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Chemical Profile of *Tridax procumbens* Linn

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Abstract: The proximate, mineral and phytochemical composition of *T. procumbens* was investigated. The proximate profile included moisture (90.05±0.00%), crude protein (3.44±0.00% WW and 34.57±0.00% DW), crude fat (0.60±0.02% WW and 6.03±0.20%), total carbohydrate (5.10±0.02% WW and 51.26±0.20% DW), crude fibre (0.61±0.04% WW and 6.13±0.40% DW), total metabolizable energy value (39.56±0.26kcal/100 g WW and 397.59±2.61kcal/100 g DW) and a total ash content of 0.20±0.02% WW and 2.01±0.20% DW, which is rich in sodium (5.02 mg/100 g WW and 50.44 mg/100 g DW), potassium (3.18 mg/100 g WW and 31.92 mg/100 g DW) and calcium (2.09 mg/100 g WW and 20.96 mg/100 g DW). The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones), saponins and tannins. It is richly endowed with carotenoids (9.41 mg/100 g WW and 94.57 mg/100 g DW) and saponins (10.30mg/100g WW and 103.52mg/100g DW). This result suggests the likelihood of this plant serving as a potential source of protein supplements and pro vitamin A (carotenoids) to the population. It also indicates that dehydration can improve the nutritional quality of *Tridax procumbens*.

Key words: Chemical profile, proximate composition, *Tridax procumbens*

INTRODUCTION

Tridax procumbens Linn (Composite) is a common grass found in the tropics. Traditionally, it is used for the treatment of bronchial catarrh, dysentery, malaria, stomachache, diarrhoea, high blood pressure and to check haemorrhage from cuts, bruises and wounds and to prevent falling of hair. It possesses antiseptic, insecticidal, parasiticidal and hepatoprotective properties and has marked depressant action on respiration (Salahdeen *et al*., 2004; Edeoga *et al*., 2005; Ravikumar *et al*., 2005; Saxena and Albert, 2005). In the present study, we investigated the proximate, mineral and phytochemical composition of *T. procumbens*.

MATERIALS AND METHODS

Samples of fresh *Tridax procumbens* plants were collected from within the Abuja Campus of University of Port Harcourt, Port Harcourt, Nigeria. They were identified at the University of Port Harcourt Herbarium, Port Harcourt, Nigeria. After ridding them of dirt, the leaves and stems were separated and stored for subsequent use. Proximate analysis of the leaf and stem samples for moisture, crude protein, fat, ash, fiber and total carbohydrate contents were carried out in triplicates according to standard methods (AOAC, 2006). The energy value was calculated using the Atwater factors of 4, 9 and 4 for protein, fat and carbohydrate respectively (FAO/WHO/UNU, 1991; Chaney, 2006a). The phytochemical screening of a portion of the leaf samples was carried out as described by Sofowora (1980) and Harbone (1973). They were screened for alkaloids, carotenoids, flavonoids (catechins and flavones), saponins and tannins. Quantitative determination of carotenoids, saponins and tannins were carried out in triplicates, using the method of AOAC (2006).

A portion of the leaf samples was dried and milled into fine powder, using a stainless steel miller. 1 g of the resultant powder was weighed into pyrex culture tubes after which 1 ml of redistilled concentrated nitric acid was added. The tubes were sealed with cling film and left overnight at room temperature in a fume hood. They were transferred to a hot block at 120°C and heated to dryness. Another 1 ml of concentrated HNO_3 was added and the tubes were heated to dryness at 150°C. This was repeated twice, until the heated samples no longer gave off red brown (ferrous oxide) fumes and the sample was light brown to yellow in color. 1 ml of $HNO_3/HClO_4$ (50/50)solution was then added and the block temperature was increased to 180°C, to allow the samples digest for about 2 hours. As soon as the digests became clear to light yellow in color, the temperature was increased to 240°C and the samples were heated to dryness. The tubes were then removed from the block and allowed to cool. The resultant ash was dissolved in 0.25 ml of concentrated HCl. 20 ml of 5% HNO_3 was added to the resulting solution, and allowed to stand. Inductively Coupled Plasma Optical Emission Spectrometer (ICPOES), Model TL 6000 Jarrell-Ash, was calibrated with standard reference solution of known concentrations to prepare a standard curve, after which the clear digests were drawn into the machine, to determine their mineral contents.

Table 1: Proximate composition of *Tridax procumbens* leaves and stems

	Stem		Leaf	
Parameter	WW	DW	WW	DW
Moisture (%)	88.30±0.02	_	90.05±0.00	-
Total ash (%)	0.50±0.01	4.27±0.09	0.20±0.02	2.01±0.20
Crude protein (%)	4.38±0.03	37.44±0.26	3.44±0.00	34.57±0.00
Crude lipid (%)	0.10±0.01	0.85±0.09	0.60±0.02	6.03±0.20
Total carbohydrate (%)	4.80±0.01	41.03±0.09	5.10±0.02	51.26±0.20
Crude fiber (%)	1.92±0.03	16.41±0.26	0.61±0.04	6.13±0.40
Total metabolizable energy (kcal/100g)	37.62±0.61	321.54±5.21	39.56±0.26	397.59±2.61

Values are means ± SD of triplicate determinations

RESULTS AND DISCUSSION

The proximate composition of the leaves and stems of *Tridax procumbens* is given in Table 1. Its moisture content is greater than those of *Amarantus hybridus* and *Telferia occidentalis*, but comparable to those of *Talinum triangulare* (Oguntona, 1998) and *Pennisetum purpureum* (Okaraonye and Ikewuchi, 2009). The moisture content of food is an index of water activity (Olutiola *et al*., 1991) and is used as a measure of stability and susceptibility to microbial contamination (Uraih and Izuagbe, 1990). The implication of this high moisture content is that:

- *T. procumbens* may have a short shelf-life due to its high moisture content.
- Dehydration would increase the relative concentrations of the other food nutrients and improve the shelf-life/preservation of the *T. procumbens* meal.

The ash content of *T. procumbens* is less than those of *A. hybridus*, *T. occidentalis*, *T. triangulare* (Oguntona, 1998) and *P. purpureum* (Okaraonye and Ikewuchi, 2009). The crude protein content in *T. procumbens* is less than those reported for *A. hybridus* and *T. occidentalis*, but greater than those of *T. triangulare* (Oguntona, 1998) and *P. purpureum* (Okaraonye and Ikewuchi, 2009). Our result (Table 1) also shows that the relative proportion of protein can even be increased further by dehydrating the *T. procumbens* sample. Thus when dehydrated, *T. procumbens* can serve as a good source of protein, with a 100 g dry sample being able to meet the daily protein requirement of 23-56 g (FAO/WHO/UNU, 1991; Chaney, 2006a). The total carbohydrate content is greater than those reported for *T. triangulare* and *P. purpureum*, but less than *A. hybridus*, (Oguntona, 1998; Okaraonye and Ikewuchi, 2009). Its crude fat content is less than those of *A.hybridus*, *T. occidentalis*, *T. triangulare* (Oguntona, 1998).

The mineral composition of *T. procumbens* leaves is shown in Table 2. The calcium content is less than that reported for *Boerhavia diffusa* and *Commelina nudiflora* (Ujowundu *et al*., 2008). It contains less sodium than that reported for *B. diffusa* and *C. nudiflora* (Ujowundu *et al*., 2008). Its potassium content is more than those of *B. diffusa* and *C. nudiflora* (Ujowundu *et al*., 2008). The level of magnesium recorded here is less than those of *B. diffusa* and *C. nudiflora* (Ujowundu *et al*., 2008).

Table 2: Mineral Element Composition of *Tridax procumbens* Leaves

	Composition (mg/kg)	
Mineral	/Dry weight	/Wet weight
Calcium	20.96	2.09
Magnesium	3.56	0.35
Potassium	31.92	3.18
Sodium	50.44	5.02
Selenium	0.20	0.02

Table 3: Qualitative Profile of Phytochemicals Found in *Tridax procumbens* Leaves

Phytochemical	Status
Alkaloids	+
Carotenoids	++
Flavonoids	
• Catechin	+
• Flavones	+
Saponins	+
Tannins	++

Key: + = moderately present; ++ = highly present

The phytochemical screening of the leaves of *T. procumbens* revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones), saponins and tannins (Table 3). The result of the quantification of some of the phytochemicals is shown in Table 4. The carotenoid content is higher than that of *Vernonia amygdalina* (Ejoh *et al*., 2007). Carotenoids provide many brilliant animal colors, as in the flamingo, starfish, lobster and sea urchin and are precursors of vitamin A (Chaney, 2006b). β-Carotene is used as a food colorant. *T. procumbens* has very high saponin content. It is higher than that reported for *V. amygdalina* (Ejoh *et al*., 2007), but less than what we reported for *P. purpureum* (Okaraonye and Ikewuchi, 2009). Saponins are known to reduce the uptake of certain nutrients like glucose and cholesterol, and so may help in lessening the metabolic burden that would have been placed on the liver (Price *et al*., 1987). We found low tannin content in this plant. It is lower than those reported for *Trichosanthes anguina* fruits (Ojiako and Igwe, 2008)

Table 4: Quantitative Profile of Phytochemicals Found in *Tridax procumbens* Leaves

	Composition (mg/100 g)	
Phytochemical	/Wet weight	/Dry weight
Carotenoids	9.41	94.57
Saponins	10.30	103.52
Tannins	0.47	4.72

Values are Means of triplicate determinations

and *C. odorata* (Apori *et al*., 2000). Processing methods such as soaking, boiling and fermentation lower the tannin contents of foods (Esenwah and Ikenebomeh, 2008).

Conclusion: our results indicate that *T. procumbens* can serve as a good source of plant protein and potassium supplement, as well as being potential source of pro vitamin A (carotenoids) to the population.

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