



# Comparative Proximate Composition of *Jatropha Curcas* Seed from India, Kaduna and Edo

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## ABSTRACT

*Jatropha curcas* seed has great economic, agricultural and nutritional potentials. The present study evaluates the proximate composition of seed and seed cake of *Jatropha curcas* from India, Kaduna and Edo, using standard methods. The proximate analysis for the seed revealed that the (%) presence of Crude Protein was (24.72±0.00) for Kaduna, (21.11±1.09) for India and (28.87±1.24) for Edo; and these increases were significant ( $p < 0.05$ ). Crude Lipid for Edo (29.95±0.50) was significantly ( $p < 0.05$ ) lower than that of Kaduna (37.85±4.11). Crude Carbohydrate for Kaduna (15.51±0.97) was significantly lower ( $p < 0.05$ ) than that of India (18.58±1.64). Crude Fibre contents were not significant ( $p > 0.05$ ). Also, the Ash and Moisture contents were not significant ( $p > 0.05$ ). The findings from this study reveal that though the seed is not edible (due to its toxic potentials), it has great nutritional potentials, especially as a source of animal feed. The result also shows that the (%) nutritional content is not really dependent on the geographical location where the plant was cultivated.

**KEYWORDS:** FPGA, *Jatropha curcas*, seed, cake, proximate analysis

## 1. INTRODUCTION

*Jatropha curcas* (Physic nut) originated in Central America and has become naturalized in many tropical and subtropical areas including India, Africa and North America [1, 2]. It is a valuable hedge plant, with the mature small trees bearing separate male and female flowers and do not grow very tall. As with many members of the family Euphorbiaceae, *J. curcas* contains compounds that are highly toxic. [3]. The plant occurs between altitudes of 10 to 1430 mean sea level (msl) and in several agroclimatic conditions. *Jatropha* plants occurs in various climatic regions and sometimes even the plants from the same climatic zone show morphological differences, particularly with regard to the shape and size of the seeds and their protein and lipid content [4]. Two genotypes of *J. curcas* are available in Mexico, toxic and non-toxic. The seeds of the non-toxic genotypes are consumed by humans after roasting [5]. Several plants exist with very high nutritive value and yet remain unexploited for both man and animal benefits; *Jatropha curcas* is among such plants. *Jatropha curcas* is a perennial plant which does not require much care and produces well for 30 to 40 years after establishment [6]. Due to its economic, nutritional and agricultural importance, *J. curcas* has recently attracted attention of various research organizations, governments, public and international developmental agencies as well as industries in the tropics and subtropics due to its adaptability to semi arid marginal sites, the possibility of using its oil as a diesel fuel substitute and its role in erosion control. However, the area of research on the nutritional importance of *J. curcas* is usually not given serious considerations, probably due to its toxic characteristics. This research is therefore embarked upon to evaluate the proximate compositions of *J. curcas* seeds from different locations.

## 2. MATERIALS AND METHODS

### Collection of Plant Materials

A composite collection of *J. curcas* fruits were gotten between the months of July and September 2009 at several locations within Kaduna and Edo states (Nigeria). They were dried in shades after which they were dehusked. Composite seeds from India were requested for and neatly parceled down to National Research Institute for Chemical Technology (NARICT), Nigeria. The seeds were then properly cleaned and stored in containers at room temperature.

### Sample Preparation

Just before the analysis, the cleaned seeds from each location were weighed and blended (both kernel and shell; to simulate what is actually done in practice when oil is being extracted from *J. curcas* seeds via an oil expelling machine).

### Sample Analysis

The dried grinded sample was extracted with petroleum ether (boiling point 40-60°C) using a soxhlet apparatus to obtain the crude lipid content. Moisture content was obtained by heating the samples to a constant weight in a thermostatically controlled oven at 105°C. The ash and crude fibre contents were obtained using the methods described by Association of Official Analytical Chemists [7]. Protein was determined using the Kjeldhal method (Nx6.25) and carbohydrate was calculated by difference.

Analysis of data: All data represent means of duplicate determinations and are expressed as mean ± standard deviation.



### 3. RESULTS AND DISCUSSION

The *J. curcas* seeds were collected from three locations, which include India (southern Asia), Kaduna and Edo (both in Nigeria, West Africa). Proximate analysis of the processed seeds was carried out as outlined above and the results presented in table 1. The (%) crude protein level for seed from Edo was slightly higher ( $28.87 \pm 1.24$ ) than those of seeds from Kaduna,  $24.72 \pm 0.00$  and India,  $21.11 \pm 1.09$ . These values however, favorably compare with  $29.40 \pm 1.04$  as reported by [6] and  $32.88 \pm 3.98$  as reported by [8]. However, the crude lipid content for seeds from Kaduna was higher,  $37.85 \pm 4.11$  than those from India,  $32.75 \pm 0.64$  and Edo,  $29.95 \pm 0.50$ . On the other hand, the crude carbohydrate contents were considerably low for all the seeds, with Kaduna having  $11.92 \pm 2.95$ , while India and Edo had  $18.58 \pm 1.64$  and  $15.51 \pm 0.97$  respectively. These results show that the three seeds are of high nutritional values and can be used as both protein and energy source in animal feeds, as the Recommended Daily Allowance (RDA) for protein is 28 and that of carbohydrates is 2,800 as reported for poultry birds [9]. Also, the result showed comparable levels of the three nutrients. This means that the nutrient contents of the *J. curcas* seed was not really dependent on the geographical location where the seeds were harvested. Also, the crude fibre contents were relatively high in the three seeds, with Kaduna having  $16.76 \pm 0.59$ , India,  $18.56 \pm 0.62$  and Edo,  $16.16 \pm 1.00$ . These do not tally well with  $2.57 \pm 0.35$  reported by [6] and  $3.81 \pm 3.96$  as reported by [8]. This is due to the fact that whole seed (including kernel and shell) was used for the analysis unlike other reports where kernel alone is used. However, the result shows that *J. curcas* seed is a good source of roughage in animal feed and plays a good role in colon cleansing. The ash contents were equally comparable with Kaduna having  $4.75 \pm 1.06$ , India having  $4.25 \pm 0.36$  and that of Edo  $3.75 \pm 0.36$ . This makes it a good source of minerals. The moisture content was also comparable, with Kaduna having  $4.00 \pm 0.71$ , while India and Edo had  $4.75 \pm 0.36$  and  $5.75 \pm 1.06$  respectively. The above results show that *J. curcas* seeds, irrespective of where they are cultivated, are good sources of animal nutrients, as they seem to have all the basic nutrients in amounts that can reasonably sustain life.

### 4. CONCLUSION

*Jatropha curcas* seeds are usually not given much attention in nutritional research due to the presence of the toxicants and anti-nutrients. However the result of the proximate analysis of the seeds from three geographical locations showed high presence of Carbohydrate, Protein and Lipid. Also present are Crude fibre and Ash, showing that it is a

good source of minerals for animal nutrition and has high colon cleansing ability. It is therefore a good potential source of animal nutrition if subjected to appropriate detoxification processes.

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**Table 1: Proximate Composition of J. Curcas Seeds from Kaduna, India and Edo**

Parameter	Sampling location	Nutrient (%)
Moisture	Kaduna	4.00±0.71 <sup>a</sup>
	India	4.75±0.35 <sup>a</sup>
	Edo	3.51±0.72 <sup>a</sup>
Ash	Kaduna	4.75±0.35 <sup>a</sup>
	India	4.25±0.35 <sup>a</sup>
	Edo	3.75±0.35 <sup>a</sup>
Lipid	Kaduna	37.85±3.18 <sup>b</sup>
	India	32.75±0.63 <sup>ab</sup>
	Edo	29.95±0.40 <sup>a</sup>
Crude Protein	Kaduna	24.72±0.00 <sup>a</sup>
	India	21.11±1.08 <sup>b</sup>
	Edo	28.87±1.23 <sup>c</sup>
Crude Fibre	Kaduna	16.75±0.58 <sup>a</sup>
	India	18.56±0.62 <sup>a</sup>
	Edo	16.16±1.00 <sup>a</sup>
Carbohydrate	Kaduna	11.93±2.94 <sup>a</sup>
	India	18.58±1.64 <sup>b</sup>
	Edo	15.51±0.96 <sup>ab</sup>

Values are mean ± SD for duplicate analysis of each sample.

Mean values in the same column for a parameter followed by the same superscript letters are not significantly different ( $p > 0.05$ ).