BAP -17

Comparative Assessment of the Nutritive Potentials of *Terminalia mantaly* Subjected to Various Processing Methods

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Abstract
This study was conducted to determine the different processing methods of *Terminalia mantaly*. Three different sample of the leave (i.e. fresh, air- dried and sundried) were used for proximate composition and phytochemical analysis to determine nutritional profile and anti-nutritional profile, the samples were triplicate and data collected were statistically analysed with one-way analysis of variance (ANOVA. There was significant difference in the crude protein content, ether extract, moisture content, and ash content ($p<0.05$) of the three samples. Crude protein was higher in sun-dried (13.13) compare to other processing methods. Treatment 1 has relatively high amount of crude fibre than the other treatments. However the Nitrogen free extracts of the T1 was higher among the treatments means. The phytochemical analysis shows that Alkanoids, Tannins, Flavonoids, saponins and oxalates were detected and their concentration were significantly different ($p<0.05$) among the processing method. Treatment 1 has the highest value of Alkanoids, Tannins, Flavoids, saponins and oxalates compare to the other treatments. In tannins, sundried has the lowest value (0.001) while fresh has the highest tannin (0.2367). For oxylate, air dried has the highest (18.10) while sundried has the lowest (2.70). For saponins, fresh has the highest (4.00) while air-dried has the lowest (1.70). From the results it is conclude that sundried *Terminalia mantaly* does better compare to the other processed methods and could be partially or fully incorporated in the diet of livestock, since it nutritional qualities shows some levels of adequate potentials and poses no detrimental effects on the animal.

Keywords: *Terminalia mantaly,* phytochemical properties, processing methods, livestock

Introduction

In time past, cereals grains supply much of the feed used in feeding livestock, especially the feeding of pigs and growing of poultry. The increasing use of cereals in livestock production not only added more cost on feeding to farmers, but it has led to a relatively scarcity of tills feed since human consumption of cereals increases (Adesehinwa *et al*., 2011). In developing country, of which Nigeria is one, cereal grains are in high demand by humans for uses, and the production capacity of cereal grain in Nigeria has been on the short supply, making it inadequate or a scarce commodity for the production of livestock . Even when there is little supply of these grains to the livestock, it is mostly very expensive. Based on this, there is need therefore for livestock producers to look for an alternate means of providing feeds for their livestock which might be relatively cheaper and readily available.

A number of browse plants worldwide serves alternate feedstuff for livestock (Aregawi and Renehart, 2008; Fayemi *et al*., 2011). Common leguminous and non-leguminous browse species that are constantly grazed by ruminants and pseudo-ruminant in different part of Nigeria includes; *Leucaena leucocephala, Adansonia digitata, Moringa oleifera, Terminalia catappa, and Terminalia superba* (Ogunbosoye and Babayemi, 2010; fayemi *et al.* 2011; Jamala, *et al* 2013). They are of great potential, especially as a source of high quality nutrient for ruminants.

Terminalia mantaly is a large tropical tree in the family *combretaceae* that is a native to the tropical region of Asia. The use of *Terminalia mantaly* had not been found as a source in feed ration formulation. However some studies on medicinal properties of the bark and wood have been reported in traditional medicine. The bark and wood are used in treating dysentery. It is also an excellent spreading shade tree (Orwa *et al,* 2009). Kokora *et al.* (2013) reported that the extracts of *T. mantaly* on two strains of *Staphylococcus aureus* and *Escherichia coli* was the strongest inhibitory activity of aqueous and ethanolic. Zirihi *et al*. (2012) reported that the *T. mantaly* extract was highly significant compare to the water extract of *T. catappa* and its hydroalcoholic extract was slightly active than the *T. catappa* on *Aspergillus fumigatus*. Thus, it has high antibiotic properties. Hence to harness the untapped potentials of this plant, the various processing methods fresh, air dried and sundried must be analyzed. In achieving these proximate analysis and antinutritional properties must be ascertain if it can be judiciously used as possible incorporation in diets of livestock especially monogastric animals if properly processed and mixed with other feed supplement without adverse effects and reduced cost of

production intensively.

This study was therefore carried out to investigate the nutritive quality of various processing methods of *Terminalia mantaly* as a supplement in livestock production.

Material and Methods

Experimental Location: The study was carried out in the Teaching and Research Laboratory of the Department of Animal Science, Delta State University, Asaba campus, located at latitude 16°14N and longitude 6°49E with a temperature of 28±6°c. Rainfall is 1505-1849.3mm, relative humidity of 69.80% and sunshine 4-8bars of the equator within the rainforest agro-ecological zone (Asaba Metrological station, 2016).

Collection of Experiment Sample and Processing Techniques of *Terminalia Mantaly*: Two hundred and fifty grammes (250g) of *Terminalia mantaly* leaves were harvested from the school, weighed and processed as fresh green, air-dried and sun-dried samples respectively. The *Terminalia mantaly* leaves used were processed as follow;

Fresh Green: The fresh green samples were crushed in a mortar.
Air-dying: The samples were spread in a well ventilated laboratory at the Animal Science Department Laboratory Asaba Campus, at a room temperature for forty-eight hours (48hrs) at 28.5°C.
Sun-drying: The *Terminalia mantaly* leaves samples were dried in special drying platform at the university premises at a mean temperature of 33.2°C for two days.

Data collection and analysis: Data were collected on the proximate analysis and phytochemical properties using the procedures of the Association of Official Analytical Chemist (A.O.A.C, 2010) at the Laboratory Unit of the Animal Science Department.

All the data were subjected to Analysis of Variance, Genstat 2014 and means were separated by Duncan Multiple Range Test.

Results and Discussion

The result of the three samples of fresh, air-dried, and sun-dried *Terminalia mantaly* shows that the sundried sample of *Terminalia mantaly* has the highest protein content with a value of 13.13% with fresh *Terminalia mantaly* showing the lowest protein content ($p<0.05$) with a value of 5.60%. Fresh sample has the highest fat content with a value of 7.69% compare to the other processed *Terminalia mantaly.* Fresh has a high moisture with a value of 91.48% and sundried with the lowest value of moisture content (80.62%).

Table 1: Proximate Composition of *Terminalia mantaly.*

Parameters (%)	T1 (Fresh)	T2 (Air-dried)	T3 (Sun-dried)	SEM
Crude Protein	5.60^{b}	12.00^{ab}	13.13^{a}	0.13
Ether Extract	7.69^{a}	5.10^{b}	2.90^{c}	0.06
Dry Matter	91.48^{a}	84.55^{b}	80.62^{bc}	0.03
Crude Fibre	23.45^{a}	16.47^{b}	14.57^{bc}	17.48
Ash	7.64^{a}	6.75^{ab}	4.45^{c}	0.68
Nitrogen free extracts	47.10^{a}	44.23^{ab}	45.57^{a}	0.03

* mean with different superscript within a row differ significantly ($p<0.05$)

The phytochemical composition of the three samples as shown in Table 2. Fresh sample has the highest value of Cyanogenic Glycosides, flavonoid, phenol, tannin and saponin. For oxalic composition, air-dried sample has the highest (18.10mg/g), while fresh sample has (15.76mg/g) and sundried has oxylate (2.70mg/g). Fresh sample was observed to have the highest saponin content (4.00mg/g) followed by sundried (2.0mg/g) and air-dried has the lowest saponin (l.79mg/g). Air-dried *Terminalia mantaly* has the highest mean value of 9.87 and 18.10 for Alkanoids and Oxylate respectively.

Table 2: Phytochemical Properties of processed *Terminalia Mantaly*

Parameters	T1 (Fresh)	T2 (Airdried)	T3 Sundried	SEM
Alkanoids (g/l)	7.45[a]	9.87[b]	5.43°	0.26
Cyanogenic Glycosides (g/l)	14.53[c]	10.72[b]	6.93[a]	0.55
Flavonoids (g/l)	16.67[bc]	14.55[b]	10.76[a]	0.32
Phenols (g/l)	9.45[c]	5.47[b]	3.57[3]	0.74
Tannins (g/l)	0.24°	0.23[b]	0.03[a]	0.03
Oxylates (g/l)	15.76[ab]	18.10[a]	2.70[c]	0.03
Saponins (g/l)	4.00[c]	1.70[a]	2.03[b]	0.06

*mean with different superscript within a row differ significantly ($p<0.05$).

The proximate composition of the *Terminalia mantaly* leaf with different processing method, which was presented in table 1, shows that the crude protein percent in sundried diets (13.13) was comparable and differs slightly with air-dried (12.00), but this differs greatly from the fresh diet (5.60). The lower value of the fresh diet is due to the anti-nutritional factors acting on the leaf. These crude protein values for the different diet fall slightly outside the range of what is reported for some browse plant used in feeding animals, 15.57%-22.38% (such as those reported by Osuntokun *et al.*, 2014). This implies that the *Terminalia mantaly* leaf have a lower protein content compared to other browse plant reported for the production of livestock.

The percentage values obtained for Ether Extract from the proximate composition of the different processing method shows a higher percentage in fresh diet which is comparably different from the air-dried (5.10) and the sundried diet (2.90). The lower value of the sundried diet can be attributed to the processing technique adopted that induces more heat which reduces the fat content in the leaf. The ether extract values obtained for the *Terminalia mantaly* with the different processing technique (i.e. 2.90 - 7.69) fall below the range reported by Okpara, (2015), for Gmelina leaf but air-dried leaf correspondents slightly to his report.

For the dry matter percentage of the *Terminalia mantaly* leaf, the fresh leaf sample has the highest percentage (91.48) which is far higher comparatively to that of the air-dried (84.55) and the sundried (80.62), reason being that it has not been subjected to any processing method. The ash and crude fibre values are relatively higher than the one reported for Gmelina by Okpara (2015), which implies that the *Terminalia mantaly* have a higher ash and crude fiber.

The phytochemical analysis for the different processing techniques used to process the leaf was reported in table 2. Alknoids, Flavonoids, Phenols, Cyanogenic glycoside, Tannins, Oxylates and Saponins were observed to be present in the leaf. The tannin concentrate were higher in the fresh leaf (0.24) which slightly differ from the air-dried (0.23), but differs greatly from the sundried (0.01). The saponin concentrate reported shows that there is a higher saponin concentrate in the fresh (4.00) than that of the air-dried (1.70) and the sundried (2.00). The saponin concentrate are within the range as reported by Zirihi *et al.,* (2012). There was a higher oxylate in the air-dried (18.10) than the fresh (15.76) and the sundried (2.70)

Conclusion

Proximate analysis of the processed *Terminalia mantaly* leaves contain major nutrients required for the production of livestock, such as (protein, fat and energy), Phytochemical analysis of *Terminalia mantaly* indicated the presence of anti-nutritional factors, which reduces the availability of one or more nutrient whose effect was recorded in the fresh leaf as having low protein content.

The processing method adopted in this study showed that the air-dried and sundried method improved the nutritional value in relation to the protein content, except for fresh *Terminalia mantaly,* which could also reduce the anti-nutritional value of the sundried *Terminalia mantaly* when incorporated in the diets of pig and ruminant animals

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