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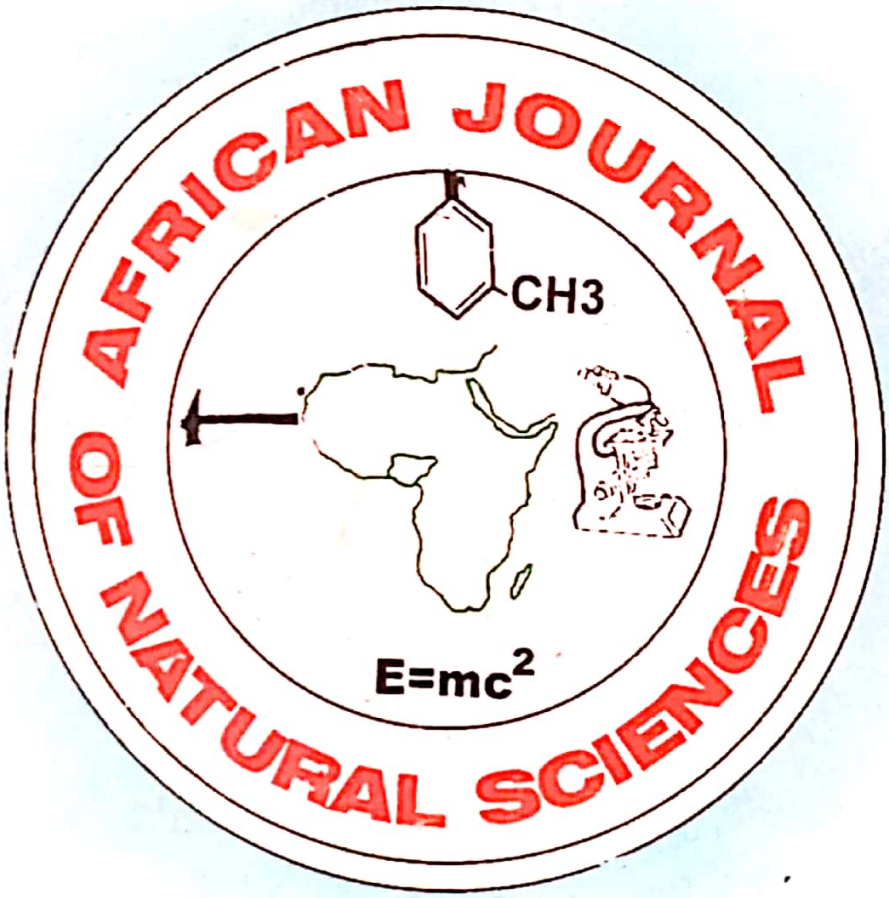

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PROXIMATE COMPOSITION AND AMINO ACID PROFILE OF RAW PROCESSED SEEDS OF JACKBEAN *(Canavalia ensiformis)* (L) (DC) I

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Abstract

An experiment was conducted to determine the proximate and amino acid composition of both raw and processed seeds of Jackbean (JB). The proximate composition of raw and processed JB were similar, with the exception of crude fibre and ash content. The crude fibre of JB dropped from 7.80% in the raw seeds to 5.20% in the processed JB, also ash content of raw JB dropped from 3.73% to 2.80% in the processed JB. Processing resulted in a decrease in the levels of most of the amino acids, except for histidine, cystine and value, which were improved through processing. Histidine increased from 6.23g / 16gN to 7.98g / 16gN, cystine from 1.35g / 16gN to 2.39g / 16gN and value from 2.62g / 16gN to 3.35g / 16gN in the raw and processed JB seeds respectively. Among the essential amino acids, histidine was observed to have the highest concentration in JB. Lysine was found to be high in JB, 4.48g / 16gN in raw and 3.81g / 16gN in the processed JB. The most limiting amino acid in JB was found to be methionine 0.46g / 16gN in the raw seeds and 0.32g / 16gN in the processed seeds. There is therefore need for methionine supplementation in diets containing JB.

Keywords: *Proximate, Compositon, Amino Acid, Jackbean, Raw, Processed.*

INTRODUCTION

The seed of jackbean (Canavalia ensiformis) (L.) (DC) is a rich source of protein and carbohydrate (Duke, 1981). There has been considerable interest in the exploitation of jackbean as a source of feedstuff for farm animals. This is because of the ability of this legume to maintain relatively high yields of gain under adverse climate and soil conditions. (D'Mello et al, 1985).

The proximate chemical composition of jackbean seeds has been studied and it appears to be suitable for monogastic animal nutrition. D'Mello et al (1985) reported that jackbean is a relatively good source of protein and apparent metabolizable energy (AME) for young chicks.

The crude protein content of dry jackbean seed ranges from 26% to 32% Udedibie (1990) reported that raw jackbeans beans seeds contains about 30% crude protein and 60% nitrogen free extract. Bressani et al (1987) reported that jackbean contains about 1.8% ether extract, 8.5% crude fibre, 3.2%, 13.5% moisture, 26% crude protein and 46.1% carbohydrate. The ether extract and ash contents of jackbean seeds are quite low while the crude fibre is slightly high.

Jackbean is relatively low in the sulphur amino acid, methionine but high in lysine. Kessler et al (1990) reported that amino acid composition of Jackbean protein was very similar to that of soyabean meal, with jackbean containing slightly less lysine than soyabean and both having relatively low levels of methionine and cystine.

Raw seeds of jackbean were obtained from the experiment plots of Abubakar Tafawa Balewa University farm, Bauchi; Nigeria. Proximate analysis and amino acid analysis were carried out of both raw processed seeds of jackbean.

Raw dry seeds of jackbean were treated using the following procedure. Two percent (2%w/v) wood ash solution was prepared by dissolving 2kg of wood ash in 100 litres of tap water, giving a rate of 1: 50 w/v. one hundred kilograms (100kg) of jackbean seeds were then soaked in 300 litres of wood ash solution for 48 hours, at ambient temperature, with stirring place every 12 hours for 1-2 minutes using a wooden rod. The ratio of jackbeans to wood ash solution was 1:3 (w/v). the wood ash solution used in the soaking of jackbeans was discarded and the jackbeans were rinsed with fresh tap water. Cooking of these beans in a fresh 2% (w/v) wood ash solution was done for 90 minutes. The solution used in cooking the beans was drained off. The jackbeans were rinsed again with fresh tap water; sun dried and ground using a hammer mill.

(i) Analytical Procedure

(a) Proximate Analysis:

Proximate analysis of both raw and processed jackbean meal were carried out according to the methods of the Association of Official Analytical Chemists (AOAC. 1990).

(b) Amino Aid Analysis

The Amino acid compositions of raw and treated samples were determined using the procedure described by Spackman *et al*, (1958). 200mg of the samples were hydrolyzed under nitrogen in 6N HCl at 105° for 22 hours. Amino acid analysis of the hydrolysate was carried out by ion-exchange chromatography using a Technicon Sequential Multisample (TSM) Amino Acid Analysis.

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Table 1: Proximate composition of raw and processed jackbean seeds

Content	Processed Jackbean	Raw Jackbean
Dry matter (%)	93.10	94.56
Crude protein (%)	28.38	28.90
Crude fat (%)	3.10	2.72
Crude fibre (%)	5.20	7.80
Ash (%)	2.80	3.73
Nitrogen free extract	53.62	51.41

Table 2: Amino acid composition of raw and processed jackbean seeds (g / 16g / N)

Content	Processed Jackbean	Raw Jackbean
Lysine	4.42	3.81
Histidine	6.23	7.98
Arginine	2.98	2.66
Aspartic acid	5.21	3.48
Threonine	5.31	2.92
Serine	3.72	2.14
Glutamic acid	7.60	4.86
Proline	0.82	0.63
Glycine	3.86	2.27
Alanine	4.16	2.27
Cystine	1.35	2.39
Valine	2.62	3.35
Methionine	0.46	0.32
Isoleucine	1.84	1.60
Leucine	2.93	1.63
Tyrosine	2.21	1.68
Phenylalanine	2.17	1.81

RESULTS AND DISCUSSION

As shown in Table 1, only minor changes in proximate composition occurred in processed jack beans as compared with the raw jack beans seeds. The crude fibre content dropped from 7, 80% in the raw to 5.20% in the processed jackbean seeds, and the ash content of the raw jackbean seeds also dropped from 3.73% to 2.80% in the processed seeds. The lower contents of ash observed in the processed seeds may be due to the loss of water soluble nutrients during the cooking process.

The determination of amino acid profiles is helpful in the formulation of diets. It is also an important parameter in the evaluation of protein quality. The amino acid composition of the raw and the processed jackbean is presented in Table 2. Processing of the beans resulted in a decrease in the levels of most of the amino acids with the exception of histidine, cystine and valine, which were improved through processing. The level of histidine in jackbeans increased from 6.23 g/16gN to 7.98 g/16gN, cystine from 1.35g / 16gN to 2.39 g/16gN and valine from 2.62 g/3.35 g/16gN in the raw and processed jackbean seeds respectively. Among the essential amino acid, histidine was found to have the highest concentration in jackbean. Lysine content dropped from 4.42g 16gN in the raw seeds to 3.80 g/16gN in the processed seeds. Similarly, methionine content in the seeds dropped from 0.46 g/ 16gN to 0.32 g/16gN in the processed seeds.

The lower of amino acid observed in the processed seeds of jackbeans may be due to leaching into the cooking medium during cooking and also because lysine and methionine are highly unstable to heat. Bressani et al (1987) made similar observation in their experiment and reported that thermal processing of jackbeans resulted in decrease in the concentration of some amino acids, particularly lysine and methionine. Lysine was found to be high in jackbeans seeds. The most limiting amino acid is jackbeans was observed to be methionine, this agrees with the findings of Kessler et al (1990). These workers in their experiment found out that methionine was one of the most limiting amino acid in jackbeans. It is therefore, necessary to ensure that diets containing jackbeans are adequately fortified with synthetic methionine.

CONCLUSION

The proximate and amino acid composition of jackbean shown in Tables 1 and 2 underline the potential value of jackbean as a feeding stuff for farm livestock feeding, as methionine supplementation can be carried out effectively and economically by the use of synthetic methionine.

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