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NUTRIENT PROFILE AND BOTANICAL DESCRIPTION OF AN EXOTIC *JATROPHA* sp EATEN AS LEAF VEGETABLE IN SOUTH WEST NIGERIA.

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Abstract:

The nutrient profile and botanical characteristics of an exotic Jatropha sp. that is assuming prominence as a leaf vegetable in South-west Nigeria were studied. The plant is a small shrub and it is generally succulent like many of the native species of Jatropha. Its leaves are palmately lobed and the stems have prominent lenticels. Exudate from the plant causes severe itching on human skin. The inflorescences are unisexual. The female flowers have not been found to produce fruits, consequently propagation is mainly by stem cuttings. The floral formulas are $K_{(5)}C_5A_oG_3$ *and* $K_{(5)}C_5A_{5+(5)}G_o$

The nutrient contents of the seven plants sampled across three locations showed variable trends. The dry matter (DM), ether extract (EE) and crude fibre (CF) of all the plants across the locations did not differ significantly while the crude protein (CP), ash, nitrogen-free extract (NFE), nitrogen (N), Phosphorus (P), Magnesium (Mg), Potassium (K) and Calcium (G) contents differ significantly among the plants across the locations.

Keyword: Nutrient profile, botanical characteristics, Jatropha, vegetable.

Introduction

The genus *Jatropha* belongs to the family Euphorbiaceae, tribe crotonae. Hutchinson and Dalziel (1980) recognised eight species in the genus *Jatropha* in West Africa which only grow wild or as ornamental. The *Jatropha* species reported in this paper does not have the type of morphological characteristics described for the eight species found in West Africa. This therefore suggests that the species may be exotic. An unconfirmed report among the Catholic Community at Ile-Ife stated that the plant was introduced from Isreal to Ile-Ife (Nigeria) by a Catholic Reverend Father in the early 1980s. Gardeners at Ilesha and Ibadan from whom samples for this research were collected confirmed that the planting materials were acquired directly from Ile-Ife or from persons who collected the materials from Ile-Ife. Hence, the Jatropha sp. has

been locally named at Ile-Ife as "*efo catholic*" or *"efo father"*, literally translated as *"Catholic vegetable"* or "*Reverend Father Vegetable"*, respectively. Users of this vegetable stated that the succulent leaves are used with other culinary ingredients to make very palatable soup. Studies conducted in Nigeria and other parts of the world showed that leaf vegetable contribute substantially to the nutrient requirement of man. Adebooye (1996) reported that the nutrient composition of six locally consumed leaf vegetables of south-west Nigeria meet the Recommended Dietary Allowance (RDA) of the United States. The food values of some leaf vegetables have been reported to be capable of substituting for meat, egg and milk, if eaten in sufficiently large amount (Oke, 1966). Therefore, many malnutrition problems in Nigeria can be solved by vegetable consumption moreso now when the level of poverty is high and majority of Nigerians cannot pay for milk, egg and meat.

Ologunde *et al.* (1992) stressed the need for identifying novel, high quality but cheap sources of protein and energy in the Third World countries, especially Nigeria because of dwindling returns from existing sources. This therefore called for identifying a broader range of plant species which have potential as major food sources and for developing these for efficient production in the Nigerian economy. This study was therefore conducted to investigate the nutrient profile of this new vegetable *Jatropha sp.*, and its botanical characteristics.

Materials and Methods

At Ile-Ife, Ibadan and Ilesha, all in South-west Nigeria, seven vigorous plants each were identified in seven Catholic homes. The plants were selected based on the uniformity of the age of which they were planted by their owners, and the general vigour of the plants (assessed by visual observation). The plants were between 10 and 14 months old. The seven plants in each location were coded letters A, B, C, D, E, F and G.

Samples of succulent leaves without petioles that are usually eaten as leaf vegetable were collected in triplicate from each plant for nutrient content study. Samples of vegetative and floral parts were also collected for morphological and taxonomic studies. voucher specimens of the materials were deposited at the Obafemi Awolowo University herbarium (IFE). Taxonomic and morphological studies were carried out at the Cytogenetics Laboratory, Department of Botany, Obafemi Awolowo University, Ile-Ife.

The succulent leaf samples collected were bagged separately and taken to the laboratory for chemical analyses. The samples were washed and rinsed twice to remove contaminants. Samples were thereafter air-dried for one hour and 500g fresh weight of each sample was measured out in triplicate for analysis. Samples were put in oven at

80□C for 72 hours to determine the dry matter (DM) contents. The dried samples were ground separately in a Wiley microhammer stainless stell mill. The ash contents were determined by igniting 2.0g of the ground sample in muffle furnace at 500□C for 5 hours. The crude fibre (CF) contents were determined by digesting 2.0g ground samples in boiling 1.25% H_2SO_4 and 1.25% NaOH. The ether extract (fat) (EE) was determined by Soxhlet extraction technique. The crude protein (CP) contents were determined by first determining the nitrogen (N) contents by micro-kjedahl method and multiplying the N value by 6.25. The nitrogen free extract (NFE) were determined by summing up the percent ash, CF, CP and EE and deducting from 100. All analytical methods described follow the Association of Official Analytical Chemists (AOAC) (1984) techniques.

Samples were digested in tripartite mixture of HNO_3, H_2SO_4 and $HCl0_4$. The digests were used for Phosphorus (P) determination by vanadomolybdate yellow colour method, potassium (K) by flame photometry, while calcium (Ca) and Magnesium (Mg) were determined by atomic absorption spectrophotometry.

Data on nutrient composition were subjected to statistical analysis using the standard methods for factorial experiment in randomized complete block design (RCBD) according to Gomez and Gomez (1984). All drawings (Figs. 1 a-E and 2A-F) are original illustrations done by the second author.

Results and Discussions

Botanical Description

Figures 1 and 2 show the vegetative and reproductive parts of the plant. The plant is a succulent shrub up to 3.5m tall. The twigs have prominent lenticels (Fig. 1a). Broken twigs exude clear juice. The leaves are simple, alternate and palmately lobed with palmate main veins (Figs. 1A and 2A). The copious clear exudate produced from broken parts of the plant causes severe itching on human skin. the inflorescence is a cymose panicle and unisexual; the female inflorescence is more condensed than the male (Figs. 1A and 2A). The male and female flowers in bud are shown in Figures 1B and 2B, respectively. Male and female flowers are actinomorphic, sessile and petalous Fig. 1c and 2c. Figure 1D shows the male half flower with two stamens in two whorls joined basally around an incipient gynoecium. The incipient gynoecium bears a style terminating in three branches. The petals and sepals are joined basically. The female flower with petals removed is shown in Figure 2D. The style terminated in three stigma branches and the androecium which is non-functioning is represented by ten staminodes coalescing around the ovary. All plants sampled had not produced fruits

since they were planted, consequently propagation is mainly by stem cuttings.

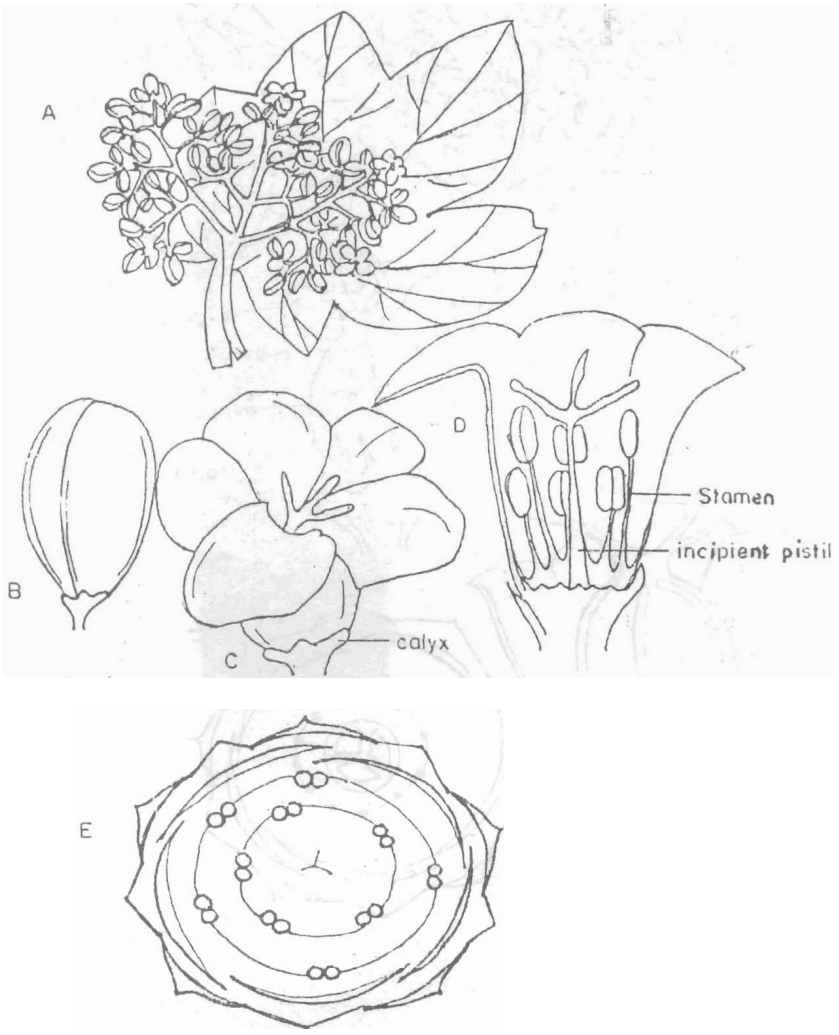

Figure 1: Characteristics of male inflorescence and male flower in *Jatropha sp*

A: Male inflorescence and the leaf.
B: Male flower in bud, C: Open male flower
D: Half of male flower, E: Floral diagram of male Flower.

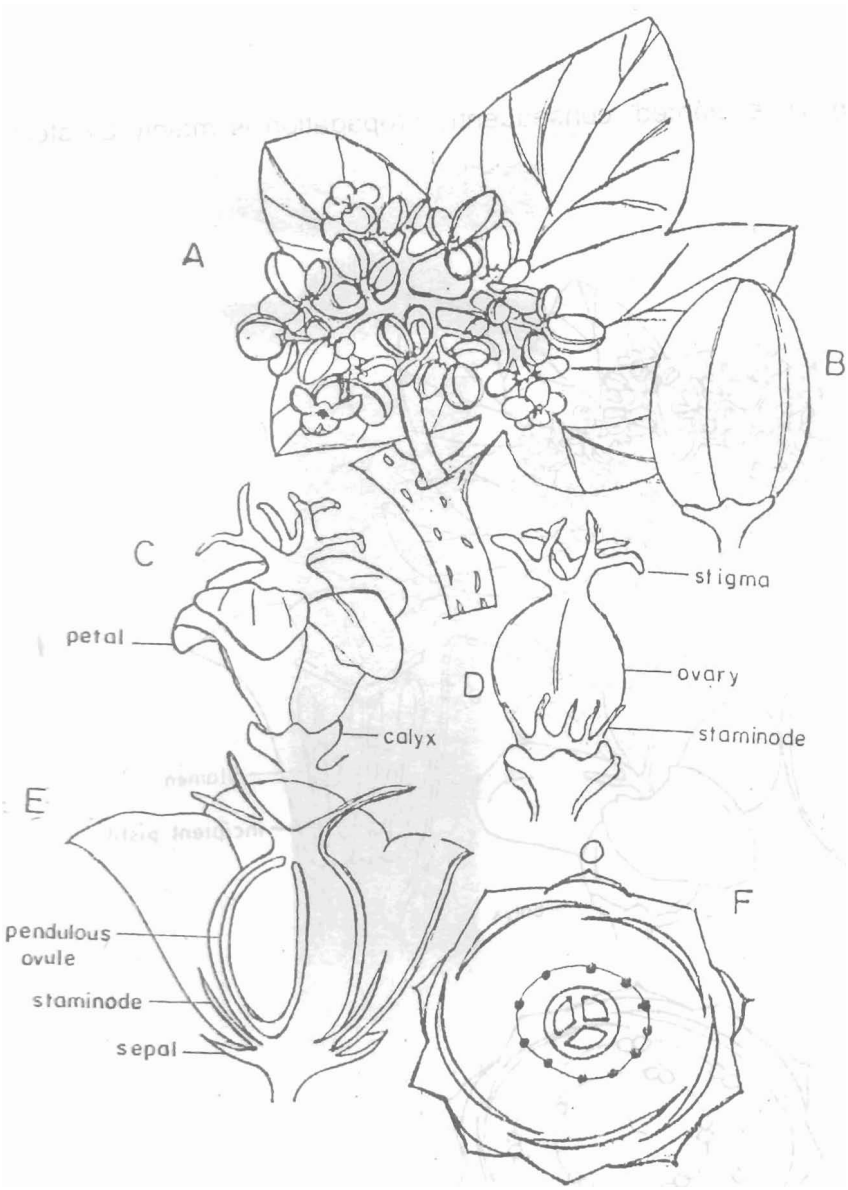

Figure 2: Characteristics of female inflorescence and female flowers in Jatropha sp.

A: Twig and female inflorescence
B: Female flower in bud
C: Opened female flower
D: Female flower with petal removed
E: Half of female flower
F: Floral giagram of female flower.

The female half flower (Fig. 2E) shows the gynoecium with three typically euphorbiacous carpels each with one pendulous ovule. From the floral diagrams (Figs. 1E and 2F), the floral formulas can be written as ♀$(K_{(5)}C_5A_{(5)+(5)}G_o$ and ♀ $K_{(5)}C_5A_oG_3$.

Nutrient Profile

Figure 3(a-f) shows the percent composition of organic constituents of the *Jatropha* sp studied. Results showed that the seven plants used for this study did not differ significantly ($P \leq 0.05$) in their DM, EE and CF contents across the locations. The percent CP, NFE and ash compositions differ significantly among the plants and across the locations. The lowest CP contents (Fig.1b) of Plant A from Ilesha, and **Plant C and G from Ile-Ife are significantly lower than the values** obtained for all other plants in other locations. The highest CP content of Plant D from Ibadan is 52.9%, 44.4% and 44.4% higher than the values obtained for Plant A from Ilesha, and Plants C and G from Ile-Ife, respectively. The ash contents (Fig.le) of Plant G from all the locations did not differ significantly ($P<0.05$). The highest ask content (13.2) was recorded for Plant F from Ile-Ife while the lowest (9.6) was recorded for Plant A from Ile-Ife.

The NFE contents (Fig. 3f) for plant E from all the locations did not differ significantly. However, the NFE contents of Plant C differ significantly for the three locations. The highest NFE content of Plant B from Ibadan is 12.4% higher than the lowest recorded for Plant C from Ile-Ife. Generally, there was a considerable difference among the plants across the locations with respect to CP, ash and NFE contents.

The uniformity of DM, EE and CF values (Figs. 3a, c and d) obtained for all the plants across the locations may be due to fixed genetic factor. It can also be suggested that an interplay of physiological x genetic factors may determine in a fixed term the DM, EE and NFE contents of the *Jatropha* sp used for this study. The differences obtained with respect to CP, ash and NFE contents may be attributed to differences in location, age of the plants and cultural treatments imposed on the plants by the gardeners. It has been reported that the nutrient composition of plant materials vary with the cultivar grown, cultural practices, environment, the season and methods of preparation (Purseglove, 1987). Also, the age at sampling has been reported by Oke (1966) to have an effect on nutrient composition of some Nigerian vegetables.

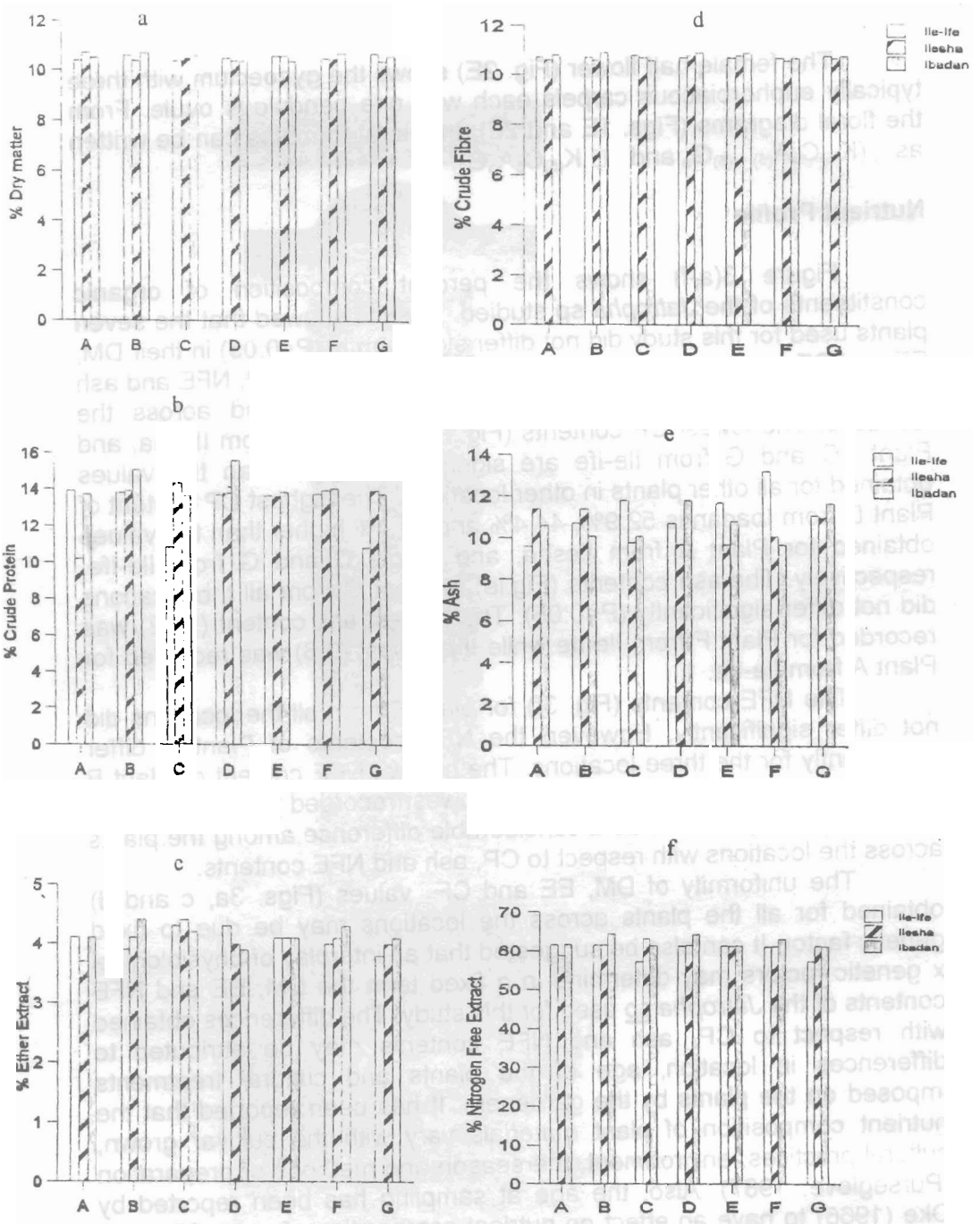

Fig. 3: Proximate composition of exotic *Jatropha sp.* (a) Dry Matter (b) crude protein CP, (c) ether extract, (d) crude fibre, (e) ash, and (f) nitrogen fixing extract, collected from three locations in south-western Nigeria.

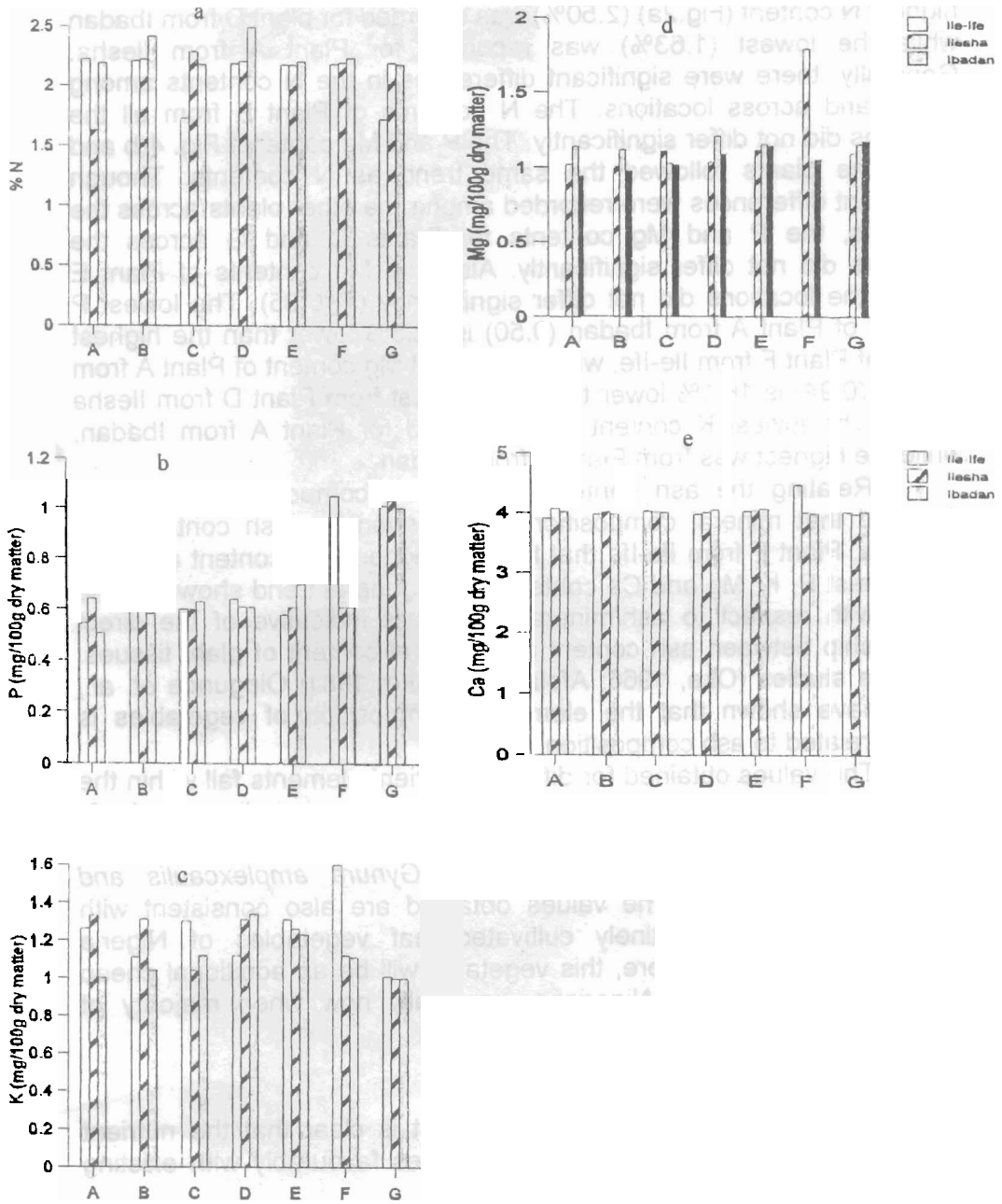

Fig 4:Elemental nutrient composition of an exotic *Jatropha sp.* from three locations in Southwestern Nigeria.

Figure 4(a-c) shows the nutrient composition of the vegetable. The highest N content (Fig.2a) (2.50%) was recorded for plant D from Ibadan while the lowest (1.63%) was recorded for Plant A from Ilesha. Generally, there were significant differences in the N contents among plants and across locations. The N contents of Plant E from all the locations did not differ significantly. The P and Mg contents Fig. 4(b and d) of the plants followed the same trend as N contents. Though significant differences were recorded among the other plants across the locations, the P and Mg contents for Plants C and G across the locations did not differ significantly. Also, the Mg contents of Plant E across the locations did not differ significantly ($P \leq 0.05$). The lowest P content of Plant A from Ibadan (0.50) is 52.3% lower than the highest (1.05) of Plant F from Ile-Ife, while the lowest Mg content of Plant A from Ibadan (0.94) is 16.1% lower than the highest from Plant D from Ilesha (1.12). The lowest K content was recorded for Plant A from Ibadan, while the highest was from Plant D from Ibadan.

Relating the ash contents to nutrient composition, it can be deduced that mineral composition is dependent on ash content. For example, Plant F from Ile-Ife that had the highest ash content also had the highest P, K, Mg and Ca contents. The general trend shown by the plants with respect to ash/mineral content is indicative of the direct relationship between ash content and mineral content of plant tissues. Previous studies (Oke, 1966; Afolabi and Oke, 1981; Ologunde *et. al.*, 1992) have shown that the elemental composition of vegetables is directly related to ash composition.

The values obtained for different nutrient elements fall within the ranges that were reported by Adebooye (1996) for six indigenous leafy vegetables of South-west Nigeria and those reported by Oke (1966) for *Heinsia pulchella, Selanum nodiflorum, Gynura amplexcaulis and Myrianthus arboreus.* The values obtained are also consistent with those reported for routinely cultivated leaf vegetables of Nigeria (NIHORT, 1988). Therefore, this vegetable will be an additional cheap source of nutrients for Nigerians, especially now when majority of Nigerians cannot pay for milk, egg and meat.

Conclusion

From the results of this research, it is clear that the nutrient composition is high enough, and it compares favourably with existing leaf vegetables of Nigeria.

Since no known native species of *Jatropha* is eaten as leaf vegetable, at least in South-west Nigeria, it is worthwhile to study fully the chemical composition of this plant to establish its suitability or otherwise for human consumption. After such studies, if the consumption is medically safe, efforts should be made to study the

mode of reproduction, and thus improve the species for better performance and include it in the cropping system.

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