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PHYTOCHEMICAL SCREENING AND NUTRIENT, ANTI-NUTRIENT COMPOSITION OF *TALINUM PORTULACIFOLIUM* (FORSK) ASCHERS SCHWEINF

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ABSTRACT

Talinum portulacifolium (Forsk.) Aschers. & Schweinf., is a green leafy vegetable that is consumed in some parts of Akwa Ibom State. The phytochemical screening showed a high concentration of alkaloids, saponins, cardiac glycosides and flavonoids. Tannins were present in trace amounts while anthraquinones were completely absent. The proximate composition analysis revealed a high moisture content of 93.90%, a protein content of 19.69% . Ash content was 2.70%, crude fiber content, 11.00%, crude fat content was 3.10% and carbohydrate content was 45.51%. The antinutrient composition analysis revealed the presence of hydrocyanide (10.80mg/100g), phytic acid (3.67mg/100g), oxalic acid (4.80mg/100g) and tannins (1.20mg/100g). These were below toxic levels except for hydrocyanide. Based on these findings, the plant is recommended for consumption and for further investigation as a potential raw material for the pharmaceutical industry.

Key words *Talinum portulacifolium*, Phytochemical screening, nutrient- antinutrient composition.

INTRODUCTION

Talinum portulacifolium (Forsk.) Aschers. & Schweinf. belongs to the family Portulacaceae. It is native to India and is commonly known as Indian spinach or fame flower. In Akwa Ibom State, it is called 'mmon-mmon ikong mbakara'.It is a fleshy, herbaceous plant which is mostly consumed as vegetable particularly n the dry season. It is often used as a substitute for the common waterleaf (*T. triangulare*). The plant has eddish- purple stems which are glabrous. The leaves are alternate, lanceolate, acuminate, entire and labrous.The plant has purple-pink flowers arranged in a racemose inflorescence.

Vegetables are very good sources of most vitamins such as vitamins A, B and C as well as some rganic acids like folic acid. Most minerals such as iron, calcium and phosphorous are obtained from vegetables. egetables are often cooked and eaten in the form of soup, salad and in vegetable stew (Phillips and Rix, 993). Leafy vegetables are also important sources of fibre intake (Osagie and Eka, 1998). Consumption of egetables can help prevent heart diseases, stroke, high blood pressure and accumulation of cholesterol. loreover, it lowers the chances of developing cardiovascular diseases (Apple *et al.*, 1997).

Fresh leafy green vegetables have crude protein content ranging from 1.5 to 1.7% and a mean of 2% (Aletor and Adeogun, 1995). Osagie and Eka, (1998) reported the proximate composition of *T. triangulare* 90.8% for moisture content, 2.4g/100g for protein content. Total fat content was 0.4g/100g, the total rbohydrate level was 4.4g/100g and the ash content was 2.0g/100g. Analysis of the mineral content of the nt by Ifon and Basir, (1979) showed a high potassium content of 6.10g/100g and a low iron content of 0.04g/

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100g. They also reported a high ascorbic acid content of 280mg/100g for *T.triangulare*. The anti- nutrient content of water leaf as reported by Aletor and Adeogun (1995), and Ladeji and Okoye (1993) indicates that the level of phytic acid is high (190mg/100g) but oxalic content was low (20mg/100g).

T.portulacifolium is increasingly being used particularly by rural dwellers in Akwa Ibom State, it was therefore necessary to investigate its nutrient and antinutrient composition as well as to do a phytochemical screening for bioactive compounds.

MATERIALS AND METHOD

Fresh leaves of *T. portulacifolium* (Forsk.) Aschers. & Schweinf., were collected around the Botany and Ecological studies laboratory, University of Uyo. The plants were identified by a taxonomist in the department and taken to the Pharmacognosy and Natural Medicine laboratory, University of Uyo. There, the leaves were cleaned, air- dried at room temperature and reduced to powdered form. The sample was then stored in an airtight container and kept in a cool, dry place. The methods of analysis were those of A.O.A.C (1990), Sofowora (1993) and Trease & Evans (1989), and the phytochemical constituents tested for were saponins, tannins, anthraquinones, flavonoids, cardiac glycosides, and alkaloids. These constituents were confirmed with thin- layer chromatography (TLC) using silica gel G60 and solvent system hexane : chloroform 3:7; chloroform :methanol 4:1. Spots were detected with UV (h max 366 & 245nm), 5% $FeCl_3$ spray reagent and Dragendorff's spray reagent. The nutrient composition tested for were protein, carbohydrates, crude fat, crude fibre, ash content and moisture content. The anti-nutrients tested for were hydrocyanide, phytic acid, oxalic acid and tannins.

RESULT

The results obtained in this work are as summarised in Tables 1, 2, 3 & 4.

TABLE 1: Result of phytochemical screening.

TEST	OBSERVATION	INFERENCE
Saponins (Frothing test	Persistent frothing for more than 30 minutes.	+++
Tannins (Ferric chloride test)	Blue- green precipitate occurred	+
Anthraquinones (Borntrager's test)	No colour change	-
Flavonoids (Shinoda's test)	orange colour observed with effervescence	+++
Cardiac glycosides		
1.Lieberman's test	Green colouration observed	+++
2.Salkowski test	Reddish-brown colour observed at interphase	+++
3.Keller-Kiliani test	Reddish-brown ring observed at interphase	++-
Alkaloids (Dragendorff's test)	Orange colouration observed	+ +-

Key: +++ =strongly present; + = trace ; - = absent.

TABLE 2 : Confirmatory test for alkaloids

REAGENTS	FRACTIONS	COLOUR	COMPOUND PRESENT	RF
	Chloroform 1	orange	alkaloid	
Dragendorff's	**Chloroform 2**	**orange**	**alkaloid**	**0.5, 0.6**
Reagent	**Aqueous**	**orange**	**alkaloid**	**0.45**
	Ethanol extract	**orange**	**alkaloid**	**0.3, 0.65**

The orange colouration was observed at the points where spots developed.

TABLE 3: Nutrient composition

Nutrient	Sample composition (%)
Protein	19.69
Carbohydrate	45.51
Crude fat	3.10
Ash content	2.70
Crude fibre	11.00

TABLE 4: Anti-nutrient composition

Anti-Nutrient	Sample composition (mg/100g)
Hydrocyanide	10.80
Phytic acid	3.67
Oxalic	4.80
Tannins	1.20

Moisture content was found to be 93.90% in *Talinum portulacifolium* (Forsk.) Aschers. & Schweinf. and the result of the phytochemical screening is as seen in Table 1. It shows that anthraquinones were completely absent, tannins occurred in trace amounts while saponins,cardiac glycosides, flavonoids and alkaloids were strongly present. A confirmatory test for alkaloids indicated that the plant is rich in alkaloids. In Table 3, the nutrient composition showed that the plant has a crude fat content of 3.10% and a carbohydrate content of 45.51%. In Table 4, the anti-nutrient analysis revealed a hydrogen cyanide content of 10.80mg/100g,oxalic acid content of 4.80mg/100g and tannin content of 1.20mg/100g.

DISCUSSION

Akindahunsi and Salawu (2005) worked on *T. triangulare* and reported the absence of alkaloids. *T. portulacifolium* on the contrary was found to be rich in alkaloids. Trease and Evans (1989) have stated that cardiac glycosides are useful in the treatment of diseases associated with the heart. *T. portulacifolium* was found to have a high content of cardiac glycosides. Bassey *et al.* (2004) also reported a high content of cardiac

glycosides in *Justicia insularis* another locally consumed vegetable which is also recommended locally as a remedy for heart diseases. That saponins were strongly present agrees with findings by Akindahunsi and Salawu (2005) in their work on *T. triangulare* . Although saponins are haemolytic on red blood cells, they are harmless when taken orally as has been reported by Price *et al.* (1987) that saponins have beneficial properties of lowering cholesterol level in the body. The complete absence of anthraquinones is similar to the result obtained by Akindahunsi and Salawu (2005) on *T. triangulare* .They did not however report the presence of flavonoids in their sample as was found in our sample.

Proximate nutrient analysis showed that *T. portulacifolium* has a higher (93.9%) moisture content than *T. triangulare* (90.8%) as reported by Osagie and Eka, (1998). This indicates that the plant is quite succulent, which it is. The value of crude protein in *T. portulacifolium* is lower (19.69%) than that of *T. triangulare* (31.00%) as also reported by Akindahunsi and Salawu (2005). Humphrey *et al.* (1993), observed that protein values that exceeded 20.0% were found in several wild vegetables such as *Amaranthus hybridus* and *Corchorus tridens*.

The carbohydrate value of 45.51% observed in *T. portulacifolium* compares favourably with that of *Justicia insularis* (45.14%) according to Bassey *et al*. (2004). The value is however lower than that of another locally consumed vegetable *Lasianthera africana* which ranges from 50.90% to 55.00% as reported by Isong and Idiong, (1997). According to them, crude fibre in the body contributes to weight, bulk and softness of faecal matter, allowing it to move through the gastrointestinal track with ease. As a result, it prevents constipation. They also stated that fibre reduces the occurrence of coronary heart diseases (CHD). In *T. portulacifolium*, crude fibre content was 11.00% and higher than the value reported for *T. triangulare*(6.20%) by Akindahunsi and Salawu (2005). They also found ash content in *T. triangulare* to be 20.00%. This was rather high when compared to the value of 2.70% obtained for *T.portulacifolium*. This value however compared favourably with *Amaranthus hybridus* (2.90%) according to Osagie and Eka, (1998). They also stated that dietary fats aid in the transportation of fat soluble vitamins and in the absorption of vitamins A, D, E, and K in the body. A crude fat content of 5.90% was reported by Akindahunsi and Salawu (2005) for *T. triangulare*. This value was higher than that obtained in this work for *T. portulacifolium* (3.10%).

Osagie and Eka, (1998) reported that phytic acid causes calcium and zinc deficiency in man when in excess, and that it plays an important role in determining starch digestibility in food. They obtained a value of 190.00mg/100g for *T. triangulare* which is quite high compared to the value (3.67mg/100g) obtained for our sample. The hydrogen cyanide content of 10.50mg/100g obtained for our sample compares favourably with the value of 8.10-10.80mg/100g reported for *Heinsia crinita* by Etuk *et al*. (1998). It is however low when compared to values (0.97-1.62mg/100g) obtained for *Lasianthera africana* by Isong and Idiong (1997). Aremu (1989) estimated that the per capita daily intake of cyanide should be 8mg/100g. He concluded that plants with high hydrogen cyanide concentration should be subjected to cooking in order to reduce or denature the toxic compound before consumption. It may therefore still be safe to consume *T. portulacifolium* since it is usually cooked before consumption.

The oxalate content in *T. triangulare* as reported by Akindahunsi and Salawu (2005) was 27.45mg/100g. This was quite high compared to the value (4.80mg/100g) obtained for *T. portulacifolium* in this work. They also reported a tannic acid content of 0.32mg/100g for *T. triangulare* which was lower than the value of 1.20mg/100g obtained for our sample. Butler (1989), stated that a high content of tannin decreases protein quality by decreasing digestibility and causes damage to the intestinal track.

CONCLUSION

The phytochemical screening of *Talinum portulacifolium* (Forsk.) Aschers. & Schweinf., revealed the presence of pharmacologically active compounds such as saponins, cardiac glycosides, flavonoids, alkaloids and tannins. This result suggests that the plant may be of high medicinal value. Nutritionally, it compares favourably with most popularly consumed vegetables like *T. triangulare* based on its moisture, carbohydrate, crude protein, ash and crude fibre contents. This indicates that the plant may be of high nutritional value. All the anti-nutrient compounds are below toxic level except for hydrogen cyanide which had a higher value than the recommended daily intake of 8mg/100g. The plant is still safe because when subjected to cooking, 99% of the initial cyanogenic glycosides are lost thus toxicity is virtually removed as reported by Bokanga (1994).

The absence of anthraquinones and the presence of saponins in both *T. triangulare* and *T. portulacifolium* suggests that both plants are related. The presence of alkaloids and tannins in only *T. portulacifolium* delimits it from *T. triangulare*. Although the nutrient composition analysis showed that *T. portulacifolium* had lower protein content than *T. triangulare,* the former had a higher crude fibre value. In spite of the high hydrogen cyanide value, the vegetable is still recommended for consumption since it is usually cooked.

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