

Effects of Three Harvest Intervals and Two Fertilizer Rates on the Yield and HCN Content of Ten *Cynodon* Cultivars¹

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ABSTRACT

Ten forage grasses (*Cynodon* spp.), including recent introductions, and Star-grass (*C. nlemfuensis* var. *nlemfuensis*) were grown in the central mountains of Puerto Rico to measure the effect of two fertilizer rates and three harvest intervals on the forage yield, crude protein yield and hydrocyanic acid content (HCN) for a 2-year period.

Fertilizer treatments applied after each harvest consisted of 2.24 and 4.48 metric tons/ha/year of a 15-5-10 fertilizer. Significant differences occurred between fertilizer rates as to dry forage and crude protein yields. Number of harvests per year were 6, 8 and 12 for 30-, 45- and 60-day intervals, respectively. Significant differences occurred among cultivars and harvest intervals. *Cynodon dactylon* (PRPI 11504), *C. plectostachyus* (PRPI 11487) and *C. nlemfuensis* var. *nlemfuensis* (PRPI 2341) occupied most of the top yield positions at the three harvest intervals. HCN within the cultivars ranged from 0 to 333 p/m.

INTRODUCTION

In the past, the utilization of forage grasses in Puerto Rico was limited to species of *Brachiaria* (Para), *Digitaria* (Pangola), *Melinis* (Molasses), *Pennisetum* (Merker), and *Panicum* (Guinea). In the last decade Star-grass has become very popular among farmers because of its rapid establishment and regrowth and resistance to diseases. Although some *Cynodon* species have been evaluated in P.R. (2, 11, 14), only Stargrass is now extensively utilized by farmers.

Heins, as cited by Semple (12), includes among others *Cynodon dactylon* (L.) Pers. (Bermudagrass) as one of the principal cultivated grasses in the tropical and subtropical regions. This species is of great importance for pasture in many parts of the southern section of the United States (U.S.). Burton *et al.* (1) developed hybrid Coastcross I which has been of excellent value to farmers in the southern U.S., and Horn *et al.* (8) reported on an F₁ hybrid of *Cynodon dactylon* (viz. Oklan) that was superior to the cultivar Midland widely used in Oklahoma. The forage potentials of the *Cynodons* have also been discussed by Harlan (6), who stated that the genus *Cynodon* offers great potential for the development of better cultivars. Although many *Cynodons* are considered excellent

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forages, some of them are known to contain poisonous substance such as hydrocyanic acid (HCN) as reported by Parodi (9) and de León (4).

This study was designed to study the effects of three harvest intervals and two fertilizer rates on yield, protein and HCN contents of Stargrass and nine recent introductions of *Cynodon* spp. in the humid mountain region of Puerto Rico.

MATERIALS AND METHODS

The work was carried out at the Corozal Substation on a Corozal clay (4% slope) of the subgroup Aquic Tropudults (Ultisol). Calcium carbonate was applied in order to raise the pH from 5.5 to 6.5 according to the method described by Riera (10).

The identification and common name of the 10 cultivars used in this research are shown in table 1. *C. nlemfuensis* var. *nlemfuensis*, Stargrass, previously tested in Puerto Rico (2, 14, 15) was used as the control plant.

The grasses were sprigged and evaluated during a 2-year period. The experimental layout was of a split-split plot design with the fertilizer

TABLE 1.—Identification of 10 *Cynodons*

Grass species	USDA PI ¹	PRPI ²	Common name
<i>Cynodon dactylon</i> (L.) Pers.	293611	11212	Bermudagrass
<i>C. aethiopicus</i> Clayt and Harlan	—	11451	stargrass
<i>C. dactylon</i> (L.) Pers.	292061	11455	Bermudagrass var. <i>coursii</i>
<i>C. plectostachyus</i> (K. Schum.) Pilger.	341817	11486	stargrass
<i>C. plectostachyus</i> (K. Schum.) Pilger.	341818	11487	stargrass
<i>C. plectostachyus</i> (K. Schum.) Pilger.	341819	11488	stargrass
<i>C. plectostachyus</i> (K. Schum.) Pilger.	341820	11489	stargrass
<i>C. plectostachyus</i> (K. Schum.) Pilger.	255455	11504	Coastcross I Bermudagrass
<i>C. nlemfuensis</i> Vanderyst var. <i>nlemfuensis</i>	—	2341	stargrass
<i>C. dactylon</i> (L.) Pers.	—	11505	Oklahoma bermuda hybrid

¹ USDA plant introduction number.

² University of Puerto Rico Agricultural Experiment Station plant introduction number.

rates³ as main plots and replicated 4 times; the 10 grasses as subplots and the harvest intervals of 30, 45 and 60 days as the sub-sub-plots. Main plots were 27.87 m² in area, the sub-plots 13.94 m² and the sub-subplots 4.65 m².

The total annual fertilizer rate was divided into 6, 8 and 12 applications for 60-, 45- and 30-day harvest intervals respectively, and the corresponding amount applied after each harvest. All grasses were cut at approximately 8 cm height from the ground. The forage was weighed and plot

³ Hereafter low and high fertilizer rates will refer to 2.24 and 4.48 metric tons of a 15-5-10 commercial fertilizer.

TABLE 2.—Effect of harvest frequency on the mean forage yields and dry matter content of 10 *Cynodons*

Grass species	P.R.P.I. number	Green forage yields ¹	Dry matter content	Dry forage yields
		Kg/ha/yr	%	Kg/ha/yr
30 Days				
<i>Cynodon dactylon</i>	11504	67,547 a	28.97 ab	18,894 a
<i>C. plectostachyus</i>	11487	64,490 a	28.64 abc	17,815 ab
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	63,011 ab	27.64 c	16,822 ab
<i>C. plectostachyus</i>	11486	61,242 ab	29.31 a	17,128 ab
<i>C. dactylon</i>	11505	60,547 ab	28.47 abc	15,776 bcd
<i>C. plectostachyus</i>	11489	59,147 ab	28.95 ab	16,181 abc
<i>C. dactylon</i>	11212	58,195 abc	29.48 a	16,324 ab
<i>C. aethiopicus</i>	11451	54,154 bcd	27.96 bc	13,439 cde
<i>C. dactylon</i> var. <i>coursii</i>	11455	49,186 cd	28.88 ab	13,095 de
<i>C. plectostachyus</i>	11488	48,138 d	29.36 a	12,275 e
45 Days				
<i>C. plectostachyus</i>	11487	93,766 a	31.69 ab	28,794 a
<i>C. dactylon</i>	11504	91,437 ab	30.38 cde	26,916 ab
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	82,398 abc	29.74 e	23,812 bc
<i>C. dactylon</i>	11505	79,251 bc	31.28 abc	23,302 c
<i>C. plectostachyus</i>	11486	77,157 cd	30.79 bcde	23,158 c
<i>C. plectostachyus</i>	11489	76,866 cd	30.87 bcd	22,862 c
<i>C. dactylon</i>	11212	76,362 cde	32.30 a	24,005 bc
<i>C. aethiopicus</i>	11451	68,578 def	29.68 e	18,794 d
<i>C. dactylon</i> var. <i>coursii</i>	11455	63,918 ef	29.67 e	17,628 d
<i>C. plectostachyus</i>	11488	56,773 f	30.11 de	15,492 d
60 Days				
<i>C. plectostachyus</i>	11487	110,712 a	35.10 a	37,378 a
<i>C. dactylon</i>	11504	103,690 ab	33.99 bc	33,641 b
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	100,542 abc	33.92 bcd	32,981 bc
<i>C. dactylon</i>	11212	96,085 bc	34.77 ab	31,861 bc
<i>C. plectostachyus</i>	11486	94,629 bcd	33.44 cde	30,555 cd
<i>C. dactylon</i>	11505	93,563 cde	34.93 ab	30,853 cd
<i>C. plectostachyus</i>	11489	83,843 def	34.41 abc	27,168 de
<i>C. aethiopicus</i>	11451	80,461 ef	32.38 ef	24,287 ef
<i>C. dactylon</i> var. <i>coursii</i>	11455	76,944 fg	31.49 f	22,483 fg
<i>C. plectostachyus</i>	11488	65,374 g	32.77 def	19,467 g

¹ Yields in the same column followed by one or more letters in common do not differ significantly at the 5% level according to Duncan's multiple range test.

samples were taken, and dried at 53.6° C, and ground in a Wiley mill⁴ to be passed through a 1 mm screen.

Dry matter was determined in all samples. For each harvest interval, samples were composited by replications and each treatment was ana-

⁴ Mention of a trade mark or proprietary product does not constitute a guarantee or warranty of the product by the USDA or the Agricultural Experiment Station nor does it imply its approval to the exclusion of other products that may also be suitable.

lyzed for crude protein content. Total N was determined with a Technicon Auto Analyzer and crude protein was calculated as $N \times 6.25$.

Hydrocyanic acid was determined by the Hogg and Ahlegreen method (7) on each harvest interval for the high fertilizer rate utilizing a composite sample of four replicates. N, P, and K analyses were run on the leaves and stems of a composite sample of four replicates of the 10 grasses with the high fertilizer rate.

Weed infestation on each plot was measured during the first year by weighing the fresh weeds bi-monthly. A rating of 1 to 9 was given to all plots at the end of the trial in terms of weed infestation on each of the 10

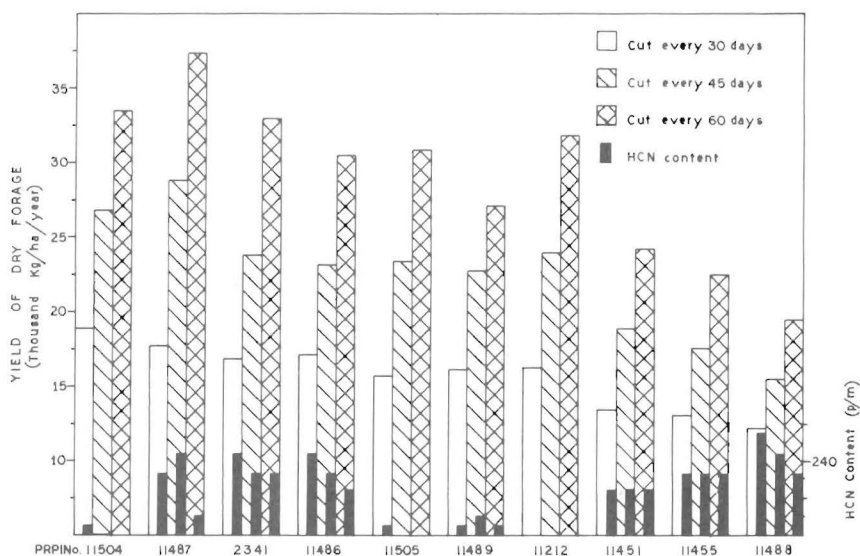


FIG. 1.—Yield of 10 forage grasses (*Cynodon* spp.) and their HCN contents when harvested every 30, 45 and 60 days over a 2-year period.

Cynodon cultivars (1 = no infestation to 9 = plots highly infected). Independent ratings were made by three persons at each fertilizer rate and harvest interval. The data were reported as an average of the three ratings.

During the first and second year, rainfall totalled 1,592 and 2,049 mm, respectively. No irrigation was applied during the course of the experiment, which lasted from January 1973 to January 1975.

The data for green forage (GF), dry forage (DF), dry matter (DM) content and crude protein (CP) were analyzed by analysis of variance in Duncan's multiple range test.

RESULTS AND DISCUSSIONS

The data in table 2 and fig. 1 show the average yields and dry matter content of the 10 grasses at the 30-, 45-, and 60-day interval grown at Corozal during a 2-year period.

Cynodon dactylon 11504⁵ produced the highest GF and DF yields at the 30-day interval, although its yield was not significantly different from those of the first 6 cultivars. The GF and DF yields ranged from 67,547 to 48,138 and from 18,894 to 12,275 kg/ha/yr, respectively. At the 45-day interval, *C. plectostachyus* (11487) outyielded all the grasses except *C. dactylon* (11504). There was no difference between *C. dactylon* (11504) and *C. nlemfuensis* (2341). The GF and DF yield ranged from 93,766 to 56,773 and from 28,794 to 15,492 kg/ha/yr, respectively at the 45-day interval. *C. plectostachyus* (11487) produced the highest DF yields at the 60-day harvest interval with 37,378 kg/ha/yr. This yield was significantly

TABLE 3.—Average green, dry forage and crude protein yield of 10 *Cynodons* at three harvest intervals¹

Harvest interval	Green forage yields	Dry forage yields	Dry matter content	Crude protein yields
Days			%	Kg/ha/yr
60	90,586 a ²	29,067 a	33.72 a	2,869 a
45	76,653 b	22,476 b	30.65 b	2,708 b
30	58,565 c	15,775 c	28.77 c	2,381 c

¹ Includes averages of 10 grasses and two fertilizer rates.

² Means in the same column followed by one or more letters in common do not differ significantly at the 5% level according to Duncan's multiple range test.

superior to those of the remaining nine *Cynodons*. *C. dactylon* (11504), *C. nlemfuensis* (2341) and *C. dactylon* (11212) produced similar DF yields at the 60-day harvest interval.

The DM content at the 30-day harvest interval was very similar for the 10 *Cynodons*. *C. dactylon* (11212) had the highest value (29.48%), whereas *C. nlemfuensis* (2341) had the lowest (27.64%). At the 45-day harvest interval *C. dactylon* (11212) had the highest value (32.30%) and *C. dactylon* (11455), the lowest with 29.67%. The DM content of the 10 grasses increased on the average at the 60-day harvest interval as compared to 30 and 45 days, ranging from 35.10 to 31.49%. *C. plectostachyus* (11487) had the highest DM content with 35.10%. The lowest dry matter contents were observed with *C. dactylon* (11455) with 31.49% and *C. aethiopicus* (11451) with 32.38%, respectively.

The average GF, DF and CP yields at the 30-, 45- and 60-day harvest

⁵ Hereafter the experimental grasses will be referred to by their Puerto Rico Plant Introduction Number (PRPI No.).

intervals for the 10 grasses are shown in table 3. The GF yields increased significantly with harvest intervals from 58,565 (30-day harvest interval) to 90,586 kg/ha/yr (60-day harvest interval). Likewise the DF yields increased from 15,775 (30-day harvest interval) to 29,067 kg/ha/yr (60-day harvest interval). A similar pattern was observed on the DM content: 28.77, 30.65 and 33.72% increases for the 30-, 45- and 60-day harvest intervals, respectively. Average CP yields of 2,381, 2,708 and 2,869 kg/ha/yr were obtained at the 30-, 45- and 60-day intervals, respectively. The GF, DF and CP yields at the 60-day harvest interval were significantly superior to those at the 45- and 30-day harvest intervals. Likewise, the yields at the 45-day harvest interval were significantly superior to those at the 30-day harvest interval.

The interaction between varieties and fertilizer rates was not significant. Varieties behaved similarly at both fertilizer rates.

TABLE 4.—Average forage and crude protein yields of 10 *Cynodons* at two fertilizer rates¹

Fertilizer rate	Green forage yields	Dry forage yields	Crude protein yields
High (4.48 mt)	93,027 a	26,878 a	3,417 a
Low (2.24 mt)	57,509 b	19,308 b	1,908 b

¹ Includes averages of ten *Cynodons* and three harvest intervals.

² Mean followed by "a" are significantly higher (5% level) than means followed by "b" according to Duncan's multiple range test.

The 10 cultivars produced significantly more DF at the higher fertilizer rate (table 4). Totals of 57,509 and 19,308 kg/ha/yr of GF and DF, respectively were produced when the low fertilizer rate was applied. On the other hand, 93,027 and 26,878 kg/ha/yr of GF and DF, respectively, were produced with the high fertilizer rate. The CP yields of the 10 *Cynodons* at the higher fertilizer rate were approximately twice as much as those at the lower fertilizer rate.

The CP yields of the 10 grasses (averages of three harvest intervals and two fertilizer rates) and the mineral composition (N-P-K) of leaves and stems are shown in table 5. *C. plectostachyus* (11487) produced the highest CP yield with 2,975 kg/ha/yr but no significant differences were observed among *C. plectostachyus* (11487), *C. dactylon* (11212 and 11505), *C. nlemfuensis* (2341) and *C. dactylon* (11504) in terms of CP yield, but these in turn were significantly superior to *C. plectostachyus* (11486) and (11488), *C. aethiopicus* (11451) and *C. dactylon* (11455). *C. plectostachyus* (11488) which produced the lowest CP yield had the highest leaf N content. The leaf P content ranged from 0.19% on *C. dactylon* (11505) to 0.28% (*C. dactylon* (11212)). *C. dactylon* (11212) had the highest leaf K content, and *C. aethiopicus* (11451), the lowest. The leaf K content ranged from 1.95% to 2.35%.

The stem N content was comparatively lower than that of leaves and ranged from 0.68% to 1.38%. The P content was slightly lower in stems than in leaves and the K content was in some cases higher in stems than in leaves.

Total DF yields during the short-day month period of December 1973 to January 1974 ranged from 3,081 to 5,202 kg/ha (table 6). *C. dactylon*

TABLE 5.—Average crude protein yields and N, P, and K contents leaves and stems of 10 *Cynodons*

Species	PRPI number	Crude protein yield ¹	Mineral element ²					
			Leaves			Stems		
			N	P	K	N	P	K
		Kg/ha/yr						
<i>Cynodon plectostachyus</i>	11487	2,975 a	2.10	0.21	2.18	0.68	0.11	1.95
<i>C. dactylon</i>	11212	2,887 a	2.62	0.28	2.35	0.98	0.20	2.75
<i>C. dactylon</i>	11504	2,871 a	1.84	0.23	2.05	1.38	0.21	2.24
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	2,828 a	2.14	0.23	2.18	1.02	0.21	2.69
<i>C. dactylon</i>	11505	2,771 a	2.22	0.19	2.12	1.02	0.18	2.35
<i>C. plectostachyus</i>	11489	2,738 ab	2.28	0.24	2.27	1.30	0.17	2.49
<i>C. plectostachyus</i>	11486	2,663 b	2.34	0.26	2.27	0.96	0.14	2.00
<i>C. aethiopicus</i>	11451	2,291 b	2.24	0.22	1.95	0.96	0.19	2.72
<i>C. dactylon</i> var. <i>coursii</i>	11455	2,279 b	2.46	0.24	2.31	1.04	0.17	2.49
<i>C. plectostachyus</i>	14488	2,231 b	2.62	0.21	2.18	0.68	0.11	1.95

¹ Means in the same column followed by different letters do not differ significantly at the 5% level according to Duncan's multiple range test.

² Grasses cut at a 45-day interval and fertilized at a rate of 4.48 metric tons of 15-5-10 per hectare per year.

TABLE 6.—Total dry forage yields of 10 *Cynodons* harvested at a 30-day interval during the short-day months of October, 1973 to January, 1974

Grass species	PRPI number	Total dry forage yields ¹
		kg/ha
<i>Cynodon dactylon</i>	11504	5,202 a
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	4,901 ab
<i>C. plectostachyus</i>	11486	4,898 ab
<i>C. plectostachyus</i>	11487	4,641 ab
<i>C. dactylon</i>	11212	4,633 ab
<i>C. dactylon</i> (Oklahoma bermuda hybrid)	11505	4,460 ab
<i>C. plectostachyus</i>	11489	4,206 bc
<i>C. dactylon</i> var. <i>coursii</i>	11455	3,591 cd
<i>C. aethiopicus</i>	11451	3,403 d
<i>C. plectostachyus</i>	11488	3,081 d

¹ Yields in the same column followed by one or more letters in common do not differ significantly at the 5% level according to Duncan's multiple range test.

(11504) had the highest yields although these were non-significantly different from those produced by *C. nlemfuensis* (2341), *C. plectostachyus* (11486-87) and *C. dactylon* (11212 and 11505).

Weed infestation occurred at a minimum on plots of *C. dactylon* (11504), *C. nlemfuensis* (2341), *C. plectostachyus* (11487) and *C. dactylon* (11212), respectively (table 7). All cultivars were least infested at the 60-

TABLE 7.—Total weeds on plots of 10 *Cynodons* grown at Corozal, P. R. during a 1-year period

Grass species	PRPI Number	Yield of weeds ¹ Kg/ha
<i>Cynodon plectostachyus</i>	11488	32.67 a
<i>C. plectostachyus</i>	11489	27.46 a
<i>C. aethiopicus</i>	11451	24.40 ab
<i>C. dactylon</i> var. <i>coursii</i>	11455	21.60 abc
<i>C. dactylon</i>	11505	21.43 abc
<i>C. plectostachyus</i>	11486	10.57 bcd
<i>C. dactylon</i>	11212	8.71 cd
<i>C. plectostachyus</i>	11487	5.85 d
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	2.40 d
<i>C. dactylon</i>	11504	1.87 d

¹ Yields in the same column followed by one or more letters in common do not differ significantly at the 5% level according to Duncan's multiple range test; lowest values represent least infestation.

TABLE 8.—Mean infestation ratings on plots of 10 *Cynodons* when grown at two fertilizer rates and three harvest intervals at Corozal, P. R. for a 2-year period

Grass species	PRPI number	Weed invasion rating ¹ Fertilizer rates							
		Low		High		Low		High	
		30 days		45 days		60 days			
<i>Cynodon dactylon</i>	11212	7.8 ²	6.5	5.8	3.0	2.8	1.1		
<i>C. aethiopicus</i>	11451	8.9	7.8	7.6	5.9	6.3	3.8		
<i>C. dactylon</i> var. <i>coursii</i>	11455	7.5	5.4	7.6	6.5	7.8	3.0		
<i>C. plectostachyus</i>	11486	7.3	2.3	4.0	2.0	5.4	3.8		
<i>C. plectostachyus</i>	11487	7.1	4.6	4.3	1.3	1.1	0.4		
<i>C. plectostachyus</i>	11488	8.3	6.3	6.9	5.8	6.4	3.8		
<i>C. plectostachyus</i>	11489	6.8	5.3	6.0	2.3	5.8	2.1		
<i>C. dactylon</i>	11504	4.5	2.8	3.3	0.8	2.9	.0		
<i>C. nlemfuensis</i> var. <i>nlemfuensis</i>	2341	6.8	4.6	4.6	3.3	1.4	0.5		
<i>C. dactylon</i>	11505	6.9	1.9	2.8	0.3	3.4	0.3		
\bar{X}		7.2	4.8	5.3	3.1	4.3	1.9		

¹ No statistical analyses conducted, 1 = no weed present to 9 = plots highly infested with weeds.

² Average of observations made by three persons at each fertilizer rate and harvest interval.

and 45-day intervals (table 8). At the 30-day interval more weed infestation was observed at the end of the experiment.

Principal weeds observed in order of importance in the experimental plot were: junglerice (*Echinochloa colonum* (L.) Link), goosegrass (*Eleusine indica* (L.) Gaertn), nutgrass (*Cyperus rotundus* L.), Bermudagrass (*Cynodon dactylon* (L.) Pers.), foxtail (*Setaria geniculata* (Lam.) Beauv.) and sour Paspalum (*Paspalum conjugatum* Berg.).

Figure 1 presents the effect of harvest frequency on the HCN content of the 10 cultivars. The HCN content ranged from 0 p/m (for the three harvest frequencies) on *C. dactylon* (11212) to a maximum of 333 p/m on *C. plectostachyus* (11488) at the 30-day regrowth stage. HCN content generally decreased as the age of the forage increased. Kingsbury, as cited by Eck (5) reported that it appears that 200 p/m HCN-p (hydrocyanic acid potential) is considered to be the "threshold of danger" to ruminant animals.

The DF and CP yields of most of the species tested are similar to those produced by the best forage grasses in use in Puerto Rico (13-15). At the 30-day harvest interval six of the cultivars produced DF yields similar to Stargrass (2341). At the 45-day harvest interval *C. plectostachyus* (11487) significantly outyielded the others except *C. dactylon* (11504). There was no difference between *C. dactylon* (11504) and Stargrass (2341). At the 60-day harvest interval *C. plectostachyus* (11487) was superior to the other nine cultivars. This grass produced DF yields of over 37,000 kg/ha/yr at this harvest interval, which is excellent, as compared to the best forage producers (2, 3, 13, 15) in Puerto Rico.

RESUMEN

Los efectos de tres intervalos de corte (30, 45 y 60 días) y dos dosis de abono de análisis 15-5-10 (2.24 y 4.48 toneladas métricas por hectárea y año) en los rendimientos de forraje verde (GF) y seco (DF), contenido de materia seca (DM) y producción de proteína bruta (CP) se estudiaron en 10 cultivares de pastos bermuda.

A los 30 días la producción de materia seca (DM) varió de 12,275 a 18,894 kilogramos por hectárea y año.

La producción más alta de materia seca se obtuvo con *C. plectostachyus* (11487) en el corte a los 45 días, seguida de cerca por la de Bermuda Coastcross I y la yerba Estrella (2341). La producción de materia seca fluctuó de 15,492 a 28,794 kilogramos por hectárea y año para las 10 yerbas. Con *C. dactylon* (11212) se obtuvo el contenido más alto: 32.30%.

C. plectostachyus (11487) rindió la producción de DM la más alta a los 60 días con 37,378 kilogramos por hectárea y año, siendo significativamente superior a los restantes 9 cultivares. La más baja se obtuvo con *C. plectostachyus* (11488): 19,467 kilogramos por hectárea y año.

La producción de DM para los 10 cultivares, considerando el promedio de los tres intervalos de corte, fue significativamente superior para la aplicación máxima de abono. Esta varió de 19,308 a 26,878 kg/ha para las aplicaciones máximas y mínimas de abono, respectivamente.

La producción de forraje seco (DF), el porcentaje de materia seca (DM) y la producción de proteína bruta (CP) aumentaron significativamente según se alargaron los intervalos de corte de 30 a 45 y de 45 a 60 días. Hubo un aumento significativo en producción de forraje seco de 30 y 23% al alargar el intervalo de corte de 30 a 45 y de 45 a 60 días, respectivamente.

La producción media de CP para las dos dosis de abono aumentó en un 17% al alargar el intervalo de corte de 30 a 60 días.

El contenido en HCN varió de 0 p/m en *C. dactylon* (11212) para las tres frecuencias de corte (30, 45 y 60 días) a 333 p/m en *C. plectostachyus* (11488) a los 30 días de crecimiento. La yerba Estrella obtuvo valores de 267, 200 y 200 p/m de HCN para las edades de 30, 45 y 60 días, respectivamente.

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