Influence of Cutting Height on Seasonal Composition of *Moringa oleifera* in the Rainforest Zone of Nigeria

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Introduction

Moringa oleifera, a native of sub-Himalayan regions of northwestern India, is now indigenous to many countries in Africa. Matured leaves and young branches of *Moringa* are potentially useful livestock fodder, for ruminants (Akinbamijo *et al.* 2004) and non-ruminants (Ly *et al.* 2001). However, in Nigeria it has been grossly underexploited as it is restricted to the arid northern zone where it is used mainly as live fence and as vegetable salad. The study was initiated because not enough information on the nutritive value of *Moringa* foliage and its change with season, harvesting or grazing had been accumulated in Nigeria especially in the rainforest zone.

Materials and Methods

The experiment was carried out in Akure (7°16´N, 5°12´E) in the tropical rainforest zone of Nigeria. The zone is characterized by two distinct seasons: wet or rainy (April to November) and dry season (December to March). The experiment was layed out as a randomized complete block design into which was fitted a 2×3 (cutting season versus cutting height) factorial arrangement. The cutting heights were 50, 100 and 150 cm. Seedlings of *Moringa oleifera* were transplanted on field plots at a spacing of 40 × 40 cm in August during the peak of the rainy season. Each treatment was replicated on twelve 4 m^2 plots. After twelve weeks of establishment (just before flowering stage), the plant foliage were cut back to 50, 100 or 150 cm above the ground level and thereafter they were not pruned to these respective heights until the next flowering stage i.e. every twelve weeks. Fodder yield for the dry season treatment was recorded from November to March and that for the wet season from April to October.

Samples of leaves and tender stems of *Moringa* from each treatment were collected separately over a period of one year and divided into dry and wet season samplings. They were dried in a forced air oven at 60°C for 48 hours, ground to pass through 1mm sieve and analyzed for dry matter, crude protein, ether extract and ash (AOAC 1995), Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF) and Acid Detergent Lignin (ADL) according to the procedures of Van Soest *et al.* (1991). Na and K were determined by flame photometry while P was determined by the vanando-molybdate method. Ca and Fe were determined after wet digestion with a mixture of nitric acid, sulphuric acid and perchloric acid using atomic absorption spectro-photometer (AOAC 1995). The data were subjected to analysis of variance using the general linear model (GLM) procedure of MINITAB (2000). Means were separated by Least Significant Difference (LSD).

Results

The significantly higher CP content of *M. oleifera* in the wet season than that in the dry season confirms earlier report by Jung and Vogel (1992) that tropical forage plants are highly palatable and nutritious during the rainy season but as the dry season approaches the nutritive value (particularly CP content) decreases (Table 1). However, the extent of this reduction seems to be worse for herbaceous forages than for shrubs and trees as the latter still retain enough nutrients to meet both the maintenance and production requirements of grazing ruminants during the dry months (Dicko and Sikena 1992).

NDF and ADF contents of *M. oleifera* at 150 cm height of pruning were significantly higher than at lower cutting heights probably due to greater residual carbohydrate reserves at the higher cutting heights (Stur *et al.* 1998). The lower Ca and Na contents and higher P content during the wet season are consistent with earlier findings (Kallah *et al.* 1999).

Conclusion

From the result of this experiment, a cutting height of 100 to 150 cm is recommended when *M. oleifera* is cultivated for fodder production.

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Table 1. Effect of cutting height, season and their interaction on nutrient compositions (%) of *M. oleifera.*

Treatments		DM	CP	ASH	EE	NDF	ADF	ADL	Ca	P	Na	K	Fe
Height (cm)													
50		20.75	26.98	8.28	3.96	23.76ab	19.03b	4.98	3.06	0.12	0.26	2.55	0.14
100		21.29	27.18	8.44	4.36	22.67b	18.42b	4.29	2.68	0.11	0.29	2.83	0.12
150		21.84	27.05	8.79	4.53	25.90a	22.94a	4.98	2.47	0.12	0.29	2.96	0.15
Season													
Wet		21.02	30.14a	8.92	4.07	23.81	20.36	3.88b	2.30b	0.14a	0.26b	2.76	0.13
Dry		21.57	24.00b	8.09	4.50	24.41	19.90	5.53a	3.17a	0.09b	0.30a	2.80	0.14
Height × Season													
50	Wet	19.96	29.56	8.66	3.64	23.21	17.67	4.17	2.46	0.15	0.24	2.63	0.14
	Dry	21.55	24.40	7.90	4.29	24.31	20.40	5.80	3.66	0.10	0.29	2.47	0.14
100	Wet	21.43	30.22	8.86	4.27	22.75	20.08	3.38	2.40	0.14	0.28	2.79	0.13
	Dry	21.15	24.14	8.02	4.45	22.59	16.76	5.20	2.97	0.09	0.29	2.87	0.11
150	Wet	21.66	30.65	9.24	4.31	25.48	23.33	4.17	2.04	0.14	0.27	2.85	0.13
	Dry	22.02	23.44	8.35	4.76	26.32	22.55	5.59	2.90	0.09	0.32	3.07	0.17
Overall Mean		21.29	27.07	8.50	4.29	24.11	20.13	4.72	2.74	0.12	0.28	2.78	0.14
Statistical significance													
Height		NS	NS	NS	NS	*	*	NS	NS	NS	NS	NS	NS
Season		NS	***	NS	NS	NS	NS	*	**	***	*	NS	NS
Height × Season		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Means within the same column with different letters are significantly different; NS = Not Significant.

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