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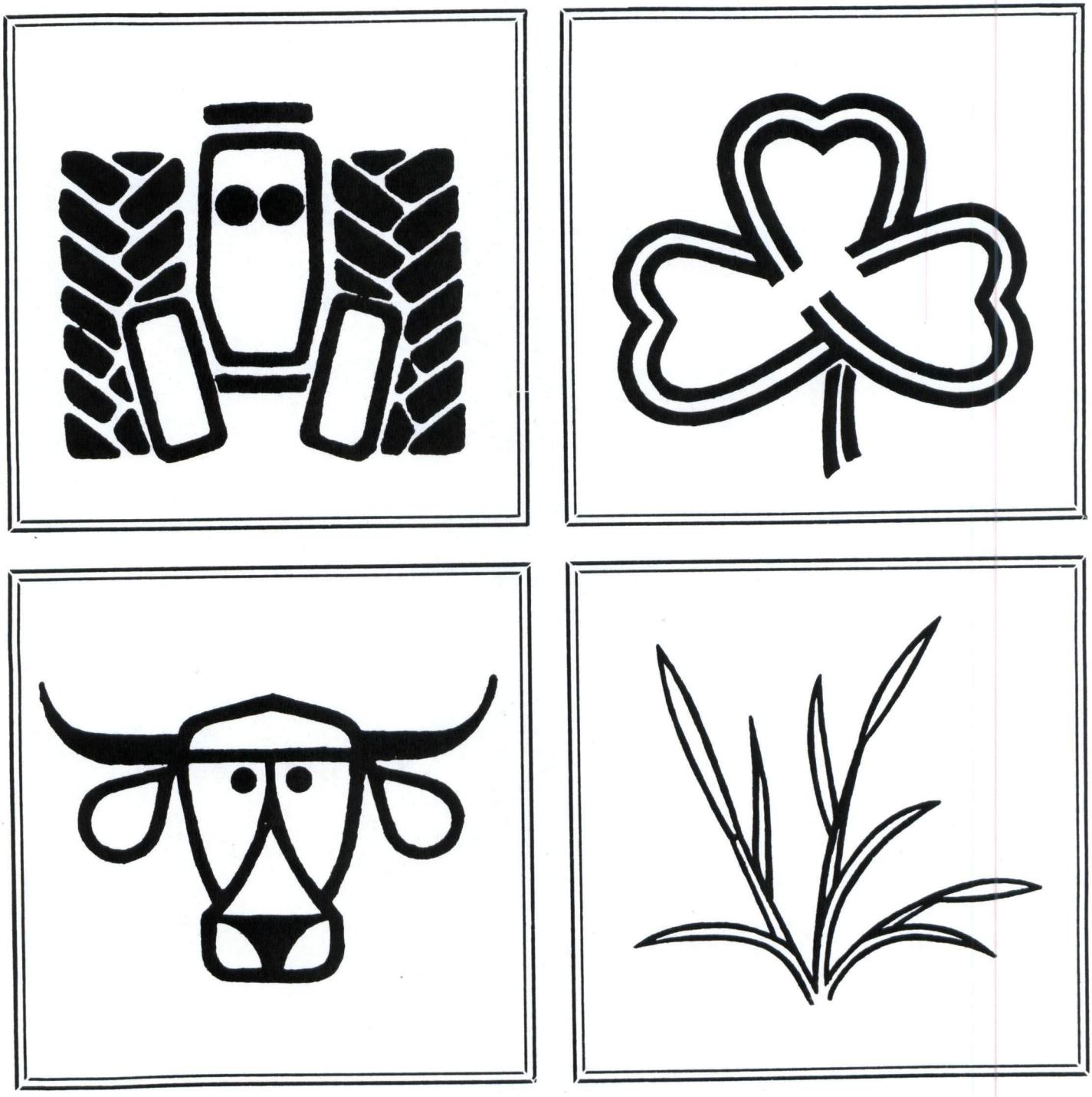

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The Performance of Yuchi Clover-Coastal Bermudagrass and Gulf Ryegrass-Coastal Mixtures as Influenced by Seedbed Preparation and Seeding Rate

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ABSTRACT

Yuchi arrowleaf clover and Gulf ryegrass were overseeded separately at varying rates on Coastal bermudagrass sod by drilling or broadcasting following either shredding or shredding and paraquat treatment. This is part of a larger study to partition energy requirements for forage production and energy contributions of components of pasture systems to livestock production. Winter crop production did not differ between shredding and paraquat or between drilling or broadcasting. Fall applied paraquat seemed to reduce the following spring and summer Coastal production. Also spring and summer Coastal production following the winter crop seemed to be reduced approximately equivalent to the winter crop production when compared with non-overseeded Coastal. A limited nitrogen study indicated that this was not a nitrogen response.

INTRODUCTION

Previous sod-seeded winter pasture research has largely ignored the potential effects of the winter pasture on the subsequent summer pasture component of the system. In areas west of the 40-inch rainfall line, the total pasture system must be considered. Plant growth made either in fall or late winter may have a profound effect on growth of the permanent grass the following summer through soil moisture effects. Similarly, pasture component contributions to livestock production, including energy efficiency and economic returns, require evaluation in the context of the whole pasture system. The agronomic research reported in this paper was designed to evaluate establishment production strategies for the winter pasture component and the carry-over effects on the summer pasture.

MATERIALS AND METHODS

Plots were seeded October 2, 1982 on Coastal bermudagrass sod sprigged in 1974 and grazed with stocker steers each summer from 1975 through 1982. The soil is a fine silty loam fertilized each year from 1975 through 1982 with 200-0-0 per acre. A split-split-split plot field design was employed with 3 replications. Main plots were seedbed preparation consisting of either (1) shredding at less than 2-inch height or (2) shredding plus paraquat to desiccate the stubble. Subplots consisted of (1) broadcasting the seed on the surface

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or (2) drilling the seed in 10-inch drill rows using a special plot drill. Sub-sub plots consisted of either (1) Yuchi arrowleaf clover, or (2) Gulf ryegrass within each broadcast or drilled plot. The clover and ryegrass were not seeded in a mixture in this study. The sub-sub-subplots were three seeding rates (high, medium, low) which were as follows: Yuchi clover - 10, 20, and 30 pounds of seed per acre; Gulf ryegrass - 20, 30, and 40 pounds per acre. Three Coastal check plots (no overseeding) were included in each replication. These were fertilized at the rate of 0, 50, and 100 pounds of N per acre on June 1. Three ryegrass drill plots on shredded areas were fertilized at the same rates. No other fertilizer was applied during the study. Harvests made on April 13 and May 31 were separated into clover, wintergrass, and bermudagrass components. The plot area had considerable volunteer rescue and some ryegrass, thus the clover plots were not pure clover. Neither preemergence nor postemergence herbicide treatments could be used to remove the volunteer grasses because of the effect on the clover and seeded grass. Volunteer grass was removed from the check plots with paraquat prior to growth initiation of Coastal. Harvests were made on August 3 and October 18 consisting of only Coastal bermudagrass to evaluate the effects of overseeding treatments on the permanent grass.

RESULTS

The main treatment effects are summarized in Table 1. Both ryegrass and arrowleaf clover were successfully established on Coastal bermudagrass sod in October 1981 by either drilling or broadcasting seed following either late September shredding or shredding plus paraquat to reduce bermudagrass competition. Ryegrass and clover yields did not differ in either April or May between shredding or paraquat, between drilling or broadcasting, or due to seeding rate. Yuchi clover and Gulf ryegrass did not differ in production on either April 13 or May 31 though the numerical yield of clover plots exceeded the yield of ryegrass plots by about 1,600 pounds per acre on May 31. Apparently the later maturity of Yuchi than Gulf was the reason for the difference.

While there was no difference in production between shredding and paraquat treatment during the time the winter crops were present, summer production of Coastal was about 1,000 pounds per acre less following paraquat. The effect of broadcasting the seed versus drilling was not significant on any date.

The winter crops produced about 2,500 pounds of dry matter by early April, prior to any appreciable growth of Coastal. However, Coastal alone produced about 2,500 pounds more forage in May, June, and July than overseeded plots. Total yields with or without overseeding did not differ appreciably.

Performance of overseeding with Yuchi clover versus overseeding with Gulf ryegrass at the first two harvest dates is shown in Table 2. Seedbed preparation (shred vs. paraquat) had relatively little effect at the first date. However at the second harvest, differences due to paraquat were in the range of 900 to 1200 pounds per acre and the effect was on the bermudagrass component. Apparently fall-applied paraquat reduced the spring recovery of bermudagrass. There

was no difference between drill and broadcast in any component at any date.

Increased seeding rate seemed to increase the amount of legume production at the first harvest and reduced volunteer grass production at the same date, while increasing ryegrass seeding rates had no effect on total wintergrass production. Likely more ryegrass from the higher seeding rates also reduced volunteer wintergrass production but it was not possible to separate the two components. Seeding rate had a relatively small effect on total production when all components were added together. At the second date legume production decreased with increased seeding rate while wintergrass was not affected, resulting in a decrease of almost 800 pounds per acre with increased seeding rate. Seeding rate had no effect on production in ryegrass overseedings. When all dates were considered (Table 1) seeding rates had no effect on dry matter production.

In legume overseeded plots the legume contributed 60 percent of total production at the first date and volunteer wintergrasses contributed 33 percent (Table 2). In ryegrass overseeded plots, ryegrass and volunteer wintergrass contributed 95 percent of total at the first harvest. At the second harvest legume constituted 33 percent of total production on legume overseeded plots while Coastal constituted 51 percent. Coastal constituted almost precisely the same 51 percent of total forage on ryegrass overseeded plots. Thus, it appears that clover and ryegrass did not differ appreciably in competition effects on Coastal. Further, summer production of Coastal (Table 1) was the same following clover and ryegrass. However, summer production following either clover or ryegrass was less than non-overseeded Coastal, indicating some competition effects on Coastal production.

While fertilization was not an important component of this study, some selected plots were differentially fertilized with nitrogen on June 1 (Table 3). The data are highly variable and inconsistent. There was an unusually large response of non-overseeded Coastal to 50 pounds per acre of nitrogen and almost the opposite effect following overseeding with ryegrass. The results of this study indicate that either the nitrogen application levels did not reach the minimum threshhold response level for Coastal, or the carryover nitrogen from several years of pasture fertilization was adequate to meet the growth requirements of Coastal. The level of total production and the absence of a difference following Yuchi clover versus Gulf ryegrass suggest a considerable amount of available soil nitrogen.

CONCLUSIONS

The results of this initial study have implications concerning winter pasture establishment practices and costs. Ryegrass and clover emerged in the fall of 1981 and again in 1982 (date not shown) with broadcast seed following shredding only. These results indicate that reduction in competition by close grazing or shredding is adequate for late September and October plantings without chemically induced dormancy or mechanical disturbance of the sod. However,

earlier planting or seedling emergence would likely necessitate reduction in bermudagrass competition by one of the means indicated above. Also, it should be noted that legume inoculant is susceptible to direct sunlight. Thus, broadcasting the seed on the surface may result in less early nodulation and nitrogen fixation than when the seed are placed in the soil by drilling unless planting is followed by rainfall and early emergence.

First year data indicate that chemically induced sod dormancy may negatively affect following-year production of the permanent grass.

Winter pasture lengthened the potential grazing season by 45 to 60 days but increased total production of the system little over Coastal bermudagrass alone. Winter crop production up to mid-April exceeded 2,500 pounds per acre while later Coastal production was reduced about the same amount as compared with non-overseeded Coastal. Additional energy is involved in the sod-seeding operation, but temperate crops and early spring forage are higher in available energy content than mid-summer Coastal forage. Also, forage availability in mid to late winter may be more critical than in mid-summer. Confirmation of these responses and further evaluations of energy requirements and contributions will constitute follow-up studies.

Table 1. Main effects of seedbed preparation and seeding rate on forage production, 1982.

Treatment	Pounds seed/ac	Date of forage harvest				
		April 13	May 31	Aug 3	Oct 18	Total
		pounds of dry forage per acre				
Shred	--	2519 a[1]	4288 a	4202 a[2]	2773 a	13,782 a
Paraquat	--	2426 a	4588 a	3115 b	2837 a	12,966 a
Broadcast	--	2551 a	4874 a	3387 a[3]	2870 a	13,682 a
Drill	--	2396 a	4001 a	3953 a	2738 a	13,088 a
Ryegrass	20	2328	3672	3608	2703	12,311
	30	2684	3526	3067	2526	11,803
	40	2464	3724	4305	2799	13,292
Average		2492 a	3641 a	3660 a	2681 a	12,474 a
Yuchi	10	2313	4597	4380	3137	14,427
	20	2622	4101	3398	2891	13,012
	30	2421	7006	3199	2751	15,377
Average		2452 a	5234 a	3672 a	2927 a	14,285 a
Coastal alone		--	5105	5464	1892	12,461

[1] Values within a column for paired treatments with a common letter do not differ significantly ($P<0.05$).

[2] One-sixth of shred plots received average of 75 pounds N/acre on June 1, Paraquat plots received no N.

[3] One-third of drill plots received an average of 75 pound N/acre on June 1, broadcast plots received no N.

Table 2. The performance of Yuchi clover-Coastal versus Gulf ryegrass-Coastal mixtures, 1982.

Treatment		pounds of dry forage per acre							
		Legume over-seeded plots				Ryegrass over-seeded plots			
		Legume	Winter grass	Bermuda	Total	Legume	Winter grass	Bermuda	Total
					April 13, 1982				
Shred		1415	702	100	2215	--	120	120	2481
Paraquat		1355	945	54	2354	--	1873	112	1985
Broadcast		1152	949	71	2172	--	2167	115	2282
Drill		1618	699	82	2399	--	2084	117	2201
	Seed rate								
Legume or	1	1016	942	101	2059	--	1935	86	2022
grass	2	1376	960	60	2396	--	2286	127	2413
	3	1763	570	69	2402	--	2165	137	2302
	Average	1385	824	77	2286	--	2129	117	2246
					May 31, 1982				
Shred		1460	529	2367	4356	24	1640	2158	3822
Paraquat		1185	855	1433	3446	59	1428	1145	2632
Broadcast		1334	640	1896	3870	58	1428	1677	3163
Drill		1284	744	1904	3932	25	1641	1627	3293
	Seed rate								
Legume or	1	1528	617	2074	4219	42	1542	1548	3132
	2	1238	839	1756	3833	10	1618	1563	3191
	3	1160	621	1870	3651	73	1444	1846	3363
	Average	1309	692	1900	3901	42	1535	1652	3229

[1] Yuchi clover was seeded at 10, 20 and 30 and Gulf ryegrass at 20, 30 and 40 pounds per corresponding to rates 1, 2 and 3, respectively.

Table 3. The effect of spring nitrogen fertilization on forage production, 1982.

Pounds N/acre	Pounds of dry forage per acre				
	April 14	May 31	Aug 3	Oct 18	Total
	Coastal alone				
0	--	5,105	5,464	1,892	12,461
50	--	6,000	9,294	2,378	17,672
100	--	4,485	9,593	1,752	15,830
Average	--	5,197	8,117	2,007	15,321
	Coastal + ryegrass[1]				
0	2,574	3,859	5,993	2,762	15,188
50	2,990	4,581	4,637	2,228	14,436
100	2,343	3,180	5,733	2,238	13,348
Average	2,636	3,873	5,454	2,409	14,324
	Coastal + Yuchi clover[2]				
0	2,248	4,483	4,061	2,838	13,630

[1] Represents nitrogen treatments on ryegrass drilled, shreded plots.

[2] Represents Yuchi on drilled, shreded plots.