Brush Control with Chemicals

hormone-type sprays tested for use in brushland management prove most effective when applied to current year seedlings

A. M. Schultz and H. H. Biswell

Brush seedlings usually appear in abundance after fire and—unless they are reduced in number—a stand of brush develops that is too dense for best use by livestock or deer.

Control of such seedlings is an important phase of brushland management, and chemical sprays are one means of control.

Where the aim of brushland management is to convert certain areas to grass, the maximum kill of seedlings is sought. However, where the management is chiefly for deer, removal of all of the seedlings is not the objective. But, in either case, it is expedient to have methods of control whereby desired minimum numbers of seedlings can be maintained.

The use of 2,4-D and 2,4,5-T for brush seedling control was studied over a five-year period. The objectives of the experiments were to find the comparative effects of different formulations and concentrations of hormone-type sprays and the importance of such factors as the kind and age of seedlings, time of spraying, site, grass competition, and grazing management.

In one experiment, each of sixteen treatments was applied uniformly to three 6.6′ × 6.6′ plots. Sprays used were amine salts and isopropyl ester of 2,4-D, isopropyl ester of 2,4,5-T, and combinations of equal amounts of the two forms, all applied at per-acre rates of 0.75 pound, 1.5 pounds, 3 pounds, and 4.5 pounds of parent acid.

One series of plots involved first-year brush seedlings—seedlings from four to six months old—and another series involved second-year seedlings. Ten check plots were established at the time of spraying the brush seedlings, making a total of 106 plots. Because the number of brush seedlings remaining after treatment is the important thing, the results are given in terms of survival rather than mortality.

In one experiment there was little difference in the kind of spray used in either age-class of seedlings. As the concentration increased, however, survival decreased among the one-year seedlings. Among the two-year seedlings, the two lowest concentrations had no effect on survival, and only the 4.5 pounds per-acre treatment had a consistent effect.

In another experiment, isopropyl ester of 2,4,5-T was applied at three different dates—May 15, June 15, and July 15—on plots with two exposures, the northwest-facing and the southeast-facing slopes. Also, a combination of 2,4-D and 2,4,5-T was used on plots containing three densities of grass: 25%, 15%, and 5%. The grass consisted principally of domestic ryegrass where the stand was densest, and foxtail fescue where it was least dense. Both the exposure and the grass density tests measured the influence of soil moisture on the effectiveness of sprays.

Survival of brush seedlings was much lower when the spraying was done early in the season. May applications gave the best results on both exposures. June was satisfactory on the northwest but too late for the drier southeast slopes. Spraying in July was equally unsatisfactory on both exposures. Survival of the brush seedlings was greatest where the grass density was highest and was intermediate where the grass density was lowest. Since these plots were sprayed in July, depletion of soil moisture by the grass, with 25% density, had already resulted in the same mortality in the plots to be sprayed as in the check plots. The chemicals had no further effect. Also it is possible that the grass tended to shield the brush seedlings against the sprays.

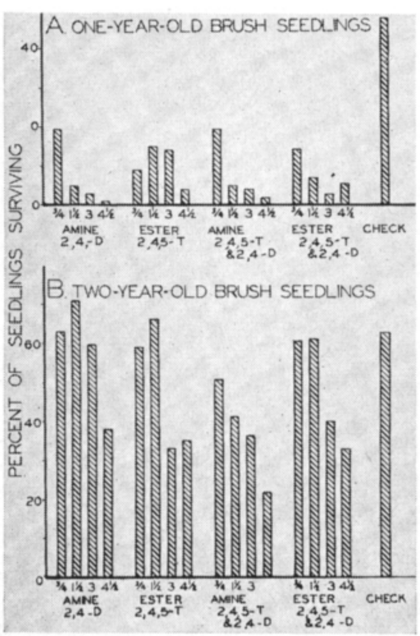
The relative susceptibility of seedlings of different species to chemical sprays is shown in the graph in column 3. Weighted averages of all treatments were used in the array.

From these experiments in brush-seedling control, it may be concluded that:

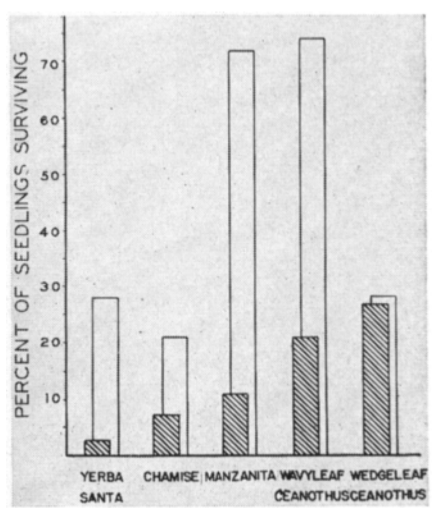
1. Sprays were more effective on current year seedlings than on two-year-old seedlings.

2. The higher concentrations of sprays were more effective than the weaker ones.

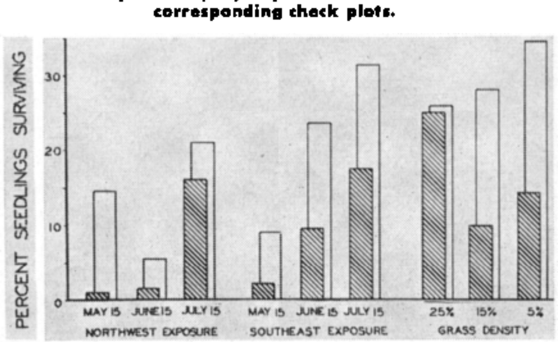
Concluded on page 13



Left—Effects of application of different formulations and concentrations of sprays on the survival of brush seedlings.



Right—Relative susceptibility of seedlings of five brush species to chemical sprays. Shaded bars represent sprayed plots; unshaded bars are check plots showing natural mortality.



Below—Influence of soil moisture on effectiveness of sprays. A and B show the effect of exposure and date of application. C shows the effect of varying amounts of grass cover. Shaded bars represent sprayed plots. Unshaded bars are corresponding check plots.

LUMBER

Continued from page 3

uted among the several stages of manufacture about as follows:

Item	%
Stumpage	16
Logging	20
Log transport	15
Sawmill	10
Yard and kiln	10
Planing and shipping	12
Selling	1
Overhead	12

Logging and log transportation thus account for more than a third of the total cost of putting lumber in the cars.

The cost history of a representative pine operation—over the past 20 years—shows real cost increases by departments to be:

Item	% Increase
Mill overhead	22
Planing, shipping, and selling costs	24
Sawing, yard, and drying costs	59
Log transportation	62
Logging cost	81

In the face of these figures it seems apparent that loggers have the biggest opportunities to reduce costs of any group in the lumber industry.

Logging and log transport costs in the California Pine Region have increased about $18.50 per M—from about $6.50 per M to around $25 per M—in 20 years. Of this increase, about $8.30 has resulted from general decline in the purchasing power of the dollar. Although this inflationary factor is the most important single cause of cost increases, it actually accounts for less than half of the rise in logging costs. Another $10.20 per M has been added to costs for reasons other than inflation.

One of these reasons is increased hourly earnings of woods labor. Average hourly earnings have risen about 3⅓ times in actual dollars during the last twenty years—somewhat less than the percentage increase in logging costs. After allowing for changes in the value of the dollar, of the total $10.20 increase in real logging and transport costs about $3.60 is attributable to increased hourly earnings. In terms of real economic cost, about 35% of the cost increase has been due to higher real wage rates.

In most industries, the impact of increasing wage rates has been offset in large measure by increases in over-all production from material, men, and machines. For example, between 1939 and 1950, over-all productivity of operations went up 10% in the paper and pulp industry, 24% in the clay construction products industry, and 17% in the mining industry, all of which are concerned with products competitive in some degree with lumber. In contrast to this general pattern of expanding productivity in the use of material, machines, and men, the hourly product in logging in the California pine region appears to have declined. For a representative group of operations, hourly product is apparently down about 20% in 20 years. This is equivalent to $5.10 per M, or half of the noninflationary increase in cost.

The decline in productivity reflects the decreasing size of timber and density of stand, more difficult logging terrain, and longer hauls. In part, these reductions were offset by better equipment. Other factors, such as changing productivities of workers and equipment and how well management recognized and dealt with the problem of efficiency in the woods, affected the end result. To reverse the productivity trend is therefore not a simple job or one the industry can expect to accomplish overnight, but productivity increase seems to be the one way which the industry has for minimizing the squeeze between costs and prices.

Henry J. Vaux is Professor of Forestry, University of California, Berkeley.

BRUSH

Continued from page 5

The kind of spray used made little difference.

3. Seedlings were more susceptible to sprays in the spring when the soil was moist than later in summer. Also, sprays were more effective on northerly exposures than on southerly ones, and more effective in sparse stands of grass where the soil moisture remained high than in dense stands where it was depleted.

4. Species were susceptible to sprays in the following descending order: yerba santa, chamise, manzanita, wavyleaf ceanothus, wedgeleaf ceanothus.

5. Although some very high kills of brush seedlings were obtained when hormone sprays were properly applied, some seedlings remained in every case. Also, when current seedlings were treated, new seedlings appeared the second year, thus tending to mask the effect of the sprays.

Results of the tests indicate that when sprays are used, the best kills can be obtained when applied to current year seedlings in the early spring after germination is complete and at the approximate rate of four pounds of acid per acre.

A. M. Schultz is Associate Specialist in Forestry, University of California, Berkeley.

H. H. Biswell is Professor of Forestry, University of California, Berkeley.

The above studies were made co-operatively by the University of California College of Agriculture and the California Department of Fish and Game, with funds provided in Wildlife Restoration Act, Project California 31-R.

RANGE

Continued from page 4

developed that year. Beetle numbers in 1953 had declined temporarily from the 1950–51 high.

This area had a few spots infested with Medusa-head, an undesirable range grass. One line transect went through such a spot so that a progressive study could be made. In 1948 only a trace was recorded, but the next year this weedy grass made up 16% of the annual grasses. By 1953, this had increased to 24%.

The perennial grass found most frequently in plots was California oatgrass—probably the best native forage grass available for this section of the state—which had managed to withstand the Klamath weed competition. When the weed was controlled, oatgrass had an excellent opportunity to spread.

Purple stipa was the second most frequent perennial grass, followed in order by squirreltail and blue wild-rye.

At the second location, the study pastures are at an elevation of 2,000′ on a 5% slope to the north, and drain into Laribee Creek, a tributary of the Eel River. Past grazing use has principally been in spring and summer, tending to give a slightly better perennial grass stand initially than in the other study area.

These pastures were approximately 10 miles from an initial beetle-release area. The first indication of beetle feeding was in 1950. Since many colonies had been distributed by ranchers on various sections of the range, it is quite possible that the beetles may have come from areas other than the initial release point. Observations during 1953 were not possible.

Klamath weed made up 70% of the vegetation in the pre-beetle observation. This dropped to 15% the year after beetles were first observed. The annual grass and forb population was about equal the first year of observation. After Klamath weed was greatly reduced by beetle feeding, the anual grasses occupied a greater part of the vacated area.

Medusa-head did not appear in the count area until the 1950 readings, and then only in one line transect. On this line, it made up 60% of the annual grass cover, or 20% of the total forage cover. During 1951, the annual grass cover increased, but at this time the weedy grasses made up only 30% of the annual grass cover and only 20% of the total forage cover.

California oatgrass was the most abundant perennial both before and after Klamath weed control. After weed control, some Hall's bentgrass and blue

Concluded on next page