Arid Land Seeding

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(Reported by Harold Wiedemann, Texas A&M University)

Farm-Tractor Front-Mounted Grubber

A newly designed grubbing blade developed for front-mounting on a rubber-tire tractor and patterned after the low-energy grubber's blade (crawler tractor) appears very promising for controlling junipers 2 to 5 feet tall. Preliminary data indicate only a slight reducing in acre-per-hour performance, while total investment will be approximately one-half. Fuel consumption is 72 percent less than that of a crawler tractor.

The farm tractor tested was a 60-horsepower John Deere 2440 with automatic reverse, foot-controlled throttle, 146 front-end loader frame, and special high-ply, used airplane tires adapted for farm tractors. The crawler tractor previously evaluated was a 65-horsepower John Deere 450-B.

The rubber-tire grubber averaged 6.3, 1.3, and 0.6 (acres per hour in densities of 50, 250, and 500 trees per acre. Production rates were computed using the curvilinear regression prediction equation Log Y = 2.49 - Log X (r = .97) when Y = production (ac/hr) and X = densities/ac.

The unit appears well suited to controlling extensive acreages of small junipers infesting previously cleared areas.

Farm tractor front-mounted grubber.

Experimental Disk-Chain

Tests in 1979 compared disk-chaining to smooth chaining for low-cost seedbed preparation on rough, log-littered, root-plowed rangeland where heavy-duty offset disks and grass drills would have been unable to operate successfully. The disk-chain was significantly better than a smooth chain in both clay and sandy loam soils, using 1 or 2 pounds of kleingrass per acre aerially seeded. The greatest improvement was in clay loam soil, where the disk-chain had 71 percent more plants per acre, and plots developed an average of more than 0.5 plants per square foot.

In drawbar tests, a 24-inch disk welded to alternate links of 34 pounds per foot chain averaged 215 ± 39 pounds pull per disk when pulled at a 45-degree diagonal between two tractors traveling at 3 mph. Linear regression equations for predicting pulling requirements, as influenced by angle of pull or operating mass (variation in disk blade and chain weight), are presented in ASAE Paper No. 80-1551, by H.T. Wiedemann and B.T. Cross. This information is useful for construction and productivity calculations. Predicted pulling costs using a D-8H and D-6C tractor (at $140 per hour) is $6.50 per acre.

In 2 years of testing, both types of chains operated successfully on log-littered, root-plowed sites. The disk-chain, however, appears to increase the potential of establishing good grass stands, especially in tighter soils and when rainfall is less than normal. Results of disk-chaining follow more closely the results of offset disking but costs and energy use appear to be reduced by half.

Land Imprinting Activities

By Robert M. Dixon, Science and Education Administration—Agricultural Research, Tucson, Ariz. (Presented by Harold Wiedemann, Texas A&M University)

In July 1976, a prototype rangeland imprinter was tested on creosotebush-infested rangeland near Tombstone, Ariz. When operating on the contour, its angular teeth bite deeply into the soil leaving interconnected water-shedding and water-absorbing imprints. The prototype rangeland imprinter was designed to concentrate and aid in deeply infiltrating rainwater, making more of this limited water resource available for germinating seeds and establishing seedlings.

Preliminary sprinkling infiltrometer results indicate that the shedding and absorbing imprints are performing as designed. Fitted Kostiakov equations indicate that 1-hour infiltration volumes for the shedding and absorbing imprints are 3.7 and 11 centimeters, whereas the corresponding infiltration rates are 2.2 and 6.9 centimeters per hour. Based on U.S. Weather Bureau data, it was determined that this system has sufficient capacity to control a 1-hour, 100-year maximum intensity rainstorm without allowing any runoff loss from the system.

Widespread use of rangeland imprinters is expected in the near future based on the numerous requests that are being received for construction plans. Some use is already occurring.

Ralph Wilson, who operates the Falcon Valley Ranch just north of Tucson, Ariz., used a homemade rangeland imprinter in a successful revegetation effort last year. Before imprinting in March 1980, his degraded rangeland was largely barren with a few scattered cactuses, half shrubs and shrubs, and virtually no grass. His homemade rangeland imprinter is much simpler in design than the prototype rangeland imprinter used near Tombstone, but functioned quite well, nevertheless.

The imprinting roller is 4 feet in diameter and 12 feet long, with 8- by 8-inch angle welded axially on its outer circumference. A commercial broadcast seeder was mounted on the tow frame and set to hurl Lehmann lovegrass seed beneath the imprinting roller at the rate of 2 pounds per acre. A good rain came at the end of July, germinating the Lehmann lovegrass seeds. By September 12th the grass was already knee-high and was forming seed heads.

The resulting dense grass cover can make efficient use of rainwater by rapidly and deeply infiltrating it to nourish and cool plants instead of being lost to surface evaporation and runoff.

Besides buying a commercial imprinter or fabricating one, another way to get an imprinter is to convert roller-type machines used for other purposes such as sheepsfoot rollers. These converted machines can make a deep impression, even on a hard packed dirt road. Conversion entails merely the replacement of compacting feet with 6- by 6-inch angle irons. In a similar manner, rolling brush cutters can be converted to land imprinters. The Water and Power Resources Service, El Paso, Tex., did this. The converted land imprinter is seeding grass on a flood-plain bench at Carbollo Reservoir, N.Mex. Cutting blades were replaced with 6- by 6-inch angle irons.

In southwest Texas, rancher-industrialist Joe Brown has a large-scale revegetation effort underway. Using large imprinters fabricated by the Brown Tool Co., he treated 900 acres of shrub-infested rangeland in March 1980 and now, reportedly, has a good stand of grass from rains that came in early July.

Now let's think small. Bonding small imprint teeth to the soles of jogging shoes produces a pair of foot imprinters or more descriptively, "rain dance shoes." Although they can't make rain, they can make rain grow more grass. Walking at a normal rate produces a stable seedbed and seedling cradle every ¾ second that will concentrate seeds, rainwater, and finely divided plant litter at a point. It is this gravitational routing of resources to a common point that should result in more efficient use of limited rainwater for seed germination and seedling establishment.

The foot imprinter is a labor intensive device that has some inherent advantages over a hand hoe. It produces a more stable seedbed and seedling cradle, and it leaves hands free to do the seeding. As a simple do-it-yourself project, the "rain dance shoe" makes imprinting technology available to the backyard gardener or to labor abundant societies.

Future research will be directed to developing imprinting tooth geometries and imprinting patterns that can make wetter seedbeds and seedling cradles through more efficient use of the limited rainfall in arid lands.

More information may be obtained by writing to:

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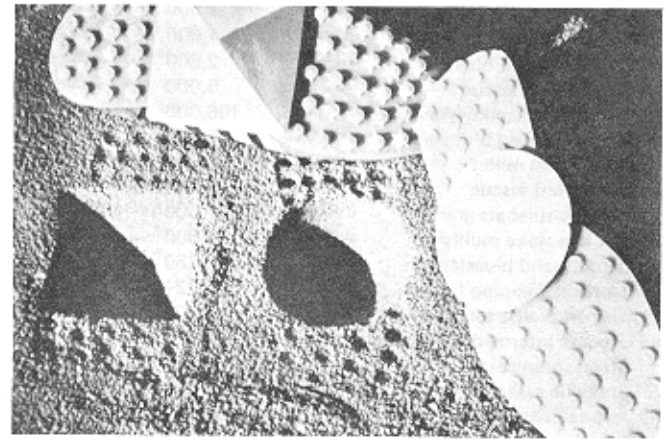
Converted sheepsfoot roller imprints a 9-foot width.

Converted rolling chopper imprints a 21-foot width.



Converted jogging shoes and their imprints.