Hand-Grubbing Mesquite in the Semidesert Grassland

CARLTON HERBEL, FRED ARES, and JOE BRIDGES, Research Agronomist and Range Conservationist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Jornada Experimental Range, Las Cruces, New Mexico; and Rancher, Las Cruces, New Mexico

Honey mesquite (Prosopis juliflora var. glandulosa Torr.) has become an ever-increasing problem on the semidesert grassland. The semidesert grassland occupies an extensive area in southeastern Arizona, southern New Mexico, western Texas, and northern Mexico. On the Jornada Experimental Range in southern New Mexico, mesquite dominated land has increased from 13 percent of the total in 1915 to 36 percent of the total in 1946 and 49 percent in 1957. This has occurred on land that has a history of conservative grazing use and even on some large areas under complete protection. While heavy grazing use will accelerate the spread of mesquite, the complete absence of grazing use will not prevent that spread.

Mesquite invasion on the sandy soils of the area is characterized by: (1) young plants that are hidden among the grasses, (2) older mesquite plants with sand blow-outs around them, and (3) the disastrous mesquite sand dunes. Once mesquite invasion has reached the third stage, it is uneconomical by present standards to reclaim that land. The average carrying capacity of the range during normal years is reduced from 18 animal-unit-years of grazing per section in the first stage to 3 animal-unit-years or less of grazing per section in the third stage.

Grubbing light stands of young mesquite plants is the most economical means of controlling mesquite. When plants become too large to grub, more expensive chemical control measures must be employed. In hand-grubbing care must be exercised to completely sever the plant below the budding area of the root. In plants not having sand piled around the base, the budding area is found about four inches below the surface of the ground.

A large scale mesquite control program was initiated on the Jornada Experimental Range early in 1958 to make information available to ranchers in the area on the costs and techniques of control measures. The area hand-grubbed was 4,265 acres located in three different pastures.

The contractor was a nearby farmer-rancher anxious to use his labor supply during an off-season. Thus if a rancher himself does not have a source of cheap labor for this purpose, it may be possible for him to make an arrangement with a neighbor to their mutual advantage.
Area Grubbed

The area grubbed on the Jornada Range was parts of three pastures. Pasture 8 has a total area of 5,512 acres. The northern part of that pasture is covered with mesquite dunes. South of the dunes is an area with a dense stand of mesquite. The southern part of the pasture, 1,951 acres altogether, had a thinner stand of mesquite, mixed younger and older plants. The younger plants, those with a crown diameter of 30 inches or less, were grubbed in this latter area. If those younger plants were allowed to remain, in a few years that grassland area would have been dominated by mesquite.

Pasture 13 has a total area of 942 acres, a small part of which is in sand dunes. A total of 813 acres was grubbed. None of pasture 11, with 3,610 acres, is sand dunes, but only 1,501 acres were grubbed this year. Thus, a total of 4,265 acres was grubbed.

Methods

Grubbing

In the grubbing program it was decided to grub plants of a 30-inch crown diameter or less.

Plants that are much larger require too much time to grub. However, if the mesquite stand is such that there are only occasional larger plants, they should also be grubbed. The maximum concentration of plants, on sites to be grubbed, was set at 150 plants per acre. Here again if a localized area has a denser stand, it should be grubbed. In the grubbing program this year, 11 men were used most of the time.

The grubbers were spaced at 30-foot intervals. They were kept in line and spaced by a system of flagging. The flags were spaced 30 feet apart. Several different colors of flagging material were fastened to lath stakes so that each individual was not confused as to which flag was to be his guide. The rows of flags were placed about ¼ mile apart. The distance will vary somewhat according to topography. As the grubbers passed a row of these flags they were moved over so that they would be in place for the return swath. Changing the flags proved to be a full-time job for one man with a pick-up truck.

A supervisor followed closely behind the grubbers to check on their work and to grub occasional plants they had missed. Accurate records of time were kept.

Checking

To obtain information on numbers of plants, checks were made by randomly located belt-transects. A belt-transect measuring 104 x 208 feet, ¼ acre, was used at each location. A spot was randomly selected near the fence and sampled. Succeeding samples were taken at 0.1 mile intervals in a cardinal direction. Two men in a vehicle required an average time of 15 minutes per sample including moving to the next sampling location. When a sampling location was reached, one man paced 208 feet from the right edge of the front bumper and placed a stake. The other man noted the location on a map and prepared the field sheet. A string 52 feet long with a rag in the center was used with a man on each side. One of the men was lined up with the right edge of the vehicle and the stake. As the men moved parallel towards the stake they collected the fol-
Three grubbed mesquite plants with a mattock used for grubbing. The plant on the left has a crown diameter of 30 inches, the one in the center 20 inches, and the plant on the right a crown diameter of 10 inches. The plants were severed about 4 inches below the surface of the ground to get the entire budding zone. Note that the center plant branched below the surface of the ground. This is common in honey mesquite.

Results and Conclusions

Belt-transect data in pasture 8 showed an average of 99.62 mesquite plants per acre on the 1,951 acres that were grubbed. Of the 99.62 plants, an average of 66.36 plants had a crown diameter of 30 inches or less and were deemed grubbable. An average of 2.34 plants per acre, or 5.47 percent, were missed. The number of plants too large to grub averaged 33.26 plants per acre. To grub the mesquite on the 1,951 acres required 1,360 man-hours for the grubbers and 96 man-hours for supervision. Included with the time for the grubbers is the time of one man whose job was to change the flags as the grubbers passed. The average time for the grubbers was 0.697 man-hours per acre and for the supervisor 0.049 man-hours per acre. As an example, if labor were $0.65 per hour and supervisory labor $1.25 per hour, the average cost of clearing would have been $0.45 per acre for the labor and $0.06 for the supervisor or a total of $0.51 per acre.

In pasture 13, belt-transect data gave an average of 60.18 mesquite plants per acre on the 813 acres that were grubbed. Of the 60.18 plants, an average of 42.80 had a crown diameter of 30 inches or less and were deemed grubbable. An average of 2.34 plants per acre, or 5.47 percent, were missed. The number of plants too large to grub averaged 17.38 plants per acre. To grub the mesquite on the 813 acres required 504 man-hours for the grubbers and flagger, and 41 man-hours of supervision. The average time for the grubbers (and flagger) was 0.62 man-hours per acre and for the supervisor 0.05 man-hours per acre. Again using $0.65 an hour for labor and $1.25 per hour for supervision as an example, the average cost of clearing would have been $0.40 per acre for the labor and $0.06 for the supervisor or a total of $0.46 per acre.

In pasture 11, belt-transect data gave an average of 69.86 mesquite plants on the 1,501 acres that were grubbed. Of the 69.86 plants, an average of 44.66 were grubbable. An average of 2.78 plants or 6.22 percent were missed. The number of plants too large to grub averaged 25.20 plants per acre. To grub the mesquite on the 1,501 acres required 667 man-hours for the grubbers and flagger, and 47 man-hours of supervision. The average time for the grubbers (and flagger) was 0.444 man-hours per acre and for the supervisor 0.031 man-hours per acre. At $0.65 an hour for labor and $1.25 per hour for supervision, the average cost of

<table>
<thead>
<tr>
<th>pasture</th>
<th>area (acres)</th>
<th>total time per acre (man-hours)</th>
<th>cost per acre</th>
<th>average time per acre (man-hours)</th>
<th>cost per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1951</td>
<td>0.697</td>
<td>$0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1501</td>
<td>0.444</td>
<td>$0.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>813</td>
<td>0.620</td>
<td>$0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>4265</td>
<td>0.593</td>
<td>$0.385</td>
<td>0.043</td>
<td>$0.054</td>
</tr>
</tbody>
</table>

1 Based on $0.65 per hour.
2 Based on $1.25 per hour.
Practical Range Management in the South

ROBERT E. WILLIAMS, Range Conservationist, Southeast, Soil Conservation Service, U. S. Department of Agriculture, Athens, Georgia

The Southern Range is scattered from the Atlantic seaboard to eastern Texas and Oklahoma, and from Virginia to south Florida. Some portions of this broad area are predominantly range, but generally timber growing is the major land use. Native range forage is a secondary crop on many woodland sites; on others, little if any forage is produced once the land is stocked with timber. Range forage is an important resource in parts of the Arkansas highlands, throughout the longleaf, slash pine, pondpine areas and marshes of the Coastal Plain, and in the flatwoods and prairies of Peninsula Florida. Natural forage is an important part of some individual cattle operations in the loblolly-shortleaf belt, the delta country, and in the mountains, but these operations are somewhat scattered.

Cattle is the main class of stock. As fence laws and better management in general increased, and the open range decreased, sheep and hogs have declined in numbers. Fencing is the first requirement for practicing practical range management. Without fences cattle cannot be controlled, and without control of the livestock, the range cannot be managed.

Historical Background

Many of these natural grazing areas in the South are older in history of use than the Western Range. Some writers claim that the first cattle to enter what is now the United States were brought by Coronado in 1540 to supply food for his great expedition in search of the Seven Cities of Cibolo. Other reports on the first importation of cattle show that Ponce de Leon brought cattle and other livestock when he landed in the vicinity of Charlotte Harbor, Florida, on his second voyage in 1521. This would be nineteen years before Coronado’s entrance.

According to some writers, DeSoto also scattered hogs and some cattle during his march through the South in the early 1540’s. Travelers who visited the Southeast before 1700 wrote of great numbers of cattle and of Indians on horseback.

Due to the mild climate, long growing seasons, and the great reservoir of natural forage, cattle and hogs were able to increase.

William Bartram wrote of "cow pens" and horse herds on the southern savannahs during his travels through the Carolinas, Georgia, and Florida, 1773-78. He also told of the Indian chiefs bearing the title of "cow-