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Proximate and Mineral Composition of *Jatropha curcas* Leaves

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ABSTRACT

The proximate and mineral composition of *jatropha curcas* leaves were evaluated in dry sample to determine the Ash, carbohydrate, crude lipid, crude fiber, crude protein and mineral contents using standard method and atomic absorption spectrophotometry method. The result showed that *jatropha curcas* leaves contained (12.0±1.00%) Ash, (61.94±5.56%) carbohydrate, (7.00±0.43%) Fat, (16.5±0.1%) fibre, (2.56±0.23%) protein, (4.33±0.28%) moisture in dry sample respectively. The result also revealed that the concentration of potassium is (18.60±1.19mg/100g) sodium (11.50±0.39mg/ 100g), magnesium (58.17±2.04mg/100g), cupper (4.23±0.12mg/ 100g), iron (2.85±0.04mg/100g) and calcium (93.42±0.48mg/100g) respectively which are the major minerals present in the sample. This indicated that *Jatropha curcas* leaves could serve as an alternative source of food for animal and human after quality processing.

Keywords: Carbohydrate, Crude Protein, *Jatropha curcas* leaves, Mineral, Moisture Analysis.

INTRODUCTION

Today about 80% of the world's population rely predominantly on plants and plant extracts for healthcare (Setzer *et al.*, 2006). Jatropha is a genus of over 170 plants from the Euphorbiceaus family commonly found and utilized across most of the tropical and subtropical regions of the world. Among the different species of jatropha, Jatropha *curcas* leaves has a wide range of uses and promising various significant benefits to human and industry. It has a yield per hectare of more than four times that of soybeans and ten times of corn. Jatropha is suitable for quick and efficient domestication compared with other woody species (Achten *et al.*, 2010).

Jatropha *curcas* leaves or physic nut, is a drought resistant large shrub or small tree, belonging to the Jenus Euphorbiaceae, producing oil containing seeds (Jangschaap *et al.*, 2007). *Jatropha curcas* leaves, is the commonest species found in Nigeria, but many species exist in different part of the world. It is a multipurpose drought resistant tree and can be cultivated in areas of low rainfall (Pratt *et al.*, 2002).

The names used to describe the plant vary per region or country. It is most commonly known as "physic nut". In Mali it is known as "pourghere". In the Ivory Coast it is known as "bagani". In senegal it is known as "tabanani". Fact Foundation, (2006). In Nigeria it is known as "binidazugu/cinidazugu" and "lapa lapa" in Hausa and Yoruba languages respectively (Blench, 2007; Blench, 2003).

The objectives of this study are to:

i. Determine the ash content, moisture content, protein, carbohydrate, fibre and lipid present in jatropha curcas leaves.
ii. Analyze the quantity of some mineral elements in the leaves.

METHODOLOGY

Sample and Sampling

Jatrropha curcas leaves used in this research was obtained from Maradun local govt, Zamfara state,Northern Nigeria in 2018. where the plant grows under natural condition. The leaves were removed from the twigs properly rinsed with clean water and air dried at 25^{o}C (room temperature), mean morning and night temperature of 24^{o}C and mean noon temperature of 27^{o}C in a well aerated atmosphere and prevented from direct sunlight to avoid denaturation of vital phyto-constituents. Dried leaves were ground using a mortar and pestle, sieved and kept in an air-tight glassware container and stored at room temperature until when needed.

Proximate Analysis:

Proximate analysis, also known as Weende analysis is a chemical method of assessing and expressing the nutritional value of a feed, which reports the moisture, ash, crude fibre, crude fat and crude protein (total nitrogen) present in a food as a percentage of dry fuel weight. Carbohydrate (nitrogen free extract) is determined by difference. The proximate analyses gives the overall nutritional composition of the sample.

The proximate analysis of sample moisture content, ash content, fibre content, and

lipid were carried out using a method recommended by association of official analytical chemists (AOAC, 2005). The protein content was determined by method reported by AOAC, (2000). While carbohydrate was determined by subtracting the sum of the weight of moisture, protein, fiber, lipid, ash, from the total dry matter. All determinations were done in triplicate.

Mineral Analyses:

The Atomic Absorption Spectrophotometer (AAS) was used for the analyses of the following metals: Ca, Mg, Cu and Fe while the Flame Photometer was used in the analyses of K and Na.

RESULTS AND DISCUSSIONS

Proximate Analysis

The results of the proximate composition of *Jatropha curcas* leaves are presented in Table1. The leaves are rich in ash, crude protein and available carbohydrate. The leaves are also moderate in lipid content and low in fibre.

The proximate analysis of the leaves indicated an appreciable amount of moisture content (4.33±0.28%) (Table 1) which was lower compared to *Ocimum gratissimum* leaves reported by Idris *et al*., (2011) and higher than Ipomoea batatus (88.43%) reported by (Sun *et al.*, 2014). The result also showed that *jatropha curcas* leaves contain high ash content (12.00±1.00%). The value was higher than what was obtained from its seed (6.00%) as reported by Odoemelam, (2005) *Jatropha Curcas* leaves had (2.56±0.23%) protein and (61.94±5.56%) available Carbohydrate. This crude protein was higher than the value reported by Ahmed, (2014) for *Ipomoea batatus* leaves (6.37%) dry weight. *Jatropha curcas* leave had high content of Carbohydrate compared to (51.80%) in *Moringa Stenopetala* Leaves (Abuye *et a*l., 2003),And was also higher than the value of (18.35%) of *Jatropha curcas* seed (Ayodele *et al.,* 2000).Carbohydrate serve as stored forms of energy as glycogen in the liver. It also provides a primary source of energy (Hassan *et al.,* 2011). The Crude lipid content is low (7,00±0.45%) when compared with the value reported for *Jatropha curcas* seeds (Hassan *et al*., 2007). Also the leaves of *Jatropha curcas* had a higher concentration of crude fiber (16.5 ± 0.31%), when compared with the leaves of *Ipomoea batatus* (12.67%) Ahmed, (2014).Fibre plays a role in the prevention of diseases by reducing the level of cholesterol, high blood pressure and constipation (Hassan *et al.,* 2011). Thus, *Jatropha* leaves could be valuable sources of dietary fibre.

The calorific value of *Jatropha curcas* leaves (321.00±1.10kJ/100g (DW) is higher than (248.8 to 307.1) kJ/100g reported for some Nigerian leafy vegetables by Hassan *et al.* (2011). The results showed that *Jatropha Curcas* leaves has higher calorific value than that of *Momordica balsamina* leaves (941.00mg/100g) and lower value than the dried leaves of *Moringa Oleifera* (3512.60mg/100g) as reported by Charles *et al.* (2011).

Table 1: Proximate composition of *Jatropha curcas* leaves

Parameters	Concentration (% Dry weight)
Moisture	4.33 ± 0.28
Ash Content	12.00 ± 1.00
Crude Protein	2.56 ± 0.23
Crude lipid	7.00 ± 0.45
Crude Fibre	16.50 ± 0.31
Available Carbohydrate	61.94 ± 5.56
Energy Value (kJ/100 g DW)	321.00 ± 1.10

Values are Mean ± Standard Deviation of Triplicate Data

Mineral Analysis

The mineral element of *Jatropha curcas* leaves is presented in Table 2. From the result, the leaves have high concentration of calcium and magnesium; which level lower of other mineral elements.

The minerals composition of the *Jatropha Curcas* leaves is presented in the Table 2. The mean value recorded for Calcium, Magnesium, Potassium and Sodium were 11.50±0.31ppm, 58.19±2.04ppm, 18.60±1.19ppm and 11.50±0.39ppm respectively. The concentration of calcium was found to be higher than what was obtained for Vetiver grass (0.48mg/100gDW) as reported by Falola *et al.* (2013). Calcium helps in regulating the passage of nutrients through cell walls and the correct contraction of the muscles. It also helps in the clothing of blood and the transfer of the signal by the nerves. It is sufficiently adequate compared to the recommended quantity for lactating goats (Hassan *et al.,* 2011). The value obtained for magnesium is higher than that obtained in *Andropogon gayanus* (2.74 mg/100 g DW) as reported by Waziri *et al.* (2013). Magnesium provides bone and tooth strength, helps in blood clothing, aids nerves impulse transmission required for muscles contraction (Gordon 2000;

Barbara and Robert, 2001; Suzanne 2002). The value for potassium is also lower compared to *Celosia argentea* leaves (5,200 mg/100 g), *Chenopodium album* (6938 mg/ 100 g) and *Solanum nigrum* (3084 mg/100 g) as reported by (Oluyemi *et al.*, 2006) also potassium is essential for keeping a normal water balance between the cell and body fluids, that is, it plays an important role in proper heart function (Gardon, 2000). The concentration of sodium in *Jatropha Curcas* leaves is lower than the value (96.56mg/100g) reported by Waziri *et al*. (2013) on the analysis of *Andropogon gayanus* grass, Sodium function as electrolytes and plays key role in ion and extracellular fluid balance and a major factor in nerves impulse transmission (Gardon, 2000). The leaves are rich in Sodium and hence could serve as a sodium supplement in diet, also as a source of calcium, Magnesium and Potassium, through their value are relatively high. However, the study also showed that the leaves of *Jatropha curcas* are low in sodium as compared to the Recommended Daily Allowance of 70 mg/100 g for a goat (Hassan *et al.*, 2007).

Table 2: Mineral Composition of *Jatropha curcas* leaves.

Mineral Elements	Concentration [mg/100 g dry weight]
K	18.60±1.19
Na	11.50±0.39
Ca	93.42±0.43
Mg	58.19±2.04
Cu	4.23±0.12
Fe	2.85±0.04

The data are mean value ± standard deviation (SD) of three replicated.

CONCLUSION

From the results obtained Jatropha curcas leaves has high percentage of crude fiber, Ash and lipid. High percentage of Ash indicate that leaves could be an important source of mineral element particularly the micronutrient The protein content could supplement the conventional food material in the supply of daily protein requirement.

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