Interseeding Sideoats Grama on the Texas High Plains[1]

TRUMAN E. ROBERTSON, Jr.,[2]
AND THADIS W. BOX

Research Assistant and
Professor of Range Management,
Texas Technological College,
Lubbock.

Highlight

Sideoats grama was interseeded in grass stands representing intermediate stages of succession near Amarillo, Texas. Seedings at 0.5-inch depth were more successful than at one-inch. Addition of 30 lb/acre nitrogen fertilizer or legume (alfalfa) to the seeding did not increase the seedling establishment. Better grass stands with less competition from non-seeded species was obtained from seeding in late May than in March, April, or June. Highest total survival of grass seedlings was also from the May seedings.

Thousands of acres in the American Great Plains were put into cultivation during the last 50 years. Many of these were abandoned when farming proved uneconomical, resulting in large areas returning to grassland through secondary succession. Almost all stages of secondary succession are evident in the Texas High Plains.

Under normal successional processes it may take from 15 to 50 years for an abandoned field to reach the climax condition (Shantz, 1917). Reseeding is usually necessary if abandoned cropland is to reach a high level of productivity in a shorter length of time. The usual technique for reseeding on the Texas High Plains includes complete destruction of established low-value grasses followed by planting a cover crop, cutting the cover crop, and drilling grass seed the following spring. Interseeding desirable grasses in the established grass cover has proved successful in some areas of the plains (Becker, Lang, and Rauzi 1957; Rauzi, Lang, and Becker 1962; Schumacher 1964).

This study was designed to test interseeding as a method for reclaiming abandoned croplands on the Texas High Plains. Specifically the study was designed 1) to evaluate interseeding sideoats grama (*Bouteloua curtipendula* Michx.) into successional stages of High Plains rangelands, 2) to study dates and depths of planting and 3) to test the effects of a commercial fertilizer and a dryland legume on seedling emergence and survival.

Procedure

The experimental area was located on the Texas Technological College Research Farm at Pantex, Texas about 15 miles northeast of Amarillo. The interseeded area was a deep hardland site in an old cultivated field abandoned for

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[2] Present address: Lincoln County Livestock Company, P.O. Box 1000, Roswell, New Mexico.

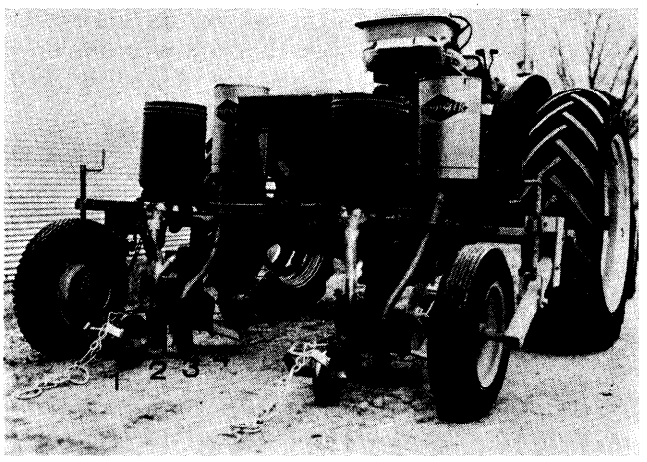

FIG. 1. The Bushland Range Interseeder showing (1) packer wheel, (2) seed placements, (3) fertilizer placements, (4) sweep, (5) coulter.

over 20 years. The area was covered with a sparse stand of sand dropseed (*Sporobolus cryptandrus* (Torr.) Gray), silver bluestem (*Andropogon saccharoides* Swartz), western wheatgrass (*Agropyron smithii* Rydb.), and annual plants. The perennial grasses grew in isolated colonies typical of early stages of succession.

The soil is uniform and consists of a single soil type and series, Pullman silty clay loam. Relief is slight, slopes range from 1 to 3%.

Annual rainfall for the area averages 20.76 inches. Over 55% of this comes during the summer months of May, June, July, August. The other 45% is scattered over the remainder of the year. Rainfall the first year was distributed normally and was approximately average for the area. Rainfall the second year was slightly below average but with normal distribution. The third year of the study was an extremely dry year with little summer precipitation.

Premier sideoats grama was seeded: 1) alone, 2) in combination with Nomad alfalfa (*Medicago sativa*), and 3) with the addition of ammonium nitrate. Dates of planting were the last week in March, April, and May of 1963, and March, April, May, and June of 1964 and 1965. Seeding rates per acre, on a pls basis, were 3 lb sideoats grama, 3 lb sideoats grama plus 30 lb nitrogen, 3 lb of sideoats plus 1 lb alfalfa seed.

All seeding was replicated two times with the Bushland Range Seeder (Fig. 1) described by Dudley, Hudspeth and Gantt (1965). Planting depths were 0.5 inch and 1 inch. Fertilizer placement was 1.5 inch to the right and 1 inch below the seed.

Seedling emergence and survival data were taken from randomly located 2-ft linear samples placed at 60-ft intervals along 4 rows in each replication. Seedling emergence data were taken approximately two weeks following planting. The seedling survival counts were made near the end of the first growing season.

Results and Discussion

Depths of seeding.—The number of sideoats seedlings that emerged and survived in all plots seeded at the 0.5-inch depth was approximately twice those seeded at the 1-inch depth. Seedlings were slower to appear from the deeper seed beds and significantly fewer emerged ($P < .05$). Seedlings from the 1-inch planting emerged in an uneven stand. Differences between seeding depths was so obvious that the 1-inch depth was not used after the second year of the study. Results discussed in this paper are based on only the 0.5-inch depth of planting.

Table 1. Three year (1963, 1964, 1965) average of number of grass seedlings emerging per foot of row.

Date	Grass Only	Grass and Alfalfa	Grass and Nitrogen	Average*
March	5.7	5.9	4.4	5.3
April	7.0	6.8	6.5	6.8
May	11.7	7.3	7.2	8.7
June[1]	4.2	3.5	2.8	3.5
	7.5a[2]	5.9b	5.2b	

[1] Only two years' data: no grass was planted in June in 1963. June was the most favorable month in 1964; no seedlings emerged from the 1965 June planting.
[2] Numbers followed by the same letter are not significantly different from each other.
* Average number of seedlings emerging per month significantly different at .05 level.

Seedling emergence and survival.—A significantly (.05 level) greater number of sideoats grama seedlings emerged when planted alone than when planted with either alfalfa or nitrogen fertilizer (Table 1). This was probably due to the disturbance of the seedbed with the nitrogen and alfalfa attachment to the seeder because attachments were not used when planting grass alone.

The most successful stands were obtained in May plantings. In May 8.7 seedlings/ft of row emerged. Significantly fewer (.05 level) seedlings emerged in the April planting and significantly less in March than in either April or May seedings.

The June date was not used the first year but was added the second year of the study. It was the most successful seeding date in 1964. However, in 1965 the June seeding was conducted in a completely dry seedbed, and not enough rains were received the remainder of the summer to germinate the seeds.

Seedling survival at the end of the first growing season followed the same pattern as seedling emergence. Plots planted in May had 7.5 seedlings/ft of row at the end of the first growing season for 86% survival. Those planted in April had 2.8 seedlings, or 41% survival; those planted in March had 2.8 seedlings, or 53% survival; those planted in June had 1.7 seedlings/ft of row or 50% survival.

There was no difference in seedling survival between grass planted alone or grass planted with alfalfa. However, significantly (.05 level) fewer grass seedlings survived when planted with fertilizer than when planted with alfalfa or planted alone. Annual grasses and annual forbs grew much more luxuriantly under fertilized conditions and pro-

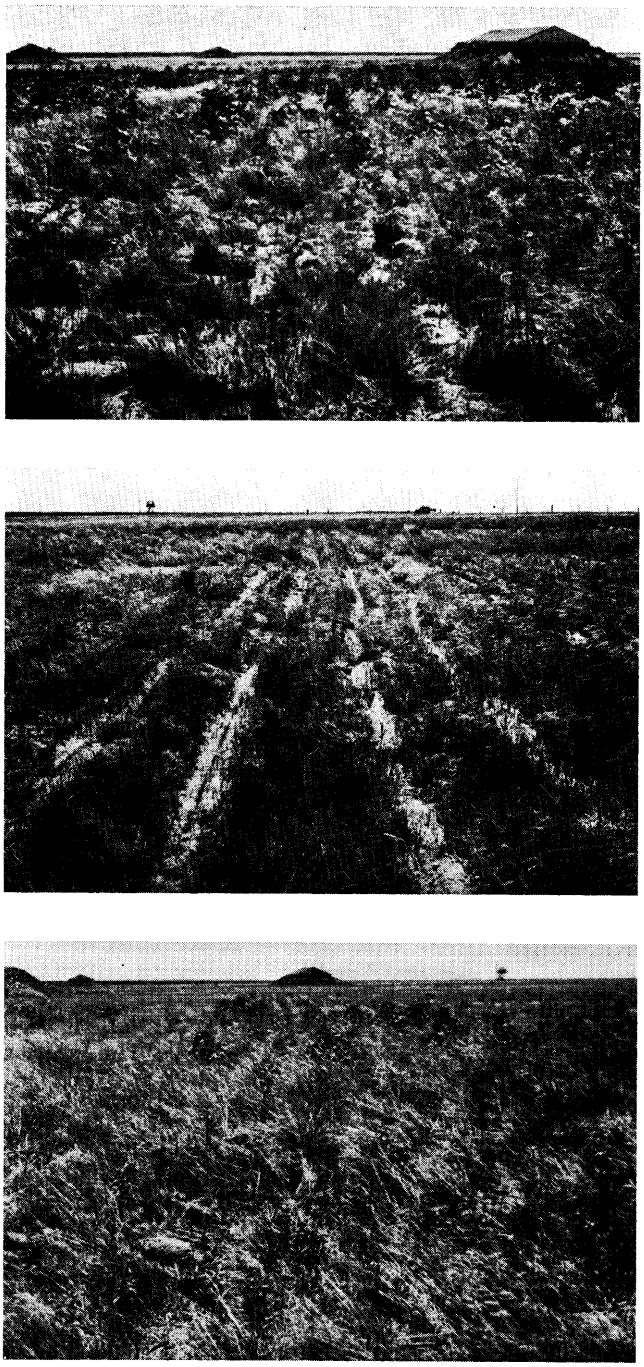

FIG. 2. Growth of annual weeds in seeded stands of sideoats grama planted in March (top), April (center), and May (bottom), 1963. Photographs, July 1963.

vided greater competition for the planted grass seedlings. They may have influenced the survival of the planted grasses.

Plant competition.—Significantly ($P < .05$) fewer native plants were present at the May planting date than in stands planted in either March or April (Table 2). Data were not collected for the June planting dates. Annual forbs comprised the greatest numbers of plants competing with seeded grasses at all dates. Fig. 2 shows the stands of forbs in the fertilized treatment area at the 3 early planting dates. Annual forbs were less by more than 50% at the May planting and those that did emerge did not grow as luxuriantly as those from the earlier planting dates. Competition from annual and perennial grasses was significantly less than competition from annual forbs. The major competing perennial grass was sand dropseed.

Table 2. Competing plants per linear foot of row at three planting dates.

Date	Perennial Grass	Annual Grass	Annual Forbs	Total
March	2.6	3.6	29.2	35.4a[1]
April	2.5	3.8	27.8	34.1a
May	1.4	2.6	13.3	17.3b
Average	2.2c[2]	3.3c	23.4d	

[1] Totals followed by the same letter are not significantly (.05) different from each other.
[2] Averages followed by the same letter are not significantly different from each other.

Pure stands of buffalograss, silver bluestem, sand dropseed, and western wheatgrass were selected in the planting areas. Seedling emergence and survival were sampled within each stand following procedures outlined earlier. Significantly more (.05 level) seedlings emerged and survived in stands of buffalograss than in stands of the other species. An average of 5.0 seedlings/ft of row was present in buffalograss stands as compared to 2.4 in silver bluestem, 2.4 in sand dropseed, and 2.8 in western wheatgrass. Seedling vigor was noticeably lower in buffalograss than in the other stands sampled.

Sideoats grama grass planted on Texas High Plains at 0.5-inch depth in May has the best chance for success. Deeper plantings caused uneven stands. Those stands planted in May had a higher seedling emergence, greater seedling survival, and less competition from other herbaceous species than those planted in March, April, or June.

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