The Bushland Range Interseeder

RICHARD F. DUDLEY, ELMER B. HUDSPETH, JR., AND C. W. GANTT
Research Agricultural Engineers, U.S.D.A., Agricultural Research Service, Agricultural Engineering Research Division: Bushland, Texas; Lubbock, Texas; and Stoneville, Mississippi, respectively.

Highlight

A range interseeder was designed and constructed at the Southwestern Great Plains Research Center in 1960. The results show promise on heavy soils as well as light ones.

During the past decade, range interseeding has become an accepted practice for restoring depleted rangeland. In 1953 the Colorado Agricultural Experiment Station designed a furrow type seeder for establishing grasses in existing stands of vegetation (Hervey, 1960). The U.S. Soil Conservation Service developed an interseeder in 1954 (Schumacher, 1964), and the University of Wyoming developed a tiller-seeder for interseeding work in 1955 (Becker, McNanee, and Lang, 1956).

From the principles in these three original designs, many interseeders have been developed and used. Although range interseeding has been successfully used on a wide range of sands and light textured soils; interseeding in clay, caliche, or other heavy soils has been more of a problem. A range interseeder (machine #SW-4) was constructed at the Southwestern Great Plains Research Center in 1960. It has shown promise in all soil types.

The general design of the Bushland Interseeder is similar to that of the Wyoming Range Seeder described by Becker, Lang and Rauzi (1957). The Bushland machine consists of a double tool bar on which two 10-inch sweeps are mounted. Gauge wheels are mounted on the rear tool bar to control the depth of undercutting of existing vegetation. Seeding units are mounted behind the sweeps. Pickerwheel type seedboxes are mounted above the seeding units for large and trashy types of grass seeds; and a small, four-compartment, fluted wheel seedbox is used for small grass and legume seeds. Two different sizes of grass seed can be planted simultaneously.
Revolving plate fertilizer hoppers are mounted on the rear tool bar. Fertilizer openers are mounted behind the sweeps and can be adjusted for fertilizer placement below and to the side of the seeded row.

The Bushland Interseeder uses the same basic planting principles as other range interseeders. Vegetation is removed from a strip of soil, and the grass seed planted in the resulting cleaned area. Major modifications from existing seeders included the use of large, flat 18-inch sweeps instead of listers for opening the furrows and the addition of shields above the sweeps to push the loosened vegetation from the seedbed (Fig. 1).

Preliminary work with the seeder indicated that in ranges where the turf was dense, the undercut sod would fall back into its original position. And, the small seedlings could not emerge through the thick turf. The shield behind the sweep was added to move the undercut sod to each side and leave a clean planting surface.

During the spring of 1963, the Bushland Interseeder was tested in several vegetative types on the Texas Technological College Research Farm near Amarillo. Sideoats grama (Bouteloua curtipendula (Michx.) Torr.) was interseeded into stands of short grass; mainly buffalograss (Buchloe dactyloides (Nutt.) Engelm.); mixed early perennial grass dominated by sand dropseed (Sporobolus cryptandrus (Torr.) Gray) and tumble windmillgrass (Chloris verticillata Nutt.); a tall grass, silver bluestem (Andropogon saccharoides Swartz); and sod grass, western wheatgrass (Agropyron smithii Rybd.) (Table 1).

Significantly greater numbers of seedlings survived per foot of row in buffalograss sod than in the taller grasses. There was no difference in survival rate of seedlings in other grass types. Sod from the short grass area was pushed clear of the furrow leaving a full 18-inch cleared area. More of the sod from the taller grasses fell back into the furrow, leaving only 10 to 12 inches cleared space following planting.

Two types of seeding units were used on the Bushland Interseeder. One type consisted of double-disc openers with depth bands followed by a 1- x 8-inch seed-firming wheel and a drag chain. This worked well on sandy soils and soft seedbeds. However, it was not satisfactory on hard, dry clay or clay loam soils.

A second type of seeding unit was constructed using 1-inch wide stiff shank openers followed by the seed-firming wheel and drag chain (Fig. 2). This opener gave good results in all types of soils.

Tests in Pullman silty clay loam on the Texas Technological College Research Farm indicated that when depth of seeding was accurately controlled, almost twice as many seedlings survived from the ½-inch depth as from the 1-inch depth (Table 2).

**Table 1. Sideoats grama seedling survival per foot of row when interplanted in four stands of grasses. Pantex, Texas.**

<table>
<thead>
<tr>
<th>Dominant Grass</th>
<th>Av. width cleared area</th>
<th>No. of Seedlings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalograss</td>
<td>18&quot;</td>
<td>2.01</td>
</tr>
<tr>
<td>Silver bluestem</td>
<td>10</td>
<td>0.95</td>
</tr>
<tr>
<td>Sand dropseed</td>
<td>12</td>
<td>0.89</td>
</tr>
<tr>
<td>Western wheatgrass</td>
<td>12</td>
<td>1.07</td>
</tr>
</tbody>
</table>

**Table 2. Mean number of sideoats grama seedlings surviving per foot of row at two planting depths. Pantex, Texas.**

<table>
<thead>
<tr>
<th>Planting Depth</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>½ inch</td>
<td>1.42</td>
<td>1.40</td>
<td>3.94</td>
<td>2.25</td>
</tr>
<tr>
<td>1 inch</td>
<td>0.62</td>
<td>0.53</td>
<td>1.26</td>
<td>0.80</td>
</tr>
</tbody>
</table>

**Fig. 1.** Front view showing sweeps to undercut existing vegetation and shields to provide a clean area for planting. Disc coulters have been replaced with caster wheels for transporting the planter.

**Fig. 2.** Rear view showing disc coulters, 18-inch sweeps with shields, fertilizer openers, seed openers, seed firming wheels, and drag chains to cover the seed.
The Bushland Interseeder has been successfully used on clays and clay loams (Robertson and Box, 1964; Robertson, 1965; Robertson, Box, Dudley, Gantt, and Sellars, 1965), on shallow caliche soils and on gravelly ridges in the Texas Big Bend area. It has been used in annual weeds, short grasses, mixed perennial grasses, tall grasses, and creosote bush ranges.

Two sizes of grass and legume seed can be planted simultaneously into poor stands of grass without seedbed preparation. Fertilizer may be added if desired. Depth of seeding can be controlled on soils not suited to double-disc openers.

**LITERATURE CITED**


**BOOK REVIEWS**


This is the most recent (1965) of Resources for the Future's studies in land use and management. Robert J. Morgan is professor of political science at the University of Virginia, and served as research associate with RFF from 1960 to 1962.

The author is consciously selective in stressing and analyzing the political processes through which soil conservation policy has been made and executed since its inception, in the main within the Department of Agriculture, much as associated with soil conservation districts. Analysis is preferred to prescription, venturing beyond conventional analysis of structure and function to focus on the inter-action between governmental administration and political power.

This relationship must be understood as long as resources conservation is a governmental objective. Political ecology is as important to the life of a unit of government as physical ecology is to a living organism, and it takes more than technical and administrative skills to achieve the purposes of government. The author believes the U. S. experience with a broad range of domestic programs and aid to underdeveloped nations points to this fact of life. Consequently, he offers both an analysis and a thesis which justify the subtitle: "Thirty Years of the New Decentralization". It is not the purpose of the book to evaluate the Department of Agriculture's physical accomplishments on the land. This job has been done in "Soil Conservation in Perspective", an earlier Resources for the Future book (See review in JRM 19(2):100-101, 1966).

Acknowledging the risk of oversimplifying some complex matters, Dr. Morgan summarizes a few provocative conclusions — two of which are, in effect, his thesis. The first conclusion is that the centrifugal forces in American government and politics invariably restrict the power of federal agencies to concentrate national resources of funds and trained manpower beyond those areas and people in most critical need of assistance. There is a tendency for all federal "welfare" or "benefit" programs to become "national" only in the sense that they are available in suitable form in a maximum number of Congressional constituencies.

His final conclusion is that the problems of administering agricultural conservation programs is inseparable from broader constitutional and political issues.

While this is a comprehensive, carefully-documented examination in depth of the administration and politics of soil conservation in this country, it is also an investigation of how power and functions are shared under our federal system of government.

Most readers of the Journal of Range Management will find this book intensely interesting — particularly those whose careers coincide with the "Thirty Years of the New Decentralization" — Wayne Kessler, Phoenix, Arizona.