

CHEMICAL COMPOSITION OF THE FRUIT, HUSK AND NUT OF *TERMINALIA CATAPPA* (INDIAN ALMOND) AS FEED SUPPLEMENT FOR RUMINANTS IN THE HUMID TROPICS

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ABSTRACT

The fruit, husk and nut of *Terminalia catappa* (Indian almond) was investigated for nutrient content. The result revealed that the chemical composition varied significantly ($P < 0.05$), with the dry matter ranging from 87.23- 94.19 % in nut and husk respectively. The crude protein ranged from 4.22 – 14.83 % in husk and nut respectively. The neutral detergent fibre also ranged from 26.21-46.90 % in the nut and husk respectively. The parts were implicated for antinutrients, tannin, saponin, phytate and oxalate, no significant differences was observed among the parts of the seed. The macro mineral content showed no significant variation, but the highest value (0.251%) of calcium was obtained in the nut. The micro minerals investigated differed significantly ($P < 0.05$). The husk had the highest value for zinc and lead (52.7 and 11.4 mg/kg) respectively, while the nut had the lowest value (31.7 and 2.7mg/kg). The highest value of copper (5.1 mg/kg) and manganese (46.6 mg/kg) was recorded for nut, while the lowest value was recorded for fruit. The highest value (208.4 mg/kg) of iron was recorded for nut, while the lowest (192.5 mg/kg) was recorded for fruit. All minerals analyzed are within the recommended limit for proper functioning of the body system. These result showed that the fruit, husk and nut of *Terminalia catappa* can be used as feed supplement for ruminants in the Tropics.

Keywords: Fruit, husk, nutrient, nut, Indian almond

INTRODUCTION

Browse plants have been recognized as an important feed resource in ruminant feeding serving as a major source of crude protein. This quality of browse plants is most useful during the dry season when most of the pasture grasses become dry and low in nutrients. With browse plants, there is always a choice of feeding the leaves alone or the leaves with the fruits or the fruits alone (Osuji et al., 1995). Several types of leguminous and non-leguminous trees are used as forages with available reports on their nutritive value. However, there are several others which are underutilized as fodder probably due to paucity of information on their nutritive value. Indian almond (*Terminalia catappa*) is a browse plant which is underutilized as fodder for ruminants in this part of the country. With the limitation in the quality of feeds, the increasing demand for animal products and the importance of browses as fodder for ruminants, it becomes necessary to exploit the potential of some underutilized browse species in the country. This study was therefore carried out to assess the

fruit, the husk and the nut of *Terminalia catappa* as feed supplement for ruminants

MATERIAL AND METHODS

Collection of samples

Samples of ripe and neat Indian almond fruits were collected from the environs of Tai Solarin University of Education. The fruits were sun dried, the seed coat and pulp of some were removed, the husk and nut were separated and milled. The dried whole fruit was also milled and taken to the laboratory for analysis.

Chemical and mineral analysis

Crude protein, crude fibre, ether extract and total ash of samples of fruit, husk and nut were analyzed in triplicates using standard procedure of A.O.A.C (2012). The crude protein was determined with the micro kjeldahl distillation apparatus, while the NDF, ADF and ADL were determined by Van Soest method (1994).

Quantitative determination of tannin, saponin, oxalate and phytate

Tannin contents were determined as described by Swain (1979). The Spectrophotometric method of Brunner (1984) was used for saponin analysis.

While Oxalate and Phytate contents were determined as described by Maga (1983).

Analysis of minerals

A total of ten minerals were analysed. Plant parts were digested with HNO₃ / HClO₃ mixtures (nitric acid and perchloric acid) (20:5 v/v). The digest was made up to 100 ml in standard volumetric flask with deionized water. Ca, Na, K, Fe, Cu, Mn, Zn, Mg and Pb in the digest were determined with the atomic absorption spectrophotometer model 420. (Gallenkemp and Co. Ltd). Phosphorus in the digest was estimated with vanadomolybdate solution. The colour so developed was read with spectrophotometer at 420 m/u.

Statistical analysis

Data obtained were analyzed and subjected to analysis of variance procedure (ANOVA) of SAS (2012). Significant means were separated by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Presented in Table 1, is the chemical composition of fruit, husk and nut of indian almond plant. It was observed that all parameters analyzed varied significantly ($P < 0.05$) among the samples. Dry matter ranged from 87.23-94.19 % in nut and husk respectively. These values are in agreement with the value (89.08-90.34 %) reported for indian almond (Abegunde *et al.*, 2014). However, the DM values obtained here are higher than the value (55.7 %) reported for *Carica papaya* fruit. The crude protein ranged from 4.33- 14.83% in husk and nut respectively. These values are at variance with the values (22.7 for fruit and 1.27% for husk reported elsewhere (Olorode *et al.*, 2014). The CP values of fruit and nut samples were high enough to be used as forage for animals, since the values are within the critical values of 6-7% recommended for ruminants (Minson, 1990). The neutral detergent fibre ranged from 26.21-46.90%. The nut had the lowest value (26.21 %), while the fruit and husk are similar. These values are considered adequate for efficient rumen function. Table 2 presents the anti-nutrient contents of fruit, husk and nut of indian almond plant. The fruit, husk and nut were implicated for all the anti-nutrient investigated. However, no significant variation occurred among the different parts. The husk had the highest (0.036)

tannin while the nut had the lowest (0.017). Same trend was observed for saponin, oxalate and phytate. All values obtained here are below toxic level of 5% which can depress feed intake (Onwuka, 1983) Table 3 presents the macro and micro mineral content of fruit, husk and nut of indian almond tree. The result indicates that the fruit, husk and nut contained all the minerals analyzed. There are no significant differences among the different indian almond parts for the macro minerals analyzed. However, significant ($P < 0.05$) variation was observed among the fruit, husk and nut for micro minerals analyzed. The husk had the highest value for zinc and lead (52.7 and 11.4 mg/kg) respectively, while the nut had the lowest value (31.7 and 2.7mg/kg). The highest value of copper (5.1 mg/kg) and manganese (46.6 mg/kg) was recorded for nut, while the lowest value was recorded for fruit. The highest value (208.4 mg/kg) of iron was recorded for nut, while the lowest (192.5 mg/kg) was recorded for fruit. All minerals analyzed are within the recommended limit for proper functioning of the body system (NRC, 2002).

CONCLUSION

The different parts *Terminalia catappa* investigated contained appreciable chemical and mineral content above recommended level to support the growth, production and maintenance of ruminants. The different parts are also implicated for anti-nutrient content although, the values were below toxic level.

It can be concluded that the parts of *Terminalia catappa* investigated have potential to boost inadequate feed supply and low level of nutrients encountered by ruminants especially during the dry season.

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Table 1 : Chemical composition (%) of fruit, husk and nut of indian almond

Parameters	Indian almond seed			SEM
	fruit	Husk	Nut	
Dry matter	90.17 ^b	94.19 ^a	87.23 ^c	0.39
Crude protein	6.52 ^b	4.33 ^c	14.83 ^a	0.24
Ether extract	5.94 ^b	8.69 ^a	4.16 ^c	0.29
Ash	4.29 ^c	5.91 ^b	6.40 ^a	0.30
Neutral detergent fibre	40.32 ^b	46.90 ^a	26.21 ^c	0.28
Acid detergent fibre	19.77 ^c	32.11 ^a	28.72 ^b	0.22

^{abc}= means on the same row with different superscript differ significantly (p<0.05)
SEM= Standard Error of mean

Table 2 : Anti-nutrient content (%) in fruit, husk and nut of indian almond plant

Parameters	Indian almond seed			SEM
	Fruit	Husk	Nut	
Tannin	0.028	0.036	0.017	0.41
Oxalate	1.400	1.142	0.356	0.42
Saponin	0.680	0.730	0.104	0.42
Phytate	1.251	1.260	0.623	0.42

Table 3: Macro and micro mineral content of fruit, husk and nut of indian almond plant

Leaves	Macro minerals (%)					Micro minerals (mg/kg)				
	Ca	P	K	Na	Mg	Fe	Zn	Cu	Mn	Pb
Fruit	0.226	0.343	0.374	0.185	0.287	192.5 ^c	47.4 ^b	3.2 ^c	28.6 ^c	9.5 ^b
Husk	0.232	0.364	0.422	0.196	0.316	196.4 ^b	52.7 ^a	4.3 ^b	31.2 ^b	11.4 ^a
Nut	0.251	0.285	0.816	0.213	0.300	208.4 ^a	31.7 ^c	5.1 ^a	46.6 ^a	2.7 ^c
SEM	0.42	0.42	0.42	0.42	0.41	0.35	0.35	0.48	0.47	0.36

^{abc}= means on the same row with different superscript differ significantly (p<0.05)
SEM= Standard Error of mean