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Proximate Composition of Leaf and Phytochemical Screening of Leaf, Stem and Root of *Tridax procumbens Cultivated in North-East Nigeria*.

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Abstract: *Proximate and phytochemical compositions of Tridax procumbens were investigated in order to ascertain their nutritional and other applications. The results obtained indicated the following proximate composition, ash (4.30 ± 0.007), moisture (5.00 ± 0.003), crude lipids (12.5 ±0.005), crude fiber (5.70 ± 0.005), crude protein (19.4 ± 0.008) and total carbohydrate (53.1 ± 0.046). Phytochemical screening of acetone and aqueous extracts of the leaves, stem – bark and root of the plants (Tridax procumbens) indicated the presence of phyto-compounds in both extracts. Flavonoids were absent in leaves and stem-bark but presence in the root extracts. Glycosides and terpenoids were absence in the aqueous extracts. However, the acetone extracts indicated the presence of terpenoid in the leaf. The results revealed that different parts of Tridax procumbens contain bioactive compounds that may have some therapeutic potential.*

Key Words, *Tridax Procubens, proximate composition, acetone and aqueous extracts, phytochemicals, root, leaf, root*

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1.0 Introduction

Several information can be gotten from proximate, elemental, vitamins and other chemical constituents of plants (Eddy and Ekop, 2005). Proximate parameters provide insight into nutritional properties of plant materials including its energy value (carbohydrate, lipid and protein), mineral nutrition (trace and major elements), etc. Vitamins and mineral are also needed for healing of wounds and bolstering of the immune system as well as repair of the immune system (Eddy and Udoh, 2005' Eddy *et al*., 2011). Much studies have been reported on the role of proximate composition and human nutrition and food availability is relatively sufficient (Chatepa, *et, al*, 2018). The phytochemical constituents of medicinal plants are responsible for therapeutic activities exhibited by these plants (Ogoko, 2018; Njoku *et al*., 2016). Phytochemicals are broadly classified in relative to their metabolic pathways into primary and the secondary metabolites. Study has revealed that the therapeutic effects of medicinal plants is primarily traced to the presence of the secondary metabolites. Secondary metabolites are efficient in traditional medicine folk practice, in modern medicine they serve as precursors for drugs production (Rehab and Amira, 2018). Currently, a search for phytochemicals is receiving much research attention because of increasing health challenges and emergence of new breed of microbial, viral, insecticidal and other infections. Information on phytochemical constituents of plant's root, stem or leaf can provide a guide on bioactive constituents and hence on anti-microbial activity Chibuzo and Okop, 2020;

Chibuzo and Aikoye, 2020). Medicinal plants are generally known and popular for a number of health benefits such as decreasing of blood pressure, prevention of cardiovascular diseases, or reducing the risk of cancer (Mirko, *et al*, 2015). These plants contain metabolites which are known to exhibit antioxidative activities against specific invading free radicals (Matthias, *et al*, 2015). In addition, medicinal plants exacerbate multiple biological effects on human system whereas, antioxidant properties is credited to the presence of various compounds such as flavonoids, phenolic acids, tannins coumarins, lignans and lignin's in different part of plant (Luo, *et al*, 2004).

The precipitating effects of tanning on protein have been utilized in processing animal hides into leather. It was demonstrated that these molecules crosslink proteins which makes them stand against the activities of bacterial and fungi (Hagerman and Butler, 1981). Coumarins are potent anticoagulant, anti-inflammatory and anti-alzhemer agent whereas flavonoid have been reported to have anti-inflammatory and antiallergic effects, for antithrombotic and vasoprotective properties, for inhibition of tumor promotion and as a protective for the gastric mucosa (Montanher, *et al*, 2007). Alkaloids have exhibited several pharmacological properties such as their usage as analgesic, cardiac stimulation activity, vasoconstriction, and muscle relaxation and as antineoplastic. Other researchers have also reported alkaloid to contain toxicity effect on animals (Bourgaud*, et al*, 2001). Saponins are unique in their foam forming property in water and have ability to cause hemolysis of erythrocytes of the blood. Saponins have demonstrated numerous pharmacological properties. Some saponins have antitumor, pesticidal, molluscicidal, spermicidal, sedative, expectorant and analgesic properties (Güçlü-Üstündağ and Mazza, 2007). Herbal medicines have gained wider acceptability because of their ability to provide solutions to numerous health challenges-(Douglas, *et al,* 2004; Fatemeh, *et al*, 2018).

According to Samantha *et al* (2018), *Tridax procumbens* contains metabolites that can function in various health application such as haematonics, anti-inflammatory, blood sugar control and anesthetic They also stated that immunomodulatory, anti-oxidant, anti-hepatotoxic, analgesic, antifungal, and antimicrobial activities of *Tridax procunbens* has been reported. There are existing literature that support the use of this plant in the cosmetic and beverages industries for production of tea and skin care products respectively (Ikewuchi, *et al*, 2015). These properties exerted by the plant can be attributed to its mechanism for defense and presence of some metabolites (Suseela, 2002). Therefore, the present study seeks to complement researches on this plant by investigating the, proximate and phytochemical composition of *Tridax Procumbens* root, stem and leaf.

2.0 Materials and Method

2.1 Sample and sample preparation

Fresh sample of leaves, root and stem of indigenous plant were collected within the premises of professorial quarters (MAUTECH). The sample were air dried in the laboratory to constant weight before converting them to powdered forms.

Analar grade reagents were used. These included tetraoxosulphate (VI) acid, sodium hydroxide, ferric chloride. Picric acid, acetic anhydride, acetone and hydrochloric acid. They were prepared using double distilled water.

In order to obtained the organic extracts of the sample, 30 g of each samples (leaves stem or root) were weighed into separate beakers containing, 300 ml of acetone respectively. Each of these beakers was properly sealed with aluminum foil and left for 48 hours. The resulting solutions were respectively filtered into separate conical flask. The filtrate which contained the extract were concentrated by removing the solvent through evaporation using a water bath. The aqueous extracts were obtained through similar procedures except the solvent was water

2.2 Experimental procedures

3.3.1 Phytochemical Screening

The methods described earlier by Odebiyi and Sofowora, (1978) were adapted to test for the presences of the active ingredient in the test samples. The presence of alkaloid was indicated by the appearance of orange colour after addition of 2 ml of picric acid. In order to detect the present of saponins, 10 ml of distilled water was added to 5 ml of the extract and shaken vigorously to observed persistent frothing as evidence for the presence of saponins. Formation of green precipitate after addition of 4 ml of water and three drops of ferric acid to the extracted was an indicative test for the presence of tannins. In order to confirm the presence

of flavonoids, small quantity of magnesium chips and three drops of concentrated hydrogen chlorides was added to the extract through the side of the tube. Appearance of reddish coloration was taken as evidence for the presence of flavonoids.

Test for the presence of phenol was carried out by addition of three drops of iron (III) chloride to 2 ml of the extract which resulted in a deep blush green solution as a positive result for the presence of phenols. For glucoside test, 10 ml of 50% sulphuric acid was added to 1ml of the extract and the mixture was heated in a boiling water for about 17minutes. Fehling's solution was added and the mixture was boiled. The appearance of a brick red precipitate shown the present of glycoside. In the determination of terpenoids, 0.4 ml of chloroform, 0.6 ml of sulphuric acid was added to the extract to observed a reddish colouration as an indication for the presence of terpenoids.

2.2.2 Proximate analysis

The protein content of the sample was estimated using the Kjeldahl method according to AOAC method number 984.13 (Association of Official Analytical Chemists, 2000). A multiplying factor of 6.25 was used for the %protein calculation. Crude fat content was determined gravimetrically after the Soxhlet extraction of dried samples with hexane. The moisture and ash contents were determined using the AOAC standard methods 930.15 and 942.05 (Association of Official Analytical Chemists, 1999a, b), respectively. Carbohydrate content was estimated using the method of difference. Crude fibre content was determined using A**OAC Method** 985.29

3.0 Results and Discussion

Results obtained from phytochemical screening of acetone and aqueous extract of stem, root and leaf of **Tridax** *procumbens* are shown in Tables 1 and 2 respectively while Table 3 present proximate composition of *Tridax procumbens* leaf.

Preliminary phytochemical investigation revealed the presence of alkaloids, phenols, saponins, and tannins, most of which were present in both acetone and water extracts. Flavonoids were absent in the leaves and stem – bark, but present in the root of acetone and water fractions whereas, glycoside was completely absent in acetone and water extracts. Terpenoids were totally absent in the stem – bark, but present in the leaves of acetone extracts and totally absent in the aqueous extracts.

Table 1: Phytochemicals in acetone extract of root, stem and leaf of *Tridax procumbens*

Bioactive agent	Leaves	Stem-Back	Root
Alkaloids	+	+	+
Saponins	+	+	+
Tannins	+	+	+
Flavonoids	-	-	+
Phenols	+	+	+
Glycosides	-	-	-
Terpenoids	+	-	-

****+ = presence, - = absent**

Table 2: Phytochemicals in aqueous extracts of roots, stem and leaf of *Tridax procumbens*

Bioactive agent	Leaves	Stem-back	Roots
Alkaloids	+	+	+
Saponins	+	+	+
Tannins	+	+	-
Flavonoids	-	-	+
Phenols	+	+	+
Glycosides	-	-	-
Terpenoids	-	-	-

****+ = presence, - = absent**

Table 3: Proximate composition of *Tridax procumbens* leaf

Component	(% w/w)
Ashen	4.30±0.07
Moisture	5.00±0.03
Crude Lipid	12.5±0.05
Crude fibers	5.70±0.05
Crude Proteins	19.4±0.08
Carbohydrate	53.1±0.46

Similar research conducted by Ikewuchi, *et al*, (2015) shows high flavonoids, alkaloids, hydroxycinnamates, tannins and phytosterols, moderate benzoic acid derivatives and lignans, and low carotenoids contents in the leaves extract of *Tridax procumbens*. Other research in which the flower of *Tridex procumbens* revealed the presence of alkaloids, carotenoids, flavonoids (catechin and flavones), fumaric acid, fl-sitosterol, saponins and tannins. It is richly endowed with carotenoids, saponins, oleanolic acid (Bhagat and Kondawar, 2019). The differences in the metabolic constituents as observed in this report and in previous work presented above could be as a result of the plant source location, method of extraction and other

factors which are not included in this work (Bhagat and Kondawar, 2019).

The proximate composition of the leaves of *Tridax procumbens* was investigated and the proximate profile shows ashen, (4.30 ± 0.07 %), moisture, (5.00 ± 0.03 %), crude lipid, (12.5 ± 0.05 %), crude fibre, (5.70 ± 0.05 %), crude protein, (19.4 ± 0.08 %) and carbohydrates, (53.1 ± 0.46 %). The present results show slight difference with those reported by Ikewuchi, *et al*, (2009), which revealed high moisture contents, (90.05 ± 0.00 %), low crude protein, 3.44 ± 0.00 %, very low crude lipid 0.60 ± 0.02 % very low crude fibre, 0.61 ± 0.04 %, and very low carbohydrate, 5.10 ± 0.02 % compare to the result presented in this work. The observed low moisture content indicates stability and resistance to microbial contamination (Oguntona, 1998).

4.0 Conclusion

Results and findings if this study reveal that aqueous and acetone extracts of have some nutritional value and is rich with phytochemicals that provides evidence for their pharmaceutical and medicinal applications. *Tridax Procumbens* can serve as a good source of plant protein as well as being potential source of nutrients. The absence of phytotoxins such as isothiocyanates and furanocoumarins indicate that the plant is safe for consumption by both humans and animals.

5.0 References

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