

PROXIMATE COMPOSITION AND AMINO PROFILE OF RAW AND PROCESSED *MUCUNA PRURIENS* SEEDS

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ABSTRACT

A comparative nutritional evaluation of raw and differently processed *Mucuna pruriens* seeds. The processing methods adopted were boiling the *Mucuna* seed for 60 minutes with distilled water (DW), fresh tamarind pulp extract (TPS) and maize cob ash (MCA) solution. The raw and resulting meals from processed *Mucuna* seed were included at 20% substitution of soya bean meal in 5 treatment diets with the control diet (no *Mucuna*). Data obtained was subjected to analysis of variance at $\alpha_{0.05}$. There were significant different in the proximate composition. The result shows that MCA treatment as the best among other tested processing methods of *M. pruriens* seeds for inclusion in diet. Although the amino acid profile shown no significant different, but the MCA had the highest methionine and lysine compared to other treatment. In conclusion, this study has revealed that *M. pruriens* seeds processed with MCA has high feed promise and could be used as an alternative protein ingredient in fish diets.

Key Words: Processing Method, *Mucuna pruriens* seed meal proximate composition and amino acid profile.

INTRODUCTION

The use of plant-derived diets in animal feeding is technically limited by the presence of high levels of anti-nutritional factors, poor palatability, low protein content and digestibility, which at some levels result to lower growth (Francis *et al.*, 2001; Fagbenro *et al.*, 2003). However, the utilization of potential plant protein material can be improved upon by adequate processing under controlled time and temperature which usually reduces or completely eliminates the effect of anti-nutrients, improves the protein quality and amino acid content of food grain legume (Makkar and Becker, 1999; Siddhuraju and Becker, 2001).

Soya bean has been the most commonly used feed ingredient for aquaculture feeds, however, it has become competitive for both human and animal uses (Tacon *et al.*, 2009). Therefore, the need to source for alternative and cheaper plant protein sources has become imperative. *Mucuna pruriens* seed has not been intensively explored as a protein source for fish feed despite its good prospect. Previous study (Francis *et al.*, 2001) on the analyzed chemical content of *mucuna* seed meal revealed crude protein content of between 25 to 32%, with approximately 3.5% lipid. The aim of this investigation therefore, is to determine potential nutritional value of processing *Mucuna* seeds in different solutions.

MATERIALS AND METHOD

PROCESSING OF *M.PRURIENS* SEEDS INTO FEEDSTUFF

A total weight of 2 kilograms of *M. pruriens* seeds was obtained from National Animal Production and Research Institute (NAPRI), Shika- Zaria in Kaduna State, Nigeria. The seeds were divided into four lots; three of which were subjected three indigenous processing methods in order to detoxify the seed materials viz: boiling at 105°C for 60 minutes in distilled water (DW), fresh tamarind pulp extract (TP) and maize cob ash (MCA) solution respectively, while the fourth was left raw (R). At the end of boiling duration, the processed seeds were washed with distilled water and screened-dried in open air under a shed for 3 days after which the raw and the processed dried samples were weighed, ground and preserved in air tight container and kept at 4°C for analyses and diet preparation.

Chemical Evaluation of Raw and Processed *M. pruriens* Seeds

The *M. pruriens* seed samples were analyzed for percentage proximate compositions of moisture, crude protein, lipid, ash fibre and mineral contents which were determined using validated analytical method of Association of Analytical Chemists International (AOAC, 2005). Amino acids profiling was done for all the five treatments using the Technician Sequential Multi-sample Amino Acids analyser (TSM) (Spackman *et al.*, 1958).

RESULTS AND DISCUSSIONS

The analysed proximate and amino acid profile of the experimental diets are shown in Table 1 and 2 respectively. There are significant different in the proximate composition. The control with contains the fish meal had the highest total proximate values. Next to the control is the maize cob ash (MCA) solution soaked mucuna which shows a closely proximate values to the control. Although the amino acid profile shown no significant different but the MCA had the highest methionine and lysine compared to other treatment.

Although the differently processed mucuna seeds appeared to be at par statistically, but subjectively, MCA processed enhanced better results. The RMD caused reduced food utilization and severe effect on nutritional status which showed direct involvement of unprocessed antinutritional factors in the raw samples. Thus boiling mucuna seeds with maize cob ash solution for 60 minutes as a locally adaptable processing method was considered most suitable for nutritional improvement of *M. pruriens* seeds for dietary inclusion to enhance growth and nutrient utilization.

CONCLUSION

In conclusion, this study has revealed that *M. pruriens* seeds processed with MCA has higher nutritional content and could be used as an alternative protein ingredient in fish diets.

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Table 1: Analyzed Nutrient Content (% Dry Matter)¹ of Raw and Differently Processed *M. pruriens* Diets and the Control Diet (NMD)

Parameters	RMD	DWD	TPD	MCD	NMD
Moisture (%)	6.20 ± 0.20 ^b	6.20 ± 0.20 ^b	6.12 ± 0.22 ^c	6.14 ± 0.20 ^c	6.40 ± 0.20 ^a
Crude protein (%)	30.10 ± 0.40 ^c	30.60 ± 0.40 ^c	30.42 ± 0.22 ^d	31.80 ± 0.24 ^b	32.52 ± 0.20 ^a
Ash (%)	8.32 ± 0.20 ^a	7.60 ± 0.24 ^c	7.91 ± 0.30 ^b	7.52 ± 0.26 ^d	7.52 ± 0.24 ^d
Crude lipid (%)	4.63 ± 0.25 ^d	4.80 ± 0.20 ^c	4.83 ± 0.25 ^c	5.20 ± 0.24 ^b	5.50 ± 0.21 ^a
Crude fibre (%)	4.30 ± 0.22 ^a	4.10 ± 0.30 ^b	4.52 ± 0.21 ^a	4.00 ± 0.26 ^c	4.15 ± 0.22 ^b
NFE ²	52.70 ± 0.14 ^a	52.50 ± 0.04 ^a	52.20 ± 0.04 ^a	51.50 ± 0.25 ^b	50.42 ± 0.22 ^c
Gross energy (Kcal/g)	4.40 ± 0.22 ^c	4.58 ± 0.22 ^b	4.56 ± 0.24 ^b	4.58 ± 0.22 ^b	4.65 ± 0.16 ^a

¹No. of samples for each determination =3; ² Nitrogen free extract.

(Means + S.E) a, b, c: Mean values in the same horizontal row with different superscripts are significantly different (P<0.05)

TREATMENTS:

RMD = Raw Mucuna Diet,

DWD = Diet from *M. pruriens* seed processed with distilled water

TPD = Diet from *M. pruriens* seed processed with tamarind pulp extract

MCD = Diet from *M. pruriens* seed processed with maize cob ash solution

NMD = Control diet

Table 2: Analysed Amino Acid Content of Raw and Processed Mucuna Diets

Amino acid	RMD	DWD	TPD	MCD	NMD
Methionine	0.68	0.97	0.75	0.99	1.09
Valine	1.26	1.97	1.98	2.07	2.03
Isoleucine	1.31	1.71	1.75	1.74	1.66
Leucine	4.62	4.09	4.65	3.57	2.88
Phenylalanine	2.14	1.96	2.16	1.86	1.63
Histidine	0.92	0.97	0.95	1.08	1.07
Lysine	1.54	1.86	1.57	2.38	2.73
Threonine	2.10	2.22	2.10	2.57	2.71
Arginine	1.44	1.5	1.47	1.65	1.70
Tryptophan	0.36	0.38	0.37	0.42	0.50

TREATMENT DIETS

RMD = Raw Mucuna Diet,

DWD = Diet from *M. pruriens* seed boiled with distilled waterTPD = Diet from *M. pruriens* seed boiled with tamarind pulp extractMCD = Diet from *M. pruriens* seed boiled with maize cob ash solution

NMD = Control diet