SUB-THEME: PASTURE AND RANGE MANAGEMENT

NUTRIENT AND ANTI-NUTRITIONAL FACTOR CONTENTS OF FOUR ACCESSIONS CULTIVARS OF *Mucuna pruriens* LEAVES.

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ABSTRACT
Mucuna pruriens is a valuable fodder and feed supplement legumes for ruminants. Samples of four accessions of *Mucuna pruriens* leaves samples were harvested from Oyo State College of Agricultural and Technology, Igboora pasture plot. The Samples were analyzed for proximate, anti-nutrient and mineral composition. The experimental plots were laid in randomized complete block design. The Four (4) different cultivars of *Mucuna pruriens* used in the study are Tmp-1, Tmp-3, Tmp-5 and Tmp-12. Significant differences ($P<0.05$) were observed among the four accessions with respect of Dry matter (DM), Crude protein (CP), and Crude fiber (CF). The proximate analysis of *Mucuna pruriens* leaves contain Crude protein ranging between (16.80 - 18.59%), Ether extract (4.12 - 4.26%), Crude fiber (17.96 - 20.01%), Ash (9.28 - 10.16%) and Dry matter (64.50 - 69.10%). The anti-nutrient content considered among the four accessions of *Mucuna pruriens* leaves are Saponin, Phytate, Oxalate, Trypsin inhibitor and Hydrogen cyanide. The studies showed that *Mucuna pruriens* had nutritive value and therefore, may serve as potential supplements for ruminants in Nigeria.
Keywords: *Mucuna pruriens*, nutrient, anti- nutrients, minerals, ruminants

INTRODUCTION
Mucuna pruriens is a leguminous vine. It is annual or sometimes short-lived perennial *Mucuna pruriens* is a vigorous, trailing or climbing, up to 6-18m long. It has a taproot with numerous, 7-10m long, lateral roots. The stem a slender and slightly pubescent. The leaves are generally slightly pubescent alternate, trifoliate with rhomboid ovate, 5-15cm long x 3-12cm broad, leaflets. The inflorescent is a drooping auxiliary raceme that bears many white to dark purple flowers. After flower pollination, *Mucuna* produces clusters of 10-14 pods. They are stort, curved, 10-12.5cm long, with between two and six seeds cover with oblong ellipsoid 1.2-1.5cm long, 1cm broad and 0.5cm thick (FAO, 2011). *Mucuna pruriens* is a valuable fodder and feed legume. Vines foliage can be used as pasture hay or silage for ruminant while pod as seed can be grind into a meal and fed to both ruminant and monogastric (Eilittä and Carsky 2003). Also, *Mucuna* leaves contain 15-20% of crude protein (Sidibé-Anago *et al.*, 2009), but has a high potential as an energy and protein source in livestock feed. The present study was carried out to determine nutrient and anti- nutrient content of four accessions cultivars of *Mucuna pruriens* leaves.

MATERIALS AND METHODS
Experimental Site
The experiment was carried out at the Teaching and Research farm of Oyo State College of Agriculture and Technology, Igboora which is located within $7^0$15 North and $3^0$30 East of the equator with an average annual temperature 27^0 (Sanusi, 2011).

Experimental Layout and Management Practices
The area of land used was 256m^2.The experimental plots were laid in randomized complete block design. Four (4) different cultivars of *Mucuna pruriens* (Tmp-1, Tmp-3, Tmp-5 and Tmp-12) procured from the International Institute of Tropical Agriculture (IITA), Ibadan, Oyo State, Nigeria were used for the study. They were sown on plot measured 3m x 3m with space of 1m between plots and two treated seeds of *Mucuna pruriens* were planted per hole with a space of 50cm x 50cm. At 10 weeks of sowing just before flowering, the herbage sample was taken from three replications pooled and mixed, one representative sub sample was taken per accession and dried.

Chemical Analysis

Collected *Mucuna* samples were oven dried at 60°c for 48hrs and ground. The finely ground samples of four cultivars of *Mucuna pruriens* used were analyzed for nitrogen (N) content using Kjeldal method and CP was calculated as N x 6.25 (AOAC, 1995).

Statistical analysis

Data obtained were subjected to analysis of variance (ANOVA). Where significant differences occurred, the means were separated using Duncan multiple range F-test of the (SAS, 1980)) option.

RESULTS AND DISCUSSION

Results

Table 1 shows the proximate composition of four accessions of *Mucuna pruriens* leaves (Tmp-1, Tmp-3, Tmp-5 and Tmp-12). Significant difference (P<0.05) was observed among the four accessions with respect of Dry matter (DM), Crude protein (CP), and Crude fiber (CF). No significant difference (P>0.05) was observed in both Ether extract (EE) and Ash. CP of four accession of *Mucuna pruriens* ranging between 16.80-18.59%, EE (4.12-4.26%), CF (17.96-20.01%), Ash (9.28-10.16%) and DM (64.50-69.10%). Among the accession of *Mucuna pruriens* (Tmp-1), (Tmp-3), (Tmp-5) and (Tmp-12), respectively all CP value were above the critical protein requirement level (7%) for ruminant. It then means that for animal to be fed with such leguminous plant, it has no need of being supplemented with any high protein feed resources.

Table 1: Proximate Composition of Four Accessions *Mucuna pruriens* Leaves

Parameters (%)	DM	CP	EE	CF	ASH
Mucuna pruriens (Tmp-1)	65.38^{b}	16.80^{b}	4.12	20.01^{a}	10.16
Mucuna pruriens (Tmp-3)	69.10^{a}	17.49^{b}	4.18	19.25^{a}	9.28
Mucuna pruriens (Tmp-5)	64.50^{b}	18.59^{a}	4.26	19.89^{a}	9.58
Mucuna pruriens (Tmp-12)	68.30^{a}	17.67^{b}	4.14	17.96^{b}	9.34
SEM	0.32	0.17	0.15	0.17	0.16

$^{a, b, c,}$ means on the same column with different superscripts are significantly (P<0.05) different.

Anti-nutrient factor was observed among the four accessions of *Mucuna pruriens* in table 2. Saponin concentration (%) range from 0.42-0.68%. The highest value of Saponin content was observed in *Mucuna pruriens* Tmp-5 (0.68%) while the least value also obtained from *Mucuna pruriens* Tmp-12 (0.42%). The oxalate (%) was considerably varying among the four accessions of *Mucuna pruriens* from 0.40 - 0.51%. Maximum oxalate content was noted in Tmp-5 (0.51%) and lowest similar values (0.40%) were observed in both Tmp-3 and Tmp-12.

Table 4: Anti-nutrient Present in Four Accessions of *Mucuna pruriens* Leaves

Parameters	Saponin (%)	Oxalate (%)	Phytate (%)	Tannin (%)	Trypsin Inhibitor (TIU/mg)	HCN (Mg/kg)
Mucuna pruriens (Tmp-1) 0.47^{b}	0.44^{b}	0.64^{b}	0.05	21.01^{b}	2.91^{b}	
Mucuna pruriens (Tmp-3)	0.47^{b}	0.40^{b}	0.64^{b}	0.04	20.78^{b}	2.74^{b}
Mucuna pruriens (Tmp-5)	0.68^{a}	0.51^{a}	0.76^{a}	0.05	25.67^{a}	3.28^{a}
Mucuna pruriens (Tmp-12)	0.42^{b}	0.40^{b}	0.63^{b}	0.04	21.51^{b}	2.88^{b}
SEM	0.015	0.001	0.008	0.003	0.29	0.03

$^{a, b, c,}$ means on the same column with different superscripts are significantly (P<0.05) different.

Discussions

According to Mowlem (1992), dry matter is the portion of the feed material that contains the nutrients. The percentage crude protein ranged (16.80-18.59%) recorded for four accessions of *Mucuna pruriens* Leaves. The CP of all the accessions were high and well above the 15% level considered adequate to meet requirement for lactating and growth in dairy cow (Omokanye, 2001). The higher values of crude protein observed in the four accessions of *Mucuna pruriens* in the present study is higher than 7% CP requirement for ruminant animals which will provide ammonia requirement by the rumen micro-organism to support optimum microbial activity. Ether extract contents of four accessions of *Mucuna pruriens* ranged (4.12-4.26%). The value recorded for Ether extract observed to be above 4.10% Ether extract recorded by Alalade *et al.* (2016) for *Psophocarpus tetragonolobus* leaves. The Ether extract contents of all accessions was within the range of (4-10%) EE recommended by Campbell *et al*. (2016). The value of ether extract in all the accession in an indicator of higher energy level for the animal (Babayemi and

Bamikole 2006) and this is a major form of energy stored in plant which is been utilized by the animal for body maintenance and production.

The tannin ranged from (0.04-0.05%). This tannin level is much lower than the level of 5% at which goats may reject feed (McLeod 1974). Tannin at this level protects liable plant protein in the rumen and consequently increase the supply of high-quality protein in to the duodenum (McLeod 1974). However, when forage legume contains high level of condensed tannins, intake and apparent digestion of protein and carbohydrate are depressed (Bamikole *et al*. 2004). Oxalate in this present study was low (0.40-0.51%). It was reported that 20g/kg oxalate can be lethal to chicken (Acamovic *et al*. 2004). Oxalate has been shown to deplete the calcium reserve, but these legume species were found to contain adequate amount of calcium, magnesium and phosphorus (Akinsoyinu and Onwuka 1988). The Saponin value is ranged 0.42%-0.68% feedstuffs containing saponin had been shown to be defaunation agents (Teferedegne, 2000) and capable of reducing methane production (Babayemi *et al*. 2004b). Cheeke (1971) reported that saponin has effect on erythrocyte haemlysis, reduction of blood and liver cholesterol, depression of growth rate, bloat (ruminant) inhibition of smooth muscle activity, enzyme inhibition and reduction in nutrient absorption. The Phytate content of *Mucuna pruriens* as shown in table 2 is (0.63-0.76%). However, the value is lower than 25mg/100g by Amata (2010) for leaves of *Myrianthus arboreus*. The negative effect of phytate in nutrition is the chelating of certain essential element such as Ca, Fe, Mg and Zinc. This contributes to mineral deficiency in people who diet on some food rich in phytate for their mineral intake (Hurrell, 2003). The Hydrogen cyanide (HCN) contents of the browse species examined were equally low. The HCN ranged from 2.74mg/kg - 2.91 mg/kg. The lethal dose of HCN for cattle and sheep is 2.0-4.0mg per kg body weight. The lethal dose for cyanogen would be 10-20 times greater because the HCN Comprised 5-10% of their molecular weight (Conn, 1979). The value of Trypsin inhibitor content was 20.78-25.67mg/kg for *Mucuna pruriens* leaves. Trypsin inhibitor are protease inhibitor occurring in raw legume seeds. Protease inhibitors are the most commonly encountered class of anti-nutritional factors of plant origin. This trypsin inhibitor has been reported to be partly responsible for the growth retarding property of legumes.

CONCLUSION AND RECOMMENDATION

From the results obtained in this research work, it could be concluded that *Mucuna pruriens* leaves have better nutrient value due to high content of protein and are of great benefit to ruminant animals with relatively low levels of anti-nutrient factors.

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