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An Assessment of the Nutritional Value of Oso - a Condiment made by Fermenting Seeds of Cathormion Altissimum

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Abstract: Oso, a condiment produced by bacteria fermentation of seeds of the legume *Cathormion altissimum* was evaluated for its nutrient content. Analysis of the fermented seeds revealed that Oso is nutritional rich, containing 25.30% protein, 16.90% lipid and 10.02% carbohydrate An increase was observed in lipid content of the seeds with fermentation, while crude protein, crude fibre, carbohydrate and ash contents decreased. Fermented seeds were also found to be rich in the mineral elements calcium, zinc and phosphorous. The condiment, Oso contain many essential and non-essential amino acids particularly lysine, leucine, tyrosine phenylalanine and glutamic acid. The values of these nutrients as recorded compare well with those recommended as required daily intake for a healthy living. Oso is a potential source of good balanced nutrient.

Key words: Nutrient content, Oso, Condiment, Amino acids, Cathormion altissimum seeds

Introduction

In tropical Africa, particularly Nigeria, it is common to ferment seeds of cereals for use as condiment in soups and stews. This is done with a view to incorporate the protein components in them into the starchy foods which constitute the bulk of the staple diets. The preparation of most of these condiments and spices is usually done by traditional art, as such; relevant food and nutritional information hardly get to the people.

Oso as a condiment is used in soups by some communities in South Western Nigeria. It is a popular food additive and delicacy among the Yewa people of Ogun State. It is a fermented product of *Cathormion altissimum* (Leguminosae and Mimosoideae) seeds. The production of Oso, like those of *Parkia biglobosa* , *Glycine max* and *Prosopsis africana* which are also seeds of legumes that are fermented into condiment is carried out with rudimentary utensils and techniques, but are safe enough for consumption as there have been no report of food poisoning or toxicity resulting from the consumption of these food additives. Usually, the fermentation process and the biochemical conversion of the seeds to edible condiment are carried out by bacteria species. Species of *Bacillus* and *Staphylococcus* were implicated in the fermentation of Soybean seeds to daddawa (Popoola and Akueshi, 1984), while *Bacillus subtilis, B. lichenformes, Leuconostoc mesenteroides* and a species of *Staphylococcus* were isolated from fermenting medium of Oso (Popoola *et al*, in press) . Sanni *et al.* (2002) reported the involvement of several strains of *Bacillus* sp. in the fermentation of *Pentaclethra macrophylla* seeds for the production of the condiment Ugba.

Despite the availability of reports on the microbiology of condiments produced locally by spontaneous bacteria fermentation in Nigeria, there are very scanty information on their nutritional quality, there is non for Oso. With the widespread incidence of protein – calorie malnutrition in developing countries (Olayide, 1982), more attention is being given to the provision of knowledge on the chemical constituents of popular locally available fermented vegetable protein. This report provides information on the nutrimental value of Oso prepared by traditional methods.

Materials and Methods

Preparation of Oso: Seeds of *Cathormion altissimum* used for Oso preparation were obtained from markets in Ilaro. Following the traditional method of preparation, 20g of seeds were washed repeatedly with tap water and boiled in excess water for 5 h to soften the seeds. The cooled seeds were transferred into a clean calabash (*Legenaria siceraria*) lined with banana (*Musa sapientum*) leaves. The seeds were covered with more leaves and then left on the laboratory bench to ferment for 4 days. 5g of boiled unfermented seeds were kept aside for analysis. At the end of the fermentation period, dried samples (unfermented and fermented) were grounded into powder and preserved in sample bottles for analysis.

Chemical Analysis: Treatment of samples and methods of analysis (except when stated) were in accordance with those recommended by the Association of Official Analytical Chemists (AOAC, 1990). Moisture content was determined by drying a known weight of powdered sample in a vacuum oven (Gallemkamp, Scientific, UK). Ash content was by determined by incinerating known weight of dried powdered samples in a muffle furnace 550 – 600°C until ash was obtained. Lipid content of samples was estimated by Soxhlet extraction of known weight of samples with petroleum ether (boiling point 60- 80°C), while protein (N x 6.25) content was determined by kjedahl method. The determination of crude fibre followed the methods described by Pearson (1991), while the carbohydrate content of samples was calculated by difference method. Calculations are as in Sanni *et al* (2004). The estimation of mineral elements of samples was by atomic absorption (Perkin, Elmer; model 380) method (AOAC, 1990). Technicon Sequential Multiple (TSM) Automatic amino acid analyser was used for the determination of amino acid contents of unfermented and fermented seed samples.

Results and Discussion

Analysis of the seeds showed that bacterial fermentation has varying effects on the nutrient contents of the seeds. Oso, the fermented product was found to contain 25.30% crude protein, 16.9% lipid and 10.02% carbohydrate (Table 1). Although fermentation of seeds brought about decrease in the values of protein, fibre and carbohydrate components recorded, the lipid component increased but the increase was not significant ($p > 0.05$). The decrease observed not withstanding, protein, crude fibre, carbohydrate and lipid contents of the fermented product compare favourably with those reported for some other popular traditionally fermented condiments (Popoola and Akueshi, 1986; Wokoma and Aziagba, 2001, Onyejegbu and Oguntunde, 1993). Reduction in the values recorded for carbohydrate is probably due to partial bioconversion of the substrate by the microorganisms involved in the fermentation process as they derive their energy from carbohydrate metabolism. The long period of boiling possibly denatured some of the protein content of the seeds. Anon (1973) reported that during soaking and blanching, about 1-3% of the protein content in some cereals and legumes is lost.

Table 1: Proximate composition of unfermented and fermented *C. altissimum* seeds (Oso) (*in g/100g of dry matter*)

Product	Moisture	Ash	Crude protein	True protein	Crude fibre	Lipid	Carbohydrate
Unfermented Seeds	24.30	3.82	29.50	20.90	10.30	16.50	15.58
Fermented seeds (Oso)	40.30	1.03	25.30	17.00	6.45	16.90	10.02

Results are average of 5 determinations.

Table 2: Mineral elements in unfermented and fermented seeds of *C. altissimum* (Oso) (*in mg/100g*)

Product	Mineral Elements				
	Ca	Cu	Fe	P	Zn
Unfermented seeds	127.40	2.60	2.05	560.0	5.81
Fermented seeds (Oso)	129.00	1.40	1.80	720.0	6.38

Values are mean of 5 determinations.

Significant increases were also recorded for Zinc (Zn), Calcium (Ca) and Phosphorous, (P) while values of Copper (Cu) and Iron (Fe) decreased slightly (Table 2). The obtained results also compare well with earlier reports of Eka (1980) that zinc, calcium, phosphorous and Iron increased as a result of fermentation of Locust bean (*Parkia biglobosa*) to "Iru" (a condiment). Obizoba and Atu (1993) made similar observations that fermentaion increased the zinc, sodium and phosphorous contents of Castor oil (*Ricinus communis*) seeds after four days of fermentation into a condiment. Oso contains a substantial amount of calcium and phosphorous which are important in diets for a healthy living.

Fermented seeds of *C. altissimum* contain many essential amino acids. Fermentation brought about increases in values for some of the amino acid content of the seeds, particularly lysine, tyrosine and valine (Table 3). Generally, the profile of amino acids in Oso is comparable to those recommended by FAO/WHO (1973). The proteolytic activities of bacteria isolates involved in the fermentation of the seeds are of assistance in improving the digestibility of Oso.

Conclusion

This investigation has shown that Oso is nutritional rich in protein, lipid, carbohydrate and some mineral elements that are required for a health dietary intake. It is also a good source of essential amino acids.There is however a need to carry out more investigations into use of starter cultures for fermentation and other ways of optimising the product processing.

Table 3: Amino acid content* of *C. altissimum* seeds before and after fermentation to Oso (amino acids are expressed as g amino acid /16g nitrogen

Amino acids	Seeds of *C. altissimum* Before fermentation	Seeds of *C. altissimum* after 72hrs of fermentation (Oso)
Essential Amino acids		
Isoleucine	2.82	2.77
Leucine	5.10	4.89
Lysine	3.78	4.82
Methionine	0.96	0.83
Cystine	1.56	1.44
Tyrosine	2.19	2.83
Phenylalanine	3.13	3.06
Threonine	2.37	2.03
Valine	2.83	3.54
Non essential amino acids		
Aspartic acid	9.25	9.90
Glutamic acid	13.25	15.85
Alanine	3.65	3.22
Arginine	4.04	3.80
Glycine	3.12	2.60
Histidine	1.36	1.24
Proline	3.06	2.85
Serine	2.73	2.65.

*values are mean of 3 readings

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