

ASSESSMENT OF THE NUTRITIVE VALUE OF SOME INDIGENOUS WILD FRUITS FOR DOMESTIC CONSUMPTION AND INDUSTRIAL UTILIZATION.

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ABSTRACT

Fruits of *Landophia owerriensis*(Utu), *Dialium guineensis*(Nkwa), *Dennettia tripetala*(Umimi) and *Tetracarpidium conophorum*(Ukpa), were collected from trees growing at Umudike, South Eastern Nigeria and their nutritive values determined. The fruits of these plants were analyzed for proximate, mineral constituents and phytochemical composition. The fruits were later sorted into proteinacious species depending on the level of protein. The percentage moisture content (M.C.%) values range from 10.99% to 12.68%. The percentage carbohydrate (CHO) range from 49-69% while the phosphorus (P) values are high and range from 223.92% in *Dennettia tripetala* to 301.63% in *Tetracarpidium conophorum*. Calcium also recorded a high value on dry weight basis. Hydroxyanic acid (HCN) values are low ranging from 0.53mg/kg in *Landophia owerriensis*. Phenol is about 0.23%. The values of alkaloid are low ranging from 0.37% in *Dialium guineensis* to 0.65% in *Landophia owerriensis*. The study showed that the fruits of these species are good sources of a wide variety of nutrients. The regular consumption of these fruits is essential to the healthy living of the population and for small scale industries.

KEY WORDS: Nutritive Value, Proximate Composition, Mineral Content, Fruits, Phytochemicals.

INTRODUCTION

Throughout West Africa, forests form an integral part of the rural economy, providing subsistence goods and services, as well as items of trade. Only a small amount and number of forest resources are utilized by man. For instance numerous wild fruits provide regular supplement to the diet, and in many cases represent a primary source of food. Some of these fruits have not been utilized by man and also have not contributed significantly to industrial use. The wild fruits can be analyzed to produce protein, ash, crude fibre, lipids, and numerous phytochemical for industrial and domestic uses. Fruits of *Landophia owerriensis*, *Dialium guineensis*, *Dennettia tripetala* and *Tetracarpidium conophorum* could provide food nutrients that are essential to the body.

Landophia owerriensis belongs to the family Apocynaceae. It is a tropical species and a climber and in some sites can be seen as a long or small subrect shrub with only terminal inflorescence. Fruits are globose and take three to four months to ripen. Fruiting is profuse from the first year of flowering and this gives rise to a good crop of healthy seeds every year. *Landophia owerriensis* fruit is succulent, ovoid or oblong drupe 48cm long. It is whitish grey yellow when ripe with 8-30 seeded pericarp (Fig 1).

Dennettia tripetala is a tree of the rainforest and occasionally found in the savanna areas. It belongs to the family Annonaceae and a very useful plant of West Africa. The young leaves are chewed on account of their pungent spicy taste. The fruits, green at first then turning red, ripen in April and may have a peppery spicy taste. The fruit is a good source of vitamins (Fig 2).

Tetracarpidium conophorum is a climbing shrub. The white flowers develop into 4 pods each with 4 seeds. The pods sun dry on the vine. The seed or nuts are flattened spheres about the size of a penny. The seeds contain a substance which gives them a bitter taste if not roasted. It is cultivated for its oil rich fruits.

Phytochemicals are present in a variety of plants utilized as important components of both human and animal diet. They are organic substances that are found in plants. They are polyphenols viz phenolic hydrolysable, tannin, and flavonoids. These are antioxidants which impart bright colors to fruits and vegetables. They exhibit anticarcinogenic and antimutagenic effects. Clearly with such a wide variety of protective phytochemicals present in fruits, vegetables, whole grain, nuts, legumes and herbal seasoning, the regular consumption of these fruits is essential to ensuring a healthier population with lower risks of heart disease and cancer. Analytical screening of phytochemicals has aided the determination of the presence of tannins, saponins, alkaloids, phenols that are contained in a particular plant. (Harborne, 1973).

The objectives of this study were to chemically analyze the fruits of *landophia Owerriensis*, *Dennettia*, *Tetracarpidium* and *Dialium guineensis* after extracting the seeds to determine their proximate composition and phytochemical content and nutritive value.

MATERIALS AND METHODS

Landophia owerriensis seeds and the seeds of the other wild fruits. *Dennettia tripetala*, *Tetracarpidium conophorum* and *Dialium guineensis* were collected from Umudike, in south eastern Nigeria and sorted into

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their different species. They were dried in the moisture extraction oven at a temperature of 65°C. The proximate composition and phytochemical contents of each species was determined by standard methods used in laboratories. The initial fresh weights of the collected samples were taken to determine the moisture contents of the seeds. They were dried in the moisture content oven at a temperature of 65°C. 2.5g of the oven dry seeds were milled and chemically analysed with the A. O. A. C (1975) method for the following attributes: crude protein, Ash, crude fibre, Fat, Carbohydrate, Phosphorous, Sodium, Calcium and Magnesium. Nitrogen determination was by semi-micro kjedal method. Phosphorous (P) was determined by the use of atomic absorption spectrophotometer using the procedures of A.O.A.C (1975).

Crude protein was obtained by multiplying the N value by a factor (6.25). crude fiber (%) was determined by the use of neutralization method involving 25N H₂SO₄ and 0.313 NaOH. This process involves defatting the sample with petroleum ether for about 2hr. Percentage fat was also determined using the soxhlet extractors while carbohydrate content was determined using the method of Pearson and James (1995). The carbohydrate was calculated by adding up the values of Crude protein, Crude fibre, Fat and Ash and subtracted from 100% to obtain the NFE (Nitrogen free extract). The phytochemical contents of the species, (Alkaloid, Phenol, Saponin, Flavonoid, Tannin, and HCN) were determined using standard methods in laboratories. Flavonoid was determined using Harborne (1973) method. Alkaloid was determined in accordance with the alkaline precipitation gravimetric method Harborne (1973) while saponin content was determined by double solvent extraction gravimetric method Harborne (1973).

Tannin was determined using the Follins-Dennis spectrophotometric method (Pearson, 1976). The same method was used in determining the phenol content of the species. The percentage hydrogen cyanide content was determined by the alkaline titration method involving the use of 25% NaOH, 6N NH₄OH solution, 5% potassium iodide and 0.02N silver nitrate solution. (AOAC, 1975). The data was analyzed using Analysis of Variance (ANOVA).

RESULTS AND DISCUSSION

The proximate composition of the species in terms of ash, crude protein (C.P), crude fibre (C.F), extractable fat, carbohydrate and percentage moisture content are shown in Table 1. Crude protein values for the species ranged from 6.42% in *Landophia owariensis* to 12.83% in *Tetracapedium conophorum* with a mean of 5.56% for all the species. The result indicates that the seeds of these species have C.P values greater than 5% on dry matter basis. The C.P values in this study compare favorably well with those of Oyenuga (1968). The mean total moisture content (MC%) values of the species in Table 1 were 12.04%. Moisture content did not depend on degree of ripeness. The biochemical processes with fruit ripening change their nutritive value significantly. The values also show that the food value of the species compare favorably with those of popular fruits. The crude fibre values of the species range from 1.47% in *Tetracapedium conophorum* to 50.7% in *Landophia owariensis* with a mean of 17.22%. The values compare well with those of Oyenuga (1968) for the edible portion of coconut (11.0%), cocoa beans (14.3%) whole fruit of the African locust bean (12.7%) and peeled yam tuber (11.2%). Palatability of the seed is generally influenced by the crude fibre content of the seed Wilson (1966).

Extractable fat in seeds ranged between 5.92% in *Landophia owariensis* and 18.20% in *Tetracapedium conophorum*. Fat is usually converted to energy in the body. Thus higher fat content in the seeds mean higher energy. Fats are, of course, obtained from carbohydrates which are present in seeds.

Table 3 shows the value of mineral content of the species (Ca, Na, Mg, P). The calcium content of the species ranged between 21.38% to 34.73%. The mean content of Ca were in the following significant order of *Tetracapedium conophorum* > *Dennetia tripetela* > *Dialum guineensis* > *Landophia owariensis*. The phosphorus content of these species is high. Phosphorus plays a vital role in the general body health by its regulatory function. Calcium which is important in bone maintenance is high in *Tetracapedium conophorum* and *Dennetia tripetela*. Rations should contain at least 0.2% of the dry matter as Ca and P (A.R.C, 1965).

TABLES 1: Proximate composition of plant species % on Dry Matter Basis

Name of species	Total M..C					
	%	Ash	C.P	C.F	Fat	CHO
<i>Landophia owariensis</i>	12.33	6.43	6.42	50.7	5.92	63.83
<i>Dialum guineensis</i>	10.99	5.04	9.68	3.11	1.31	69.87
<i>Dennetia tripetela</i>	12.16	5.85	12.19	13.60	5.53	50.67
<i>Tetracapedium conophorum</i>	12.68	4.92	12.83	1.47	18.20	49.90

TABLES 2: Protein Content

Name of species	%CP
Landophia owariensis	6.42
Dialum guineensis	9.68
Dennettia tripetala	12.19
Tetracapedium conophorum	12.83

- Proteinaceous spp are all those having C.P values greater than 5% (dry matter basis) *

TABLE 3: Mineral content of species on Dry weight Basis (%)

Name of Species	Ca	Na	Mg	P
Landophia owariensis	21.38	38.10	18.40	267.67
Dialum guineensis	25.39	41.10	30.40	295.67
Dennettia tripetala	34.73	18.70	22.40	223.92
Tetracapedium conophorum	109.55	24.80	42.40	301.63

TABLE 4: Phytochemical composition of the plant species

Name of species	Alkaloid %	phenol %	saponin %	flavonoid %	Tannin %	HCN (mg/kg)
Landophia owariensis	0.65	0.22	0.62	0.61	0.69	13.01
Dialum guineensis	0.37	0.19	0.35	1.04	0.18	6.70
Dennettia tripetala	0.41	0.23	0.73	0.53	0.38	11.53
Tetracapidium conophorum	0.53	0.23	1.18	0.45	0.58	0.53

Plate One: *Landophia owariensis*Plate Two: *Dialium guineensis*

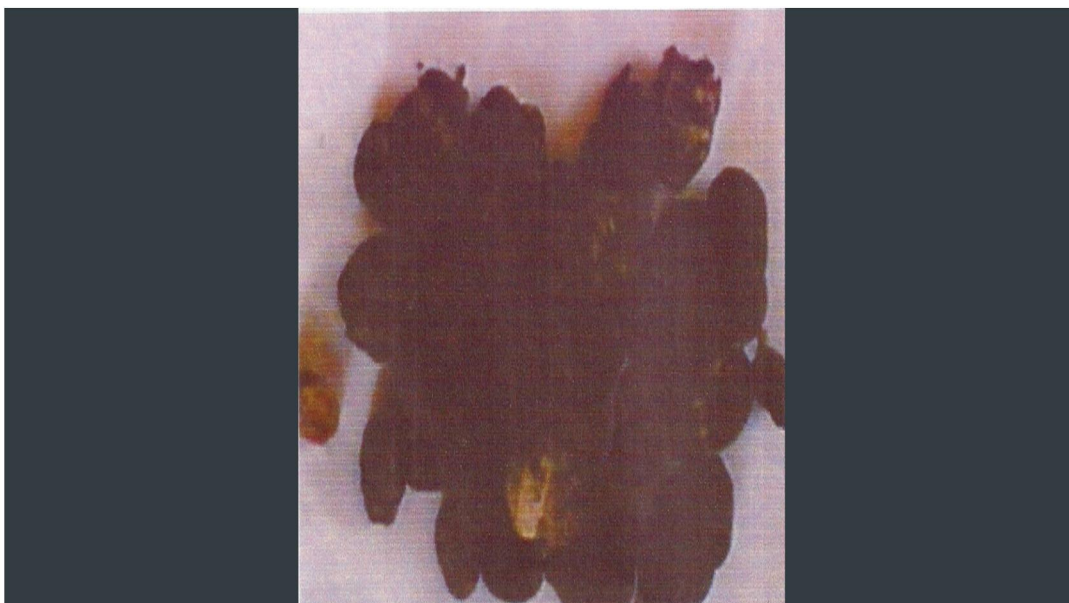


Plate Three: *Dennettia tripetala*

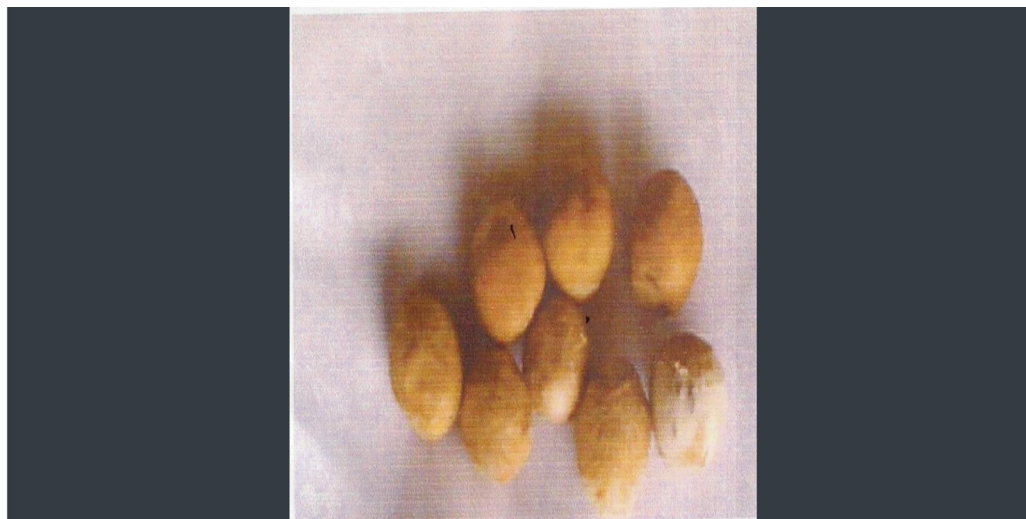


Plate Four: *Tetracarpidium conophorum*

CONCLUSION

The nutritive value of the species under study viz *Landophia oweriensis*, *Dennettia tripetala*, *Dialum guineensis* and *Tetracarpidium conophorum* fruits compare favorably with other popular fruits and the amounts of toxic substances are well below the recorded critical level. The fruits of these species are good sources of phytochemicals, minerals and other nutrients. With the wide variety of phytochemicals present in the fruits of these species, the regular consumption of these fruits is essential to the healthy living of the population and for small scale industrial set up.

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