. Wu, and J. Zhang, (2011). Studies on the anti oxidant and hepatoprotective activities of polysaccharides from Talinum triangulare. Journal of Ethno-pharmacol. 136(2):316-321.

[10] C. L. Ezekwe, R. U. Chidinma, and P. C. U. Okechukwu , (2013). The effect of methanol extract of Talinium triangulare (water leaf) on the Haematology and some liver parameters of some Experimental Rats, Global Journal of and Biotechnology and Biochemistry, 8 (2):pp. 51-60.

[11] AOAC, (1995). Official methods of Analysis (16th edn) Association of official Analytical Chemists. Arlington, V.A.USA.

[12] D. Pearson, (1976). The chemical Analysis of Foods.7th Edn., Churchill living stone, London, p. 7-11.

[13] E. A. Sofowora, (1982). Medicinal plants and Traditional Medicine in Africa. 1st Edition. John Wiley and Sons, Chichester, New York, ISBN-10:0471103675. 256pp.

[14] J. B. Harbone, (1973). Textbook of phytochemical methods. 1st Edn. Chapman and Hall Ltd. London pp: 110-113.

[15] A.L.Essien, R. U. B. Ebama, H. B. Udo, (1992). Chemical evaluation of pod and pulp of the fluted pumpkn (Telfaria occidentalis) fruits. Food Chem. 45:175-178.

[16] O. K. Ndukwe, and A. Ikpeama, (2013). Comparrative evaluation of the phytochemical and proximate constituents of OHA (Pterocarpus Soyansii) and Nturukpa (Pterocarpus santalinoides) leaves. International Journal of Academic Research in Progressive Education and Development. Vol. 2(3): 22-31.

[17] Margaret, M. John, E. Nyakno, P. Henry, (2016). Proximate and phytochemical composition of some lesser known leafy vegetables consumed in Northern Senatorial District of Cross River State, Nigeria. World Journal of Nutrition and Health, 4 (1):16-21.

[18] J. Omale, and C. E. Ugwu, (2011). Comparative studies on the protein and mineral composition of some selected Nigerian Vegetables. African Journal of food Science Vol.5 (1): 22-25.

[19] O. Ekumankama, (2008). Nutrient Composition of indigenous vegetables (Pterocarpus Soyanxii, Pterocarpus Santallinoides and Gnetum africanum). Nig. J. Nutr. Sci. 29:19-200.

[20] A. S. Adepoju, A. I. Gbadamosi, and C. O. Adewunmi, (2006). Formations of antimicrobial dried powdered herbs in soap bases. In phytomedicines in malaria and sexually transmitted diseases; challenges for the new Millenium.

[21] C. O. Eleazu, and K. C. Eleazu, (2013). Bioative constituents and in vitro Antioxidant Capacity of water leaf (Talinum triangulare) as affected by domestic cooking. European Journal of Medicinal plants. 3 (4): 540-551.

[22] E. I. Adeyeye, and O. O. Ayejuyo, (1994). Chemical composition of Cola acuminata and Grarcina kola seed grown in Nigeria. International Journal of food Science and Nutrition, 45:223-230.

[23] Akindahunsi, and S. O. Salawu, (2005). Phytochemical screening of nutrient and antinutrient composition of selected tropical green leafy vegetable. Afr. J. Biotech, 4:497-507.

[24] O. I. Oloyed, (2005). Chemical profile of unripe pulp of Carica papaya. Pak. J. Nutr. 4: 379-381.

[25] G. Hassan, F. W. Abdulrahaman, and A. A. Zuru (2004). Nutritional and Phytochemical investigation of Diospyros mespiliformis (L). Niger. J. Basic Applied Sci. 13:1-8.

[26] L. G. Hassan, K. G. Umar, and A. Usman, (2005). Nutrients content of the leaves of Tribulus terrestri (Tsida). J. Trop. Biosci. 5: 77-82.

[27] M. B. Adinortey, J. K. Sarfo, E. T. Quayson, A. Weremfo, C. A Adinortey, W. Ekioh, and J. Ocran, (2012). Phytochemical Screening, Proximate and Mineral Composition of Launaea taraxacifolia leaves. Research Journal of Medicinal plants, 6:171-179.

[28] L. G. Hassan, and M. M. A. Ngaski, (2007). Nutritional Evaluation of Cassia siamea leaves. J. Chem. Soc. Niger, 32: 137-143.

[29] N. Ihedioha, and C. O. B. Okoye, (2011). Nutritional Evaluation of Mucuna flagellipes leaves. An Underutilized legume in Eastern Nigeria. Am. J. Plant Nutr. Fertiliz. Techmol. 1:55-63.

[30] M. S. Turan, H. Z. Z. Kordali, A. Dursun, and Y. Sezen, (2003). Macro and Micro mineral content of some wild edible leaves consumed in Eastern Anatolia. Acta Agriculturae Scandinavica Sect. B. plant Soil Sci. 53:129-137.