

EFFECT OF THE CUTTING FREQUENCY ON YIELD AND CRUDE PROTEIN AND MINERAL CONTENTS OF PANICUM MAXIMUM

D.E. Morillo¹, J. Faría-Mármol^{1,2} and R. González³

¹Fondo Nacional de Investigaciones Agropecuarias, Apartado 1316, Maracaibo, Venezuela

²Facultad de Agronomía, Universidad del Zulia, Apartado 15205, Maracaibo, Venezuela

³Facultad de Ciencias Veterinarias, Universidad del Zulia, Maracaibo, Venezuela

ABSTRACT

Dry matter yield per cutting and total production, crude protein content and mineral composition of Guineagrass (*Panicum maximum* Jacq.) as affected by three cutting frequencies (28, 42 and 56 days) were evaluated in a wet/dry tropical area in Venezuela. Only CP was affected ($P < 0.05$) by the cutting frequency, decreasing ($P < 0.05$) from 11.9 to 9.2 % as the harvest interval increased. Mean DM yield per cutting and accumulated over the 336-day experiment (661 and 5140 kg/ha) were low, probably due to low rainfall (600 mm) during the trial. Mean macro (%) and microelement (ppm) concentrations were: Ca, 0.9; P, 0.31; Mg, 0.45; K, 2.17; Na, 0.09; Cu, 11; Fe, 133 and Mn, 269, which were regarded as nutritionally adequate for grazing ruminants.

KEYWORDS

Panicum maximum, cutting, yield, crude protein, mineral composition, Venezuela

INTRODUCTION

Guineagrass (*Panicum maximum* Jacq.) is widely used in many grazing systems of tropical America. It is the main forage species in Venezuela and in the wet/dry well-drained zones of the Maracaibo Lake basin, with approximately 33 and 50 %, respectively, of the total pasture area. It has been reported that its dry matter (DM) yield per cutting may vary from less than 100 to near 5000 kg/ha with 8 to 10 % crude protein (CP) depending on factors such as soil fertility and fertilizers, age of regrowth and season of the year (Arias, 1984; Urdaneta *et al.*, 1992; Pérez, 1995). Despite its importance to cattle production systems in the latter region, few reports exist on its mineral composition in relation to plant age.

The purpose of the study was to evaluate the effect of three cutting frequencies on DM yield, and CP and mineral concentrations of Guineagrass in a wet/dry tropical environment.

MATERIALS AND METHODS

The experiment was conducted in 1992 and 1993 at a farm located in Zulia State, western region of Venezuela (10½ 32' 32"N and 72½ 12' 30" W), with climate and vegetation corresponding to a tropical dry forest. Mean annual rainfall is 1063 mm, distributed in alternate dry (four and two months) and rainy (two and four months) seasons. Average annual temperature is 28 ½°C. Soil is a sandy loam Typic Haplustalf with pH=5.2, 2.68 % organic matter, and 8, 60, 100 and 324 ppm of P, K, Ca and Mg, respectively.

Twelve experimental plots (3x4 m) of *P. maximum* were used to evaluate three cutting frequencies, 28, 42 and 56 days, in a randomized complete block design with three replications. Before each cutting, plant height was measured at three randomly selected sites in the plots to be cut. The available forage 30 cm above the ground in the central 2x2-m area from each plot was cut using hand shears, weighed and a sample (ca. 500 g) consisting of 10 grab samples was taken to determine DM content at 60 ½°C and to estimate DM yield. Samples from the first, mid and last cuttings for each frequency in two replications, corresponding to rainy, intermediate

and dry periods, respectively, were analyzed for CP content (AOAC, 1980), and Ca, P, Mg, K, Na, Cu, Fe and Mn concentrations using the methods compiled by Fick *et al.* (1979).

Analysis of variance for dry matter yield per cutting and total production, plant height data from 12, 6 and 4 cuttings for 28, 42 and 56 days, respectively, over the total experimental period (336 days), and CP and mineral data, were carried out and least-square mean were compared using Duncan's multiple range test.

Forage composition will be discussed in relation to nutritional requirements of grazing ruminants.

RESULTS AND DISCUSSION

Agronomic characteristics. Mean DM yield and total production, and plant height of *P. maximum* as affected by the cutting frequency are shown in Table 1. No effect of the cutting frequency was detected ($P > 0.05$) on any of the agronomic variables. Dry matter yield per cutting and plant height tended to increase while total DM production declined with longer cutting intervals, but the differences were not significant. Mean total DM production, similar to that obtained by Arias *et al.*, (1984), and DM yields are lower than those reported elsewhere in comparable conditions for unfertilized Guineagrass (Urdaneta *et al.*, 1992; Pérez, 1995). Mean plant height reached the lower limit (60 to 90 cm) recommended for using this grass. These results may be partly attributed to the low rainfall (600 mm) and long dry seasons during the experiment.

Crude protein, ash and mineral concentrations. Average CP, ash and mineral concentrations of *P. maximum* as affected by the cutting frequency are shown in Table 2. Effect of the cutting frequency was detected only on CP content, which decreased ($P < 0.05$) as the harvest interval increased. These results are similar to those reported for Guineagrass and other grasses (Arias *et al.*, 1984; Minson, 1990). All mean and individual CP values were above 7%, minimum level indicated to avoid a depression in forage intake (Minson, 1990). Mean macro and microelement contents were above the critical concentrations (CC) for deficiency suggested for grazing ruminants and summarized by McDowell (1992), but 23 and 45% of the individual P and Cu values, respectively, were below the CC for those elements. Mean Ca:P ratio was also within the recommended range for ruminants. In general, mineral concentrations were similar to or higher than those reported in other studies (Perdomo *et al.*, 1977; Gohl, 1982). Therefore, mineral supplementation of ruminants consuming this forage could be required to prevent specific mineral deficiencies.

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Table 1

Average dry matter (DM) yield per cutting and total production and plant height of *Panicum maximum* as affected by the cutting frequency.

Cutting frequency,		DM yield,		DM production,		Plant height,	
		kg/ha/cutting		kg/ha		cm	
days	nz	Mean ^y	SE ^x	Mean	SE	Mean	SE
28	32	507	127	5378	542	56.2	3.3
42	21	734	157	5139	542	61.8	4.1
56	17	870	174	4905	542	64.6	4.6
Overall	70	661		5141		59.9	

z Number of observations. Twelve, 8 and 6 cuttings every 28, 42 and 56 days.

y Least-square means, which did not differ among frequencies, P>0.05.

x Standard error of the least-square means.

Table 2

Average crude protein (CP), ash and mineral concentrations of *Panicum maximum* as affected by the frequency of defoliation^z.

Item	Frequency of defoliation, days			Overall	SE ^y	CC ^x
	28	42	56			
CP, %	11.1a	10.1b	9.2c	10.1	0.11	7.0
Ash, %	9.38	8.96	9.05	9.13	0.33	-
Ca, %	0.96	0.82	0.91	0.90	0.06	0.30
P, %	0.32	0.29	0.33	0.31	0.05	0.25
Ca:P ratio	3.1:1	2.9:1	2.8:1	2.9:1	0.5	-
Mg, %	0.52	0.42	0.42	0.45	0.07	0.18
K, %	2.15	2.25	2.13	2.17	0.12	0.60
Na, %	0.085	0.095	0.100	0.093	0.01	0.080
Cu, ppm	10.0	11.0	11.0	10.7	1.5	8.8
Fe, ppm	137	157	105	133	28	50
Mn, ppm	269	302	235	269	42	40

^z Least-square means based on 6 observations.

^y Standard error of the least-square means.

^x Critical concentration for deficiency for grazing ruminants.

a, b, c Means on the same line with different superscripts are different, P<0.05.