

# Mesquite Control on the Coronado National Forest

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## Highlight

Mesquite is one of the most tenacious invaders of rangeland in the Southwest, and control efforts have resulted in only partial success. Aerial spraying was the most effective and inexpensive of six control methods tried on the Coronado National Forest in Arizona.

On the Coronado National Forest, velvet mesquite (*Prosopis juliflora* var. *velutina*) is a problem on approximately 40% of the grazing allotments. Usually, mesquite is thickest on the most productive and the most accessible range sites (Fig. 1). Where mesquite is thick enough to



FIGURE 1. Mesquite covered bottomland. Site produces little forage.

completely occupy the site, sheet and gully erosion are often a serious problem. On such sites the mesquite must be controlled before any appreciable benefits can be expected from improved grazing management. In lighter stands, the beneficial effects of better management will be nullified in time by the spreading and thickening of the mesquite. The purpose of this article is to present briefly the experience of the Coronado National Forest in controlling mesquite on its grazing lands.

Several control methods for mesquite are available but none is completely satisfactory. Several methods are described by Reynolds and Tschirley (1963). We have used all of the popular methods. Although

the work has not been on a particularly large scale, some of these pilot tests do give a fair idea of the relative cost and effectiveness of the different methods under practical conditions (Table 1).

**Basal Stem Treated With Diesel Oil.**—The basal stem diesel-oil treatment was tried on about 1,000 acres over the past several years. This method involves applying a low-grade diesel fuel around the base of the tree. A backpack pressure tank is used with a pipe nozzle about 4 ft long curved at the end. The long nozzle is necessary to reach under the canopy to the base of the stems of low-branching trees. Enough oil must be applied so that it effectively soaks down and envelops the bud

zone to prevent sprouting. This method resulted in approximately an 85% kill on upland sites where the bud zone was close to the surface. On bottomland sites sometimes the buildup of soil is so great that the bud zone is buried beyond the reach of the diesel oil. Projects involving this type of mesquite netted approximately a 35% kill. One gallon of diesel oil will treat 6 to 8 trees. An active worker should treat 30 to 40 trees/hr. Our cost for the hand treatment operation averaged 10¢/tree.

**Fenuron Pellets.**—Our use of fenuron pellets was very limited and not too successful. Three different rates of application on plots of 7 acres each were used. The area treated had been chained two years previously and, at the time of treatment, had a tree density of 145 live trees/acre. The following dose rates were of fenuron pellets used on the three plots:

Tree Ht. feet	Dose rate in teaspoons		
	Plot A	Plot B	Plot C
0 - 3	1	2	0.5
3 - 6	2	4	1.0
6 - 12	3	6	1.5

The largest kill of 26% and 28% respectively was obtained in Plots B and C on the 0-3 and 3-6 ft trees. For some unexplainable reason Plot A showed only a 10% mortality in these classes.

No effect at all was observed on the 6-12 ft class even by the heaviest application.

Costs were eight cents per tree or \$12.00/acre for the fenuron alone.

**Table 1. Summary of Mesquite Control Projects on Coronado National Forest.**

Method	Acres Treated	Average Cost		Remarks
		Per Tree	Per Acre	
Basal Stem Diesel Oil	1032	10¢		Practical and successful on stands of 50 trees per acre and under
Fenuron Poisoning	21		\$12.00	Not successful
Pushing	578	10 to 12¢		Fairly successful, although resprouting
Chaining	1510		\$4.00	Prolific resprouting
Root Plowing	862		\$12.00 <sup>1</sup>	Successful, some resprouting
Aerial Spray <sup>2</sup>	2000		\$2.50	Good success, 40% total kill

<sup>1</sup> \$4.00 additional for seeding.

<sup>2</sup> Two applications necessary.



FIGURE 2A. Bottomland site immediately after mesquite was removed by pushing with dozer.



FIGURE 2B. Two growing seasons later—site is highly productive once mesquite is removed.

The use of fenuron is not in the least encouraging.

*Pushing with Dozer.*—We have pushed 600 acres of mesquite with a dozer, and this method was fairly effective. More trees were missed with the dozer than was true of hand treatment; this was particularly true of small trees. These are difficult for the bulldozer operator to see, and the larger trees that are pushed out tend to cover up the smaller ones.

Bulldozing creates considerable ground disturbance which has proven to be an asset (Fig. 2A). On areas where there was a remnant sod of perennial grasses, the response of more vigorous growth was much more rapid than where it was not disturbed (Fig. 2B). Where there was very little native grass remaining, the disturbed areas provided a good seedbed for reseeding.

Nearly all of our pushing projects were done with a D-7 Hula Dozer. Costs averaged between 10 to 12¢ per tree. After 5 years some of these projects show considerable re-sprouting. We have found that unless a tree is completely severed from the roots of the bud zone, it will not die. If the tree breaks off above the bud zone, it resprouts from the stump.

*Chaining*—has been the least successful method on the Coronado for removing mesquite. Because of the sprouting ability of the mesquite, about all that was accomplished was to trade large trees for small ones. However, about 6 to 8 years of time was gained by reducing the competition. The sprouts on 6-year old chaining projects are now becoming large enough to reduce forage production.

All of our chaining was done by contract. Two D-7 Caterpillar tractors or equivalent were used, pulling 300 feet of anchor chain between them. The cost was \$4.00/acre. Chaining and the dragging of the brush left considerable soil disturbance and a reasonably good

seedbed. The treated area was then planted to Lehmans Lovegrass.

*Root Plowing.*—A rear-mounted Fleco plow on a D-8 tractor and a front-mounted plow on a D-7 were used for root plowing. Our two projects with root plows total 862 acres. There was no apparent difference in results between the rear-mounted and front-mounted plows. All vegetation was severed from the root systems to a depth of about 12 to 16 inches.

It is essential to reseed after root plowing. One area was seeded to Lehmans lovegrass from an exhaust seeder behind the Dozer. After three years this project can be considered a success. The other area was seeded to Lehmans lovegrass from a fixed-wing aircraft. After three years the seeding is a failure and will have to be redone. We draw no conclusion from this failure that aerial seeding is not satisfactory.

On areas where the mesquite has a density of 150 trees/acre or more and where there is little perennial grass remaining, root plowing was found to be the most effective method. At a cost of \$16.00/acre it is possible to convert non-productive forage land to good grazing land.

*Aerial Spraying.*—We sprayed about 2,000 acres of mesquite with 2,4,5-T, using fixed-wing aircraft. The rate of application was 1/3 lb of 2,4,5-T iso-octyl Ester in a 1:7 mixture of diesel oil and water. Two applications are necessary. It is desirable to skip a year between applications to give the sprouts a chance to grow out enough so that the second application is effective. Aerial spraying is the only method where timing is critical. Spraying must be done in the late spring when the leaves are full-sized but have not yet become waxy. Usually the plant is still blooming at this stage and small beans up to an inch long can be found on some trees. This stage of development usually occurs during the latter part of May or the

early part of June. The projects treated have been relatively level areas or those with a fairly even gradient. In the future we expect to do some work with helicopters. The helicopter may be particularly advantageous in more undulating country where small isolated patches are hard to reach effectively with fixed-wing aircraft.

Our costs for aerial control of mesquite were about \$2.50/acre per application, or a total of \$5.00/acre for the full treatment. Examination of treated areas shows a total kill of about 40%. When 40% of the trees are killed outright, competition has been reduced by 85 to 90% on the area. Aerial spraying was the most effective as well as the cheapest method we tried. As a result, our recent work has been almost entirely limited to aerial spraying.

#### Summary

Mesquite encroachment is a problem on about 40% of the highly productive range on the Coronado Forest. Methods tried on a pilot basis include basal oiling with diesel oil, individual tree poisoning with fenuron, pushing with a bulldozer, chaining, root plowing, and aerial spraying. The basal diesel oil method is good for small areas where the density does not exceed 50 trees/acre. Aerial spraying appears to be the most practical method available for extensive areas.

None of the control methods are completely effective in removing the mesquite permanently. All treated area will need periodic maintenance treatment.

#### LITERATURE CITED

- REYNOLDS, H. G., AND F. H. TSCHIRLEY. 1957. Mesquite control on Southwestern rangeland. U.S.D.A. Leaflet 421. 8 p.