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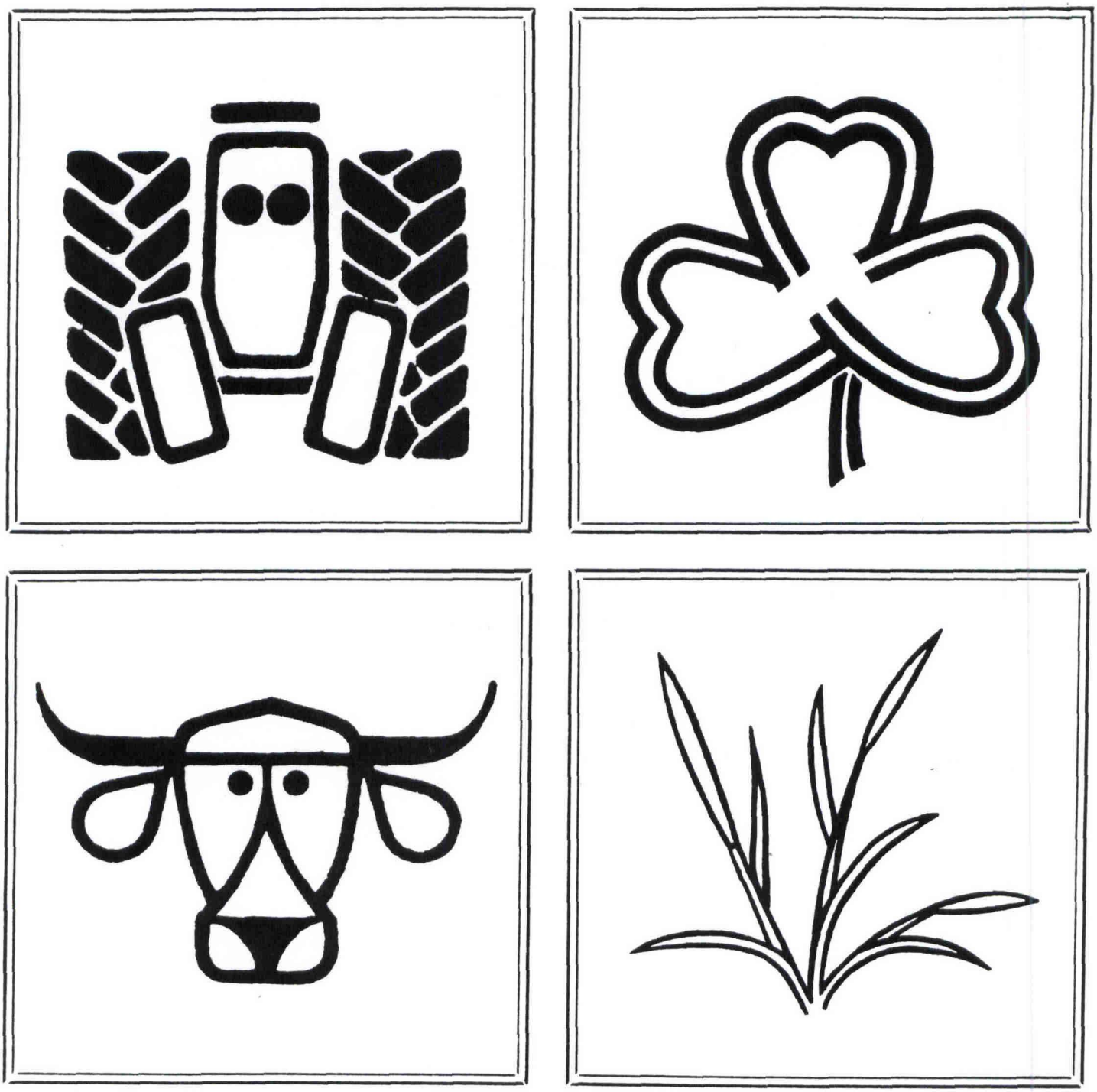

Forage Research in Texas

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

The Effects of Planting Methods and Rates of Sod Seeded Crops on Forage Production, 1981-1983

E. C. Holt and B. E. Conrad [1]

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, between drilling or broadcasting, or among seeding rates of the two species. Total yields of ryegrass plus Coastal and Clover plus Coastal were the same. Production through April was increased by overseeding plots.

However, summer Coastal production following the winter crop seemed to be reduced approximately equivalent to the winter crop production when compared with non-overseeded Coastal. Thus, total yields were about the same with or without overseeding.

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 the fall or late winter may have a profound effect on growth of the permanent grass the following summer through soil moisture effects. Also, if the cool-season crop is a grass, total nitrogen requirements may be greater. 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.

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[1] Professor and associate professor, respectively, Soil & Crop Sciences Department.

KEY WORDS: sodseeding/ Coastal/ Yuchi clover/ Gulf ryegrass/ seeding rate/ seedbed preparation.

MATERIALS AND METHODS

The second year of the study was seeded on the same plots as in the preceding year. Seeding was about October 1, 1983 on Coastal bermudagrass sod sprigged in 1974 and grazed with stocker steers each summer from 1975 through 1981. The soil is a fine silty loam fertilized each year from 1975 through 1981 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 seed on the surface 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 are; Gulf ryegrass - 20, 30 and 40 pounds per acre. The ryegrass plots received 50 pounds of nitrogen per acre at planting. Three Coastal check treatments (no overseeding) were included in an adjacent experiment. These were fertilized at the rate of 0, 50 and 100 pounds of N per acre in mid-March. The plot area was fertilized with 70-0-0 on June 29. The study was reestablished on plots receiving the same treatment in 1981-82. Harvests made on April 19, May 25 and June 28 were separated into clover, wintergrass, and bermudagrass components. Harvests were made on August 5 and September 13 consisting of only Coastal bermudagrass to evaluate the effects of overseeding treatments on the permanent grass.

RESULTS

The overseeding methodology study indicates no real effects of shredding versus shredding followed by paraquat desiccation of the sod on subsequent dry matter production (Table 1) Similarly broadcasting the seed, either ryegrass or Yuchi clover, resulted in the same dry matter production as placing the seed in the soil with a drill. The third variable in the study was seeding rate. Yield was the same, including first-cutting yield, for seeding rates of 20 to 40 pounds per acre of ryegrass or 10 to 30 pounds of Yuchi. The two-year averages follow the same patterns as the 1983 data (Table 2).

The above data suggest that energy and seed costs for establishment can be reduced by reducing sod cover by shredding (or close grazing) followed by broadcasting 10 pounds of Yuchi or 30 pounds of ryegrass or a mixture of the two species. It should be pointed out that there was some volunteer wintergrass (rescue and/or ryegrass) present in both years of the study which, if not

present, could alter early production. Further, the exposure of inoculated clover seed to direct sunlight where the seed are placed on the surface (by broadcasting) may be detrimental to the inoculum. This may be an important factor with initial planting before any buildup of Rhizobia occurs in the soil and if moisture for germination is not available at planting time.

There was no negative effect of paraquat on Coastal recovery and production in 1983 as was evident in 1982. Yield of the check plot (Coastal only) in April was less than that of overseeded plots. Conversely, yield of Coastal only (checkplot) in early August was much higher than overseeded plot yields resulting in yield of Coastal alone being as high or higher than Coastal plus overseeded crop yield. Apparently overseeding in this environment results in shifting some of the yield to the cool season but not in increasing total yield in a system where some of the nitrogen was applied to the winter crop. In other words, at a fixed nitrogen level, Coastal is more efficient in nitrogen use than the winter crops, thus total yield is not increased by winter overseeding If additional nitrogen were applied to Coastal following the winter crop and assuming that moisture was not a limiting factor, greater total production might be realized by sod seeding than by Coastal alone.

The two-year yield data (Table 2) show the same pattern as the 1982-83 data. Also, yields for the two years were very similar, averaging about 6 tons per acre.

The data in Table 3 indicate essentially no effects of establishment practices on botanical composition. In legume overseeded plots there is a trend toward higher percentage of legume and less weeds in April with heavier seeding rates. Ryegrass did not show a similar pattern, and the cost of the extra legume seed to achieve the result would be prohibitive especially since yield was not affected (Table 1). Weed invasion in April and May was greater in legume plots than in ryegrass plots. Apparently Yuchi clover is less competitive than Gulf ryegrass in the early stages of plant development thereby allowing more weeds to develop. The competitive effects of clover vs ryegrass on Coastal were variable in May. On the average there was more Coastal in the ryegrass plots indicating that ryegrass has passed its peak but individual treatment combinations varied. Ryegrass had completely disappeared prior to the June 28 harvest whereas clover still constituted 15 to 20% of the population in clover overseeded areas.

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 with broadcast seed following shredding only. These results indicate that reduction of competition of Coastal bermudagrass 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.

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 without an appreciable increase in total dry matter production, 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 reduce winter supplementary feed requirements because forage availability is more critical than in mid-summer. Thus, the practice may make a positive contribution even though dry matter production is not increased. Confirmation of these responses and further evaluation of energy requirements and contributions will constitute follow-up studies.

Table 1. Main effects of seedbed preparation and seeding rate on forage production, 1983

Treatment	Seed/ac lb.	Date of forage harvest: Mar. 3	Apr. 19	May 25	June 28	Aug. 15	Sep. 13	Total
		pound of dry forage per acre						
Shred	-	526a	1854a	1530a	884a	3817a	2568a	11179a
Paraquat	-	504a	2128a	1372b	877a	3733a	2710a	11284a
Broadcast	-	527a	1994a	1456a	940a	3773a	2693a	11383a
Drill	-	503a	1992a	1443a	822b	3777a	2584a	11121a
Ryegrass	20	536	2370	1217	877	3566	2646	11213
	30	637	2407	1079	832	3737	2706	11398
	40	562	2252	1133	829	3474	2561	10821
Average		547a	2341a	11743b	849a	3593a	2640a	11113a
Yuchi	10	486	1433	1952	973	4114	2617	11575
	20	534	1953	1633	894	3795	2673	11482
	30	426	1579	1697	869	3964	2628	11163
Average		482a	1655b	1765a	912a	3958a	2638a	11410a
Coastal alone		774	451	1875	1264	6051	2269	12684

Values within a column for paired treatments or ryegrass vs. Yuchi means with a common letter do not differ significantly ($p<0.05$)

Table 2. Two-year average of main effects of seedbed preparation and seeded rate on forage production, 1982-83

Treatment	seed/ac. lb	1982	1983	Average
		Pounds dry forage per acre		
Shred	-	13,782[a]	11,179[a]	12,480[a]
Paraquat	-	12,966[a]	11,284[a]	12,125[a]
Broadcast	-	13.682[a]	11,383[a]	12,532[a]
Drill	-	13,088[a]	11,121[a]	12,104[a]
Ryegrass	20	12,311	11,213	11,762
	30	11,803	11,398	11,600
	40	13,292	10,921	12,056
Average		12,474[a]	11,113[a]	11,793[a]
Yuchi	10	14,427	11,575	13,001
	20	13,012	11,482	12,247
	30	15,377	11,163	13,270
Average		14,285[a]	11,410[a]	12,847[a]
Coastal alone		12,461	12,684	12,572

Values within a column for paired treatments or ryegrass vs. yuchi means within a common letter do not differ significantly ($p<0.05$).

Table 3. Botanical composition of forage mixtures in overseeding study, 1983

Treatment	Seed Rate[1]	Ratio (percent) of components of plant population							
		Legume overseeded plots				Ryegrass overseeded plots			
		Legume	Winter grass	Coastal	Weeds	Legume	Winter grass	Coastal	Weeds
					April 19, 1983				
Shred		84	0	3	13	0	93	5	2
Paraquat		87	0	1	12	0	94	3	2
Broadcast		88	0	2	15	0	93	5	2
Drill		83	0	3	10	0	95	2	3
Legume or grass	1	80	0	4	16	0	92	5	3
	2	84	0	1	15	0	96	4	0
	3	92	0	2	6	0	93	5	2
					May 25, 1983				
Shred		67	0	27	6	0	48	49	3
Paraquat		60	0	27	13	0	73	22	5
Broadcast		70	0	18	12	0	60	37	3
Drill		58	0	36	6	0	60	37	3
Legume or grass	1	63	0	29	8	0	58	36	6
	2	60	0	25	15	0	60	40	0
	3	68	0	25	7	0	64	35	1

Table 3. Botanical composition of forage mixtures in overseeding study, 1983 (Continued)

Treatment		Ratio (percent) of components of plant population							
		Legume overseeded plots				Ryegrass overseeded plots			
		Legume	Winter grass	Coastal	Weeds	Legume	Winter grass	Coastal	Weeds
					June 28, 1983				
Shred		14	0	86	0	0	0	100	0
Paraquat		19	0	81	0	0	0	100	0
Broadcast		15	0	85	0	0	0	100	0
Drill		17	0	83	0	0	0	100	0
	Seed Rate[1]								
Legume or grass	1	13	0	87	0	0	0	100	0
	2	18	2	82	0	0	0	100	0
	3	19	0	81	0	0	0	100	0

[1] Seedling rates were 10, 20 and 30 and 20, 30 and 40 pounds per acre for Yuchi clover and ryegrass, respectively.