Weeds of Western Australia - Mesquite (Prosopis juliflora D.C.)

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MESQUITE

(Prosopis juliflora D.C.)

The mesquite undoubtedly provides shade and produces nutritious pods under conditions where few other trees will grow. It can, however, have drastic effects on other vegetation. In the Southern United State it has caused a considerable reduction in the carrying capacity of millions of acres of range lands and in Western Australia large tracts of grazing country are also menaced.
A WEED has been defined as "a plant growing out of place" and this definition is appropriate in the case of Mesquite. A tree or shrub grown for shade and ornamental purposes and bearing nutritious pods would appear to be welcome everywhere but, under some conditions, Mesquite has undesirable characteristics which outweigh its advantages and have provided a major agricultural problem.

The problem has its greatest magnitude in the United States. Mesquite is now firmly established on 70 million acres of range in Texas, New Mexico and Arizona. It is native to this territory but remained in a state of balance with the other vegetation until the advent of domestic livestock. At least half the area has been invaded since the grazing of animals was commenced and this transformation has occurred during the last 100 years. Prior to its encroachment on grassland ranges the plant was confined to the valley bottoms and drainage courses, with the uplands being dominated by grasses. Now much of the upland has shrubby vegetation with a big proportion of Mesquite.

The rapid advance of Mesquite in America has been the subject of much research costing thousands of dollars. No doubt a number of factors have contributed to disturbing the previous delicate balance between grassland and woody species. Those suggested include natural biotic factors such as insects causing a reduced seed crop, cessation of recurrent prairie fires, drought and grazing by domestic animals. Besides the effects of selective grazing, animals undoubtedly cause widespread distribution of seeds.

Seeds of Mesquite have been introduced to many countries but in most cases little more has been heard of the plant. Two exceptions, however, are Hawaii and Western Australia. It is recorded that Father Bachelet planted seeds of Algaroba or Mesquite near the Catholic Cathedral at Honolulu in 1828. The one seedling that appeared grew rapidly into a large tree and the seeds were carried by cattle to the barren hillsides of extinct craters and also to elevated coral beds. Here the plants thrived and soon the accidental distribution was supplemented by systematic plantings from which thousands of tons of pods for cattle food were obtained. In comparing Hawaiian experience with that of other countries several aspects must be kept in mind. Much of the land carried little or no herbage previously; cheap labour is available for the gathering of the pods, and the species or variety of Mesquite being grown may not be the pest type of other lands.

It is known that seeds of Mesquite were introduced to Western Australia about 25 years ago and doubtless there had been introductions prior to that time. The seeds were reputedly those of a spineless type and were planted in a number of towns in the North-West and on many station properties, particularly with a view to providing shade and shelter and also, in the case of pastoralists, for the nutritious pods. In many cases difficulty was experienced in raising the plants but
they were established in a number of localities. It was soon found that although some of the trees were innocuous or had only small spines, others were heavily armed with thorns of more than three inches in length.

At first the plants showed little tendency to spread and remained restricted to favourable conditions such as around mills, in gullies and in the vicinity of homesteads where some watering was carried out. The first major spread followed the wet season of 1945 when, in conformity with the American pattern, plants appeared on relatively high ground some distance from waterways. In subsequent dry seasons the spread was restricted but the plants showed no tendency to recede and further migration occurred in favourable seasons. By 1954 on one pastoral property between Onslow and Roebourne, Mesquite was spread over more than 30 square miles of which about four square miles had reached thicket formation. This infestation originated from a few trees at the homestead and some plantings at mills. During the same period plants had spread naturally for several miles from places where they had been planted in towns and a number of thickets had been formed. This explosive type of distribution after periods of quiescence is a dangerous characteristic.

Mesquite is only likely to become aggressive where there is summer rainfall. It has been introduced to other States but, so far, has not shown the strong weed tendencies that it has displayed in Western Australia. Authorities in other parts of Australia, however, are aware of our experience and are not taking liberties with this plant.

**DESCRIPTION**

The Mesquite is a legume belonging to the same group as the wattles. The names Mesquite and Algaroba are both applied to two or more species of *Prosopis* which intergrade into each other almost completely. American workers consider most Mesquites to be one species, *P. juliflora*, but recognise three varieties—the Honey Mesquite—var. *glandulosa* (Torr.) Cockerill, the common variety found in Texas; the Western Honey Mesquite, var. *Torreyana* L. Benson, common in Southern New Mexico, western Texas and southeastern Arizona, and Velvet Mesquite var. *velutina* (Woot.) Sarg. which occurs in Arizona. The main basis for distinguishing these varieties is the size, shape and hairiness of the leaflets. These range from the short, hairy and closely-spaced leaflets of Velvet Mesquite to the long, linear, glabrous and widely spaced leaflets of Honey Mesquite. Western Honey Mesquite is intermediate between these extremes.

Depending on climate and soil, all three varieties of Mesquite vary in character of growth, being either trees or shrubs. Under favourable conditions they may become large trees of 40ft. or more in height with well defined trunks 2ft. or more in diameter. In semi-arid sandy places, Mesquite is a many-stemmed shrub of about 3ft. while the type that causes most
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concern is intermediate, often being branched from the base and reaching a height of 15-20 feet.

The leaves are dark green and similar to those of many acacias, being divided into numerous small leaflets. In America the plant is deciduous but in the north of this State is evergreen. The wood is hard and a reddish brown with an outside layer of yellow sapwood. The twigs are armed with straight spines which vary in size but may reach a length of three to four inches, usually being more numerous and better developed on regrowth from stumps. The small, greenish-yellow, fragrant flowers are borne near the ends of the branches in cylindrical clusters two to three inches long. The fleshy pods or beans are straw-coloured when ripe. They are four to eight inches long and each contains 10-20 hard seeds.

Mesquite has been declared a primary noxious weed for that portion of the State north of the 26° of latitude. This means that it is compulsory to destroy the plant in that area.

**SIGNIFICANCE**

As already mentioned, along with the characteristics which make it a noxious plant, Mesquite has some desirable features. The timber has been used in America for both fuel and posts, although in recent years the value for these purposes has declined. The pods contain a high proportion of sugar and protein and are relished by stock. In Hawaii many
thousands of tons are gathered annually and ground into meal for livestock. Although the foliage is often sparse it has been used for shade and shelter where more umbrageous trees will not grow and apiculturists regard it as a valuable source of honey.

Why are we concerned about the spread of a plant having all these attributes? Kenneth W. Parker and S. Clark Martin in their publication—"Mesquite Problems on Southern Arizona Ranges" list the following principal reasons—

1) Mesquite, even under moderate grazing use, is still persistently increasing both by invading open grassland and by thickening of old stands.

2) Cutting Mesquite, especially in bottom-land areas, usually results in an impenetrable thicket of sprout regrowth and new seedlings. In many of these “jungles,” grazing has had to be abandoned.

3) Livestock handling costs are increased, especially in dense upland Mesquite thickets where it is difficult to gather livestock for market or to find screwworm-infested animals for treatment.

4) Increases in Mesquite are usually accompanied by decreases in quantity and quality of perennial grass forage and corresponding reductions in livestock production.

5) Still more serious from a long-time viewpoint is the accelerated erosion generally found on uplands as well as bottom lands wherever Mesquite has encroached.

To these must be added severe digestive troubles resulting from impaction where range cattle are forced to subsist chiefly on Mesquite beans and leaves.

American experience is being largely repeated where Mesquite has become established in Western Australia. Dense thickets have prevented the mustering of stock and prolific growth near windmills has acted as a shield preventing the pumping of water. Thorns have injured the hooves of animals, and have also punctured many vehicle tyres. Besides supplanting mulgas and other valuable forage shrubs, the surface roots of the Mesquite compete strongly with grasses which soon disappear from around the trees. Mesquite is therefore an enemy of the most valuable assets of our pastoral country and can cause a rapid deterioration in grazing value. Undoubtedly this menace, if allowed to progress unchecked, could impair the productivity of millions of acres in the northern parts of the State, as it has already done in the southern parts of the United States.

Mesquite is one of the few trees that townspeople have been able to establish for shade and shelter under the hot, dry conditions of the North-West. It is understandable that those who do not appreciate its significance to the pastoral industry are loth to destroy it. Several other trees without the undesirable characteristics of the Mesquite have been grown however, including the athel tamarisk (Tamarisk aphylla), kurrajong (Brachychiton spp.), river gum (Eucalypt-
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tus camaldulensis) and various palms. The athel tamarisk can be propagated from cuttings, grows rapidly and provides good shelter from wind. It is likely, that in some of the localities the following could also be grown successfully: carob bean (Ceratonia siligua), pepper tree (Schinus molle), sheoaks (Casuarina spp.), flame trees (Erythrina spp.) and cape lilac (Melia azedarach).

Fig. 5.—An indication of the prolific seeding that occurs. Mature pods almost cover the ground beneath a tree at Carnarvon

CONTROL

Mesquite will develop roots from stems if they happen to be covered by drifting sand but distribution is mainly dependent on seeds. Seed production is variable but even in seasons of sparse seeding, some plants produce a heavy crop of pods. In common with many other legumes a proportion of the seeds are hard, not absorbing water readily and may remain in a dormant condition for a number of years. Seeds have been found viable after storage for 44 years in the herbarium. Such longevity is a great advantage for ensuring reproduction in areas with unreliable seasons.

Mesquite has an extensive rooting system with a taproot and strongly-developed surface roots. Initially the taproot outgrows the shoot and when the plant is a foot high the taproot may be considerably longer. This penetration by the root is a characteristic of many drought-resisting plants, enabling moisture to be obtained when the soil nearer to the surface is dry. At the base of the stem where it joins the main root, is a dormant bud zone often extending six to eight inches below ground level. If the upper portion of the plant is removed or severely damaged these buds become active producing a number of shoots which grow rapidly. There is similar reaction if the roots are disturbed but only partially removed from the ground. Any control measures, particularly mechanical methods therefore, must be carried out systematically and thoroughly in order to be effective.

Fig. 6.—As a shade and shelter tree, the Athel Tamarisk has none of the disadvantages of the Mesquite and will thrive under similar conditions. This photograph shows an Athel Tamarisk (left) and a Mesquite growing side by side at Carnarvon

The seeds of Mesquite have been carried by flood waters but stock have been responsible for much of the spread. Some of the seeds pass through animals without being digested, in fact their germination is probably stimulated. Seedlings often appear in cow pats—a healthy environment for young plants—and there is some evidence that they are transported by kangaroos. Some wild animals in America are also responsible but not to the same extent as cattle.

If only a few trees occur, as is usually the case when they have been planted in the garden, they can be destroyed by grubbing below the bud zone to which reference has been made. An effective chemical treatment is to spray or jet the basal two to three feet of the trunk with diesoline containing 1 lb acid equivalent of 2,4,5-T ester in ten gallons. Care must be taken to ensure that the trunk is completely encircled and the bark thoroughly covered. A knapsack spray pump is suitable for this treatment and should be operated at a low pressure so that a fine stream of liquid rather than a spray is being ejected. Young plants are killed
readily by the application of this preparation to the foliage in the form of a fine spray. Weaker solutions containing 3 lb. acid equivalent of 2,4,5-T in 100 gallons of water have also proved effective in the case of foliage spraying of seedlings and young plants.

Although the treatments suggested are practicable for small groups of trees or even a greater number scattered over a wide area they do not solve the problem of extensive, more or less continuous infestations such as that covering about four square miles on a pastoral property between Onslow and Roebourne.

Some encouraging reports were received from America following the application of 2,4,5-T by means of aircraft but at the same time reference was made to the variability of the results which, in some cases, were poor. As an effective aerial treatment would be of major assistance in handling our most serious infestation a trial was undertaken using 14, 22 and 28 ounces acid equivalent of 2,4,5-T in four gallons of 25 per cent. diesolene-water emulsion per acre. In each case complete defoliation occurred within a few weeks but later new shoots appeared and only a small proportion of the Mesquite were killed. These were mainly smaller plants in the more scattered formation. With a view to obtaining deeper penetration and greater uptake of the chemical, an application of 12 ounces acid equivalent of 2,4,5-T in four gallons of 25 per cent. diesolene-water emulsion per acre was made on August 23, 1954. This treatment again caused the plants to lose their leaves and when they had partially recovered a further application at the same rate was made on November 13, 1954. The final result was somewhat better than following the single spraying but was not sufficiently positive to warrant persevering with the method.

A start has now been made to attempt to destroy the main concentrated infestation of somewhat more than one thousand acres, by chaining to bring the growth to ground level, at the same time lifting as many of the roots as possible. This will be followed by heavy raking into windrows and burning. The breaking of the ground surface by the machinery will assist with the establishment of buffel grass (Cenchrus ciliaris L.) which, however, will also be dependent on favourable seasonal conditions. It is planned to follow these operations with systematic burning with a view to checking the growth of young Mesquites and further use will be made of chemicals, probably for both basal treatment and foliage spraying. The project is not based on proven methods but delay will only increase the magnitude of the problem.

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Although during the summer months there is a considerable surplus of locally produced Spearwood Brown Globe onions, owing to their poor keeping quality they are exported prior to June. The results obtained from the use of maleic hydrazide suggest a remunerative side-line for small farms in the South-West area.

Larger trials will be conducted at Manjimup next season in order that these results may be further tested.

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Regulations recently promulgated under the Noxious Weeds Act now require that sheep intended for importation into Western Australia from other States shall be accompanied by a certificate from the Department of Agriculture in the exporting State to the effect that they have been examined and found free of Bathurst burr and Noogoora burr. Inspectors have been advised that no sheep are to be admitted unless the prescribed certificate is produced.

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