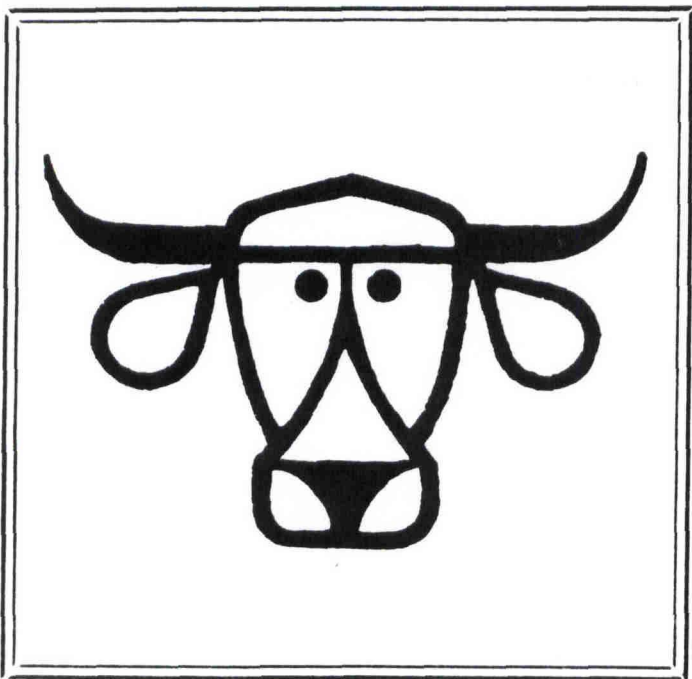
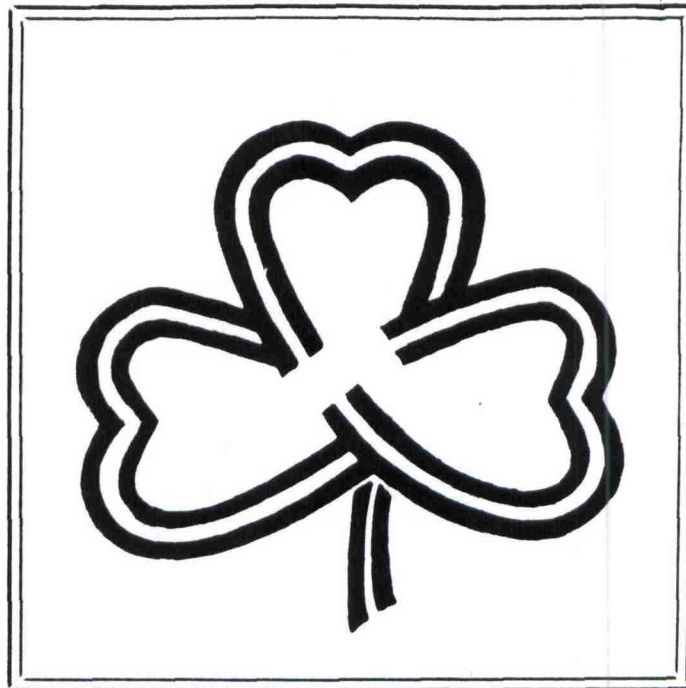


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PERFORMANCE OF RANGE FORAGE SPECIES INTERSEEDED
IN COASTAL BERMUDAGRASS ON LIGNITE OVERBURDEN ^{1/}J. G. Skousen and C. A. Call^{2/}

SUMMARY

Illinois bundleflower, sericea lespedeza, western indigo, and Maximilian sunflower were interseeded in Coastal bermudagrass sod on 2 year-old and 8 year-old lignite overburden spoils near Fairfield, Texas. Cultural treatments included herbicidal suppression of bermudagrass prior to seeding, and fertilization at time of seeding. Seedlings of the interseeded species were only observed in herbicide treated plots. Establishment and growth of Maximilian sunflower was better on fertilized plots, whereas legume establishment and growth was better on older, non-fertilized plots.

INTRODUCTION

Coastal bermudagrass (Cynodon dactylon) is the most widely used plant species in mine-land revegetation programs in Texas. Under intensive management, Coastal achieves excellent ground cover, maintains high yields and satisfactory forage quality, and hence provides a solid base for erosion control and year-round grazing. However, it may be desirable to establish other plant species, primarily perennial legumes, in Coastal bermudagrass pastures to: increase forage quality for livestock, provide food and cover for wildlife, and supplement fertilizer inputs through atmospheric nitrogen fixation. The objective of this study was to determine the cultural requirements for establishing low-maintenance species in Coastal bermudagrass sod.

PROCEDURE

Illinois bundleflower (Desmanthus illinoiensis), sericea lespedeza (Lespedeza cuneata), western indigo (Indigofera miniata), and Maximilian sunflower (Helianthus maximiliani) were interseeded separately at rates of 1.5, 5.0, 2.0, and 1.0 pounds PLS per acre, respectively, in Coastal bermudagrass sod on 2 year-old and 8 year-old overburden sites near Fairfield, Texas on March 15, 1983. Each species was interseeded on 20-inch row spacings into herbicide-treated (glyphosate sprayed in 10-inch bands at 5 quarts per acre) and untreated sod. Fertilizer treatments

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Graduate Research Assistant and Assistant Professor, Range Science Department.

(0-0-0 pounds N-P-K per acre and 40-40-40 pounds N-P-K per acre) were applied at the time of interseeding. Plots (66 feet by 6.6 feet) were arranged in a split-plot design with three replications per treatment. Plant density (number of plants per 40 inch row length) and aboveground biomass were measured for each species in late October 1983.

Analysis of soil samples indicated no significant differences in pH, N, P, K, Ca and Mg at both sites. However, management practices prior to the initiation of this research were different at the two sites. The 8 year-old site had been grazed at a stocking rate of 2.7 acres per AUY, while no grazing had occurred on the 2 year-old site. During the year prior to the establishment of the plots (1982), the 2 year-old site received 90 pounds of N-P-K per acre, while the 8 year-old site received 60 pounds of N-P-K per acre.

RESULTS AND DISCUSSION

Interseeded species were only observed in Coastal bermudagrass sod which had been suppressed by glyphosate herbicide. Fertilization had a variable effect on plant establishment in bermudagrass sod on the different aged overburden sites (Table 1). Applied fertilizer enhanced Maximilian sunflower establishment and biomass production on the 2 year-old overburden site, but not on the 8 year-old overburden site. Non-fertilized Maximilian sunflower plants had greater density and biomass on the 8 year-old site as compared to the 2 year-old site. Illinois bundleflower failed to establish on the 2 year-old site, and establishment and yield were negatively affected by applied fertilizer on the 8 year-old site. *Sericea lespedeza* failed to establish in fertilized plots on either site, and showed greater density and biomass in unfertilized plots on the 8 year-old site as compared to the 2 year-old site. Western indigo, a cool-season legume, failed to establish on the 2 year-old site, and showed poor establishment on the 8 year-old site, regardless of fertilization treatment.

Coastal bermudagrass on the 2 year-old site had greater biomass production than older, previously grazed Coastal on the 8 year-old site (Table 2). Herbicide suppression and limited competition from interseeded species reduced Coastal bermudagrass biomass production by 14% and 38%, respectively, on fertilized and non-fertilized plots on the 2 year-old site, and by 25% and 32%, respectively, on the 8 year-old site (Table 2).

The poor establishment and low biomass production of the interseeded legume species can be related to the competitive nature of established Coastal bermudagrass and to the lack of precipitation during the seedling establishment period in April, 1983 (Table 3). The greater establishment and biomass production of interseeded Maximilian sunflower plants can be related to their rapid seedling growth, aggressive rhizomes, and drought tolerance.

These species will be incorporated into mixtures with native, warm-season perennial grasses and interseeded in Coastal bermudagrass sod on lignite overburden in follow-up studies.

Table 1. Density and aboveground biomass production of species interseeded into Coastal bermudagrass sod on 2 year-old and 8 year-old lignite overburden sites

Site/Treatment*	Density**	Biomass (lb./ac.)
<u>Maximilian sunflower</u>		
2 year/fertilized	14.3 ^{α*}	1403 ^{α+}
2 year/non-fertilized	1.5 ^α	43 ^b
8 year/fertilized	3.1 ^α	204 ^{αb}
8 year/non-fertilized	7.6 ^α	289 ^{αb}
<u>Illinois bundleflower</u>		
2 year/fertilized	0 ^b	0 ^α
2 year/non-fertilized	0 ^b	0 ^α
8 year/fertilized	.5 ^b	4 ^α
8 year/non-fertilized	4.7 ^α	257 ^α
<u>Sericea lespedeza</u>		
2 year/fertilized	0 ^b	0 ^α
2 year/non-fertilized	.4 ^b	5 ^α
8 year/fertilized	0 ^b	0 ^α
8 year/non-fertilized	4.9 ^α	346 ^α
<u>Western Indigo</u>		
2 year/fertilized	0 ^α	0 ^α
2 year/non-fertilized	0 ^α	0 ^α
8 year/fertilized	.2 ^α	4 ^α
8 year/non-fertilized	.1 ^α	4 ^α

* Fertilized treatment received 40-40-40 lb. N-P-K/ac. at time of interseeding.

** Average number of plants per 40 inches of row length.

+ Means followed by the same letter in the same column for each species are not significantly different at $p \leq .05$.

Table 2. Coastal bermudagrass biomass production, alone or in combination with interseeded species

Site/Treatment*	Biomass (lb./ac.)	
	with interseeded species	without interseeded species
2 year/fertilized	8764	10207 ^{α**}
2 year/non-fertilized	3793	6068 ^{bc}
8 year/fertilized	5153	6886 ^b
8 year/non-fertilized	2789	4093 ^c

* Fertilized treatment received 40-40-40 lb. N-P-K/ac. at time of interseeding.

**Means followed by the same letter are not significantly different at $p \leq .05$.

Table 3. Monthly rainfall at Fairfield, Texas during spring 1983

Month	Inches
January	1.0
February	5.5
March	4.0
April	1.2
May	8.0