

# Control of Noxious Range Plants in a Range Management Program

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PLANTS which are undesirable in the light of best land use are called "noxious." On range lands a noxious plant may be one which competes with the growth of desirable species and reduces grazing capacity or it may be actually poisonous to livestock, or its presence may increase handling costs. It is the purpose of this paper to point out the place of noxious plant control in a management program.

Noxious plants are an ever-increasing threat to the welfare and permanence of the western livestock industry. Some people contend that since settlement of the West there has been no significant change in the vegetation. This viewpoint is contrary to the facts. It is true that large areas of grassland, brush, and timberlands in their grosser aspects are still much the same as they have always been. But closer examination even of these types will often reveal changes that have been brought about largely by noxious plant invasions. These changes are reflected over extensive areas mainly in poor productivity and accelerated erosion rates.

To avoid controversy, let us look at the lands where the evidence provided by historical accounts, eyewitness descriptions of early pioneers, and retraceable early day photographs is hard to refute (1, 6, 7). In the Southwest, mesquite alone now covers some 60 million acres representing a twofold increase over its original distribution 100 years ago. The 30-million-acre increase has been largely at the expense of open grasslands.

Juniper in this region has likewise encroached over additional millions of acres. In the Intermountain States and the Northwest big sagebrush is found on some 95 million acres—much of this has always been sagebrush—but in the original stands it has greatly thickened and in addition has spread into some 7 to 10 million acres of higher mountain country where it was formerly a rarity. In the same region, low-value cheatgrass has replaced the more useful bunchgrass species on several million acres—and still is on the march. In California, the 11 million acres of chaparral represent a sizable expansion in brush and this largely at the expense of grassland and conifer forest types. In this State, too, there are nearly 8 million acres of woodland-grass, over much of which brush is also spreading or increasing in density. Poisonous St. Johnswort or Klamath weed, a native of Europe, has infested several hundred thousand acres of choice range in California and is still on the increase. Here and there, throughout the West, are literally dozens of other undesirable plants whose presence on the range constitute local but still important problems in range improvement—for example, bitterweed in Texas, snakeweed in the Southwest, sneezeweed in Colorado, tarweed and Wyethia in the Mountain States, and pricklypear on the Great Plains.

That there has been a marked change in plant cover in the West is apparent. Reduced economic returns as a result of these changes must be great. For example, the total loss from mesquite and

juniper in Texas has been estimated by Bell and Dyksterhuis (2) at 20 million dollars per year.

A large part of the changes in vegetation has been from open grassland to shrubs or low-value trees. Throughout most of the West the usually limited rainfall will permit only a restricted amount of plant growth—whether it be grass, weeds, shrubs, or trees. An increase of woody vegetation in grassland means that the soil is robbed of moisture that would otherwise produce range forage. As the invading shrubs become larger and more numerous their demand for moisture increases, with the result that each succeeding year less range forage is produced.

#### CAUSES OF NOXIOUS PLANT INVASIONS

Most of the widespread invasion of grassland by woody species has taken place during the past 100 years. The question naturally arises as to what held these woody plants in check before that and what forces have been released within recent years to encourage these invasions. Throughout most of the West it is apparent that the balance between open grassland and brush cover is delicate and therefore easily upset. Any intelligent attack on the problem of control requires an understanding of the forces which hinder or favor the increase of undesirable plants.

The causes for these changes in vegetation have been variously attributed to fire (either protection from it or uncontrolled burning), drought, cultivation and subsequent abandonment, distribution of the seed by livestock and rodents, and to continuous heavy grazing. Of all these causes, greatest weight must be given to grazing. Where grazing use is too heavy over a period of years the grass cover is worn thin, plant vigor is reduced, seed crops are poor, litter is scarce, and much mineral soil is exposed. Thus competi-

tion from desirable forage plants is reduced, their reproduction is hindered, and conditions are made favorable for their replacement by noxious range plants.

#### MANAGEMENT AS A TOOL IN PREVENTION OF INVASION OF NOXIOUS PLANTS

It has long been an accepted fact by range managers that most undesirable weeds can be kept in check through strict adherence to moderate grazing practices. Moderate grazing use may not prevent ultimate encroachment of such woody species as mesquite and juniper, but at least it will greatly retard it. But no degree of moderation in grazing use will drive out these deep-rooted shrubs within a reasonable length of time once they have become firmly established. For example, in Montana on the basis of a 31-year-old study, Lommasson (4) reported that big sagebrush which had invaded high-mountain grassland would apparently maintain itself indefinitely even under good range management. In the Southwest much the same tenacity has been observed in the case of mesquite and juniper (6, 7).

It is small comfort to the stockman with heavily infested ranges to know that the invasion would have been less rapid if his range had been managed differently. The paramount problem for him is not alone one of controlling further spread but how to eliminate present stands of noxious plants and how to improve the productivity of his range. This is a problem of major importance. An entirely satisfactory answer has not yet been determined for all species and sites. But it is a source of satisfaction that range research and experience have made rapid strides in solving the problem for some species during the past decade. This information is being put to good use. For example, with big sagebrush, extensive areas have been converted to good grass-

land by elimination of this plant followed by reseeding.

#### BENEFITS OF CONTROL

Before starting a program of noxious plant control one should fully consider why control is needed on a particular range and what benefits may reasonably be expected. Depending on the kind of noxious plant present, there are several reasons for undertaking control work.

Control may be needed to increase the quantity of forage. Elimination of woody plants has often increased the grazing capacity two and threefold. For example, in Arizona such forage increases have been realized following mesquite control. In Oklahoma, sand sage control, as reported by Savage (9), doubled the grass and boosted meat production as much as 57 pounds per acre.

Better quality forage has usually accompanied these increases in production, resulting in a longer "green feed" period when nutrients are above maintenance requirements of livestock.

Shrub control is a "must" whenever artificial reseeding is to be attempted. It is also a "must" in many instances for natural revegetation under proper management. Noxious plant control may be needed also to facilitate the handling of livestock, as in special holding traps or hospital pastures.

Control is needed in some areas to reduce the fire hazard, as with cheatgrass and big sagebrush.

Control of many poisonous species is needed to reduce or prevent livestock losses.

Control of some woody species is often needed on watersheds to increase water yields.

In many instances, particularly with taprooted species, eradication is a prerequisite in the control of accelerated erosion.

#### METHODS AVAILABLE FOR CONTROL

What are the tools and methods available for control? In brief, these are: simple manual methods, power machinery, fire, biological, and chemical herbicides.

There is no magic wand method and there probably never will be for eliminating noxious plants. Control methods entail labor, materials, equipment, and knowledge. Noxious plants, when once established, increase by geometric proportions and the most practical time to apply control is at the beginning of the invasion when costs may be only a few cents an acre. Such work can be done with simple manual methods. The benefits may not be measurable in more forage but the work will be warranted as insurance against further increase and subsequent loss in forage production.

Biological control of noxious plants has been frequently suggested. The classic example of success is the control of cacti in Australia with beetles. Just recently, as reported by Holloway (3), there have been promising attempts to control St. Johnswort on the Pacific Coast with insects (*Chrysolina hyperici* and *C. gemellata*). This method may be feasible with introduced plants, but where native species are concerned entomologists state that there is not much hope because the native insects are in turn kept in check by natural predators and other forces of nature.

In Texas and California, goats have been used successfully to clear brush, but grazing must be correlated with proper management to avoid loss of grass.

The use of power machinery and the application of chemicals by aerosol machines and airplanes are also often mentioned as having great possibilities for control. Properly equipped airplanes can be used to treat 1000 acres in a day's time at a volume application rate of 4 or

5 gallons per acre. Only a few years ago this was not possible. The prompt acceptance of Savage, Brown, and McIlvain's work (10) with 2, 4-D on sand sagebrush resulted in the treatment by airplane of over 100,000 acres of range in Texas in 1948 at a cost of about \$2.00 per acre. But this apparently successful effort prompts a word of caution—the same method when tried in eastern Oregon on 10,000 acres of big sagebrush, a different plant, resulted in total failure. It is possible that future research may reveal that 2,4-D or allied herbicides may kill big sagebrush and other plants, but until then it would seem the wiser course to follow proven methods. The wide-scale use of chemicals on range lands is new and there is much need for intensified research.

#### PLACE OF NOXIOUS PLANT CONTROL IN MANAGEMENT

There is a distinct place for noxious plant control in the overall management program. But one may well ask—how far is one justified in going in the effort to improve the range through destruction of noxious plants? The answer depends largely on the kinds of plants involved. If the plant is poisonous and is causing losses, a rancher is justified in going to considerable expense to correct the trouble. Most poisonous plants are eaten because of hunger or depraved appetite. In the case of plants which are reducing the grazing capacity, the rancher can proceed with confidence only when he is sure that the work will result either in enough increased forage to pay its way or serve as insurance against further invasion. Range reseeding must accompany elimination of noxious plants where the remnant grasses are too sparse to insure rapid covering of the soil following control. It is well known that with the use of proper methods, control is practical and

will pay its way on selected sites as in the case of big sagebrush, sand sagebrush, and mesquite (5, 6, 8, 9). For example, in southern Arizona benefits from mesquite control liquidated (with beef figured at 16 cents a pound) the original costs in 5 years and the treatment effects were estimated to last for 20 years.

In many parts of the West noxious plant control may well be a continuing operation, with re-treatment necessary every 20 to 30 years. Control work should be regarded as an investment in improvement and it may be desirable to treat methodically from 5 to 10 per cent of the land each year. Accordingly, the ranch operator should provide specifically for control costs much as he has in the past for taxes, insurance, fences, water development, and herd improvement. Consequently, the work should be well planned in advance.

When one is familiar with some of our major noxious plant problems and appreciates how control may be used as a means of range improvement—it becomes clear that further research is going to be required before control work is entirely practical everywhere in the West. More educational work will be needed also. In conclusion, it may be said that the future productivity and permanence of the range livestock industry depends largely on how well the range resources are managed and how much time and effort is spent on proven range practices. With rising living standards and increases in population, the demands for meat are ever increasing. More meat can be produced by growing more range forage. Noxious plant control is one of the important measures for accomplishing this end.

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