COMPARATIVE EVALUATION OF NUTRIENT AND ANTI-NUTRIENT CONTENTS OF *Persea americana* (AVOCADO) LEAVES AS FEED SUPPLEMENT FOR RUNIMANTS IN THE TROPICS

A. A. MAKO*[1], V. O. AKINWANDE[1], A. AKINFEMI[2] AND O. Z. AJAYI[1]

[1]*Department of Agricultural Science,*
Tai Solarin University of Education, Ijagun. Ijebu-Ode
[2]*Department of Agricultural Technology,*
Yaba College of Technology, Lagos
**Correspondence: jokemako2006@gmail.com ;08023292736*

ABSTRACT

An evaluation of nutrient and anti-nutrient contents of different forms of *Persea americana* (PA) leaves was investigated. Experiment 1 involved the determination of the chemical composition of green, yellow and brown leaves of PA. Experiment 2 determined the tannin, saponin, phytate and oxalate contents of the different leaves of PA. Results revealed that the chemical composition of the leaves varied significantly ($P<0.05$). The dry matter ranged from 88.75-91.24% in green and brown leaves respectively, while the crude protein ranged from 16.31-18.41 % in brown and green leaves respectively. The neutral detergent fibre ranged from 49.21- 55.48% in green and brown leaves respectively. Tannin, saponin, phytate and oxalte content of the leaves did not differ significantly, but was within the tolerable limit for consumption. These result showed that the different forms of *Persea americana* leaves can be used as feed supplement for ruminant in the Tropics.

Keywords: anti- nutrient, leaves, nutrient, *Persea Americana.*

INTRODUCTION

Meeting the nutritional needs of livestock throughout the year is a major challenge facing livestock farmers in the tropics due to seasonality of forage (Mako, 2009). For livestock to reach their genetic potentials for milk, meat, wool, and hides, it is important that they receive sufficient intake of energy, protein and mineral. Various researches had been carried out to resolve this, but there is still a wide gap between demand and supply of livestock products generated in these areas. Multipurpose plant tree leaves species are beneficial and can provide palatable and nutrition fodder during long period of scarcity (Tipu *et al.,* 2006). There are various multipurpose plant leaves and fruits which remain still relatively unexplored as feed supplement for ruminant production. Avocado trees (Persea americana) is one of multipurpose trees which grows widely as shade plant in Nigeria and other higher rainfall areas of west Africa (Arikwe *et al.,* 2012). The tree leaves is more of an ornamental plant than, a feed or food some but provides seasonal fruits that may be more useful for human consumption. The avocado (*Persea americana*) is a tree native to Mexico and central America, classified in the flowering plant family lauraceous

This study was therefore designed to evaluate the nutrient and anti-nutrient contents of *Persea americana* leaves.

MATERIAL AND METHODS

Collection of samples

Green and yellow leaves are plucked from pear tree while the brown leaves were picked from the floor around the root of the plant. Reasonable numbers of each leaf type were collected and taken to the laboratory for analysis.

Chemical and mineral analysis

Crude protein, crude fibre, ether extract and total ash of samples 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).

Statistical analysis

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

RESULTS AND DISCUSSION

Table 1 presents the chemical composition of green, yellow and brown leaves of *Pearsea americana*. It was observed that all parameter analyzed varied significantly ($p<0.05$). DM ranged from 87.78- 91.22% in green and brown leaves respectively. These values are in agreement with the values reported for African pear leaf (96.20%) (Arikwe *et al.*, 2012). However the value obtained in this study are higher than values reported for cynodon dactylon (40.31%) reported by Mako *et al.* (2014).

The CP obtained here ranged from 23.59-25.85% in brown and green leaves respectively. It was observed that these values are in agreement with the value (25.45%) reported else were for African pear leaf (Arikwe *et al.*, 2012). The CP levels obtained here exceed the 8% recommended level that can provide the minimum requirement for microbial activity (NCR 2002).

The NDF also varied significantly from 59.48-60.01 % in green and brown leaves. These values are within the recommend limit of 60.00% guaranteed for forage intake by ruminants (Messiner, 1991). Table 2 shows the content of anti-nutrients. The parameters analyzed indicate the presence of anti-nutritional factors in leaves. The presence of these anti-nutrients seems to be way of storing nutrients or as a means if defending their structure and reproductive elements (Mako, 2009). The phytochemical which have being implicated in limiting in utilization of forage include tannin, saponin, oxalate, phytate etc (Mako, 2009). It was observed that values of all anit-nutrients analyzed were below toxic level of 5% which can reduce digestibility of fiber (McLeod, 1974). The level of tannins obtained in this study ranged from 0.40- 0.50% in yellow and green leaves respectively. These values are in agreement with the value (0.68 %) reported else were for *Persea americana* leaves (Arikwe *et al.*, 2012), but at variance with the value of 3.24 % reported for *Persea americana* leaves (Ishiwu *et al.*, 2013). The implication of the presence of tannin in the nutrition of animal is that it forms complexes with protein in the rumen as protection against massive proteolysis, thereby reducing rumen protein digestibility (Barry and McNabb, 1999). Saponin, oxalate and phytate also follow the same trend. It was observed that brown leaves have the lowest values which could be because it has dried off. High level of phytate consumption can retard digestibility of other nutrients and the performance of animals owing to its anti-nutritional effect (Yueming *et al.*, 2015)

CONCLUSION

The different forms of *Persea americana* leaves investigated showed adequate content of nutrients to meet the requirement of ruminants. The various anti-nutrient investigated were below lethal level. It can then be concluded that these leaves have potential to boost the inadequate feed supply and low level of nutrients in grasses encounter by ruminants, especially during the dry season.

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Table 1: Chemical composition (%) of different forms of *Persea americana* leaves

Parameters	Different forms of *Persea americana* leaves			SEM
	Green	Yellow	Brown	
Dry matter (DM)	88.75^{c}	90.34^{b}	91.22^{a}	0.42
Crude protein (CP)	25.85^{a}	23.98^{b}	23.59^{c}	0.33
EE	3.60^{c}	4.05^{b}	4.24^{a}	0.30
Ash	10.32^{c}	11.89^{b}	12.33^{a}	0.20
NDF	59.48^{c}	59.94^{b}	60.01^{a}	0.32
ADF	38.63^{a}	39.50^{b}	48.87^{c}	0.40

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

Table 2: Secondary Metabolites (%) content of *Persea americana* leaves

Parameter	Different forms of *Persea americana* leaves			SEM
	Green	Yellow	Brown	
Tannin	0.88	0.44	0.27	0.41
Oxalate	0.432	0.408	0.392	0.42
Saponin	0.68	0.397	0.281	0.42
Phytate	0.623	0.617	0.600	0.42

SEM= Standard Error of mean