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Physical and Chemical Characteristics of Breadfruit (*Artocarpus altilis*) Seeds Collected from Three Locations in Edo State, Nigeria

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Abstract: The study was initiated to ascertain some physical and chemical characteristics of the breadfruit seed collected from three locations (Benin City in Oredo, Egor in Egor, and NIFOR in Ovia North-East Local Government Areas) in Edo State, Nigeria. 150 units of well-matured seeded breadfruits were harvested, the fruits were opened and the following physical characters were determined; weight of fruits, number of seeds per fruit, percentage weight of seeds and weight per seed. The seeds after sun-drying (30-35° C) and seed coat removed were apportioned into two (defatted and undefatted)by extraction followed by proximate chemical analysis (AOAC, 1990).Results indicated that there was no significant ($P > 0.05$) differences between locations for the physical and chemical characters of the breadfruit and seeds determined. However, it indicated that the mean weight of fruits ranged between 1228.5 and 1291.09 numbers of seeds per fruit (from 73.0 to 77.0) while the mean weight of seeds per fruit and mean weight per seed were between 615.4g and, 750.1g and 8.49g and 9.00g respectively. The seed weights per seed were between 615.4g and 750.1g, 8.49g and 9.00g respectively. The seed weights (percent) per fruit were 50.1, 54.9 and 53.1% for the three locations. The chemical composition of the fruit seed indicated ash to be between 5.02% for Benin and 5.33% for NIFOR and CP, 18.27 (Benin), 19.11 (Egor) and NIFOR, 19.37 percent. Other parameters measured (EE, CF, NFE) were 8.25, 16.18 and 42.10% for Benin City, 8.63, 16.92 and 17.15% for Egor and NIFOR, 8.54, 16.75, and 43.49 percent. Results for the defatted seed meal were (2.75%), CP (27.93%), CF (15.37%) and 48.01% for NIFOR. It may be concluded that locations within the region did not considerably affect the breadfruit and seeds characteristics measured in this study.

Key words: Breadfruit seed, live stock industry, feed for live stock, solvent extracted meals

Introduction

In the recent years, the rate and level of performance of the Nigerian livestock industry have fallen below expectation. This has been attributed to among other factors (Ukagha, 2003; Amaefule and Obioha, 2001; Ikhatua, 2000) high feed cost, accounting for between 60 and 80 percent of total cost of production. Hence the rapid expansion and success of the livestock industry will depend largely upon the availability of good quality and affordable feed for livestock (Egbewande and Olorede, 2003; Ikhatua, 2000; Tewe, 1998; Olomu, 1996). Unfortunately, efforts at addressing these anomalies have greatly been thwarted by the escalating cost of feed ingredients necessitated by not only inadequate supply but by competition between human, and livestock as well industrial uses.

One of the promising ecologically advantageous eco-friendly perennial crop that can be fractionated into food, feed and fuel in Nigeria is the Breadfruit *(Artocarpus altilis)* which grows in Southern Nigeria (Achinewhu, 1982). Consequently, the investigation was carried out to determine the physical and chemical characteristics of the breadfruit seeds harvested from trees in three locations in Edo State, a state in Southern Nigeria.

Materials and Methods

For the study, 150 units of well matured seeded bread fruit were harvested from locations in three Local Government Areas of Edo State, Nigeria. These were Benin City in Oredo Local Government Area, Egor in Egor Local Government Area, and NIFOR in Ovia North East Local Government Areas. The fruits were opened and the following physical characters were determined *(*Harris *et al, 1968)* viz; weight of fruits, number of seeds per fruit, percentage weight of seeds and means weight per seed. Also after sun drying (30-35°C), the seeds were opened after removing the seed coat. A portion was ground for analysis (AOAC, 1990) while the rest portion were defatted by solvent (N-hexane) extraction and chemical composition determined (AOAC, 1990). The physical and chemical compositions were determined from the average of three samples per location respectively.

Data obtained from the investigation were subjected to analysis of variance (Steel and Torrie, 1980) at 5 percent level of probability.

Results

The physical computations of breadfruit used for the study are presented in Table 1. Results of the proximate chemical composition of the breadfruit seeds (un defalted) are shown in Table 2, while Table 3 contains the results for the solvent extracted meals.

The result indicated that there were no significant ($P > 0.05$) differences between the three locations (Benin City, Egor and NIFOR) for the physical and nutro-

Table 1: Physical Composition of Breadfruit Used for the Study

Location	Average weight of fruit (g)	Average Number of seeds per fruit	Average weight of seeds per fruit (g)	Percentage weight seeds (g)	Mean weight per seed (g)
Benin City	1228.5	73.0	615.4	50.1	8.49
Egor	1230.0	76.0	750.1	54.9	8.88
NIFOR	1291.0	77.0	685.0	53.1	9.00
Mean	1249.8	75.3	683.5	52.7	8.79
SEM	29.116	1.700	55.00	1.980	0.218

Table 2: Chemical Composition of Breadfruit (*Artocarpus altilis*) Seeds for the Study Composition (%)

Location	DM (%)	Ash (%)	CP (%)	EE (%)	CF (%)	NFE (%)
Benin City	93.14	5.02	18.27	8.25	16.18	42.10
Egor	92.83	5.25	19.11	8.63	16.92	43.94
NIFOR	92.73	5.32	19.37	8.94	17.15	44.53
Mean	92.90	5.20	18.92	8.61	16.75	43.52
SEM	0.175	0.128	0.469	0.282	0.414	1.035

*Air Dry Basis

Table 3: *Chemical Composition of Defatted Breadfruit Seed Meal

DM (%)	Ash (%)	CP (%)	EE (%)	CF (%)	NFE (%)
95.68	2.75	27.93	1.62	15.37	48.03

*DM basis

chemical composition of the breadfruit seeds and meals respectively. Also the breadfruit seeds (Table 2) were found to contain more than 90 percent dry matter (between 93.73 and 93.14%), crude protein (between 18.27 and 19.37%) and ether extract, between 8.25 and 8.74 percent. Others were from 16.18 to 17.15% for crude fibre, while the ash gave 5.02%, 5.25% and 5.32% for Benin City, Egor and NIFOR respectively.

Computations for the seeds (Table 1) also indicated that the weights of the seeds constitute between 50 and 55% of the total fruit weight. Apart from the mean weight of fruits weighing above one kg, the number of seeds per fruit and seed weights were between 73 and 77, and from 8.49 to 9.0g respectively.

The proximate composition of the defatted seeds revealed the mean values of 95.65% DM, 27.93% CP and 2.75% Ash. Others were CF (15.37%), EE (1.62%) and 48.01% for NFE.

Discussion

Table 1, 2 and 3 show the results of the physical and chemical composition of breadfruit *(Artocarpus altilis)* seeds respectively collected from three locations in Edo State, Nigeria. The results indicated that apart from the percentage weight of seeds, the values obtained for the physical characteristics of the breadfruit were lower than those reported by Qnijano and Arango (1979) for breadfruit found in Colombia.

Similarly, in comparison of chemical characteristics of breadfruit seed, those for Colombia (Quijano and Arango, 1979) were different from those obtained in a Nigerian environment. That is 1.50% ash, 5.5% fat, 8.73% total protein and 1.69% fibre for Colombia sample vs Nigeria (Table 2 and 3). The variations in results between the two countries may be due to environmental factor, cultivars differences, agronomic origin or the quality of the breadfruit seed products. The later are attributable to processing, storage, and method of preparation of breadfruit seed prior to analysis. Oyenuga (1968) stated that crude protein levels of crops have been attributable to environmental factors and cultivar differences. Also, Achinewhu (1982) have earlier reported that breadfruit grows wild in the southern parts of Nigeria and that it thrives in a relatively hostile environment. Bower (1981) and Coenan and Bawau (1981) have earlier on reported an on-going extensive scientific breeding programme on breadfruit in the pacific region.

There were no readily available information on the chemical composition of defatted breadfruit seed meal for comparison with data obtained in this study. Values obtained (Table 3) on DM basis showed an aberrantly high crude fibre and NFE contents. However, there are indications that breadfruit can be improved in nutritional yields for animals (or man) by approaches such as breeding programmes.

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