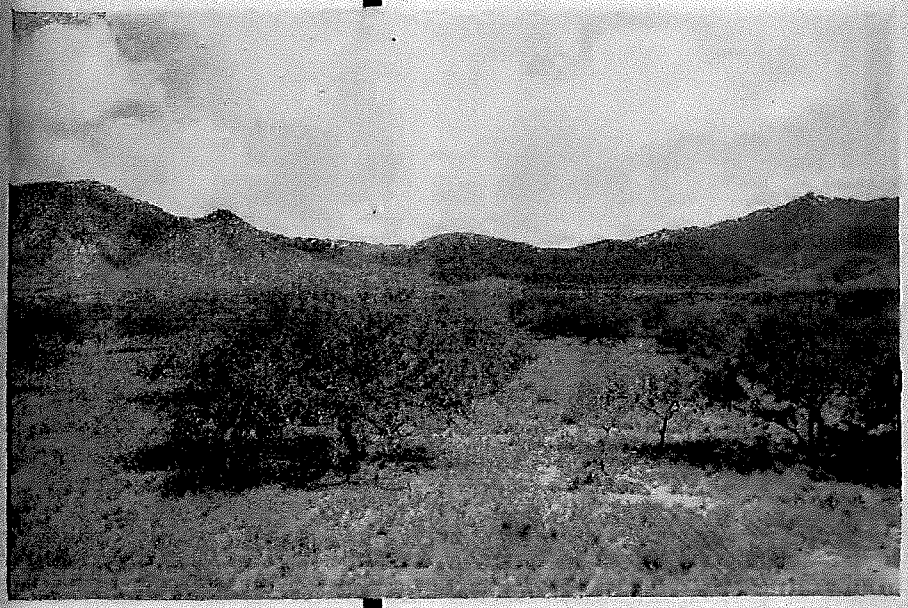
CONTROL OF Mesquite



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ON SOUTHWESTERN RANGES

CONTROL OF MESQUITE ON SOUTHWESTERN RANGES

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Importance of Control.

Range owners and livestock producers in the Southwest—vitally interested at the present time in greater meat production—have reason to be concerned at the spread of the many-branched, deep-rooted shrubs or trees known as mesquites (*Prosopis* spp.). These are found in ever-increasing abundance on many grassland ranges of Arizona, New Mexico, Texas, and portions of adjoining States. Much of the original open mesquite woodland in valley bottoms has been converted into thickets (*bosques*), and many of these have had to be abandoned for grazing on account of the difficulty encountered in gathering and moving cattle. This is especially true wherever screwworms are troublesome. But of even greater concern is the very considerable loss in perennial-grass forage that has resulted from the invasion of mesquite into open range lands. In this respect, mesquite constitutes a menace that in some sections has aroused a determined effort to control the plant or at least to halt further intrusion.

On the other hand, mesquite has three undeniable good qualities. Its 4- to 8-inch pods, generally borne in clusters near the branch tips, are relished by livestock, are highly nutritious, and in critical periods when other feed is scarce have definite value; the leaves are sometimes grazed sparingly, especially in the spring and as emergency forage. Mesquite also supplies fuel wood and post material where other wood is scarce. Lastly, on scantily grassed sandy soils the shrubs and trees perform an important service in holding the soil against wind and water erosion. But here the record of favorable qualities ends, and on most southwestern grassland these are greatly overweighed by the presistent tendency of mesquite to spread and to take an ever wider hold on the range. This tendency is well illustrated by the contrast between the cover illustration of an all-too-firmly established stand and the view in figure 1 of the same area 38 years earlier.

With a root depth that may reach 25 feet and particularly because of a root spread up to 75 feet or even more, the mesquite draws off large quantities of soil moisture that might otherwise support more valuable forage plants. Once established, the shrubs spread steadily. On the upland areas, wherever it has encroached, there has been a considerable decrease of perennial grass forage. This apparently is largely due to competition for soil moisture, but it has been greatly accelerated where palatable forage plants have been overgrazed. In bottom lands where heavy grazing has resulted in severe accelerated erosion and consequent bank cutting and drainage, native saltgrass and sacaton have completely disappeared before dense thickets of mesquite. The hard-coated seeds, after being eaten by cattle, game, rodents, or birds, are dispersed and germinate readily.

In general, on grassland where mesquite is on the increase, there is nearly

[1] Acknowledgment is made of the helpful assistance of Frank Bolce, manager of the Empire Ranch, in testing control methods; and of the work of William J. Pistor, of the Arizona Agricultural Experiment Station, on arsenic content of mesquite leaves on treated trees.

[2] Maintained by the Forest Service, U. S. Department of Agriculture, for Arizona, New Mexico, and West Texas, with headquarters at Tucson, Ariz.

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always an unprofitable reduction in grazing capacity. On the other hand, where a good cover of perennial grasses has been maintained, mesquite encroachment has been retarded.

Considering the advantages and disadvantages of mesquite, the problem appears to be one rather of control than of elimination; that is, control of further encroachment into grassland areas and the use of practical methods of thinning out some of the present stands, allowing the remaining perennial grasses to spread. Such control is not too difficult or expensive. But it should not be attempted where the grass cover is so scant or the soil so subject to blowing—as in mesquite sand hills—that removal of mesquite

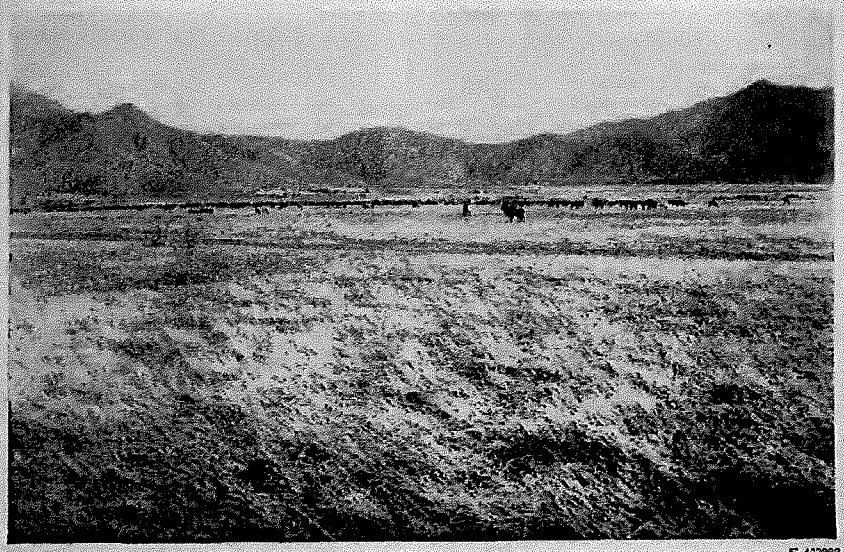

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FIGURE 1.—In striking contrast to the cover picture taken in 1941 and showing the great inroads made by mesquite during the intervening years, is this view of the same area taken in 1903.

might accentuate serious wind or water erosion and fail to bring about the desired improvement in forage cover.

Controlling Mesquite by Grubbing Small Plants.

Small seedlings and shrubs of 1-inch stem diameter or less can be killed by grubbing out the plants to a depth of 5 or 6 inches below the soil surface. This method is recommended for controlling further spread of young stands; cost depends on the density of the stand, and ranges from a few cents to $3 per acre in light stands and in moderate to heavy growth up to $15 per acre. Both stems and roots make good fuel which may reduce the net cost. Moisture content and type of soil are important factors in the labor cost.

Clearing with Power Machinery.

In Texas various tools, such as bulldozers, tree dozers, and "stingers" powered by caterpillar tractors, have been used with success in clearing mesquite-infested land. Tools designed specifically to tear out the main roots near the surface do the work satisfactorily, but those that shear the trees off at the soil surface usually fail to prevent considerable sprouting. Machine removal may cost as little as $2 per acre, but most ranchers find that the large investment in equipment is prohibitive.

Spraying with Kerosene or Diesel Oil.

Spraying the trunks of the trees with kerosene from the ground line to a height of 18 to 24 inches, by means of 2- or 3-gallon pressure spray tanks, has been a common control practice for some years, but results are exceedingly variable. Kerosene has been overrated as a killing agent; because it defoliates the upper portion of the mesquite, the entire tree is likely to appear dead when it is not. There is little doubt that the cases of unsatisfactory kill generally outnumber those reported as successful.

Spraying is most effective if done in July and August. Best results are obtained when the soil around the stems is well soaked with the spray material; otherwise vigorous sprouting will result. Sprouting may also be reduced by digging away the soil around the stem base prior to spraying. The rate of application is about 1 quart per tree, varying from 20 to 30 gallons per 100 trees. Rough-barked trees appear to be more readily killed than smooth-barked trees, probably because more kerosene is absorbed. Pouring kerosene around the base of the tree has been found to be more wasteful and less effective than spraying.

Diesel oil, preferably the "27 degree plus" grade, is equal to kerosene as a killing agent, and probably better, since it is less volatile and contains a higher percent of killing hydrocarbons. As with kerosene, it is important that the soil be saturated to a depth of several inches adjacent to the trunk of the tree. The average kill seldom exceeds 50 percent, but may be somewhat increased if stems are girdled 12 to 18 inches from the ground and the oil sprayed into and below the girdle.

The main advantages in the oils are that they are readily obtainable in ordinary times, no preparation is required, and aside from fire, no hazard is involved.

Poisoning with Sodium Arsenite.

More promising methods are those involving poisoning with a solution of sodium arsenite. This solution is easily prepared, can be effectively and, with due caution, safely used at a reasonable cost, and is sufficiently absorbed that all active growing cells are killed. Two methods of application have proved effective—root-poisoning by the trench or basin method and stem-poisoning by girdling or frilling.

The basin method is best used on trees which are too large to grub out readily with a mattock and too small or shrubby to be girdled effectively—single-stemmed trees 1 to 3 inches in diameter. On many-stemmed, sprawling trees of larger diameter, whose stems may be partly prostrate and covered with soil or otherwise difficult to girdle all the way around, a combination of both methods is recommended. Best results by either method appear to be obtained during the late fall, winter, and early-spring months, and poorest in the warm summer months.

Application of Arsenite.

If the trees are to be used for fuel or posts, they should be cut before treatment, leaving stumps a foot or more high. On large areas, to assure thoroughness and efficiency, mark off portions of pastures or drainages and start treatment at one side of a pasture or at the top of a drainage.

The basin method of application consists simply in digging a shallow basin or trench around the base of the tree, into which about 1 quart of 1:12 arsenite solution is poured (fig. 2).

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FIGURE 2.—For the basin method of applying arsenite solution a long-handled pint cup is the most serviceable tool.

By the girdling method trees are frilled with an ax and a 1:2 arsenic solution is applied directly into the frill. Downward strokes of the ax will allow the chips to remain attached and form a crevice, retaining the poison better and keeping animals from it (fig. 3). Although the frill need not be more than 1 inch deep, it must completely encircle the stem, preferably near the base—certainly below the lowest branches, to prevent sprouting

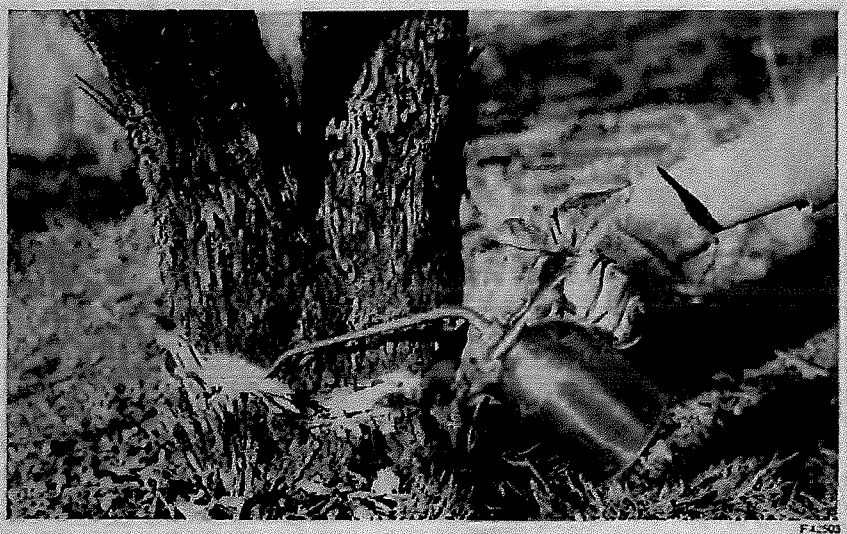

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FIGURE 3.—A long-spouted oilcan with a thumb-controlled valve is most useful in applying the solution to the girdle or frill completely encircling the stem.

from the crotch. Little if any of the poison will travel laterally within the stem.

The best method of attack will be for each man on the job to confine himself to one method of control at a time. In an area where the mesquite is mostly of tree size, the more experienced and faster worker can best handle the girdling, and the less experienced the basin method. Because of the danger in handling sodium arsenite, **the one responsible for the work should mix all solutions and supervise the carrying out of the necessary precautions.**

Equipment needed for extensive arsenite control work consists of the following:

1. Pick-up or wagon to transport materials.
2. Ten-gallon oil drum equipped with faucet for stock solution of arsenic.
3. Twenty-gallon drum for starch solution.
4. Fifty-gallon drum for water.
5. Buckets for carrying solution.
6. Pint cans with wooden handles.
7. Engineer's oilcans (quart size) with pump attachment.
8. Light axes. Barring individual preference, short-handled light axes have proved efficient if kept sharp.
9. Protective material, including gauntlet gloves, overalls or sleeve aprons, and goggles and mask.

Preparation of Arsenite Solution.

The sodium arsenite can be made up by mixing thoroughly the three ingredients in any desired multiple of the proportions shown below. This basic prescription makes 1 gallon of stock solution:

White arsenic (arsenic trioxide powder)	8 pounds.
Caustic soda (sodium hydroxide flakes)	2 pounds.
Water	3 quarts.

The chemicals are first weighed out and mixed dry. To the dry mixture of arsenic and soda add about a third of the water required, constantly stirring with a long wooden paddle and adding more water to reduce the violent boiling which will occur. **Always add water slowly to chemicals; never add chemicals to water.** The stock solution is left in this concentrated form for transportation to the field, where it may be diluted as required.

For the basin method use 1 part of stock solution to 12 parts of water; for the girdling method, 1 part of stock solution to 2 parts water—or better, to 2 parts of liquid laundry starch, which will add body, make application easier, and cause the poison to adhere more effectively to the stem. To prepare a starch solution, dissolve 1 cup of gloss starch in a small amount of water, add about 1 gallon boiling water, and cook and stir until clear. The consistency should be that of a mediumweight lubricating oil.

Precautions.

White arsenic and caustic soda, as well as the sodium arsenite compound, are powerful skin irritants and extremely poisonous internally to animals or humans. **Neither dry nor liquid forms should be handled without thorough protection, not only from any possible bodily contact with the chemicals, but also from inhaling either dust or vapors arising from them.**

Workers should at all times wear gauntlet gloves of leather or of cloth that has been dipped in hot paraffin. In mixing or pouring the stock or

diluted solution, the worker must always stand to windward and wear a coverall—or better, a sleeved apron of shoe length—of stout cloth dipped in hot paraffin, of oilcloth, or one that is otherwise impervious to the chemicals. The face must be protected with goggles and a mask. A light mask such as that shown in figure 4 will afford practically complete protection to both eyes and breathing passages.

FIGURE 4.—*A*, Light dust mask made of nonpriority materials; *B*, mask in use.

Arsenite solution spilled onto the clothes and soaking through to the skin may cause ulcers. When there is any known danger of this, the skin should be washed immediately with soap and water. **Any person suffering from skin irritation should immediately discontinue the handling of arsenic and receive medical treatment from a physician.** The greatest danger of skin irritation lies in small amounts of the stock solution splashed onto unprotected clothing and drying there. Perspiration will later redissolve these chemicals and allow them to come in contact with the skin and cause ulcers, most often about the groin or belt line. Daily change to cleanly laundered clothing is an effective preventive. Still better, wear outer clothing so protected that the solution cannot get through.

Keep all equipment and materials out of reach of children and animals; best under lock and key. Mark all equipment plainly, as with paint. Prevent livestock from licking any chemical from basins or frills, and cover spilled chemicals with earth and brush. Wood from poisoned trees must not be used as fuel, since the smoke may be poisonous.

There is apparently no danger to livestock from browsing the leaves, stems, or seed pods of poisoned trees if the chemicals have been confined to basin or frill, as proved in feeding trials made by the Arizona Agricultural Experiment Station. Either method of poisoning can be used in pastures grazed continuously by cattle, with no death loss or sickness so long as the livestock cannot reach soil or plant surface to which the poison has been applied.

Cost of Arsenite Methods.

Costs will depend principally on cost of chemicals, efficiency of labor, and density of mesquite growth. In 1941 the chemicals (purchased in bulk) cost approximately 70 cents per gallon of stock solution. One gallon of stock solution will treat about 55 trees (a moderate stand per acre) by the basin method, or 280 trees by girdling method. The average worker can treat about 25 trees per hour using the basin method or 12 trees per hour using the girdling method. However, under general range conditions it is necessary to use both methods with different bushes and trees on the same area in order to assure greatest efficiency. Under these conditions the cost of chemicals will vary from 25 to 50 percent of the total cost. Results obtained are apt to vary according to local conditions, but the solutions here recommended should be effective anywhere in the Southwest.

Will Control Pay?

Whether mesquite control by these methods will pay is, of course, a question for the individual range owner to decide. Cost of control may in some instances be met by first harvesting the wood for fuel, fence posts, or other purposes or may be counterbalanced by less tangible benefits, such as reduced losses from screwworms and other pests and reduction of labor required to handle livestock. In areas with even fair stands of perennial grasses, mesquite control accompanied by conservative grazing and judicious range-management practices will result in a considerable increase in grass forage. In Texas grazing capacity has in many instances been greatly increased by removal of mesquite from pasture land. In southern Arizona killing out mesquite on an area of mesquite grassland resulted within 2 years in more than doubling grazing capacity. In some instances, the combination of some wood for use or sale, better range, healthier livestock, and lower range labor cost may far outweigh control costs.

Where mesquite control is undertaken, it is important to be thorough, as hit-or-miss work by any method will give only disappointing results and a poor return for the funds expended.

Plant Cover and Good Management Essential.

The best sites for control, providing the best return in the rapid spread of valuable forage grasses, are those having a hard soil on which is at least a fair stand of grass interspersed with the shrubs. If little or no other plant cover is present to prevent soil washing or blowing, mesquite control is inadvisable unless the soil is firm, moisture conditions are relatively good, and the control measures are accompanied by reseeding to vigorously growing grasses. Control on loose soil is hazardous even where a fair grass cover is present; it is disastrous where grass is scanty. On reseeding operations, where these are justified, scattering the cut brush will help to reduce soil movement and protect the seedlings.

Where mesquite is killed out and wood removed, grazing on the area should be so controlled, both in numbers of livestock and in season, as to favor return of a perennial grass cover and to maintain it in satisfactory condition. For application of control methods and good range management in your locality, as well as for information on materials under war restrictions, seek the advice and assistance of your county agricultural agent.

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