Arid Land Seeding

Carlton H. Herbel, *Chairman*

(Reported by Dan W. McKenzie)

During the past year an area on the Jornada Experimental Range infested with creosotebush and some honey mesquite was rootplowed and seeded with the arid land seeder prototype equipment developed in the 1960's. Lehmann and Boer lovegrass, black and sideoats grama, yellow-bluestem, blue panicgrass, and fourwing saltbush were used in the seeding. The Jornada Experimental Range is planning to treat about 200 acres with this equipment so the effects of rootplowing and seeding on the ecosystem can be studied.

Other vegetative rehabilitation equipment that members of the workgroup are developing are, a low-energy grubber, new rangeland seeder, disk-chain, and land imprinter. They are reported below.

Low-Energy Grubber, Experimental Disk-Chain, and New Rangeland Seeder

By Harold T. Wiedemann, Texas A&M University
(Presented by Bobby T. Cross, Texas A&M University)

Low-Energy Grubber

A low-energy grubber developed by the Texas Agricultural Experiment Station, Vernon, Tex., has proven to be economical and effective in controlling small trees and brush. The unit is best suited for grubbing trees and brush 1-foot to 8-feet tall in densities of 35 to 200 plants per acre. This grubber has proven effective in mesquite, juniper, algerita, huisache, and blackbrush reinfestations on previously cleared pastures. Grubbing rates of 2 to 10 acres per hour have been achieved at costs of $2.50 to $12.50 per acre on a contract basis. A special U-shaped blade severs the roots 6 to 12 inches below ground to prevent sprouting. The development of a unique hydraulic attachment has increased tree-cutting capacity by one-third and has resulted in effectively uprooting trees that are from 4 to 22 inches in diameter. This low-energy grubber is described by H. T. Wiedemann, et al., 1977, "Low-Energy Grubber for Controlling Brush," *Transactions of the ASAE* 20(2): 210-213.

Low-energy grubber with hydraulic attachment to adjust cutting blade angle for improved soil penetration and stump splitting.

New Rangeland Seeder

An experimental rangeland seeder developed by the Texas Agricultural Experiment Station features a promising new concept for metering fluffy grass seed and a new method of seed placement in rough, log-littered, rootplowed rangeland. Uniform seed metering is accomplished with a semicircular seedbox, auger agitator, and pickerwheel. A double-run, internal cup feed mechanism meters small slick grass seed. The flexing runner openers can cross 12-inch logs without breakage. Comparative results over a 5-year period from nine ranch locations include aerial and drill seeding, seedbeds prepared by chaining, roller chopping and disking are covered by H. T. Wiedemann, et al., 1979, "Seed Metering and Placement Devices for Rangeland Seeder," *Transactions of the ASAE*, in press. Several manufacturers have expressed interest in commercial production of the seeder.

Experimental rangeland seeder near Guthrie, Tex.

Experimental Disk-Chain

A disk-chain, currently under study by the Texas Agricultural Experiment Station, holds promise in reducing cost and energy requirements of seedbed preparation by one-half to two-thirds on rough, log-littered, rootplowed rangeland. Disked seedbeds have consistently given better results than seedbeds prepared by smooth chaining in studies over a 5-year period; however, chaining is substantially lower in cost per acre than disking. Combining the best of both systems has resulted in the development of a disk-chain. Field results show grass densities of 0.41 and 0.13 plants per square foot for disk-chaining and smooth chaining respectively, using 1 pound PLS (pure live seed) per acre of Kleingrass aerially seeded in tests conducted in 1978. Disk-chaining appears very promising because it is well adapted to treatment of extensive acreages, disturbs the soil well, reduces costs by one-half to two-thirds, and generally does not require costly raking.

Disk-chain in operation on rangeland.

Land Imprinter

By Robert M. Dixon, Science and Education Administration
(Presented by Gary Frasier, Science and Education Administration)

The Science and Education Administration began development of a rangeland imprint seeder in 1976. This seeder is designed to produce a seedbed microclimate suitable for seed germination and subsequent seedling establishment. Specifically, it is designed to:

1. Form mulch-lined rainwater-irrigated seedbeds without inversion of the soil surface.

2. Convert above-ground plant materials into an effective surface mulch.

3. Operate satisfactorily without breakdown and rapid wear on rough, rocky, and brush-covered terrain.

4. Protect and conserve existing soil, water, and vegetation regardless of post-treatment climatic conditions.

5. Interrupt well-drained microtopography (network of interconnected rills and small gullies) by impressing the soil surface with complex patterns of closed (and crisscrossing) vee furrows.

6. Convert concentrated storm runoff to diffuse runoff for controlling erosion.

7. Increase depression storage of rainwater up to 2 inches by forming closed-geometry microroughness.

8. Kill shrubs while only slightly thinning native grasses.

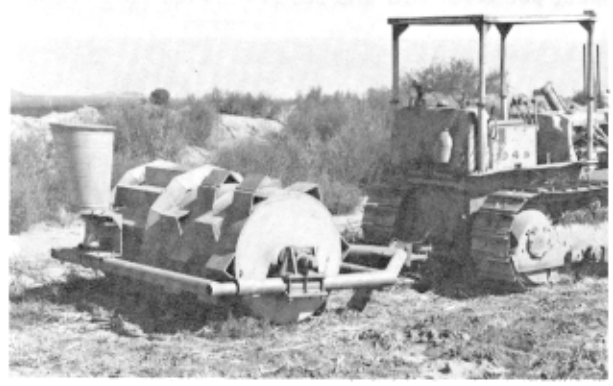
9. Increase populations of macropore-forming soil invertebrae.

10. Operate satisfactorily on any slope considered safe for prime mover and operator.

11. Firm the soil surface slightly to enhance moisture flow to seeds and decrease soil detachability under rain-drop impact and overland flow.

12. Operate satisfactorily at speeds up to 6 mph.

13. Yield a favorable benefit-cost ratio through low cost of treatment and marked increase in forage production.



Rangeland imprint seeder.

Preliminary tests, involving the imprint seeding of more than 2,000 acres, indicate that the preceding 13 design objectives are being adequately met.

A commerical broadcast seeder (12-volt dc) was mounted directly behind one of the imprint capsules to scatter about half of the seed over the newly imprinted surface and the other half on adjacent unimprinted land to be pushed into the soil surface on later passes of the imprint seeder.

Future development plans include: (1) further testing of the imprint seeder's ability to satisfy its design criteria and, (2) further refinement and adaptation of the imprint seeder for a wide range of specific uses.

Plant Materials

Gil Lovell, *Chairman*

The Plant Materials Workgroup has been active compiling, and updating previous reports on new or improved plant materials. The workgroup's prime goal for 1978, completing and publishing an updated listing of released plant materials suitable for rangeland rehabilitation, has been achieved. The results are presented in this table:

Table 1.—*Plant varieties released in 1978 suitable for range and stabilization*

Species	Variety	Common name	Test number	Released by	Area of use
Cenchrus ciliaris	Llano	Buffelgrass	Ex. Hy. 331	SEA; TX AES; SCS	From Llano River South in TX
Cenchrus ciliaris	Neuces	Buffelgrass	Ex. Hy. 2-1	TX AES; SCS; SEA	From Neuces River South in TX
Cercocarpus montanus	Montane	Mountainmahogany	NM-715	SCS; NM AES; CO AES	CO and NM between 3,500 and 9,500 feet elevation
Chilopsis linearis	Barranco	Desertwillow	NM-778	SCS; NM AES	West TX to southern CA, South of Albuquerque, NM
Elaeagnus angustifolia var. orientalis	King-Red	Russian-olive	WY-292A	SCS; NM AES; CO AES	Full range unknown - much of NM and CO, 3,500-7,000 feet elevation
Foresteria neomexicana	Jemex	New Mexico foresteria	A-12044	SCS; NM AES; CO AES	Considerable drought tolerance at elevations of 3,000-7,000 feet over much of CO and NM
Helianthus maximiliani	Aztec	Maximilian sunflower	PMT-1564	SCS; TX AES	Areas of TX and OK receiving 18 inches or more ppt.
Helianthus maximiliani	Prairie Gold	Maximilian sunflower	PMK-1425	SCS; NE AES	KS, NE, northern OK, and eastern CO
Oryzopsis hymenoides	Nezpar	Indian ricegrass	P-2575	SCS; ID AES	Full range unknown - ID on range and surface mined areas
Panicum virgatum	Alamo	Switchgrass	PMT-788	SCS; TX AES	Better adapted to southern half of TX than other cultivars
Phragmites australis	Shoreline	Common reed	PMT-2376	SCS; TX AES	Full range unknown—TX, OK, and KS
Ratibida pinnata	Sunglow	Grayhead Prairieconeflower	PMK-1158	SCS; NE AES	Plant communities of the true prairies; KS, NE, IA, MO
Yucca elata	Bonita	Soaptree yucca	NM-748	SCS; NM AES	Southwest TX, central AZ and NM at elevations of 1,500-6,000 feet