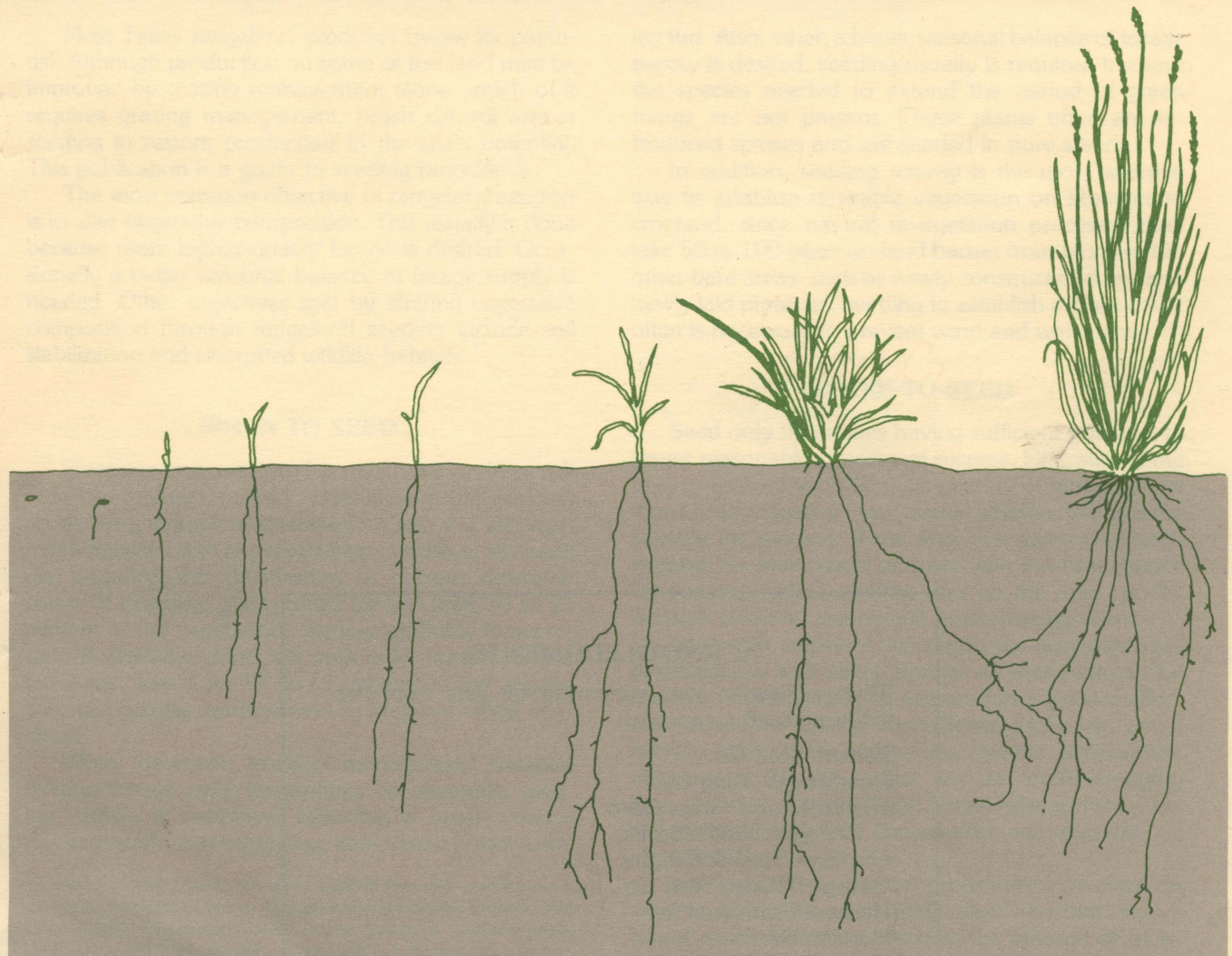
B-1379

Texas Agricultural Extension Service

People Helping People

SEEDING RANGELAND



Texas Agricultural Extension Service • Zerle L. Carpenter, Director • The Texas A&M University System • College Station, Texas

ACKNOWLEDGMENTS

This publication was supported by gifts from the following seed companies:

Bamert Seed Co.
Douglass W. King Co.
Foster-Rambie Grass Seed
G.E. Pogue Seed Co., Inc.
Garrison Seed & Co., Inc.
George Warner Seed Co., Inc.
Harpool Field Seed Inc.
Horizon Seeds
Sharp Bros. Seed Co.

SEEDING RANGELAND

Tommy G. Welch and Marshall R. Haferkamp*

Most Texas rangeland produces below its potential. Although production on some of this land may be improved by grazing management alone, much of it requires grazing management, brush control and/or seeding to restore production to the site's potential. This publication is a guide to seeding rangelands.

The most common objective of rangeland seeding is to alter vegetative composition. This usually is done because more higher-quality forage is desired. Occasionally a better seasonal balance of forage supply is needed. Other objectives met by altering vegetative composition through rangeland seeding include soil stabilization and improved wildlife habitats.

WHEN TO SEED

Since seeding rangeland is expensive and the risk of failure is always present, carefully consider seeding or allowing natural revegetation. When the management objective is to improve range condition, evaluate the quantity and distribution of current desirable plants. If desirable plants make up less than 10 to 15 percent of the vegetation, seeding probably is necessary. If desirable plants are uniformly distributed and make up more than 10 to 15 percent of the vegetation, use grazing management to improve range condition.

Often, however, another management decision dictates the necessity for seeding. For example, seeding usually is necessary following a brush control method, such as rootplowing, that destroys the existing turf. Also, when a better seasonal balance of forage supply is desired, seeding usually is required because the species needed to extend the period of green forage are not present. These plants often are introduced species and are seeded in pure stands.

In addition, seeding usually is the most effective way to establish desirable vegetation on abandoned cropland, since natural revegetation processes may take 50 to 100 years on land barren from farming. On other bare areas, such as newly constructed dams and newly laid pipelines, seeding to establish a plant cover often is necessary to prevent wind and water erosion.

WHERE TO SEED

Seed only those sites having sufficient potential to insure reasonable chances of success. First, survey the area to determine if there is a mixture of range sites or if one predominates; then, decide whether the sites are suitable for seeding. If the area is a mixture of sites, expend the most effort on ones with the best chance for success. Select seeding sites so the area can be incorporated into the overall ranch management.

Sites with sufficient soil depth for adequate root development and water storage or sites that can be modified mechanically to accomplish a greater effective soil depth usually are suitable. However, avoid barren, rocky sites, which have greater temperature extremes at the soil surface and are more droughty than sites with some soil and litter on the surface. Low soil moisture and wide temperature extremes can kill plant seedlings.

Although the amount of precipitation received on an area cannot be controlled, select sites that receive runoff water, thereby increasing the amount of moisture available. However, do not disturb steep, potentially erosive areas.

*Extension range brush and weed control specialist and formerly assistant professor, Texas Agricultural Experiment Station, The Texas A&M University System. Junior author is currently range scientist, Eastern Oregon Agricultural Research Center, Agricultural Research Service, United States Department of Agriculture.

WHAT TO SEED

Plants selected for seeding depend on management objectives. For example, plants to improve range condition are different from those selected to stabilize a disturbed area or to extend the grazing season. However, regardless of management objective, select only species of plants that are adapted to the soil, climate and topography of the area to be seeded. If possible, choose plants that: (1) establish easily, (2) are palatable to animals that will graze the seeded area, (3) are relatively productive, (4) withstand invasion by undesirable plants, (5) withstand moderate grazing, (6) prevent erosion under moderate grazing and (7) are available at a moderate price.

Usually, plants best adapted to an area are native ones growing in the area, so it is important to determine the original source of seeds of native species. When available, use certified named varieties. Generally, seed of native species should originate from local sources or from within 200 miles north or south and 100 miles east or west of the area to be seeded. Recommended species and varieties for the various resource areas and soil groups are shown in table 1. Consult local Soil Conservation Service personnel for information on seeding specific range sites, because some species are adapted to only certain range sites within a resource area.

Often, mixtures of native and/or introduced species are seeded on rangeland, partly as an attempt to simulate natural conditions. Using a mixture is helpful because all areas have variations in soil, moisture and slope, and each species in the mixture is adapted better than other species to certain site characteristics. For instance, variation in rooting habits of species in the mixture allows for more efficient use of moisture and nutrients from the various soil depths. Also, the mixture usually extends the grazing season because each species varies slightly in its period of lush growth and dormancy. Finally, a mixture provides a varied diet that often is more desirable to animals.

Under certain conditions, a pure stand of a single species is more desirable. Species low in palatability and needing special management, or species requiring intensive management, should be planted alone. In addition, many introduced species are easier to manage when planted in a pure stand.

Use seed of known quality. Know the germination and purity of the seed, since seeding rates are based on pure live seed.

HOW TO SEED

Seedbed Preparation

An ideal seedbed is firm below seeding depth, free from live, resident plant competition and has moderate amounts of mulch or plant residue on the soil surface. A major purpose of seedbed preparation is to reduce existing plant competition.

Plowing is the most common method of preparing a seedbed. A variety of plowing methods is available. The method selected depends on the type of vegetation to be controlled and the level of financial resources available. On abandoned cropland use a moldboard, offset disk or one-way. On a brush infested area, consider rootplowing.

Herbicides also may be used to control existing vegetation. After applying the herbicide, drill seeds of desired plants directly into the dead vegetative cover. Although this method of seedbed preparation seldom is used, it offers possibilities where wind erosion occurs.

In areas where wind or excessive heat is a problem, protect clean-tilled soil with a cover crop or dead litter crop. Sorghums make an excellent dead litter mulch. To prevent seed production in sorghum, plant it late in the growing season or harvest it, leaving the stubble for mulch. Small grains also may be used as a cover crop. After establishing the cover crop, drill or broadcast seeds of desired species into the stubble or mulch.

In some areas seedbeds have been successfully prepared by burning. For example, prescribed burning may reduce competition from certain perennial plants, allowing subsequently seeded species to establish more easily. Following a wildfire, seeding may be necessary to restore the area's productivity.

On abandoned cropland, an ideal seedbed may be prepared without undue expense, but on rangeland, the ideal seedbed is a goal seldom attained because expenses exceed expected returns. Even though preparing an ideal seedbed may not be economically feasible, prepare the best seedbed that available resources allow. On some brush-infested rangeland, rootplowing, followed by roller chopping, raking or chaining, is an acceptable method of seedbed preparation. Roller chopping usually is conducted before seeding. On potentially productive sites the expense of rootplowing, raking and plowing with an offset disk may be justified. In addition, smooth seedbeds allow for harvesting seed, and the income from seed sales could pay for seedbed preparation costs.

Timing

Choosing the correct time to seed is very important. Try to seed at the beginning of a period that will provide the best growing conditions (favorable temperatures and good soil moisture). In most cases, achieve the greatest success by seeding just before the season of expected high rainfall. Most parts of Texas receive significant rainfall in early to mid-spring; in those areas, warm season plants may be seeded successfully during late winter to early spring. The Trans-Pecos region usually receives its precipitation during

mid to late summer, so seeding in midsummer may be best. In the more southern areas of the state where a rainfall peak occurs in the fall, seeding in late summer or early fall may allow seedlings time to become established before the winter season. In terms of temperature, many cool season plants may be seeded either in the spring or early fall, though late summer or fall normally is best because young seedlings may not tolerate hot, dry summers. On the other hand, warm season plants grow best if seeded in the spring.

Seeding Methods

The two most common methods of seeding rangeland are drill and broadcast. Drill methods place the seed in the soil; broadcast methods place the seed on the soil's surface.

Drilling is a superior method because the drill places the seed in the soil, thus improving the probability of seedling establishment. Use drills on old fields and on areas where a smooth seedbed has been prepared. A good drill has the following:

- Double disk opener to provide a trench with minimum soil movement.
- Depth bands for proper depth control.
- Packing mechanism to place seed more firmly in contact with soil.
- Seed boxes with agitators to keep seed mixed and prevent fluffy seed from lodging in box, separate boxes for large and small seed, divided or partitioned boxes to keep seed feeding to individual metering devices and a good metering device to control the amount of seed to be planted.

Since most drills are not sturdy enough to be used on rough rangeland, broadcast seeding often is used instead. However, broadcast seeding has limitations because seed are poorly covered with soil and stand establishment often is slower.

Broadcast the seed by aerial or ground application. Ground application includes broadcasting by hand, rotary spreader, with airstream or exhaust or seeder boxes of the fertilizer-spreader type. Aerial application is popular because it is faster. Aircraft must be equipped with a spreader and a positive, power-driven seed metering device.

Broadcast seeding seldom is effective without some soil disturbance before the seeding operation. Be sure to distribute seed uniformly. Small, slick seed lend themselves to broadcast seeding much better than large fluffy seed, since small seed are easier to broadcast and are covered by natural sloughing of the soil.

Broadcast seeding is more successful if the seed are broadcast on loose, rough soil, where natural sloughing and settling will cover the seed, or when seeding is followed by harrowing, chaining or cultipacking. If the seedbed consists of large clods of soil, seed may be buried too deeply.

Seeding Rate

The quantity of seed to apply per acre depends upon the species, method of seeding and potential site productivity. Seeding rates usually are based on pounds of pure live seed (PLS) per acre. PLS is the percentage of the bulk seed material that is live seed. This is determined by multiplying percentage germination by percentage purity of the lot of seed. When hard seed are involved, PLS = (percent germination + percent hard seed) × percent purity.

Recommended seeding rates usually call for 20 live seed per square foot. The number of seed per pound varies with species. Table 1 gives the number of seed per pound and recommended seeding rates for species used in Texas.

Seeding Depth

Optimum seeding depth is roughly proportional to seed size. Since smaller seeds have a smaller quantity of stored energy, do not seed them as deeply as larger seed. As a rule, plant seed at a depth four to seven times the diameter of the seed. When using a mixture of small and large seed, determine the planting depth by the diameter of smallest seed. In most rangeland seedings, plant the seed about ¼ to ½ inch deep but not deeper than ¾ inch. Plantings can be deeper in light, sandy soils than in heavier, clay soils.

MANAGEMENT AFTER SEEDING

Protect a newly seeded area from grazing until plants are established. Some species establish sooner than others, but in general plants should be well-rooted before grazing to prevent pulling up the seedlings. Length of deferment from grazing varies. In exceptionally good growing conditions, deferment through one growing season may be sufficient. During periods of harsh growing conditions, however, 2 or 3 years of deferment may be necessary. Grazing during dormant periods may help improve the stand by scattering and trampling seed into the soil. After plants are established, practice good grazing management to maintain the seeded stand.

Because seeded areas usually receive some type of soil disturbance, weeds or weedy species often become abundant during the growing season following seeding. Weed control measures such as mowing, shredding or use of herbicides may be necessary during the first growing season to allow seeded species to become established. Most grass seedlings can tolerate a herbicide application after the seedlings have reached the fourth leaf stage.

Table 1. Seed characteristics, seeding rates and adaptations of species used for seeding Texas rangeland.

Name	Variety[1]	Seeds per lb	Seeding rate[2] lb PLS per acre		Ratings of adaptation[3]						Native or introduced	[4]	Regional adaptation[5]																		[6]
					Tolerance			Soil																							
			Normal rows (40 in)	Drill (20 in or less) or broadcast	Drought	Cold	Salt	Sandy	Loam	Clay		Season of growth	Coast Saline Prairie	Coast Prairie	East Texas Timberlands	Claypan Area	Blackland Prairie	East Cross Timbers	West Cross Timbers	Grand Prairie	North Central Prairies	Central Basin	Edwards Plateau	Northern Rio Grande Plain	Western Rio Grande Plain	Central Rio Grande Plain	Lower Rio Grande Valley	Rolling Plains	High Plains	Trans-Pecos	Minimum rainfall (inches)
Alkali sacaton		1.750.000	0.4	1.0	2	1	1	3	2	1	N	W										X	X	X	X	X	X	X	X	10
(Sporobolus airoides)	Saltalk				2	1	1	3	2	1	N	W									X						X	X		10
Angleton bluestem *(Dichanthium aristatum)*		500.000	0.4	1.0	2	3	2	3	3	1	I	W		X																30
Big bluestem[7] *(Andropogon gerardii)*		130.000	2.0	6.0	2	1	2	2	1	2	N	W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	25
Black grama *(Bouteloua eriopoda)*	Nogal	1.335.000	0.5	1.5	1	2	3	1	1	3	N	W																X	X	10
Blue grama		711.000	0.5	1.5	1	1	2	2	1	1	N	W																X	X	10
(Bouteloua gracilis)	Lovington	(spikelet)			1	1	2	2	1	1	N	W																X	X	10
	Hachita				1	1	2	2	1	1	N	W																X	X	10
Blue panicgrass *(Panicum antidotale)*		657.000	0.8	2.0	2	3	2	2	1	1	I	W									X	X	X	X	X	X	X	X	X	20
Boer lovegrass		2.922.000	0.8	1.5	1	2	2	1	1	1	I	W																	X	10
(Eragrostis chloromelas)	Catalina				1	2	2	1	1	1	I	W																	X	10
Buffelgrass	Common	225.000 bur	1.2	3.0	1	3	3	2	1	2	I	W												X	X	X	X			16
(Cenchrus ciliare)	Higgins[8]	or 867.000	0.5	1.5	1	3	3	2	1	2	I	W												X	X	X	X			16
	Nueces	grain			1	3	3	2	1	2	I	W												X	X	X	X			16
	Llano				1	3	3	2	1	2	I	W												X	X	X	X			16
Buffalograss		42.000 bur or	5.0	16.0	1	1	2	3	1	1	N	W					X	X	X	X	X	X	X					X	X	15
(Buchloe dactyloides)	Texoka	275,000	---	3.0	1	1	2	3	1	1	N	W					X	X	X	X	X	X	X					X	X	15
		grain																												
California cottontop *(Digitaria californica)*		1.092.000	0.4	1.2	2	2	2	2	1	2	N	W									X		X	X	X	X	X	X	X	X	15
Caucasian bluestem *(Bothriochloa caucasica)*		860.000	0.5	1.2	2	2	2	2	1	1	I	W				X	X	X	X	X	X	X	X					X	X		18
Common reed[9] *(Phragmites australis)*	Shoreline	Rhizomes 12 to 18 in long	1 to 1½ rhizomes per foot of row		3	1	2	1	1	1	N	W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30
Engel[illegible] daisy *(Engelm[illegible]nia pinnatifida)*	Eldorado	58.500	5.0	15.0		1	3	2	1	3	N	C				X	X	X	X	X	X	X	X	X		X	X	X	X		
Gordo bluestem *(Dichanthium aristatum)*		500.000	0.5	1.2	2	2	2	3	2	1	I	W		X			X							X		X	X			25

(Dichanthium aristatum)																																
Green sprangletop *(Leptochloa dubia)*		538,000	0.7	1.7	1	1	2	1	1	2	N	W						X	X	X	X	X	X	X	X	X	X	X	X		10
Illinois [illegible]dleflower *(Des[illegible]us illinoe[illegible])*	Sabine	64,000	4.5	13.5	[illegible]	1	3	2	1	1	N	W		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		16
Indiangrass[7] *(Sorghastrum nutans)*		170,000	1.5	4.5	3	1	2	1	1	2	N	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		16
	Cheyenne				3	1	2	1	1	2	N	W						X	X	X	X							X	X		16
	Lometa				3	1	2	1	1	2	N	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			22
King Ranch bluestem *(Bothriochloa ischaemum* var. *songarica)*		835,000	0.5	1.2	1	1	2	3	1	1	I	W		X		X	X	X	X	X	X	X	X	X	X	X	X				20
Kleberg bluestem *(Dichanthium annulatum)*		800,000	0.5	1.2	1	2	2	2	1	1	I	W		X		X	X			X		X	X	X	X	X	X				20
Kleingrass	Selection 75	500,000	0.8	1.5	2	3	2	2	1	1	I	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		20
(Panicum coloratum)	Verde	450,000	0.8	1.7	2	3	2	2	1	1	I	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		20
Lehmann lovegrass *(Eragrostis lehmanniana)*		4,245,000	0.8	1.5	1	3	2	1	1	2	I	W										X	X	X	X	X		X	X		10
(E. lehmanniana × *E. trichophora)*	Cochise				1	3	2	1	1	2	I	W										X	X	X	X	X		X	X		10
Little bluestem *(Schizachyrium scoparium)*		255,000	1.2	3.4	2	1	3	1	1	1	N	W		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		20
	Pastura				2	1	3	1	1	1	N	W																X			16
	Cimarron				2	1	3	1	1	1	N	W																X	X		16
Maximilian sunflower *(Helianthus maximiliana)*	Aztec	320,000	---	0.25-1.0[10]	2	1	3	1	1	1	N	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			18
Medio bluestem *(Dichanthium aristatum)*		500,000	0.4	1.0	2	3	2	3	3	1	I	W	X				X						X	X	X	X					25
Old World bluestem *(Dichanthium* spp - *Bothriochloa* spp blend)	T-587	854,000	0.5	1.2	1	2	2	2	1	1	I	W		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	14
Plains bristlegrass *(Setaria leucopila)*		293,000	1.0	3.0	1	1	2	1	1	1	N	W				X					X	X	X	X	X	X	X	X	X	X	12
Rhodesgrass *(Chloris gayana)*	Bell	1,405,000 (spikelet)	0.4	1.0	2	3	1	2	1	1	I	W	X	X									X	X	X	X					20
Sand bluestem		125,000	2.0	6.0	2	1	3	1	2	3	N	W						X	X	X	X						X	X		18
(Andropogon gerardii var. *paucipilus)*	Woodward				2	1	3	1	2	3	N	W						X	X	X	X						X	X		18
	Elida				2	1	3	1	2	3	N	W															X	X		14
Sand lovegrass		1,300,000	0.8	1.5	1	1	3	1	2	3	N	W						X	X	X	X						X	X		18
(Eragrostis trichodes)	Mason	2,000,000	0.8	1.5	1	2	3	1	2	3	N	W						X	X	X	X	X	X	X	X		X	X		18

[1]Named varieties are adapted to regions checked. If a named variety is not listed, seed used should have a local origin or be from within 200 miles north or south and 100 miles east or west of site to be seeded. This is particularly important for widely adapted species.

[2]PLS = pure live seed = (percent germination + hard seed) × percent purity.

[3]Symbols for adaptation: 1 = good, 2 = fair, 3 = poor.

[4]Symbols: W = warm season, C = cool season.

[5]Land resource areas are shown in figure 1. Consult local Soil Conservation Service personnel for information for seeding specific range sites because some species are adapted to only part of a resource area and/or to only certain range sites within a resource area.

[6]Extra moisture from runoff may substitute for rainfall. Figure 2 shows the average annual precipitation in Texas.

[7]These tallgrass species occur in resource areas listed. However, seed only on sites with high soil moisture potential such as bottomland range sites in the lower rainfall areas of the state.

[8]Higgins is better adapted to clay soil than other varieties. Nueces and Llano are more cold tolerant than Common and Higgins.

[9]Common reed is used at waterline on farm ponds and watershed dams for stabilization. When used at waterline, use anywhere in the state regardless of quantity of rainfall.

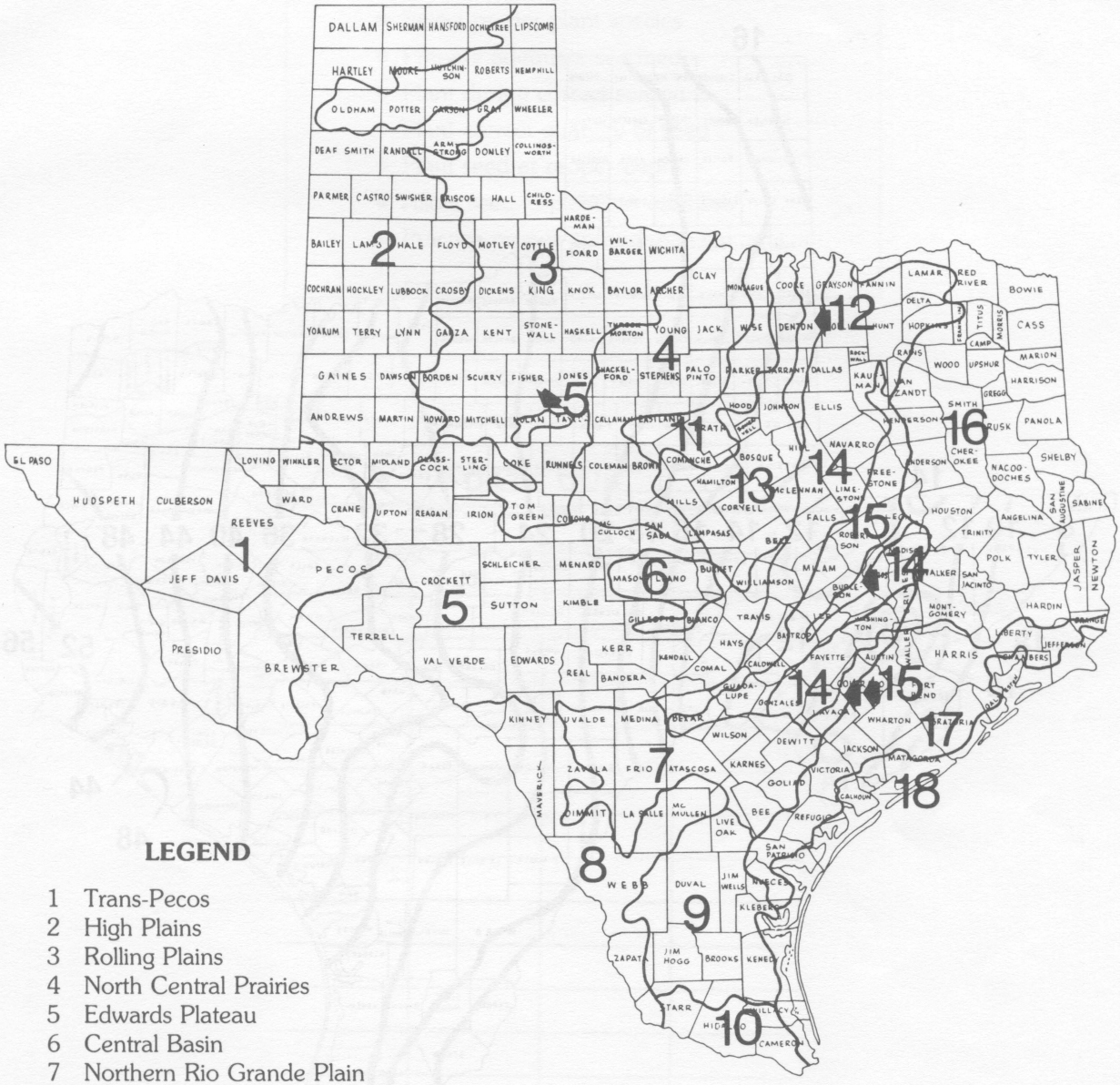
[10]Low rate for range seedings. High rate for wildlife block seedings.

Table 1. Seed characteristics, seeding rates and adaptations of species used for seeding Texas rangeland (concluded).

Name	Variety[1]	Seeds per lb	Seeding rate[2] lb PLS per acre		Ratings of adaptation[3]						Native or introduced	4	Regional adaptation[5]																			6
					Tolerance			Soil																								
			Normal rows (40 in)	Drill (20 in or less) or broadcast	Drought	Cold	Salt	Sandy	Loam	Clay		Season of growth	Coast Saline Prairie	Coast Prairie	East Texas Timberlands	Claypan Area	Blackland Prairie	East Cross Timbers	West Cross Timbers	Grand Prairie	North Central Prairies	Central Basin	Edwards Plateau	Northern Rio Grande Plain	Western Rio Grande Plain	Central Rio Grande Plain	Lower Rio Grande Valley	Rolling Plains	High Plains	Trans-Pecos	Minimum rainfall (inches)
Sideoats grama		143,000	2.0	4.5	2	1	2	2	1	1	N	W				X	X	X	X	X	X	X	X	X	X	X		X	X	X	14
(Bouteloua curtipendula)	Haskell	(spikelet)			2	1	2	2	1	1	N	W			X	X	X	X	X	X	X	X	X	X	X	X		X	X		14
	Premier				2	1	2	2	1	1	N	W											X					X	X	X	14
	El Reno				2	1	2	2	1	1	N	W						X	X	X	X		X					X	X		14
	Niner				2	1	2	2	1	1	N	W											X					X	X	X	14
	Vaughn				2	1	2	2	1	1	N	W																	X		14
	Uvalde				2	1	2	2	1	1	N	W										X	X	X	X						18
Sorghum almum		90,000	---	2.0	2	2	2	2	1	1	I	W		X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	18
(Sorghum almum)				15.0[11]																											
Switchgrass[7]		389,000	1.2	3.5	2	1	2	1	1	1	N	W		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
(Panicum virgatum)	Alamo	427,365	0.5	2.0	2	1	2	1	1	1	N	W		X	X	X	X	X	X	X	X	X		X				X			25
	Blackwell	389,000	1.2	3.5	2	1	2	1	1	2	N	W					X	X	X	X	X							X	X		20
	Caddo	389,000	1.2	3.5	2	1	2	1	1	2	N	W					X	X	X	X	X							X	X		20
	Grenville	389,000	1.2	3.5	2	1	2	1	1	2	N	W																X	X		20
	Kanlow[12]	389,000	1.2	3.5	3	1	2	1	1	1	N	W					X	X	X	X	X							X	X		25
Weeping lovegrass		1,500,000	0.8	1.5	2	2	2	1	1	1	I	W			X	X	X	X	X	X	X			X				X	X		16
(Eragrostis curvula)	Ermelo				2	2	2	1	1	1	I	W			X	X	X	X	X	X	X			X				X	X		16
	Morpa				2	2	2	1	1	1	I	W			X	X	X	X	X	X	X			X				X	X		16
	Renner				2	2	2	1	1	1	I	W			X	X	X	X	X	X	X			X				X	X		16
Western wheatgrass		110,000	2.4	7.0	2	1	1	3	1	1	N	C																X	X		16
(Agropyron smithii)	Arriba				2	1	1	3	1	1	N	C																	X		16
	Barton				2	1	1	3	1	1	N	C																	X		16
Wilman lovegrass	Palar	1,103,000	0.8	1.5	1	3	2	1	1	2	I	W										X	X	X	X	X				X	10
(Eragrostis superba)																															
Yellow bluestem	Plains	830,000	0.5	1.8	2	1	2	2	1	2	I	W			X	X	X	X	X	X	X							X	X		18
(Bothriochloa ischaemum	Ganada				2	1	2	2	1	2	I	W																X	X	X	10
var. ischaemum)	WW Spar				2	1	2	2	1	2	I	W			X	X	X	X	X	X	X							X	X		18

[11]Low rate for seeding with rangeland mixture

[12]Adapted to lowlands receiving extra moisture from runoff



LEGEND

1 Trans-Pecos
2 High Plains
3 Rolling Plains
4 North Central Prairies
5 Edwards Plateau
6 Central Basin
7 Northern Rio Grande Plain
8 Western Rio Grande Plain
9 Central Rio Grande Plain
10 Lower Rio Grande Valley
11 West Cross Timbers
12 East Cross Timbers
13 Grand Prairie
14 Blackland Prairie
15 Claypan Area
16 East Texas Timberlands
17 Coast Prairie
18 Coast Saline Prairies

Figure 1. Land resource areas.

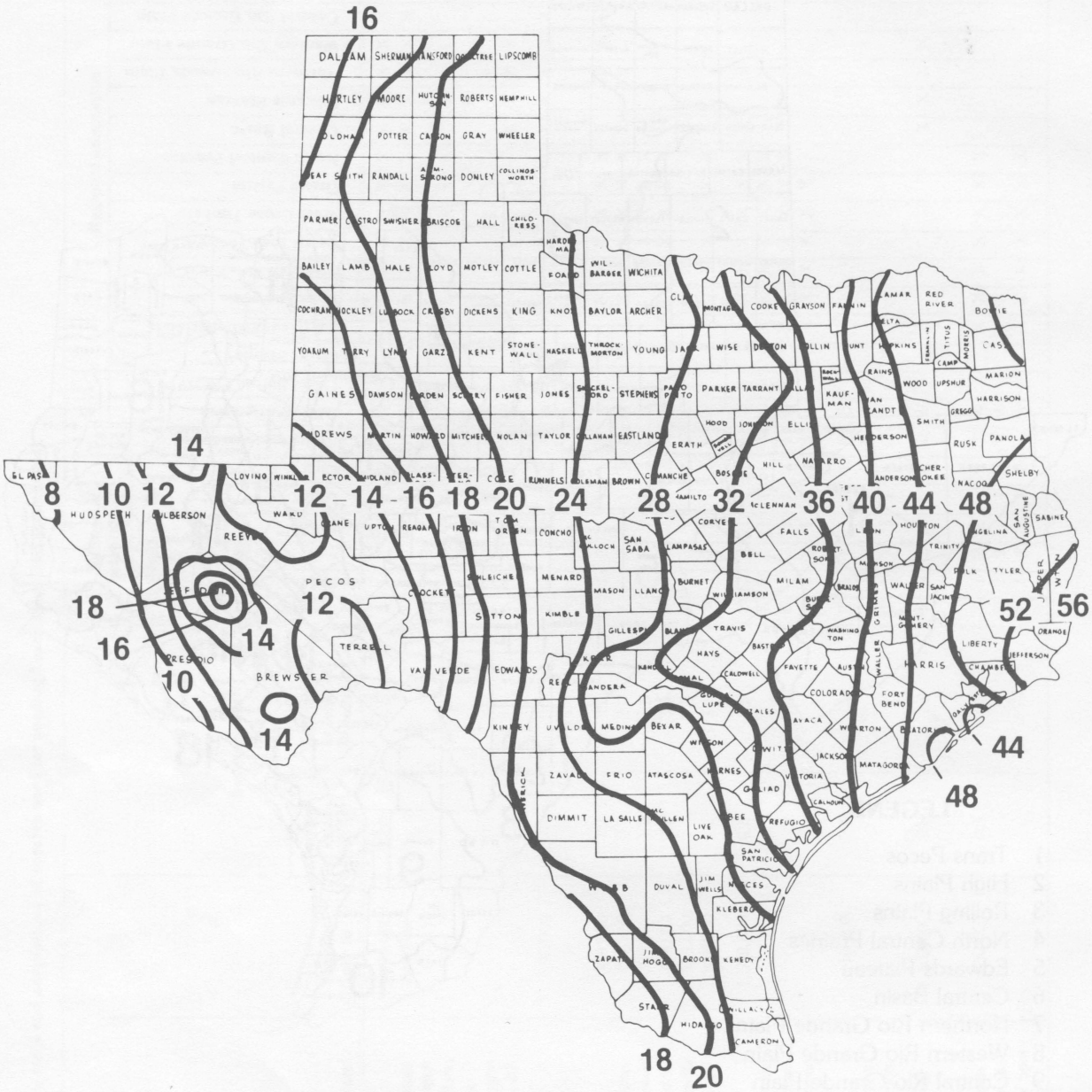


Figure 2. Mean annual total precipitation in Texas.

SUMMARY

For a successful seeding:

- Select proper site
- Select proper plant species
- Prepare adequate seedbed
- Plant during correct season
- Plant correct quantity of seed
- Plant seed at proper depth
- Allow seeded plants to establish
- Practice proper grazing management

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, handicap or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.
10M--3-87, Revision