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Big Sagebrush Control

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Distribution of Common Sagebrush Types in Wyoming

Silver Sagebrush (A. cana)

Threetip Sagebrush (A. tripartita)

Low Sagebrush (A. arbuscula)

Big Sagebrush (A. tridentata)

Black Sagebrush (A. nova)
CHEMICAL CONTROL of big sagebrush (*Artemisia tridentata*) has long since passed the experimental stage. Farmers and ranchers have sprayed over 50,000 acres in Wyoming during the past five years. The U. S. Forest Service, the Bureau of Land Management, and the Agricultural Stabilization and Conservation groups have accepted the use of herbicides to control sagebrush as a range-improvement technique. They are working with individual operators throughout the Western Region. Although research has answered several questions, supplementary information is still being gathered to guide field work in the various phases of sagebrush control.

**When to spray—**

Sagebrush — rapid twig elongation (active growth) and associated species in following stages of growth.

Bluegrass (*Poa secunda* complex) — full to past bloom.

Common phloxes (flowery and hoody) — early seed formation.

Idaho fescue — starting to head.

Poor results within any one year or area of control can usually be attributed to growing conditions at the time of chemical applications. Since dates of application vary from year to year, vegetative surveys to determine application dates should be taken each time a spray program is initiated.

In the Bighorn Mountains, at an average elevation of 8,200 ft. and an average annual precipitation of 22 in., the spray date is usually around mid-June. On drier sites with less annual precipitation the dates will be considerably earlier. Excellent control resulted when the low growing *A. tridentata* in the Red Desert area, elevation 7,000 ft. and annual precipitation of 10 in. per year, was sprayed the last week in May.

Effectiveness of the herbicide drops quickly as soil moisture and temperatures become critical to the plant's growth. Since the percentage of control from a given treatment may vary considerably with the lapse of as little as 10 days, later applications are considerably more critical than earlier applications.

**What to use—**

Butyl ester of 2,4-D at 2 pounds of acid per acre in oil at a total volume of 2 gal. per acre.

Under favorable growing condi-
tions, the butyl ester of 2,4-D has produced the greatest control per dollar invested. However, the low volatile esters have given better control under unfavorable or dry growing conditions. Several researchers have reported success with 2,4,5-T compounds. However, for the Western Region as a whole, 2,4-D ester formulations are recommended for the most economical control. One year's application of 2 lbs. of 2,4-D acid per acre will result in 70 to 90 percent control of sagebrush stands. Increased chemical concentrations give slightly better control; however, the additional advantage which may result may not offset the added cost of the chemical. A second-year application is usually necessary to get complete control. Complete control is not always desirable and it is felt that
75 percent or more control of sagebrush will result in maximum return per dollar invested.

Water or oil can be used as a carrier in applying the chemical. Because of the lower volume required for good coverage, oil is more popular and more extensively used than water. Two gal. total volume of diesel oil and chemical per acre have given satisfactory coverage and control, whereas 5 to 10 gal. of water are required to do the same job. When landing strips cannot be located any closer than 20 to 30 miles from the sagebrush area, one soon realizes the advantage of using oil. Although most commercial chemicals contain wetting agents, it is only added insurance and very inexpensive to add a wetting agent to any chemical at application time.

What will it cost?

Cost will range from $3 to $4 per acre.

The cost per acre of spraying will vary depending upon type of terrain, size of area, distance to landing facilities, and airplane equipment. With the cost of chemicals reduced, and with use of larger, more efficient applicators, one may expect to see the upper limits of cost to be somewhere around $3 per acre.

What can be expected?

Two areas in the Bighorn Mountains in northern Wyoming comprising approximately 310 acres were used to obtain the value of a chemical sagebrush-control program. The experiment was initiated in 1952; production, utilization, and seedlings studies have been conducted each year since.

Common native grasses such as the fescues, bluegrasses, and wheatgrasses can be expected to increase their production from 100 to 150 percent the first year following spray application. Subalpine needlegrass (Stipa columbiana) has become a very important component in some of the areas. The percentage composition of all forbs has not measurably changed. Such forbs as silvery lupine (Lupinus angustifolius), orange arnica (Arnica fulgens), and purple agoseris (Agoseris purpurea) were measurably reduced, whereas dandelion (Taraxacum officinale) and starry chickweed (Cerastium arvense) have increased.

Production of the native grasses has increased fourfold over the 5-year period. Averages from the 5-year period show the unsprayed areas producing 526 lbs. of air-dry grass per acre as compared with 2,075 lbs. where 75 percent or more of the sagebrush has been controlled. The increased production has been shown to be more available for livestock use because of the more open grazing area. In sprayed areas, livestock have utilized 60 percent of the forage production, but only 25 percent where the sagebrush has not been controlled.

The low-growing forms of sagebrush appear to be as easily killed as the larger types. However, the low-growing forms are usually an indication of a site which is relatively low in productive capacity. In such cases returns for money invested may not be realized.

Return for investment

Indications are that optimum return per dollar invested occurs within the range of 75 to 90 percent sagebrush control. Figures on the cost per ton of air-dry forage reported in Circular 54, "Sagebrush Control — Good and Bad," were only assump-
tions. With five years of data available, accurate figures can be presented. Sagebrush rangeland at higher elevations (over 7,500 ft.) produced an average of 526 lbs. of air-dry grass per acre, whereas in areas of 75 percent or more sagebrush control, the production was increased to an average of 2,075 lbs. per acre at a total cost of $3.50 per acre. Livestock utilized 50 percent of the 1,500 lbs. of increased grass production or approximately 750 lbs. of additional grass per year. This would present a cost of $1.87 per ton of grass, or a yearly amortized cost of $1.86 for 750 lbs. yearly over this 5-year period.

Benefits from such a program can be expected to continue for extended periods of time. Production has increased yearly over the 5-year study period and can be expected to maintain its high level of productivity for many more years.

Where to spray

Over 50,000 acres of sagebrush have been chemically controlled in Wyoming. Many ranchers and farmers have an organized yearly spray program, and many others are interested...
in the program. While it has been well established that big sagebrush may be economically controlled with a resulting increase in forage production, it is not always desirable to control this shrub. In areas of fall/winter grazing, the sagebrush plant is often one of the main sources of winter forage.

To make spraying a profitable venture, there must be a good understory of grasses to take over as the sagebrush is killed out.

Know the different species of sagebrush! Besides being good indicators of site conditions, some species are quite resistant to herbicidal treatments.

Big sagebrush (A. tridentata), both the tall and the dwarf forms, is easily controlled. The big sagebrush is usually found on sites which are favorable for control programs. The dwarfed type is usually found on drier sites and may be one of the main sources of winter forage.

Silver sagebrush (A. cana) differs from other species in that the most common type has an entire leaf and tillers, especially after burning. The use of chemicals has given unsatisfactory control to this species.

Threetip sagebrush (A. tripartita) has deeply lobed leaves and is capable of stump-sprouting. Satisfactory kills have been obtained on the taller-growing type with very little control on the prostrate type.

Black sagebrush (A. nova) is quite resistant to herbicidal sprays. Best results have been obtained with the low-volatile ester of 2,4-D. However, results have been erratic.

Low sagebrush (A. arbuscula), sprayed with the low-volatile ester at 2 lbs. per acre, has shown moderate susceptibility. Seventy-five percent or more kill has resulted from the above treatment. Low sage is quite palatable and affords considerable forage in most areas. A control program of the arbuscula species would probably be impractical.

Before a chemical sagebrush-control program is started, the selected area should be surveyed, and sagebrush types as well as the grass understory should be taken into consideration. Chemical methods of range improvement should be used wisely. In the hands of qualified personnel, the use of chemicals can contribute much to range-improvement practices.
Paintrock experimental areas showing Big Sagebrush-controlled area.

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