EFFECTS OF PROCESSING ON THE NUTRITIONAL CONTENTS OF *Enterolobium cyclocarpum* SEEDS

***O. O. FALOLA,*A. F. ADISA, °O. O OLUFAYO AND A.*ADEKANBI**

**Federal college of Animal Health and Production Technology, PMB 5029, Ibadan, Oyo state, Nigeria.*
°Department of Nutrition and Dietetics, Federal polytechnic, Ilaro, Ogun state, Nigeria.
oyenikeolubunmi@yahoo.com; 08056266636

ABSTRACT

An experiment was carried out to determine the effects of different method of processing on the nutritional and anti-nutritional contents of *Enterolobium cyclocarpum* seeds. The seeds were harvested and processed into four different treatments: T1 (raw), T2 (boiled), T3 (Soaked), and T4(roasted). The seeds were later ground in hammer mill and taken to laboratory for chemical analysis. Data obtained were subjected to analysis of variance (ANOVA). It was observed that crude protein of the treated seeds were significantly higher than the raw. T2 recorded the highest (36.31%) followed by T3 (34.52%) and T4 (33.24%) while the lowest was observed in T1 (19.33%), Ether extract followed the same trend. Crude fiber ranged from 15.92% in T1 – 2.42% in T2. Results obtained for calcium (8.90-6.00%), magnesium (5.45-4.85%), sodium (2.38-1.69%) and phosphorus (2.85-1.36%) were significantly higher in T1among the treatments. Oxalates (0.19-0.11%), phytates (0.33-0.19%), tannin (0.05-0.02%), and saponnin (0.41-0.33%) were observed to be significantly lower in the processed seeds than the raw. It can be concluded that processing has significant effects on the nutrient contents of the seeds.

Key words: *Enterolobium cyclocarpum* seeds, nutrients, anti-nutrients and mineral contents.

INTRODUCTION

The prohibitive cost of concentrate diets for ruminants in the tropics during the dry season necessitates continuous search for less expensive and high nutritive feedstuffs. Unconventional protein sources from browse trees, legumes and seeds of trees were reported to be sustainable for ruminants in the tropics. *Enterolobium cyclocarpum* is a mimosaceous legume tree, found in the deciduous lowlands forest (Janzen, 1981). The legume is easily established and fast growing to maturity over a period of time than most common leguminous trees in Nigeria. In a preliminary study, Ezenwa (1998) recommended the legume to be suitable for use in intensive feed garden in southwestern Nigeria, being fast and luxurious in growth. *E. cyclocarpum* has large, indehiscent, dry and sweet fruits that drop to the ground when ripe. The mesocarp is soft while the seed is relatively hard. According to Janzen (1981), its fruits are avidly eaten by free-ranging horses, suggesting its utilization for livestock. Browse plants and their seeds are available in the off season but most of them are less beneficial to livestock as they contain anti-nutritional factors, hence, the need for processing in order to make them suitable for livestock. The study aimed to determine the effects of different methods of processing on the nutritional contents of *Enterolobium cyclocarpum* seeds.

MATERIALS AND METHODS

Enterolobium cyclocarpum pods were harvested at NACGRAB Moor –plantation Ibadan and the seeds were removed from the pods manually. The seeds were divided into four treatments: T1 (raw), T2 (boiled) 1kg of the seeds was poured into boiling water for 40minutes, drained and sundried for 3days. T3 (soaked) 1kg of the seed was soaked in 2liters of water for 24 hours drained and sundried for 3 days. T4 (roasted) 1kg of the seed was roasted in dry frying pan on a hot plate at 60^{oc} for 45 minutes. All the treatments were ground in hammer mill for consequent analysis.

Chemical and statistical analysis

Proximate composition, mineral content and anti-nutritional contents were determined according to the standard method (AOAC, 1990). All the data obtained were subjected to analysis of variance (ANOVA) using SAS (1998), Means were compared using Duncan (1955) option of same software.

RESULTS AND DISCUSSION

Table 1showed the proximate composition of raw and processed *Enterolobium cyclocarpum* seeds, the crude protein ranged from 36.31 – 29.33%, processing increased the CP contents while crude fiber was reduced, the CF values ranged from 15.39-2.42%, T1 recorded the highest while the least was observed in T2. Ether-extracts follows the same trend, it ranged from 5.66-2.20% the highest was observed in T1 while the lowest was observed in T2. Table 2 showed the mineral contents of the raw and the processed seeds. Processing reduced the level of mineral composition of the seeds. The range observed for Ca (8.90-6.00%), Mg(5.45-4.85%), Na(2.38-1.69%) and P(2.85-1.36%), T1 recorded the highest and significantly higher than values obtained for T2, T3and T4 among the treatments. The values obtained for Ca, Mg, Na and P were within the range recommended for maintenance , lactating and non-lactating goats. (NRC, 1981).Presented in Table 3 is the anti-nutritional factors of both the raw and processed seeds. It was observed that processing reduced the level of anti-nutritional contents of the seeds. Oxalates ranged from 0.19-0.11%, T1 recorded the highest, there were no significant differences among T1, T2 and T3. The same trend was observes in Phytates (0.33-0.19%), tannin (0.05-0.02%) and saponnin (0, 41-0.33%) The levels of oxalates observed here is unlikely to pose toxicity problems, since it is below 2-5g (Oke, 1969). Oxalate affects Ca and Mg metabolism (Onwuka,1983) but ruminants can consume considerable amounts of high oxalate plants without adverse effects due principally to microbial decomposition in the rumen.(Oke,1969). The knowledge of the phytate level in feeds is necessary because high concentration can cause adverse effects on the digestibility of minerals. (Nwokolo and Bragg, 1977). Phytate forms stable complexes with Cu^{2+}, Zn^{2+}, Co^{2+}, Mn^{2+}, Fe^{2+} and Ca^{2+}. Saponins reduce feed intake, and uptake of certain nutrients including glucose and cholesterol. From the levels obtained in this study it is not likely that the saponnin content of *Enterolobium cyclocarpum* seeds will affect its nutritional potentials to any significant extent. The level of tannin which adversely affect digestibility in sheep and cattle is between 2% and 5% (Diagayete and Huss; 1981). Goats are known to have threshold capacity of about 9% dietary tannin (Natis and Malachek, 1981).

CONCLUSION

The study has shown that different processing methods increase crude protein contents, reduce crude fiber, mineral and anti-nutritional contents of *Enterolobium cyclocarpum* seeds.

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Table 1: proximate composition of processed *Enterolobium cyclocarpum* seeds

Parameters	T1(raw)	T2(boiled)	T3(soaked)	T4(roasted)
Dry matter	92.13	91.63	91.85	92.07
Crude protein	29.33	36.31	34.52	33.24
Crude fiber	15.39	2.42	3.00	9.26
Ether extract	5.66	2.20	3.12	3.80
Ash	4.35	3.50	3.85	3.79
NFE	47.36	50.87	41.98	43.78

Table 2: Mineral contents (%) of raw and processed *Enterolobium cyclocarpum* seeds

Parameter	T1(raw)	T2(boiled)	T3(soaked)	T4(roasted)	±SEM
Calcium	8.90^{a}	6.90^{b}	6.00^{bc}	6.10^{bc}	2.90
Magnesium	5.45^{a}	5.32^{b}	4.85^{c}	5.27^{b}	0.60
Sodium	2.38^{a}	2.16^{b}	1.69^{c}	2.16^{b}	0.69
Phosphorus	2.85^{a}	2.59^{b}	1.36^{c}	2.30^{bc}	1.49

±SEM = standard error of mean, a,b,c means same superscripts on the same row are not significantly different $P > 0.05$

Table 3:Anti-nutritional contents (%) of raw and processed *Enterolobium cyclocarpum* seeds

Parameters	T1(raw)	T2(boiled)	T3(soaked)	T4(roasted)	±SEM
Oxalate	0.19^{a}	0.12	0.11	0.11	0.07
Phytate	0.33^{a}	0.20	0.19	0.19	0.14
Tannin	0.05^{a}	0.03	0.02	0.02	0.03
Saponin	0.41^{a}	0.34	0.34	0.33	0.08

±SEM = standard error of mean, a,b,c means same superscripts on the same row are not significantly different ($P > 0.05$)