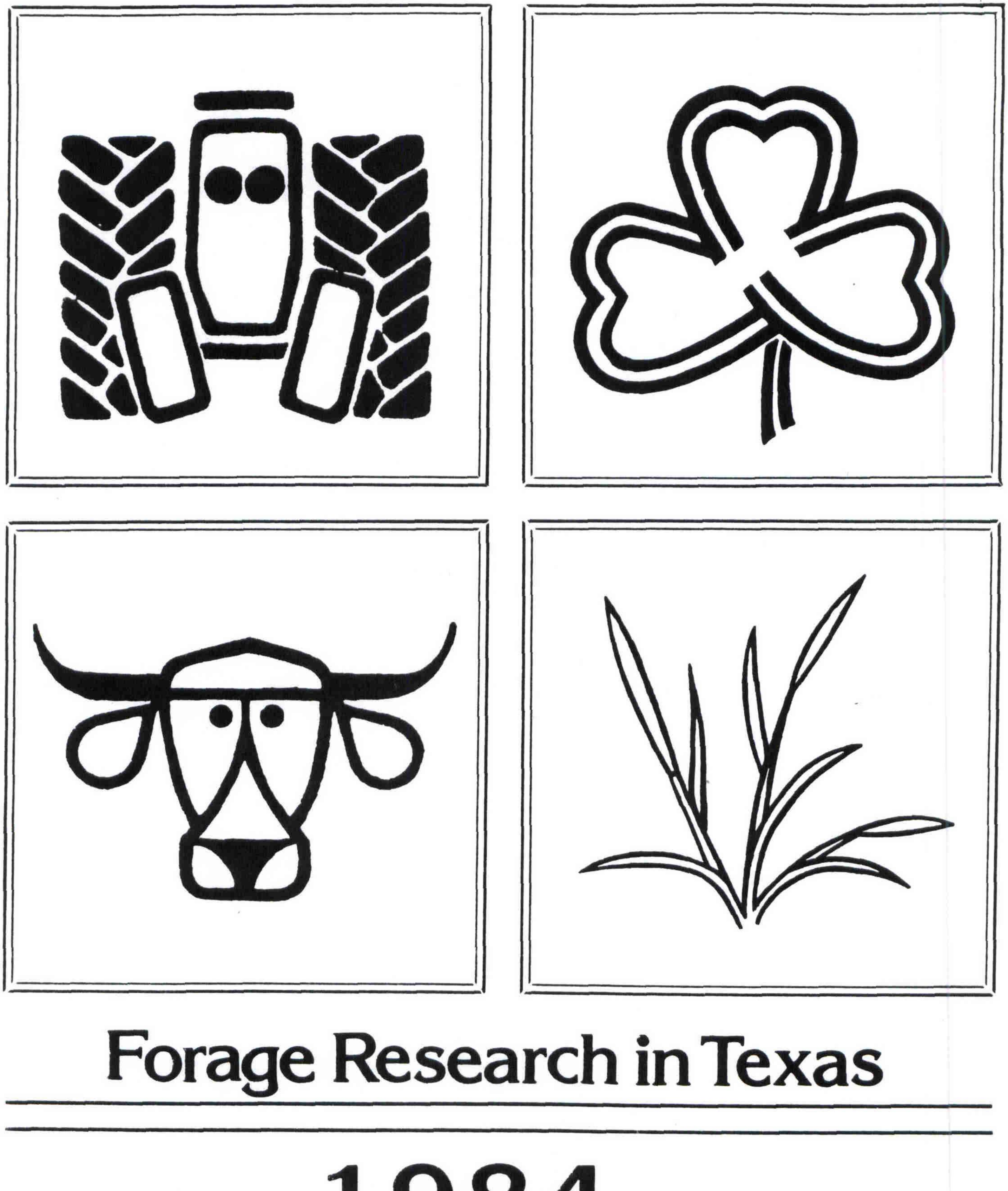
PUBLICATIONS

1984

CPR—4253
October 1984



Forage Research in Texas

1984

The Texas Agricultural Experiment Station Neville P. Clarke, Director The Texas A&M University System, College Station, Texas

EFFECTS OF FALL CLIPPING ON BERMUDAGRASS YIELDS THE FOLLOWING YEAR

T. S. Harris, V. L. Jones and L. Gordon[1]

SUMMARY

Callie and coastal bermudagrasses were subjected to 6 different fall clipping treatments consisting of ending monthly harvesting in the months of August through November 1982 (4 treatments) and 2 other treatments consisting of delaying harvesting after August until October and November. The purpose of the experiment was to measure the effects of fall clipping on winter tolerance as manifested by yields the following year. Four nitrogen levels were also included in the test. Yields during 1983 through August decreased from 11,675 to 9,835 pounds of dry matter per acre as a result of continued monthly fall harvesting through November 1982. Yields during 1983 due to the 2 delayed 1982 fall clipping treatments were identical at 10,671 pounds of dry matter per acre and generally ranked second to the treatment not harvested after August. When the amounts of forage harvested during application of the 1982 fall treatments were added to 1983 yields, the 2 delayed fall harvest treatments resulted in much greater yields, a mean of 13,821 compared to a mean of 11,911 pounds of dry matter per acre for the 4 other treatments. The total of fall and following year yields were not different for these 4 treatments because the decrease in 1983 yields due to late fall harvesting was compensated by the amounts harvested during the fall. Nitrogen fertilizer, up to 360 pounds per acre did not influence clipping treatment results, but increased yields from 3,694 to 16,742 pounds per acre for Callie and from 7,238 to 21,876 pounds per acre for coastal.

INTRODUCTION

Since bermudagrasses are of tropical origin, one of the problems associated with their production in the U. S. is that some varieties are damaged by the relatively cold temperatures which occur some winters in the southern region where they are grown. This problem has been approached through plant selection and breeding, but often at the sacrifice of other desirable attributes such as high dry matter yield and forage quality. Many observations suggest that winter tolerance can be improved by reducing nitrogen application or not harvesting late or frequently during the fall. A certain amount of regrowth after fall utilization is believed to increase protection against winter kill through natural development of winter hardiness or through the insulation effect provided by standing fall regrowth. Less drastic

---

[1]Assistant professor, research scientist, and graduate student, respectively, Cooperative Research Center, Prairie View A&M University, Prairie View, Texas 77446.

KEYWORDS: Bermudagrass/cultivars/winter hardiness/fall clipping/yield fertilization.

clipping heights have tended to support this latter claim.

Quantitative data required to ascertain these observations are not available, especially on the numerous bermudagrass varieties recently being evaluated or released in Texas. This study was designed to evaluate any effect of selected fall clipping lateness and frequency treatments on the winter tolerance of Callie and coastal bermudagrasses as manifested by spring dry matter yields. Different levels of soil nitrogen are also included in the study to determine whether nitrogen influences the effect of fall clipping treatments on bermudagrass yields.

PROCEDURE

This study was established on field plots arranged in a randomized complete block design with split blocks and split plots. Each of 4 blocks (containing a replication of the experiment) was split to accommodate the 2 bermudagrass varieties, Callie and coastal. Four nitrogen levels were used for each block and variety to result in 32 main plots, 8 by 24 feet with 5-foot alleyways between each. These main plots were split to accommodate 7 fall clipping treatments, resulting in 224 experimental units. The grasses were established during April 1982 by sprigging plant materials in a row located in the center of each 3.4 by 8 foot subplot, placed 1 foot apart in the row.

Nitrogen treatments consisted of a check (0 nitrogen) and 3 levels of nitrogen, 22.5, 45 and 90 pounds per acre applied each year in April, and these same amounts applied immediately after each harvest through August. Phosphorus and potassium fertilizers were applied each spring on all plots to provide 53 pounds per acre of actual ingredients.

Fall clipping treatments commenced each year after monthly harvests were taken through July. Four of these consisted of taking the last monthly harvest for the year in August, September, October and November. These are designated as Treatments 1 through 4 in Tables 1 and 2. Two other treatments consisted of not harvesting after August until October and November, designated as Treatments 5 and 6, respectively. A seventh plot was used as a spare in 1982, but was used as an additional treatment beginning in August 1983.

Harvests were taken by clipping a 26-inch strip through the center of each designated subplot with a sickle bar mower, each strip being 6 feet in length and clipped 1 inch above ground level. Clippings were raked onto a canvas and weighed in the field. A sample of approximately one-half pound from each harvested subplot was bagged, sealed, and used to determine percent dry matter. These samples are also to be used in forage quality analyses.

RESULTS AND DISCUSSION

Dry matter yields harvested through August 1983 as a response to 1982 fall clipping treatments are given by variety and harvest date in Table 1. These data show that 1983 yields are significantly higher as a result of Treatment 1 where the grasses were not harvested after August 1982. As monthly fall clipping treatments were continued from

September through November 1982 (Treatments 2-4) yields during 1983 showed a steady decline as a result of lateness of clipping during the previous year. Mean yields for both varieties due to Treatments 1 through 4 were 11,675, 10,658, 10,469 and 9,835 pounds of dry matter per acre, respectively. For Treatments 5 and 6 (not harvested in 1982 after August until October and November, respectively) yields for the 1983 season through August were identical for both treatments (10,671 lbs/ac). Yields resulting from these 2 treatments were significantly less than those from Treatment 1 and higher than Treatment 4 which provided the lowest 1983 yields. The above clipping treatment results on 1983 yields were similar for separate variety analyses as no significant interaction was found between clipping treatment and variety. The coastal variety was found to yield about 30 percent more forage than Callie under all treatment factors. This was partially attributed to a rust-like infestation in the Callie stand. A significant interaction was also found between fall clipping treatment and harvest date for each variety. Yield data for June and July 1983 show greater numbers and amounts of significant differences among the 6 treatments than data for the month of August. This indicates that previous fall clipping effects were essentially overcome by the time of the July 20-21, 1983, harvest.

The results presented above and in Table 1 do not reflect various amounts of forage harvested during the application of fall clipping treatments, which were produced after a cutting on August 23-24, 1982, to initiate the clipping treatments. In the case of Treatment 1, which was not harvested after August 1982, a large amount of fall produced forage was sacrificed for winter protection, and was considered unsuitable for feed in the spring and not harvested. This amounted to from 1209 to 3975 pounds per acre based on the amounts harvested after August 1982 in the application of the other clipping treatments. Amounts of fall forage sacrificed for winter protection in the case of Treatment 1, however, resulted in from 1004 to 1840 pounds per acre more forage the following year compared to the other treatments.

The results in Table 2 consider total forage harvested after August 24, 1982, during the application of fall clipping treatments and the amounts harvested in 1983 through August 25. These data show that all forage actually harvested during the experimental year were significantly higher under treatments 5 and 6 than under other treatments. Since these treatments allowed long growth periods during the fall, ending in October and November 1982, respectively for Treatments 5 and 6, but caused only slight yield reductions the following year (Table 1), most of the higher total yields were attributed to fall harvesting. Treatments 1, 2, 3 and 4 however, were not significantly different from each other in the amount of forage harvested during the experimental year (Table 2). The mean dry matter yield for Treatments 1 through 4 over the period was 11,911 compared to 13,821 pounds per acre for the mean of Treatments 5 and 6. For Treatments 1 through 4, the spring yields decreased as monthly fall harvesting continued, but the increasing amounts of fall forage harvested as a result of the application of Treatments 2, 3 and 4 completely compensated for gains in yields due to early cessation of fall harvesting. This resulted in yields harvested over the experimental year to be statistically the same for these 4 treatments.

The different levels of nitrogen application had significant effects on yields of each variety at each harvest, but did not interact significantly with fall clipping effects on yields the following year. Table 3 shows the effect of increasing nitrogen fertilization rate from 0 to 90 pounds per acre applied initially each season, and in the same amounts after each harvest through August. Dry matter yields were significantly correlated with increasing levels of nitrogen fertilization, and ranged from 3,694 to 16,742 pounds per acre for Callie and ,238 to 21,876 pounds per acre for coastal over the experimental year.

Table 1. Yields of Callie and coastal bermudagrasses during 1983 as influenced by 1982 fall clipping treatments

Treatment reference number	[1]1982 Fall clipping treatment			[2]Mean dry matter yields, 1983								
				Callie				Coastal				Means
	Sep	Oct	Nov	Jun	Jul	Aug	Totals	Jun	Jul	Aug	Totals	
				lbs/ac								
1	-	-	-	4444 a	1745 a	2939 a	9128 a	7305 a	3050 a	3867 ab	14,222 a	11,675 a
2	x	-	-	3747 bc	1450 b	3113 a	8310 bc	6240 b	3022 a	3744 b	13,006 b	10,658 b
3	x	x	-	3602 bc	1600 ab	3012 a	8314 bc	5894 a	2978 a	3852 ab	12,724 b	10,469 b
4	x	x	x	3413 c	1467 b	2848 a	7728 c	5364 c	2710 b	3867 ab	11,941 c	9,835 c
5	-	x	-	4143 ab	1556 b	2967 a	8716 ab	5861 b	2972 a	3792 ab	12,625 bc	10,671 b
6	-	-	x	3697 bc	1533 b	2961 a	8191 bc	5961 b	3073 a	4117 a	13,151 b	10,671 b

[1]The symbol "x" indicates that a harvest was taken after August 24, 1982, during the month where the symbol appears. The symbol "-" indicates that harvest was not taken during the month in 1982.

[2]Yields within a column followed by the same letter are not different at the 0.05 level according to the Duncan Multiple Range test.

Table 2. Total forage harvested during application of fall clipping treatments after August 24, 1982, and during the 1983 season through August 25

Treatment reference number	[1]1982 Fall clipping treatment			[2]Total forage harvested during application of 1982 fall clipping treatments and during 1983 through August		
	Sep	Oct	Nov	Callie	Coastal	Means
				----------------	lbs/ac	----------------
1	-	-	-	9,129 a	14,222 a	11,676 a
2	x	-	-	9,519 a	14,520 a	12,019 a
3	x	x	-	9,877 a	14,450 a	12,164 a
4	x	x	x	9,491 a	14,078 a	11,785 a
5	-	x	-	11,369 b	15,695 b	13,532 b
6	-	-	x	11,096 b	17,125 c	14,110 b

[1]The symbol "x" indicates that a harvest was taken after August 24, 1982, during the month where the symbol appears. The symbol "-" indicates that harvest was not taken during the month in 1982.

[2]Yields within a column followed by the same letter are not different at the 0.05 level according to the Duncan Multiple Range test.

Table 3. Yields of Callie and coastal bermudagrasses as influenced by level of soil applied nitrogen

[1]Nitrogen level (lbs/ac)	[2]Dry matter yields									
	Callie					Coastal				
	Fall 1982	1983 Jun	1983 Jul	1983 Aug	Totals	Fall 1982	1983 Jun	1983 Jul	1983 Aug	Totals
	lbs/ac									
0	707 a	1171 a	610 a	1206 a	3,694 a	997 a	2394 a	1212 a	2635 a	7,238 a
23	1436 b	2866 ab	1212 b	2383 ab	7,897 b	1829 ab	5015 b	2316 b	3191 ab	12,351 b
45	1832 b	5290 bc	1758 b	3106 b	11,986 c	2479 bc	7948 c	3431 c	4736 b	18,594 c
90	2819 c	6071 c	2654 c	5198 c	16,742 d	2976 c	9059 c	4911 d	4930 b	21,876 c

[1]Level of actual nitrogen applied during each application through August 1982; and April, June and July 1983.

[2]Yields within a column followed by the same letter are not different at the 0.05 level according to the Duncan Multiple Range test.