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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 11 (1): 139-141, 2008
ISSN 1028-8880
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Nutritional Evaluation of *Sterculia setigera* Seeds and Pod

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Abstract: The results obtained on analysis of the seeds and pods of *Sterculia setigera* for their nutritional composition revealed that while the seed sample has high crude protein, crude fibre, carbohydrate and fat contents, their contents in the pod sample was very low. The analysis of the mineral profile reveals that the seed of *Sterculia setigera* is rich in sodium, iron, zinc and manganese. Conversely, the mineral composition of the pod is low.

Key words: Nutritional, evaluation, *Sterculia setigera*, seeds, pod

INTRODUCTION

In developing countries, there is need for a constant search of new food resources to alleviate hunger, which arises from increasing population, shortage of fertile land and nonmechanization of the farming system. Predictions of the future needs based on the current rates of population increase and food production emphasize the seriousness of this problem. Non-timber forest products are important for food security, health, social and economic welfare of rural communities (FAO, 1990).

While every measure is being taken to boost food production by conventional agriculture, a lot of interest is currently being focused on the possibilities of exploiting the vast number of less familiar plant edible resources existing in the wild (Rao, 1994; Felger, 1979; USNAS, 1975). Recently, there have been reports in the literature on the nutritional and industrial potentials of seeds from edible fruits, some of which were hitherto, discarded (Adesomoju, 1987; Idigo, 1989; Ukhun and Uwatse, 1988). Most reports on some lesser-known and unconventional crops indicate that they could be good sources of nutrients and many have the potential of broadening the present narrow food base of the human species (Van Etten *et al*., 1995; Okigbo, 1977; Aletor and Aladetimi, 1989).

Sterculia setigera is a savanna tree. It is wide spread in the savanna area of tropical Africa; often characteristic of stony hills. It is deciduous, grows up to 12 m high and 15 m in girth. The bark is pale purplish, smooth with thin scales which peel off expose yellowish patches, exuding gummy sap. The 3-lobed leaves, 6-20 cm broad and long, broadly ovate and densely pubescent on both surfaces. Flowers are borne in small inflorescence in the previous year's shoots. The fruits are composed of 4 or 5 boat-shaped carpels which split to reveal about 12 slate-coloured seeds, 10-15 mm long (Keay, 1989).

This study was carried out to evaluate the nutrient composition of a wild gathered plant fruit (*Sterculia setigera*) in order to determine the suitability of its use in alleviating deficiencies of micro-nutrients, protein, energy and the prevention of nutritionally associated diseases.

MATERIALS AND METHODS

The study was conducted in 2006. The seed and pod samples of *Sterculia setigera* were collected from the same plant in Abuja, Nigeria and identified at Seed Research Laboratory Unit, Botany Department, University of Benin. The samples were dried for twenty-one days. The dried seed and the pods were milled to flour in a Wiley Mill to size of 60-mesh with suitable precaution to avoid contamination of the samples. The powders were stored in plastic containers at a room temperature until use. Three replicates were analysed for each of the sample and the standard error of each mean value determined.

Proximate analysis: Moisture content was determined by drying in an oven set at 105°C to dry to a constant weight. The nitrogen content was determined by micro-Kjeldahl method (Humphries, 1956) and crude protein content was calculated by multiplying the Nitrogen (N) value with a constant 6.25. The crude lipid content was estimated by extracting the sample with ether in Soxhlet extractor. The Total Dietary Fibre (TDF) content was determined by using non-enzymatic gravimetric method proposed by Li and Cardozo (1994). Also, the crude carbohydrate content was calculated according to Muller

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and Tobin (1980). The calorific values of the seed and pod were calculated by multiplying the crude protein, crude lipid and crude carbohydrate content by the factors 16.7, 37.7 and 16.7, respectively (Siddhuraju *et al*., 1992).

The samples were digested using two types of acid (perchloric and nitric). Jenway Digital flame photometer (mode: PFP 7) was used to measure the level of sodium, calcium and potassium in the seed and pod samples. Finally, cadmium, copper, magnesium, iron, zinc and manganese were estimated using Atomic Absorption Spectrophotometer (model: Buck 200, Buck Scientific, Norwalk).

RESULTS AND DISCUSSION

The crude protein was found to be 21.40% in the seed sample and 4.36% in the pod sample (Table 1). The result, though higher than earlier report on the same species (Ighodalo *et al*., 1993) is comparable to 22.86, 23 and 29% reported on seeds of *Teramnus labialis*, shelled rubber and *Vigna unguiculata* sp. *cylindrical* (Viswanathan *et al*., 1999; Ukhun and Uwatse, 1998; Thangadurai, 2005), respectively. The basic role of protein in nutrition is to supply adequate amount of amino acids. Therefore, the seed of *Sterculia setigera*, has a considerable promise as a protein source.

A considerable quantity of crude fibre (11.58%) was estimated in the seed. This is comparable to a value of 11.90% obtained in *Treculia africana* (Achinewhu, 1982). A lower value of 3.17% was estimated in the pod. Total carbohydrate content was 21.03% in the seed and 2.11% in pod. This value obtained for seeds are lower than those earlier reported by Ighodalo *et al*. (1993).

The levels recorded for macro minerals (calcium, potassium, magnesium, sodium and Iron) in the seed sample are 108.0, 105.0, 59.0 and 28.41 mg/100 g DM and 27.12 ppm, respectively. Similarly, 21.0, 11.0 and 17.0 mg/100 g DM, 0.41 and 0.33 ppm were estimated in the pod sample for calcium, potassium, magnesium, sodium and iron (Table 2). For the trace elements (manganese, Zinc and copper), 19.66, 18.74 and 8.69 ppm, respectively were estimated in the seed sample and 0.49, 0.26 and 0.14 ppm estimated for the pod sample. For the heavy metals (lead, chromium, nickel, cadmium and cobalt), only trace quantities were measured in the seed and pod samples. It is interesting to note that the proximate composition, macro and trace element content of the seed is by far higher than that of the pod, but the heavy metal content of the two samples are comparable.

Table 1: Proximate composition of *Sterculia setigera*

	Percentage DM[1]		Calorific value (Kj/100g DM[1])	
Nutrients	Seed	Pod	Seed	Pod
Crude protein	21.40±0.4	4.36±0.2	357.30±0.2	72.81±0.3
Crude lipid	11.58±0.2	3.17±0.3	436.50±0.4	119.51±0.2
Crude fibre	7.73±0.5	1.60±0.5	-	-
Carbohydrate	21.03±0.4	2.11±0.2	351.02±0.2	35.34±0.5
Moisture content	16.42±0.2	2.01±0.3	-	-

DM[1] = Dry Matter, Mean±SE

Table 2: Mineral composition of *Sterculia setigera*

	mg/100 g DM[1]	
Minerals	Seed	Pod
Calcium	108.00±0.4	21.00±0.3
Potassium	105.00±0.5	11.00±0.2
Magnesium	59.00±0.2	17.00±0.4
Manganese (ppm)	19.66±0.5	0.47±0.2
Zinc (ppm)	18.74±0.3	0.26±0.3
Copper (ppm)	8.69±0.5	0.14±0.3
Iron (ppm)	27.12±0.4	0.33±0.2
Sodium	28.41±0.5	0.41±0.4
Lead (ppm)	0.11±0.4	0.03±0.3
Chromium (ppm)	0.09±0.2	0.05±0.4
Nickel (ppm)	0.13±0.5	0.07±0.2
Cadmium (ppm)	0.06±0.3	0.02±0.2
Cobalt (ppm)	0.12±0.5	0.05±0.2

DM[1] = Dry Matter, Mean±SE

CONCLUSION

The evaluation of the proximate composition and mineral analysis of *Sterculia setigera* revealed that the seed sample is by far more nutritional than the pod sample and could be a good source of protein, carbohydrate, macro and trace elements. Consequently, the fruit could be useful in alleviating disease conditions that arises from nutritional deficiencies that is threatening most developing countries including Nigeria.

REFERENCES

Achinewhu, S.C., 1982. Composition and food potential of the African oil bean seed (*Pentachthra macrophylla*) and velvet been (*Mucuna urienes*). J. Food Sci., 47: 1736-1737.

Adesomoju, A.A., 1987. Fatty acid composition of the seed oil of *Chlorophora excelsa*. Bull. Chem. Soc. Nigeria, 12: 69-71.

Aletor, V.A. and O.O. Aladetimi, 1989. Compositional evaluation of some cowpea verities and some under-utilized edible legume in Nigeria. Nahrung, 33: 999-1007.

FAO, 1990. World Meat situation and Outlook. Commodities and Trade Division. ME 90/1. Rome.

Felger, R.S., 1979. Ancient Crops for the Twenty First Century. In: New Agricultural Crops. Ritchie, G.A. and A. Gray (Eds.), AAAS selected synpism 38. Bolder, Col., USA.

Hymphries, E.C., 1956. Mineral Components and Ash Analysis. In: Modern Methods of Plant Analysis. Peach, K. and M.V. Tracey (Eds.), Springer-Verlag, Berlin, 1: 4368-4503.

Idigo, M.C., 1989. Potential suitability of some local seed oils for plant alkyresin synthesis. Nig. J. Tech. Education, 6: 67-73.

Ighodalo, C., C. Eromosele and O. Eromesele, 1993. Studies on the chemical composition and physico-chemical properties of seeds of some wild plants. Plant Foods Hum. Nutr., 43: 251-258.

Keay, R.W.J., 1989. Trees of Nigeria. Oxford University Press, New York, pp: 476.

Li, B.W. and M.S. Cardozo, 1994. Determination of total dietary fibre in foods and products with little or no starch, monezymatic gravimetric method. Collaborative study. J. Assoc. Official Anal. Chem. Int., 77: 687-689.

Muller, H.G. and G. Tobin, 1980. Nutrition and Food Processing. Groom Helm Ltd., London.

Okigbo, B.N., 1977. Neglected plants of horticultural and nutritional importance in traditional farming system of tropical Africa. Acta Hortic., 53: 131-149.

Rao, P.U., 1994. Nutrient composition of some less familiar oil seeds. Food Chem., 50: 379-382.

Siddhuraju, P., K. Vijayakumari and K. Janardhange, 1992. Nutritional and chemical evaluation of raw seeds of the tribal pulse *Vigna triblobata*. Nutrition, 42: 97-103.

Thangadurai, D., 2005. Chemical composition and nutritional potential of *Vigna unguiculata* sp. *Cylindrica* (Fabaceae). J. Food Biochem., 29: 88-98.

Ukhun, M.E. and G.M. Uwatse, 1989. Nutritional evaluation of selected Nigeria rubber seed products, a chemical approach. Plant Foods Hum. Nutr., 38: 309-318.

USNAS (US National Academy of Science), 1975. Under-explained tropical plants with promising economic value. Report of Ad-hoc Panel of the Advisory Committee on Technological Innovation.

Van Etten, H., W.F. Kwolek, J.E. Peters and Bouriel, 1995. Characteristics of 10 wild plant legumes from Mediterranean French pastor. J. Agric. Food Chem., 43: 680-683.

Viswanathan, M.B., D. Thangadurai, K. Tamil Vendan and N. Ramesh, 1999. Chemical analysis and nutritional assessment of *Teramnus labialis* (L.) Spreng. (Fabaceae). Plant Foods Hum. Nutr., 54: 345-352.