COMPARATIVE CHEMICAL EVALUATION OF LOCUST BEAN (*Parkia biglobosa*) FRUIT PULP HARVESTED DURING THE DRY AND WET SEASONS.

***M. S. Nadro and H. A. Umaru**
Department of Biochemistry
Federal University of Technology
P. M. B. 2076, Yola
Adamawa State.
NIGERIA.

ABSTRACT

Proximate analysis of Parkia biglobosa (Locust bean) fruit pulp was carried out to determine moisture, fat, protein, carbohydrate and some vitamins. Results indicate that samples harvested after the commencement of the rains contained higher percentages of moisture 15.83 ± 0.78 as compared to 11.30 ± 2.04, fat 37.10 ± 2.0 as compared to 36.80 ± 1.86, ascorbic acid (vitamin C) 3.16 ± 0.53 as compared to 2.80 ± 0.19. However carbohydrate and protein contents are higher in the samples harvested during dry season (37.66 ± 2.01 as compared to 30.70 ± 0.46 and 8.5 ± 0.07 as compared to 7.5 ± 0.92 respectively) samples harvested before the commencement of the rains contained high amount vitamin E (1450 ± 18.00) ug/100g as compared to (1090 ± 15.00) ug/100g. Overall, there was no significant difference (p=0.05) between the proximate nutritional compositions of the two samples.

Key words: *Parkia biglobosa fruit pulp, proximate analysis, vitamins*

*: **All correspondences.**

INTRODUCTION.

In Nigeria a variety of edible fruit bearing trees abound. Some of these are cultivated while others grow in the wild and several wild species bear fruits during the dry season, especially towards the beginning of the rainy season. Several of these wild fruits remained unused due to ignorance. The locust bean tree is an example (Ghazanfar, 1989).

The Locust bean fruits appear in bunches of pods, which vary in length between 12-27cm. The seeds are dark brown in colour and are embedded in a yellow powdery pulp. The seeds contain about 20% semi liquid oil, 20-25% protein and are very rich in minerals particularly phosphorus and iron. The seeds also contain about 35% carbohydrates which are mostly non-reducing sugars (Odunfa, 1988). The yellow powdery pulp is consumed in some parts of Nigeria and may be fermented locally into a paste that is eaten as cereal foods. The pulp is a good source of carotene, a precursor of vitamin A, which is an anti-infective vitamin (Reinhold, 1989). The pod is rich in fair proportion of minerals and high in fibre. The husk contains hydrolysable and non-hydrolysable tannin, which is a valuable source of tannin for leather industry particularly in the production of a particle, board that is imporous to water (Oyenuga, 1965). Locust

bean has the highest tannin content of all Nigeria trees so far screened (Odunfa, 1988). Its tannin belongs to condensed catechol class (Reinhold, 1989).

The production and distribution of fruits tend to vary on seasonal bases with the season of scarcity occuring during the dry season. Wild fruits, seeds and vegetables offer a convenient but cheap means of providing adequate supplies of vitamins, minerals, fats, proteins, carbohydrates and fibre to people living within the tropics (Carlowitz, 1985). Wild fruits are particularly important during the dry or planting season and before harvest periods when several communities within the savannah and drier region pass through a period of low nutrient availability (Madusolumuo and Akogun, 1998). Most affected are children of pre school age group with most cases of morbidity related to inadequate intake of food containing essential nutrient (Igbedioh et al, 1996). Food preferences and high cost of obtaining fruits do not help the situation. The affordability as a factor is responsible for the high incidence of malnutrition in low-income families (Madusolumuo and Akogun, 1998).

The locust bean fruit pulp can be used as a supplement to a relatively or more costly cultivated fruits. The locust beans are not normally used for food in their natural state. The yellow powdery pulp of the fruit that is edible can also be fermented into a paste, which is eaten as cereal foods. The fermentation makes the locust bean and its pulp edible by increasing the digestibility and removing some objectionable flavours. The toxic components of the fruits such as phytic acid and oxalate are reduced during fermentation (Odunfa, 1982). Proteins are also hydrolysed to amino acids during fermentation hence making them more digestible (Eka, 1980).

Very little is however, known about the nutritional composition of several of the wild fruits found in the Savannah region of Nigeria. Eromosele et al (1991) reported that some wild fruits have higher nutritional values compared with levels found in cultivated fruits. It would thus be helpful if information on the nutritional value of wild fruits were provided to further guide choice and effective utilization of these fruits at those periods when they become very useful.

MATERIALS AND METHODS.

Two different samples of locust bean fruit (dry and wet season samples) were used for this study. One sample was harvested during the dry season, while the other was harvested after the commencement of the rainy season. The fruit pulp was separated from the seeds with the aid of mortar and pestle. Powder was obtained using an lmm test sieve (Endocott, London)

Depending on the food component to be determined, different quantities of the samples were used in the analysis. The method described by Skoog and West (1974) was used for fat and crude protein determination while ash, vitamins A, B_1, B_2, C, D, E and moisture contents were determined as described by AOAC (1980). Carbohydrate content was however determined by difference. Student's t-test was used to analyse the results.

RESULTS AND DISCUSSION.

The result of the comparative proximate composition of *P. biglobosa* fruits pulp harvested in dry and wet seasons is as shown in table 1.

Table 1: Comparative proximate composition of *Parkia biglobosa* fruit pulp harvested in dry and wet seasons. (Mean ± SEM; n = 6).

Food constituent	Sample harvested in dry season (% composition)	Sample harvested in rainy season (% composition).
Carbohydrate	37.66 ± 2.01*	30.70 ± 0.46
Fat	36.80 ± 1.86	37.10 ± 2.10
Protein	8.50 ± 0.07	7.50 ± 0.92
Ash	5.73 ± 0.37	7.47 ± 1.21 ***
Moisture	11.30 ± 2.04	15.83 ± 0.78

*Significantly different ($P<0.05$) from carbohydrate in sample harvested during the rainy Season.

**Significantly different ($p<0.01$) as compared with ash content of the dry season sample

***Significantly different ($p<0.05$) as compared with moisture of the dry season sample.

Results of proximate analysis showed that samples collected during the rainy season contained higher amounts of fat, ash and ascorbic acid (vitamin C) as compared with samples collected during the dry season. On the contrary, carbohydrate, vitamin A, B_1, B2, D and E contents were significantly higher ($p<0.05$) in dry season samples as compared with the wet season samples probably due to the effect of rain, temperature and atmospheric oxygen (Miller and Hayes, 1982). This would have been due to leaching by rain since vitamins B1 and B2 are water-soluble. The decrease in vitamin D seems to agree with the findings of Grandy and Thakker (1980) that vitamin D is susceptible to decomposition by relative humidity, temperature and water. Carotene's and vitamin E are destroyed in the presence of high temperature and atmospheric oxygen to yield 5, 6 epoxide and biologically inactive quinones respectively Wilson et al; 1981.

The results suggest that both dry and wet season samples were good sources of carbohydrate and fat. Though the samples collected during the dry season contained higher amounts of carbohydrate, the pulp is hardly eaten before the onset of the rains since it has been observed to cause terrible stomach discomfort and nausea and is even believed to be poisonous.

The protein contents of both samples were not significantly different ($p>0.5$). Protein was present in reasonable amount in the pulp. The pulp that contains reasonable amounts of protein (20-25%) may serve as an important source of proteins especially for inhabitants of the Sahel region during the dry season when protein malnutrition is most common in the area (Madusolumuo and Akogun, 1998).

The ascorbic acid content of both samples was substantial (28-32%) though the amount in samples harvested during the rainy season was significantly higher ($p>0.05$) than the dry season samples (Table 2).

Table 2. Vitamins content of *Parkia biglobosa* fruit pulp harvested in dry and wet seasons (mean ± SEM;
n= 6).

Vitamins	Sample harvested in dry season (:g/100g)	Sample harvested in rainy season (:g/100g)
∃-carotene	5 ± 0.00	4 ± 0.00
B_1	50 ± 2.00*	34 ± 3.00
B_2	52 ± 2.00**	46 ± 4.00
C	2800 ± 19.00	3160 ± 53.00***
D	0.016 ± 0.003	0.013 ± 2.00
E	1450 ± 18.00****	1090 ± 15.00

*Significantly different ($p<0.05$) from vitamin B_1 harvested during the rainy season.

**Significantly different ($p<0.05$) from vitamin B_2 harvested during the rainy season.

***Significantly different ($p<0.05$) from vitamin C content of the dry sample.

****Significantly different ($p<0.05$) compared with vitamin E collected in rainy season.

The increase humidity appears to promote a detoxification process that may involve conversion of glucose to ascorbic acid, considering the fact that ascorbic acid is readily water soluble (Nelson and Cox, 2000). Furthermore, ascorbic acid has antioxidant property (Umar et al., 1999) and may further play a role in reducing toxic effect when wet season samples are consumed. This may be the basis of the wet season samples being quite less toxic than dry season samples.

SUMMARY AND CONCLUSION.

Our results suggest *P. biglobosa* fruit pulp as a useful source of essential vitamin moreso, when consumed in the wet season. In the North Eastern part of Nigeria where common fruits like oranges and banana are in short supply it is possible for wild fruits such as *biglobosa* to provide the vitamin requirements of the local populace. Specifically when the inhabitant of the region important consumes the fermented pulp of P biglobosa minerals are provided apart from serving as vitamin supplements to their diet. The extent to which this fruit pulp can provide dietary fulfillment in terms of vitamins and minerals is subject of an ongoing study.

REFERENCES.

Association of Official Analytical Chemist (AOAC) (1980). Methods of analysis. 3rd edn. Washington DC. P3-15.

Carlowitz, P.G. (1985). ICRADS" Multi-purpose tree and shrub information system" Agro-forestry system. 5: 312-338.

Eka, O. U. (1980). Effect of fermentation on the Nutrient status of Locust Beans Food Chemistry p303 - 308.

Eromosele, I.C; Eromosele, C.O. and Kuzh Kuzah, D.M. (1991). Evaluation of mineral elements and ascorbic acid Contents in some wild plants Plant Fd Hum. Nutr. 41: 151-154.

Ghazanfar, S.A. (1989). Savannah plants of Africa. Macmillan Publisher Ltd London. P81-133.

Grandy, L. T. and Yhakker, K. D. (1980). Stability of Solid Drug: Degradation of ergocalciferol (Vitamin D_2 and Cholecalciferol (Vitamin D_3) at high humidity and elevated temperatures J. Pharm 2 , 2 - 4

Igbedioh, S. O., Ogbeni; A. O. and Adole, C. M. (1996). Infant weaning practices of some Tiv Women resident in Makurdi, Nigeria. Nutr. and Hlth., II 13 - 28.

Madusolumuo, M.A and Akogun, O.B. (1998). Socio-cultural factors of malnutrition among under-five in Adamawa State, Nigeria. Nutrition Health 12: 257-262.

Miller, D.R. and Hayes K.C. (1982). Vitamin Excess and toxicity in Nutritional Toxicology, J.N. Hathcock, Edn. Academic press New York p81-133.

Nelson, D. L. and Cox. M. M. (2000). Carbohydrate biosynthesis in: Lehninger Principles of Biochemistry (3rd ed). Worth Publishers Pp. 743.

Nilson, J. L. G., Daves, G. D. and Folkers, K. (1968) New Tocopherol dimers. Acta chem. Scand. 22 200 - 206

Odunfa, S.A. (1988). Carbohydrate changes in fermenting locust bean during fermentation . Vol. 32. University Press Ibadan p3 - 10

Odunfa, S.A. (1988). Carbohydrate changes in fermenting locust bean during Preparation J. Fd. Comp. Anal. 32: 3-10.

Oyenuga, V. A. (1968). Nigeria Foods and Feeding Stuff. 3rd Edu. University Press Ibadan Nigeria p100 - 102

Reinhold, V.N. (1989). Vitamin A. Nostraquds Scientific Encyclopedia. 7th edn. Vol. 11 Macmillan Publishers Canada.

Skoog, D.A and West, D.M. (1974). Analytical Chemistry: An Introduction. 13th edn. Holt Rine Hort and Winston Inc. U.S.A. p271-273.

Umar, I.A. Toh, Z. A. Iabalojobi, F.I. Igbokwe I.O and Gidado, A. (1999). Effect of Orally administered Vitamin C and E on severity of anaemia in Trypanosome bruce-infected Rats. Trop vet 18: 71-77.