



## Proximate and Mineral Elements Analysis of *Ziziphus mauritiana* Fruits

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### Abstract

The fruits of *Ziziphus mauritiana* plant were subjected to proximate and mineral elements analysis. The results of the proximate analysis revealed the presences of moisture contents  $5.16 \pm 0.29\text{mg}/100\text{g}$ , ash contents  $6.16 \pm 0.29\text{mg}/100\text{g}$ , crude lipid  $62.00 \pm 0.50\text{mg}/100\text{g}$ , crude fiber  $1.67 \pm 0.29\text{mg}/100\text{g}$ , crude protein  $6.18 \pm 0.13\text{mg}/100\text{g}$  as well as available carbohydrate  $83.98 \pm 0.46\text{mg}/100\text{g}$  in dryweights. The values of the mineral elements analysis conducted were evaluated; Sodium  $7.67 \pm 0.138\text{mg}/100\text{g}$ , potassium  $306.67 \pm 11.55\text{mg}/100\text{g}$ , calcium value obtained were  $0.033 \pm 0.003\text{mg}/100\text{g}$ , Magnesium was recorded as  $0.16 \pm 0.005\text{mg}/100\text{g}$ , while the value of phosphorus was recorded as  $1.582 \pm 3.34\text{mg}/100\text{g}$  in dry weight respectively. The results of the mineral analysis conducted on *Ziziphus mauritiana* fruits revealed the presence of higher potassium and sodium values while the least value was obtained in calcium. The proximate composition showed the fruits as having higher value of crude protein and lipid contents while the crude fiber had the least value respectively. The high values of potassium and sodium in the fruit make the fruit good source for the formation of bones and teeth more especially in the growing children. *Ziziphus mauritiana* fruit contains important mineral elements that would possibly improve on the proper metabolic activity and therefore could improve on health standard if properly utilized.

**Keywords:** *Ziziphus mauritiana* plant, fruits, proximate and nutritive analysis

### INTRODUCTION

*Ziziphus mauritiana* (L.) wild (Rhamnaceae) locally known as Jujube (English Name) Magarya in Hausa, is for tropical evergreen tree grows in the East and West Africa, Nigeria (Adzu *et al.*, 2001). *Ziziphus* is a genus of about 40 species of spiny shrubs and small trees in the buckthorn family, Rhamnaceae, distributed in the warm-temperate and subtropical region throughout the world. The leaves are alternate, entire, with three prominent basal veins, and 2-7 cm long; some species are deciduous, others evergreen. The flowers are small, inconspicuous yellow-green. The fruit is an edible drupe, yellow-brown, red, or black, globose or oblong, 1-5 cm long, often very sweet and sugary, reminiscent of a date in texture and flavor (Adzu *et al.*, 2001). The plant locally known as Magarya in Hausa is a multipurpose tree species belonging to the family Rhamnaceae. It is an important cultivated tree and one of the few truly native tree species of Arabia that is still growing along with many newly introduced exotic plants. All parts of the plants are use by the local Arab people to help maintain a healthy lifestyle (Nazif, 2002). The plant has been used for its soothing properties (Adzu *et al.*, 2002). The plant is a shrub, sometimes a tall tree, reaching a height of 20m and a diameter of 60cm; bark light-grey, very cracked, scaly, trunk twisted;

very branched, crown think; shoots whitish, flexible, drooping; thorns in pairs, one straight, the other curved (Adams and Adzu, 2004). The chemical constituents conforms the fruits beneficial use as a tonic (Arnanthan *et al.*, 2003)

The fruits taste like a mixture of dates and apples and are highly prized by the Bedouins and were found to have a very high energy value. Fruit can be eaten raw or dried for later use and has a pleasant sub-acid taste, somewhat resembling dried apples (Facciola, 1990). Only dates, figs, raisins and a few other dried fruits have a higher value (Facciola, 1990). The seeds are rich in protein and the leaves in calcium, iron and magnesium. The food from this plant is an important source of energy, protein and minerals (Arnanthan *et al.*, 2003). The berries are tonic and will revive a falling appetite (WHO, 2007). They are also laxative and have been used as a vermifuge. It refreshes and restores, improves memory and is a remedy for high blood pressure (Lavy and Bairachi, 1991). In the Western part of Sudan the cherry-type fruit is considered a delicacy and the bitter-sweet pulp of fruit is dried and milled. The seed coat is also cracked open and the kernels eaten raw. In Northern Nigeria especially and other states and the fruits are eaten (Hassan and Umar *et al.*, 2007).

Many plants are widely distributed around our environments and are highly rich in nutrients, vitamins, and mineral, but adequate knowledge on the vital role of these plants to human health is not known in our communities (Nwaogu *et al.*, 2009). Due to the wide uses, its availability and nutritional as well as its mineral contents and the high increasing population, it seems necessary to conduct a research to determine the nutritional and mineral contents so as to a certain the health benefit of this plant fruit to the community. As it has been observed and to the best of my knowledge no work has been done on the proximate and mineral elements of *Ziziphus mauritiana* fruits in Kebbi State thus, this research work aimed at providing a base line for further study on this plant.

#### **MATERIALS AND METHODS**

##### **Sample collection and Processing**

*Ziziphus mauritiana* (Magarya) fruits were collected at four (4) villages within and around Aliero community namely; Kalli, Gangije, Gittah and Aliero so as to have equal representative of Aliero community. The fruits were collected from 3/4/2015 to 10/4/2016 by hand picking beneath the trees. The fruits were washed in tap water and shades dried for 7days and stored in dry and clean air tight containers. The dried fruits samples collected were labelled accordingly for easy identification and brought to the Microbiology Laboratory, Kebbi State University of Science and Technology, Aliero for further analysis. The fruits were made to powder using clean dry-mortar and pestel and later put in a clean grinding machine to achieve smooth flour. These were later sieved using a clean sieve to make a fine powder. The powder were collected and put in sterilized polythene containers and stored at room temperature until analysis. Fifty grams (50g) were collected from each sample labelled and made into triplicates. All samples collected and identified were subjected to proximate and mineral analysis. Moisture, ash, crude lipid and crude fiber contents were determined using the methods of (AOAC, 1990).

##### **Chemicals and Reagents Used**

The chemical and reagents used were of analytical standards and were prepared and used in the laboratory according to the Procedure as described by AOAC (1990).

##### **Proximate composition and Mineral analysis**

Proximate composition and mineral analysis were carried out according to the procedure of (AOAC, 1990). The percentage moisture of the samples were obtained in oven dehydration at 110°C for 3 hrs and the ash contents were

determined using muffle furnace at 550°C for 5 hrs. The crude fiber and crude lipids were determined according to the methods as specified by (AOAC, 1990). The Micro-Kjeldahl methods were used to obtain the total nitrogen content and the values were multiplied by 6.25 to determine the crude protein in the samples as adapted by the AOAC (1990). The carbohydrate content was determined by the methods described in AOAC (1990). Standard deviation was employed in the analysis of data obtained in the research work

#### **RESULTS AND DISCUSSION**

The proximate and mineral compositions of *Ziziphus mauritiana* fruits were analyzed and the results of the analyses were presented in Tables 1&2. The results of the proximate analysis conducted showed the presences of moisture content, ash content, crude protein, crude lipid, crude fiber and available carbohydrate Table 1. The analysis of the mineral compositions were conducted and presented as in Table 2. The results revealed the presences of sodium, potassium, calcium, magnesium and phosphorous respectively. The sample analyzed showed low moisture content (7.5% mg/100g) as compared to that of the *Daniellia oliveria* fruit, the low moisture content of the sample is an indication of good storage quality with minimal fungal or microbial activity which does not permit the growth of molds in the sample or sample product (Hassan and Umar, 2004). The carbohydrate content of *Ziziphus mauritiana* fruit is high (83.98 0.46 mg/100g). The major function of carbohydrate in human body is to provide the body with energy and *Ziziphus mauritiana* fruit has enough energy available for the daily metabolic activity for the human body. The ash content of the *Ziziphus mauritiana* fruit sample was found to be relatively low (6.16±0.29mg/100g) compared to that of *Daniellia oliver* fruit (Umar *et al.*, 2007). This indicates that the fruit contain nutritionally more important mineral elements as reported. The lower the percentage of ash in a sample, the higher the values of its mineral contents (Umar *et al.*, 2007). It is reported that sample with higher percentage of ash content is expected to have lower concentration of minerals elements, which are expected to speed up the rate of metabolic process and improve growth and development (Muhammad, 2011). The ash content shows microbiological stability as higher mineral contents are sometimes used to retard the growth of certain microorganism (Umar, 2004).

The lipids are the principal source of energy in the body, still should not exceed the daily requirement or the recommended dose of not more than 30 calories so as to avoid obesity and other related diseases (Berko and Taiye, 1999). The result of the crude lipid (1.5% mg/100g) of the sample was low (< 10%). Thus, this could not be classified as oil seed like the castor seed and melon, but can provide the body with enough energy for its daily activity (Gordon and Kessel, 2002). The crude fiber content of the fruit is relatively low (1.5% mg/100g) and when consumed adequately, the fiber diets help in the digestion by providing the movement of food through the intestine, and high food expands the walls of the colon, there by easing the passage of waste material in the body. The fiber helps to provide the cells and tissues with both support and mechanical strength. Fiber lowers cholesterol level in the blood and thereby reducing the risk of various cancers. Low intake of fiber in the diet of infant's and weaning children is recommended since high level in the diet can lead to enhanced gut perturbation in young animals (Umar, 2004). The percentage of crude protein in the sample was very low (2.71%) compared to that in the fruit of *Sclerocarya birrea*. This is a good indication that the fruit cannot provide enough protein needed for body activity but could be a potential source of protein to both humans and livestock feed formulation (Gordon and Kessel, 2002).

The concentration of sodium in *Ziziphus mauritiana* fruit in this research was (7.67±0.0.38msg/100g). This showed that the

fruit is a good source of sodium which would keep blood pressure in the normal range and reduces an individual's risk of coronary heart disease, stroke, congested heart failure and kidney disease (Gommong, 2003). Excess of sodium intake, would lead to high blood pressure and hypertension and thus it should be consumed in a moderate level. As in the other way round, absence of sodium in our diet would result in muscle cramps, appetite and dehydration, but the main sign is fatigue, hence the need to consume the fruit within the require value is very necessary since too much or too little of which would be dangerous in the human metabolic system (Singh *et al.*, 2010). Magnesium in the fruits of *Ziziphus mauritiana* was 0.16±0.005 and is very low for the body metabolic activity in human beings. Manganese helps give support to the immune system, regulation of blood sugar levels, production of energy and cell production (Anitia *et al.*, 2006). It works with vitamin K to support blood clotting. Birth defects can results when an expecting mother does not get enough of this important element and it also function as enzyme activator and its deficiency has been reported to cause (Anhwange *et al.*, 2004). The lower values of potassium, phosphorus and calcium in the fruit does not mean they are totally absent but the lower amount could act as a good source of the mineral elements in the metabolic system of the body in the case of potassium and potential source of calcium and phosphorus for good formation of bones and teeth (Anhwange *et al.*, 2004).

Table 1: Proximate composition of *Ziziphus Mauritania* fruit

Parameter	Concentration Mg/100g
Moisture content	5.16±0.29
Ash content	6.16±0.29
Crude lipid	6.2.00±0.50
Crude fiber	1.67±0.29
Crude protein	6.18±0.13
Available carbohydrate	83.98±0.46

Values are mean ± standard deviation of replication

Table 2: Mineral composition of *Ziziphus mauritania* fruit

Minerals	Concentration Mg/100g
Sodium	7.67±0.38
Potassium	306.67±11.55
Calcium	0.033±0.003
Magnesium	0.16±0.005
Phosphorous	1.582±3.34

Values are mean ± standard deviation of replication

**Conclusion**

From the results analyzed, a conclusion can be drawn that *Ziziphus mauritania* can be stored for a long period due to its low moisture content. The ash content is moderate; the fiber content if consumed adequately will aid the development of cell tissues given support and mechanical strengths to the body. The fruits are low in protein but if taken adequately can aid building our body and healing our wounds (Adedeye, 2002). The available carbohydrate indicates that the fruits possess high potentials

of energy source for our day to day activities. In light of the above results, we can conclusively say that *Ziziphus mauritania* fruits are good for human consumption especially as it is cheap and available in our local areas. The determination of nutritive contents of less explored food would go a long way to supplement quality and quantifiable balanced diet to Nigeria and Africa at large. Therefore, due to the effective values of this plant, much research and studies should be carried out.

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