CONTROL OF WEEDS IN THE NURSERY BY CHEMICALS

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A number of new chemicals have come into the market in recent years which have greatly aided nurserymen in the control of weeds. Some, like methyl bromide and allyl alcohol, kill the weed seeds before they germinate. These are applied previous to seeding and require that a week or so elapse after their use before seeding of the tree crop can be safely done. Other chemicals, such as naphtha or mineral spirits, kill the weeds after germination without injuring the coniferous trees.

The seed killers have a distinct advantage in that they largely solve the weed problem, for both conifer and broadleaf species during the critical 4 to 6-week-period after treatment. This is especially important for broadleaf species, since mineral spirits applied at dosages heavy enough to kill a high percent of the weeds are generally injurious or fatal to most broadleaves.

Methyl Bromide:

The seed killer, methyl bromide, was tested at Hugo Sauer Nursery in 1950 and completely eliminated weeds for at least 22 days; even at the end of 36 days the weed stand was rather thin (0.5 weed per square foot in treat. ed beds compared with 7.7 weeds per square foot in check plots). The application was made at the rate of l pound per 100 square feet as recommended by the manufacturer, using a special kit supplied for the purpose. The methyl bromide is injected as a gas under a previously laid, gastight cover of paper or plastic which is weighted down on the edges with soil. Methyl bromide seems especially well adapted to smaller nurseries or those with a rather small percent of their area in-seedbed production. It is comparatively easy and safe to handle if the manufacturer's directions are followed.

Allyl Alcohol:

Allyl alcohol is another seed killer that has shown excellent results in trials, both at Hugo Sauer and Eveleth Nurseries [1]. In a test run in 1948, the weed stand was only 19 and 11 percent of that in check beds at the end of two months where beds had been treated at 10 and 20 gallons per acre of allyl alcohol, respectively, applied as a 0.2-percent solution in a coarse spray under gravity flow. Allyl alcohol has the disadvantage that its fumes are toxic to humans and special precautions are needed to avoid injury to the eyes, skin, and respiratory system.

1 Stoeckeler, J.H., Roe, E.I., and Sowash, R.O. A llyl alcohol for weed control in forest nurseries. Lake States Forest Experiment Station, University Farm, St. Paul, Minnesota. 3 pages, mimeographed. November 1950.

With the, weed seed killers mentioned, it is necessary that the beds be brought to final shape before treatment. Otherwise, working the soil after treatment will bring up weed-seed-bearing soil from below the level of effective penetration of the chemical (usually 1 to 2 inches). A rest period of about a week or 10 days to allow dissipation of the toxic effect of the chemicals is required before seeding of the tree crop. The chemicals are more effective if the soil and air temperatures are fairly warm. They are most effective if applied where air temperatures are above 70°F. in the shade.

Both allyl alcohol and methyl bromide have given indications of also having some fungicidal value and reducing losses from damping-off and root rots.

Sulfuric Acid

Sulfuric acid, long used as a fungicide in the control of damping-off in conifer nurseries, has been observed to be effective also in killing some seeds. It is usually applied immediately after the tree seed has been sown and covered. The ordinary rate in light sandy acid soils is about 1/8 fluid ounce per- square foot, in a dilute 2-percent solution; and with heavier, neutral or slightly alkaline soils the rate is about 1/4 ounce per square foot. For control of weed seeds, sulfuric acid is not as good as methyl bromide or allyl alcohol, but it has reduced weeding costs in the two-week period following seeding by 30 to 60 percent or more.

Mineral Spirits:

The petroleum products known as mineral spirits or naphtha have been successfully used as selective herbicides in conifer beds. They seem especially well adapted to weeding first-year conifer seedbeds which require much laborious and expensive hand weeding and where mechanical cultivation ay not be feasible because of the broadcast pattern or danger of burial or injury of the very small seedlings.

The naphthas most effective on nursery weeds contain 10 to 22 percent of aromatic hydrocarbon. They are applied full strength in a fine spray under pressures- of around 50 to 100 pounds, and dosages of 20 to 100 gallons per acre, depending on species. Among trade names of products successfully used are Stoddard Solvent, Sovasol No. 5, Stanisol, Varsol, and Sohio Weed Killer.

Mineral spirits were used for about a decade by truck gardeners to weed carrots and parsnips, and were also. successfully used in control of weeds An culture of guayule -- a rubber-bearing shrub grown in California and Texas during World Tar II.

From 1945 on, various researchers and nurserymen tested mineral spirits on conifers to control Weeds. [1,2] In southern nurseries, dosages of 14 to

1/ Gilgut, C.J. Control of weeds in the nursery by chemical sprays. Bass. Mgr. Expt. Sta. Bul. 436: 54. 1946. - 2 Robbins, P;X., Grigsby, E.II., and Churchill, B.R. Report on chemical weed control for conifer seedlings and transplants. Mich. Agr. Expt. Sta. Quarterly Bul. 30(2)- 237-240. November 1947.

30 gallons per acre-have been used on slash, longleaf, loblolly, and shortleaf pines, depending on age of the plants. Cossitt reports savings weeding costs of up to 90 percent compared with hand weeding .[1/]

Dosages ranging from 25 to 40 gallons per acre have. been successfully used on firs, hemlock, spruce, and pine native to the Pacific Northwest by F. W. Deffenbacher, Nursery Superintendent of the Wind River Nursery, Gifford Pinchot National Forest, Carson, Washington.

In some northeastern nurseries, notably New York's Saratoga State Nursery, large-scale weeding with oil sprays has been an accepted practice in beds of red, jack, and white pine, a,¸~ white and red spruce since about 1947-1948, according to Eliason.l

In the Lake States, good results were obtained with 40 to 75 gallons of mineral spirits per acre on jack and red pine and with 30 to 40 gallons on spruces..W

In the central part of the United States, eastern and Rocky Mountain red cedars. Austrian, white, pitch, ponderosa, and red pines have all been .successfully weeded at dosages of 25 to 40 gallons per acre.

The usual method is to apply the mineral spirit sprays when the trees are at least 2 to 4 weeks old and when most weeds are less than one-half inch in height or spread. When trees are less than 2 weeks old in the southern United States or less than about 4 weeks old in the Lake States, they are rather susceptible to injury by the oil sprays. Nurserymen usually avoid-spraying in this "sensitive" period, except on the few species that are somewhat more oil-resistant when very young, and with about half or less of the usual dosage.

Irrigation of the beds for 30 to 60 minutes with the overhead system before application of mineral spirits has shown promise of reducing "oil-burn" injury to the trees without appreciably lowering weed kill.

The mineral spirits have been found in experiments at the Hugo Sauer Nursery at Rhinelander to possess considerable value when applied as pre-emergent sprays at 150 gallons per acre. Such a treatment in late April and May 1949 reduced the weed stand by 77 percent for about a 20day period in seedbeds of jack and red pine. The treatment apparently caused no damage when applied immediately before or within 2 to 3 days after seeding,

1 Cossitt, F., M. Mineral spirits as a selective herbicide in southern pine seedbeds. Southern Lunbernn 175 (2201): 203-204. December 15, 1947.

2 Eliason, E. J. The use of oil sprays for the control of weeds in coniferous nurseries. New York State Conservation Dept., Albany, N. Y. 8 rages, mimeographed. February 26, 1948.

3 Stoeckeler, Joseph H. Control of Weeds in coniferous nurseries by mineral spirits. lake States Forest Expt. Sta., Station Paper No. 17, 23 pages. May 1949.

Similar dosages applied just as the trees-were emerging from the soil or when germination was only 3 to 50 percent completed shored heavy damage.

-The pre-emergent mineral spirit sprays appear to be somewhat more effective in late spring after the weed seeds have begun to soften up and are ready to germinate than in early spring sprayings when the weed seeds are quite dormant and not softened or ready to germinate.

Complete control of the weed problem by use of mineral spirits cannot be expected, and a little "mop up" hand weeding is always necessary to eliminate the few larger weeds or more oil-resistant species which were not killed or have stooled out from the base or stern.

The lighter applications of mineral spirits usually can be made at costs of $p15 to 20 per acre. Hand weeding may cost from 3 to 5 times as much.

Close observations at the Hugo Sauer Nursery comparing fresh and one-year old mineral spirits indicate that such materials stored from one season to the next tend to cause much greater injury to tree seedlings, due probably to some chemical change which occurs in prolonged-storage. It appears, therefore, that overwinter storage of, large quantities of mineral spirits is undesirable.