South Carolina: The Belle W. Baruch Forest Science Institute of Clemson University.
Springer, J.H. (1982). Movement patterns of coyotes in South Central Washington. **Journal of Wildlife Management**, 46, 191-200.
Stuwe, M. (1985). McPaal, **Microcomputer program for the analysis of animal locations.** Front Royal, VA: Conservation and Research Center, Smithsonian Institution.
Woodzicki, K.A. (1950). Wild pig: (**Sus scrofa** Linn.). **New Zealand Department of Science and Industrial Research Bulletin 98.**
Wood, G.W., J.B. Hendricks, and D.E. Goodman. (1976). Brucellosis in feral swine. **Journal of Wildlife Diseases**, 12, 579-582.
Wood, G.W., and D.N. Roark. (1980). Food habits of feral hogs in coastal South Carolina. **Journal of Wildlife Management** 44 505-511.

Initial Establishment of 14 Forage Species on Rootplowed Creosotebush (Larrea tridentata) Rangeland in Presidio County, Texas

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ABSTRACT

In June and July of 1985, 14 species were broadcast seeded on a sandy and gravelly range site in Presidio County, Texas. Both sites supported heavy creosotebush (Larrea tridentata) communities and were rootplowed and disced to remove the shrubs and prepare a seedbed. Overall average seedling density in the fall of 1985 was 84.68 per 50 square feet on the sandy site and 76.38 on the gravelly site. Five species (and a mixture) showed better than average establishment on both sites. These were: A-68 Lehmans lovegrass (Eragrostis lehmanniana), Cochise lovegrass (E. lehmanniana × tricophora), Niner sideoats grama (Bouteloua curtipendula), green sprangletop (Leptochloa dubia) and Llano buffelgrass (Cenchrus ciliaris).

INTRODUCTION

The Trans-Pecos region of Texas consists of approximately 18,000,000 acres, most of which is rangeland important for livestock production. Grazing capacity of the Trans-Pecos has been compromized by an abundance of brush species such as mesquite (**Prosopis glandulosa**), creosotebush (**Larrea tridentata**), tarbush (**Flourensia cernua**), and catclaw (**Acacia greggii** and **Mimosa biuncifera**). Traditional means of controlling unwanted brush include mechanical methods (such as plowing, shredding and rollerchopping), prescribed burning and the application of chemicals. Mechanical methods of control followed by reseeding have been widely practiced on many types of rangeland. Reseeding on arid rangelands however is risky from the standpoint of seedling establishment and cost effectiveness. Many ranchers, who own their own crawler tractors and have either a rootplow or heavy disc, prefer mechanical control of brush over chemical methods, since they feel they spend less cash out of pocket. A common practice is to broadcast seed immediately behind the rootplow or disc.

Species used for reseeding should be well adapted to the climate and soils of the area, be nutritious and palatable enough to be of value to a producer but yet be able to withstand moderate grazing pressure. Another consideration, from a rancher's point of view, is the availability of seed at low or moderate cost.

The objective of this study was to evaluate several potentially adapted forage species in a seeding trial on rootplowed and/or disced creosotebush rangeland.

METHODS AND DESCRIPTION OF AREA

Two creosotebush-dominated study sites, located on the Johnny Surratt ranch near Plata, Presidio County, Texas, were initiated in the spring of 1985. The region lies within the desert grassland vegetation zone as defined by the Soil Conservation Service, but is currently dominated by desert shrubs such as creosotebush and tarbush. Average annual rainfall is 11 inches, usually concentrated in late summer. The average frost-free period is generally from March 21 to November 10. High winds in spring, temperatures of over 100° F. in summer, and potential summer evapotranspiration rates of approximately 100 inches are common in this desert ecosystem.

One of the sites was located on a gravelly soil of an upland topographic position; the other was located on a sandy soil in a basin or low topographic position. The basin soil was classified as a sandy loam, mixed, thermic ustollic camborthid. The upland soil was classified as a loamy skeletal, mixed, thermic, ustollic calciorthid. Two 150 foot by 150 foot macroplots were established on each site — one plot in each location had been rootplowed in 1984 and disced in 1985; the other plot in each location was rootplowed and disced in 1985 prior to seeding.

Each macroplot was divided into three blocks, each of which was further subdivided into 15 subplots 10 feet wide and 50 feet long. A different species was assigned to each of 14 subplots in each block in a randomized complete block design. One subplot received a mixture of all species. The northeast corner of each subplot was marked with a stake and an identifying number.

Seed of the 14 forage species was hand broadcast at approximately 20 pure live seed per square foot with a cyclone seeder on June 20 (basin site) and on July 3, 1985 (upland site). All seed except that of Eragrostis spp. was covered by dragging with a section of chain link fence. Eragrostis seed was not covered because of its very small size (Cox and Martin, 1984). The species used (table 1) were selected on the basis of known or expected adaptability to arid regions and their value as forage for livestock and wildlife.

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Table 1. Forage Species seeded in Mechanically treated Creosotebush communities in Presidio County, Texas, June and July. 1985.

Species	Accession or Variety	Source
Atriplex canescens (Pursh) (4-wing saltbush)	T 4474	SCS-Los Lunas, N.M.
Atriplex semibaccata (R.Br.) (Australian saltbush)	Corto	Pecoff Bros. Escondido, Calif.
Bouteloua curtipendula (Torrey) (sideoats grama)	Niner	SCS-Los Lunas, N.M.
Bouteloua gracilis (Griffiths) (blue grama)		SCS-Los Lunas, N.M.
Buchloe dactyloides (Nuttall) (buffalograss)		Curtis & Curtis Clovis, N.M.
Cenchrus ciliaris (Linnaeus) (buffelgrass)	Llano - ANA-3866	Foster-Rambie Uvalde, Tx.
Ceratoides lanata (Pursh) (winterfat)		Curtis & Curtis Clovis, N.M.
Eragrostis curvula (Nees) (weeping lovegrass)		SCS-Tucson, Az.
Eragrostis lehmanniana (Nees) x **tricophora** (Coss & Dur.)	Cochise	SCS-Tuscon, Az.
Eragrostis lehmanniana (Nees) (Lehman's lovegrass)	A-68	SCS-Tuscon, Az.
Eragrostis superba (Peyr.) (Wilman's lovegrass)	Palar 5037	SCS-Tuscon, Az.
Leptochloa dubia (Nees) (green sprangletop)	441186	SCS-Knox City, Tx.
Mendora longifolia (Gray) (showy menodora)		SCS-Knox City, Tx
Setaria leucopila (Scr. & Merr.) (plains bristlegrass)	ANA-3865	Sharps Bros. Amarillo, Tx.

All macroplots were fenced to exclude livestock after seeding was completed. A precipitation gauge was set up at each site and a temperature-humidity recording device was set up in an instrument shelter at the upland site.

On October 18, 1985, just prior to expected cold-induced dormancy, the plots were surveyed to determine density of each seeded species. Density was determined by counting the number of seedlings in a transect belt one foot wide and 50 feet long placed diagonally from the southwest to northeast corners of each 10 × 50 foot subplot.

Data were subjected to analysis of variance and treatment means were separated based on least significant differences and Duncan's multiple range tests at $P < .05$ (Little and Hills, 1978).

RESULTS AND DISCUSSION

Nine inches of rainfall was recorded on the upland (gravelly) site and 10.33 inches fell on the basin (sandy) site from June 27 through October 18. Two-thirds (6.33 inches and 6.37 inches) of this occured after August 29. Average daily high temperature during July and August was 96° F. Temperatures of 100° F. were reached during the periods of August 23-29 and August 2-8 respectively.

The only species that failed to germinate or become established between June 27 and October 18 was winterfat (Figs. 1 and 2). Australian saltbush, showy menodora and four wing saltbush (which was seeded only on the upland site) all germinated in September with cooler temperatures and fall rains.

The average establishment rate for all species on the basin site was 84.68 plants/50 square feet (Figs. 1 & 2). The same five species and the mixture — A-68 Lehman's lovegrass, Cochise lovegrass, Niner sideoats grama, green sprangletop and Llano buffelgrass — all ranked above the mean on both sites (Fig. 3). On the basin site A-68 Lehman's did significantly better ($P < 0.05$) than the mixture or any other species. On the upland site the mixture did significantly better than all other species (Figs. 1 and 2). It should be noted that Lehman's lovegrass was predominant in the mixed stand on both sites.

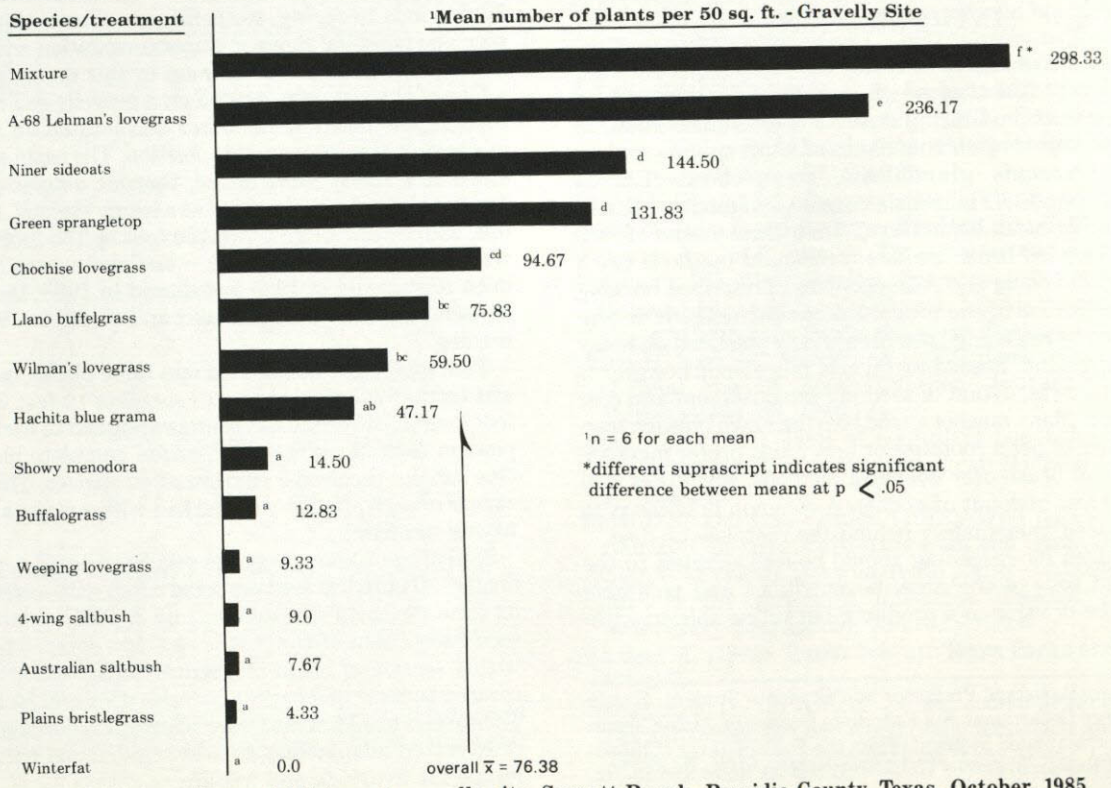

Fig. 1. Initial seedling establishment, gravelly site, Surratt Ranch, Presidio County, Texas. October, 1985.

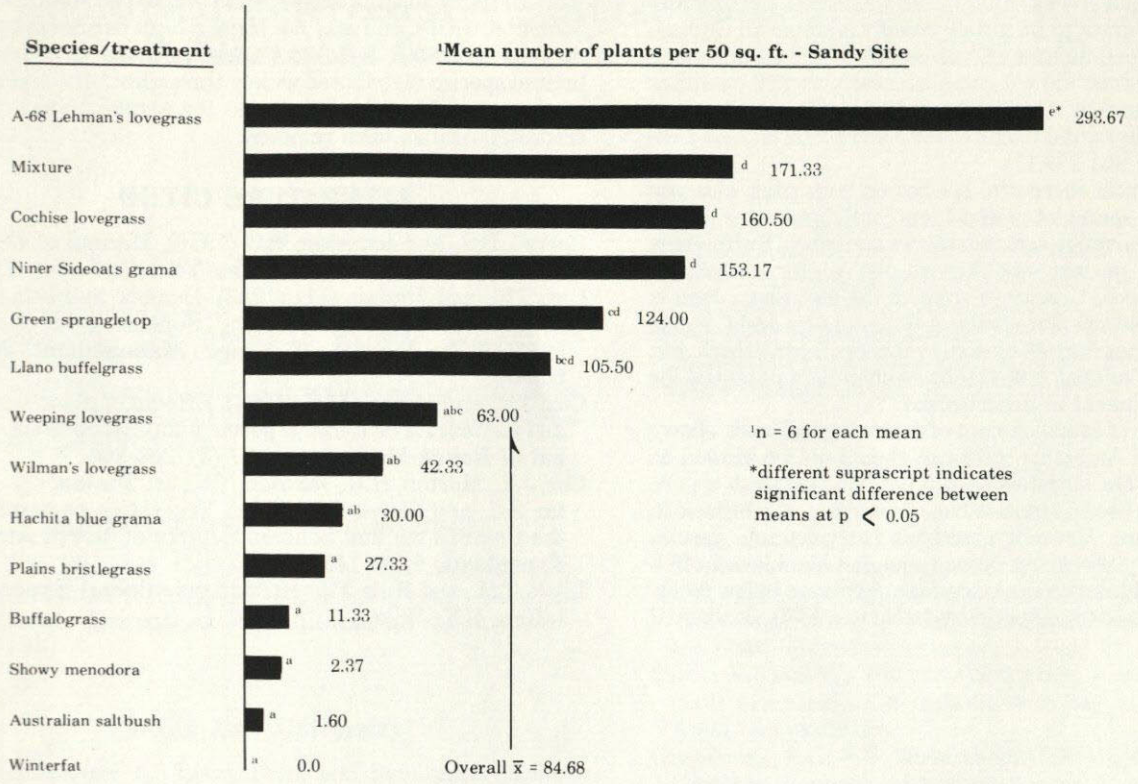

Fig. 2. Initial seedling establishment, sandy site, Surratt Ranch, Presidio County, Texas. October, 1985.

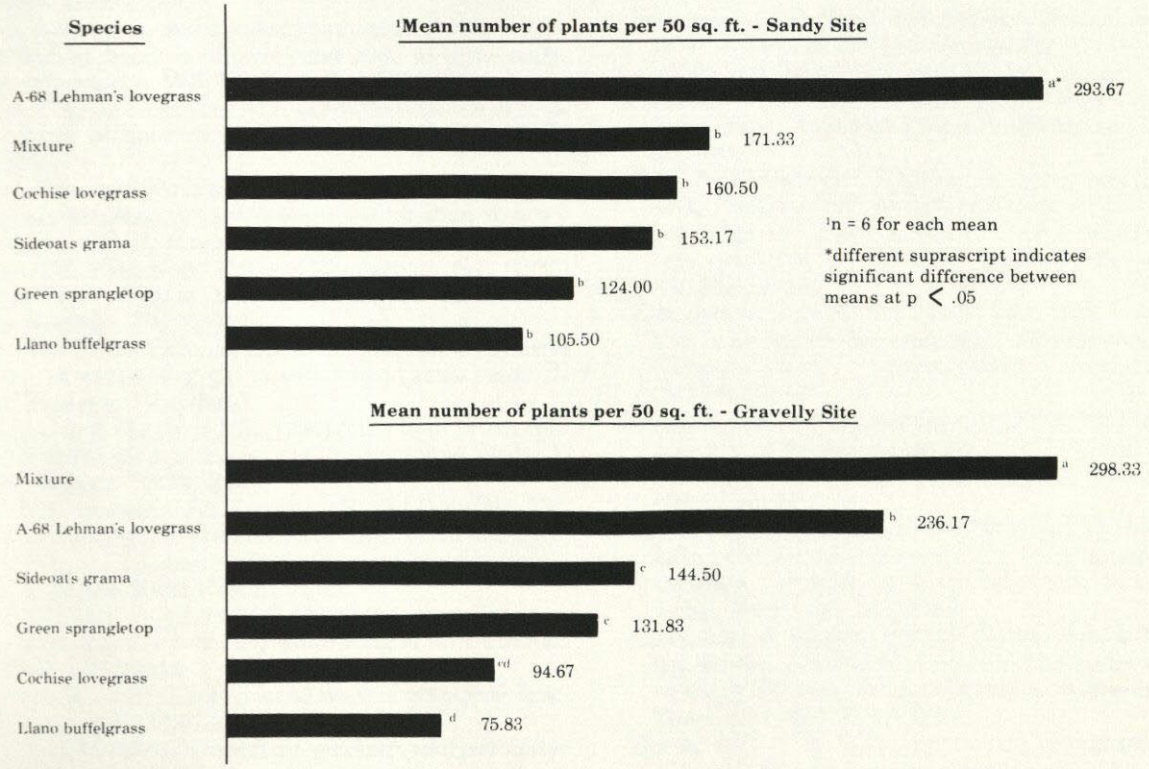

Fig. 3. Initial seedling establishment, top six species, sandy and gravelly sites, Surratt Ranch, Presidio County, Texas. October, 1985.

Cox and Jordan (1983) found A-68 Lehman's, Cochise and Wilman's lovegrass to be nearly equally adapted to Chihuahuan desert conditions at San Simon, Arizona. In our study Wilman's lovegrass did not establish nearly as well on either the sandy or gravelly site (42.83 and 59.5 plants per 50 square feet respectively) as did Cochise (160.5 and 94.62) or A-68 Lehman's (293.67 and 236.17).

Of the six most successful species on both sites, sideoats grama, green sprangletop and Llano buffelgrass are probably the most palatable and valuable to a rancher. Buffelgrass however may or may not survive the winter climate in southern Presidio County in spite of the fact that Llano is a relatively cold tolerant strain. A-68 Lehman's and Cochise lovegrass are not favored by some ranchers for livestock, but according to Cox et al. (1984) they do show high potential for cover establishment in desert areas.

The low rate of establishment of four-wing saltbush, showy menodora and Australian saltbush should not be viewed as poor success. The objective should not be to estabish a pure stand of these browse species but to provide some browse in a grass mixture. Australian saltbush is a palatable species adapted to very low precipitation zones, but like Llano buffelgrass, may not tolerate prolonged temperatures below freezing. Showy menodora, a species valuable to wildlife, is adapted more to rocky soil and ledges in the Trans-Pecos (Correll and Johnston, 1970), and may not show a high degree of success on finer textured soils. Four-wing saltbush is a desirable browse species distributed widely throughout the Chihuahuan desert and is a logical choice for establishment where creosotebush has been removed.

LITERATURE CITED

Correll, D.S., and Johnston, M.C. (1970). **Manual of the Vascular Plants of Texas**. Tex. Res. Found. Renner, Tx.

Cox, J.R., and Jordan, G.L. (1983). Denisty and production of seeded range grasses in Southeastern Arizona (1970-1982). **Journal of Range Management 36** (5): 649-651.

Cox, J.R., and Martin, M.H. (1984). Effects of planting depth and soil texture on the emergence of four lovegrasses. **Journal of Range Management 37** (3): 204-205.

Cox, J.R., Morton, H.L., Johnsen, T.N., Jr., Jordan, G.L., Martin, S.C., and Fierro, L.C. (1984). Vegetation restoration in the Chihuahuan and Sonoran deserts of North America. **Rangelands 6** (3): 112-115.

Little, T.M., and Hills, F.J. (1978). **Agricultural Experimentation.** N.Y., Wiley.