



Phytochemical, vitamin and mineral compositions of ethanol Leaf-Extract of *Albizia Ferruginea* and its Proximate Composition

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Abstract:

This study investigated phytochemical, vitamin and mineral compositions of ethanol leaf-extract of *Albizia ferruginea* and its proximate composition using standard analytical methods. The results showed the following order of occurrence of phytochemicals: phenols > flavonoids > terpenoids > glycosides > alkaloids > saponins > steroids and tannins. The composition (%) of carbohydrate, protein, moisture, fat, ash and fibre were 64.76 ± 2.08 , 20.36 ± 1.24 , 6.46 ± 1.10 , 5.24 ± 0.98 , 2.13 ± 0.36 and 1.05 ± 0.10 respectively. The results also recorded the vitamin composition in the following order of occurrence: thiamine > riboflavin > ascorbic acid > phylloquinone > niacin > folic acid and retinol while minerals and their concentrations (mg/100g) were Fe (1.42 ± 0.07), Zn (1.36 ± 0.02), Mg (0.75 ± 0.03), P (0.67 ± 0.03), Ca (0.44 ± 0.02), K (0.43 ± 0.03) and Na (0.36 ± 0.04). *Albizia ferruginea* leaves had high contents of phenol, thiamine, carbohydrate and Fe which may justify both its nutritional and ethno-medicinal benefits to human health, the leaves seem to have good nutritive, vitamin and suitable mineral element values necessary to maintain good health.

Keywords: *Albizia ferruginea*, chemical analysis, leaves.

Introduction:

The plant kingdom is a treasure house of potential drugs and in the recent years there has been an increasing awareness about the importance of medicinal plants (Yadav and Agarwala, 2011). According to World Health Organization (WHO), medicinal plants would be the best source to obtain variety of drugs. However, such plants should be investigated to better understand their properties, safety, and efficiency (Hannah and Krishnakumari, 2015).

Albizia ferruginea is a perennial tree with about 45m high and 3m girth. The leaves are bipinnate with pinnae exceeding sometimes seven pairs (Agyareet *et al.*, 2006). It is a species of plant in the Fabaceae family, found in Angola, Benin, Cameroon, Republic of Congo, Nigeria, Senegal, Togo, Uganda among others. This species threatened by deforestation is widespread in west and central Africa (Kareruet *et al.*, 2007). It is called 'Evouvous' by Ewondo tribe in the central region of Cameroon, the decoction of its barks mixed with those of *Ongokea* and *Piptadeniastrum africanum* is used as traditional remedy to cure infertility (Noumiet *et al.*, 2011). It is also called "Uge-ehu" in Abakaliki dialect of Ebonyi State, Nigeria. The genus *Albizia* comprises approximately 150 species, mostly trees and shrubs native to tropical and subtropical regions of Asia and Africa. Stamens elongate and are usually white. Corolla is funnel-shaped, connate beyond the middle. Fruit is broadly linear indehiscent or 2-valved, valves not twisted (Karuppanan *et al.*, 2013).

The nutritional interest in some of these plant species stems from their rich contents of essential amino acids, vitamins and minerals and also their rich content of the mentioned nutrients, it is established that green vegetable leaves are the cheapest and most abundant sources of proteins because of their ability to synthesize amino acids from a wide range of virtually available primary materials such as water, carbon dioxide, and atmospheric nitrogen (as in legumes) (Arowosegbe *et al.*, 2015). Naturally grown herbs and plants also have plenty of phytonutrients which are extremely valuable for our body and good health. The most important and valuable phytonutrients include natural minerals (like zinc, iron, calcium, copper and other elements) and vitamins (including vitamins A, B, C, D, E and others) (Uzoekwe and Mohammed, 2015). The proximate analysis of nutritive ingredients gives a good insight especially when presented with additional data about their phytochemical contents as well as their biological activities. The nutritional value describes mainly the percentage of major nutritional bio-molecules such as proteins, carbohydrates, lipids and fibre along with the presence of major minerals and their food value (Karuna and Vijaya, 2014).

Furthermore, research has reported the safety evaluation of *Albizia* species to tap out the shelf of bioactive constituents that possess pharmacological properties used in treatment of rheumatism, stomach ache, cough, diarrhoea, wounds, anti-helminthic etc (Karuppanan *et al.*, 2013). Plants/herbs have plenty of phytonutrients which are extremely valuable for our body and good health (Bongoni *et al.*, 2013). Although considerable information now exists on the nutrient composition of other *Albizia* species, none of such information could however be obtained, hence there is need to ascertain the phytochemical, vitamin and mineral composition of ethanol leaf-extract of *Albizia ferruginea* and their proximate composition.

Materials and Methods:

Materials:

The fresh leaves of *Albizia ferruginea* were gotten from Umuezeoka, Ezza North L.G.A. in the month of February. All chemicals and reagents were of analytical standard.

Methods:

Extraction of plant sample:

The leaves of the plant were rinsed in water and dried. The dried plant parts were ground using a milling machine and the fine powdery sample was then used in the analysis. Exactly 300g of the powdered sample was soaked in 1200ml of ethanol and allowed to stand for 48 hours. The soaked leaves were then filtered using a muslin cloth and concentrated by evaporation to dryness using rotary evaporator.

Determining Of Chemical Component:

Alkaloids, flavonoids, glycosides, phenols, saponins, terpenoids were determined according to the methods of Harbone (1973). Tannins and steroids were according to the method described by Pearson (1976) and Edeoga *et al.* (2005) respectively. Proximate composition determination was according to the methods of AOAC (1995). Sodium, potassium, manganese, calcium, magnesium, zinc, and iron were determined using the methods of AOAC (1995). Retinol, ascorbic acid, phylloquinone, thiamine, riboflavin, niacin and folic acid were determined using the methods of Okwu and Josiah (2004).

Data Analysis: Data were treated by analysis of variance (ANOVA), and the level of significance was set at $P < 0.05$.

RESULTS

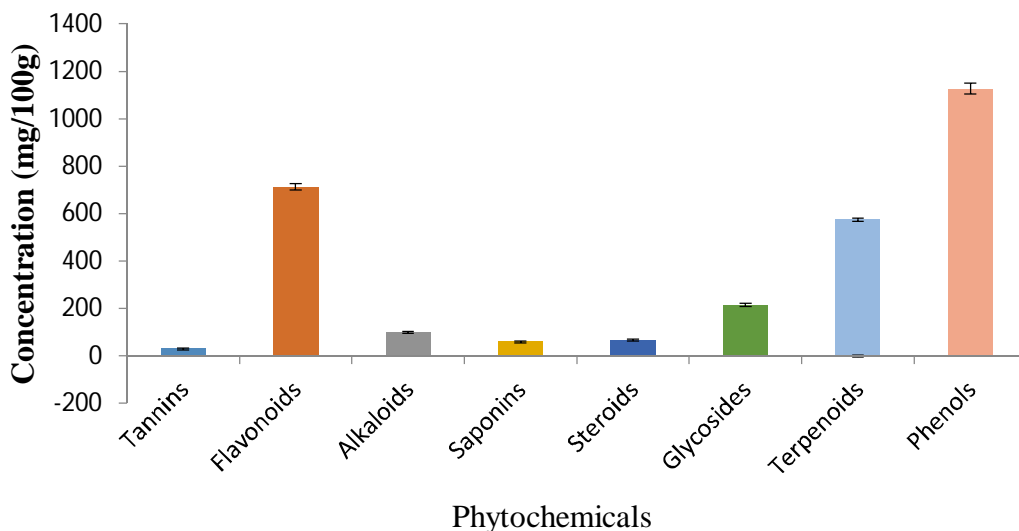


Figure 1: Phytochemical composition of ethanol leaf-extract of *Albizia ferruginea*.

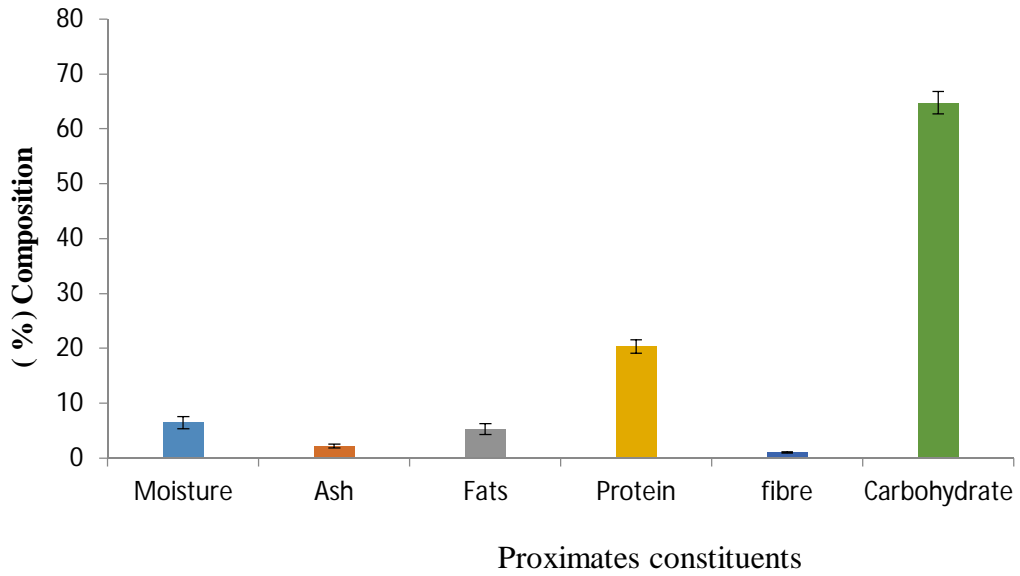


Figure 2: Proximate composition of *Albizia ferruginea* leaves.

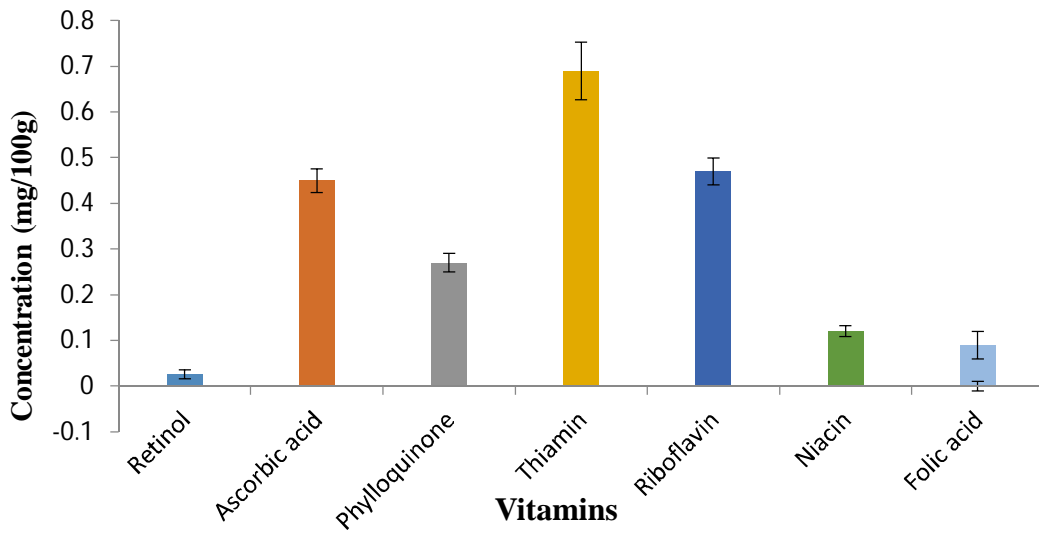


Figure 3: Vitamin composition of ethanol leaf-extract of *Albizia ferruginea*.

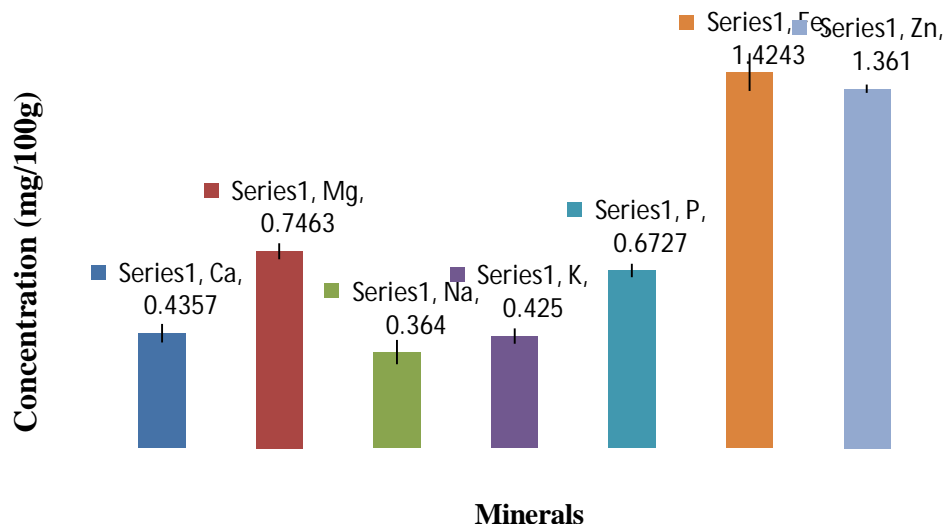


Figure 4: Mineral concentration of ethanol leaf-extract of *Albizia ferruginea*.

Discussion:

The phytochemical constituents of the ethanol leaf-extract of *Albizia ferruginea* were shown in the order of concentrations as phenols > flavonoids > terpenoids > glycosides > alkaloids > steroids > saponins > tannins (Figure 1). Ariharasiva *et al.* (2014) reported that the ethanol extract of *Albizialebeck* revealed the phytochemicals in other of concentrations to be alkaloids, glycosides, steroids, flavonoids, saponins, tannins. Ueda (2003) reported the presence of saponin in *Albizialebeck* leaves. Also, Akinyeye and Olatunya (2014) reported the following phytochemicals in their order of concentration as alkaloids > saponins > tannins > steroids > phlobatanins > terpenoids > flavonoids > cardiac glycosides in most of the samples. Indravathiet *et al.* (2013) evaluated *Albizia amara* and showed that phytochemical constituents were seen in the following order of concentrations: alkaloids > saponins > phenolic compounds > glycosides > tannins > sterols. Egbon *et al.* (2017) reported that *Phyllanthus amarus* methanol extract revealed that alkaloid and flavonoids were high in concentrations while saponin and glycoside were low in concentration while the aqueous extract of *Phyllanthus amarus* also recorded alkaloids, the highest in concentrations and tannins, saponins and terpenoids were low in their concentrations. Nwauzoma and Dawari, (2013) reported that the phytochemical screening of *Piper umbellatum* leaves recorded a very high amount of steroid (more than 95%), little traces of tannin and alkaloid, while saponin and phenol were slightly 10% each and- flavonoid has less than 10% occurrence.

The results on the proximate composition (Figure 2) showed that the ethanol leaf-extract of *Albizia ferruginea* contained high concentration of carbohydrate (64.76%) and low concentration of fibre (1.05 %). Ahmed *et al.* (2017) reported a results of proximate analysis of *Pterocarpuserinaceus* stem bark shows that it has high carbohydrate content (39.33%). Nweze and Nwafor (2014) reported carbohydrate as highest in concentration among the proximate compositions of *Moringa oleifera*. Egbon *et al.* (2017) reported the percentage proximate composition of *Phyllanthus amarus* as moisture (37.40), crude fat (5.6), crude protein (1.54), ash (9.0), crude fiber (14.99), and carbohydrate (31.47). It also contains fibre (31.22%), proteins (8.70%) and moisture content of 1.85%. The bark of *Ficus capensis* yielded 10.00% moisture, 3.73% protein, 2.00% crude fat, 10.95% ash, 20.50% crude fiber, and 52.82% carbohydrate as the results of the proximate analysis (Uzoekwe and Mohammed, 2015). Ojokuku *et al.* (2011) recorded that *Croton penduliflorus* seed contained the proximate as moisture was 9.8%, protein was 3.63%, crude fat was 1.92%, ash as 15.60%, crude fiber as 16.38% and carbohydrate as 52.66%. The bark of *Ficus capensis* yielded 10.00% moisture, 3.73% protein, 2.00% crude fat, 10.95% ash, 20.50% crude fiber, and 52.82% carbohydrate as the results of the proximate analysis (Uzoekwe and Mohammed, 2015). Proximate composition of

Albizia lebbek indicated presence of higher contents of carbohydrates, crude fiber and proteins for seed and pod, respectively (Muhammad *et al.*, 2013).

The ethanol leaf-extract of *Albiziaferruginea* revealed that thiamine concentration was highest in the sample followed by riboflavin, ascorbic acid and phyloquinone while retinol was the lowest in concentration as seen in figure 3. Achi *et al.* (2017) reported the results of vitamin composition of aqueous extract of *Ficuscapensis* leaves to contain a variety of vitamins (A, B-complex, C, E, D, K and carotenoid) with β -carotenoid having the highest concentration and Vitamin A while the B-Vitamins and Vitamin E are in moderate amounts. Ahmed *et al.* (2017) reported that *Pterocarpuserinaceus* bark contains high amount of vitamin B₉ (Folic acid) and vitamin A. Vitamins C and K were present in very low amount respectively.

Mineral analysis of the ethanol leaf-extract of *Albiziaferruginea* showed that the extract contained higher concentration of iron and sodium was the lowest in concentration as shown in Figure4. Akinyeye and Olatunya (2014) reported that phosphorus was highly concentrated among all the proximate analysed. Sodamade *et al.* (2013) reported that samples of *Moringaoleifera* revealed that it possess Fe. Ahmed *et al.* (2017) reported that the stem bark of *Pterocarpuserinaceus* contains high amount of phosphorus, copper and iron. Lead, cadmium and nickel were not detected. Mineral composition of *Albizialebbeck* (L.) pods and seeds indicated that potassium was in the highest concentration followed by sodium while copper was found in the lowest amount for seed and pod, respectively (Muhammad *et al.*, 2013).

In conclusion, the study of phytochemicals, vitamins, minerals and nutrients in *Albiziaferruginea* leaves contained high content of phenol, thiamine, carbohydrate and Fe which may justify both its nutritional and ethno-medicinal benefits to human health. Leaves of *Albiziaferruginea* seem to have good nutritive, vitamin and suitable mineral element values necessary to maintain good health.

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