NURSERY WEED CONTROL WITH DACTHAL

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Certain herbicides have provided satisfactory weed control in forest nursery seedling and transplant beds, with little or no injury to trees. These have included soil fumigants, contact oils, certain triazines, Eptam, and Vegadex (5, 6, 7, 10). When some of these materials are used, the trees appear to "escape" chemical injury because the particular herbicides are volatile, are not absorbed through the foliage, or are applied to and remain in the surface layer of soil. With such materials, successful treatment demands special formulations, precise dosage, careful and timely application, and even special cultural procedures (1, 2, 3, 4, 5, 8, 9). Often the margin of safety is small. Thus, very careful selection of herbicides is still being made.

Since Dacthal (DCPA, dimethyl 2,3,5,6-tetrachloroterephthalate) is reported to control carpetweed (Mollugo verticillata L.), purslane (Portulaca oleracea L.), chickweed (Stellaria media (L.) Cyrill.), witchgrass (Panicurn capillare L.), and other weeds common in forest nurseries, the chemical has been tested both as pre- and post-emergence sprays on coniferous seedlings in the greenhouse and nursery and on transplants in the nursery. Initial experiments have indicated that low dosages of Dacthal satisfactorily control weeds with no measurable injury to tree seedlings (5). Rates of 1 and 2 pounds per acre (active ingredient) were applied as pre- and post-emergence sprays to different replicated half flats of autoclaved Plainfield sand when seeding with 400 red pine (Pinus resinosa Ait.) seeds and 7 weeks later. Uniform seedling emergence began 10 days after seeding. During the growing period, seedlings in all treated flats appeared as healthy and as vigorous as seedlings in untreated (check) plots. Eleven weeks after seeding, the seedlings in each plot were counted, harvested, dried, and weighed. Final seedling stands were comparable in all treated and untreated plots, with only slight reductions in total dry weights of the pre-emergence treatments. Other similar experiments tested Dacthal at 6 and 8 pounds per acre as a post-emergence treatment. Again, treated pine seedlings appeared as vigorous as untreated seedlings, final seedling counts were comparable, and total dry weights of the treated seedlings were reduced only slightly.

In 1961 and 1962, to ascertain possible phytotoxic levels, relatively high rates of Dacthal were applied as pre- and post-emergence sprays to red pine (Pinus resinosa Ait.) seeded in greenhouse flats. In three experiments, 2, 4, 6, 8, 10, and 12 pounds per acre of Dacthal were sprayed onto half-flat plots of steamed nursery soil; each treatment was replicated six times in each experiment.

In the first series, Dacthal at 2, 4, 6, and 8 pounds per acre did not affect seedling emergence and did not incite phytotoxic symptoms on young pine seedlings. After 2 1/2 months, the treated seedling stands were comparable to the untreated checks in stand density, size, color, and general appearance. In the second series, seed germination and seedling emergence were uneven in all plots and continued for more than 1 month after seeding. Pre-emergence treatments with Dacthal at 4, 6, and 8 pounds per acre appeared to magnify these irregularities in seedling development; in treated flats seedling emergence was delayed somewhat, seedcoats remained tight for more than 1 week on some seedlings, and early growth was slow. However, no distortion, malformation, or abnormal color was seen. Although some height differences between the treated and check plots remained after 3 1/2 months, most of the seedlings were growing well even at the highest dosage. Seedling stands that received postemergence treatments with Dacthal were comparable to the untreated check plots throughout the experiment. No deleterious effects were observed. Seedlings had normal green color, good vigor, rapid development of true needles, and uniform growth.

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In October 1962, a third series of pre-emergence treatments was made using Dacthal at 2, 4, 6, 8, 10, and 12 pounds per acre. In this experiment, plots were sprayed 1 week after seeding but before any seedlings had emerged. As in series 2, germination and emergence were somewhat variable, but the differences among half flats apparently had no relation to dosage. For example, some untreated check plots had a sparse, uneven stand, whereas many treated plots, even at the highest dosages, had good stands, good color and vigor, and uniform growth.

Results of these experiments confirm those of field trials and indicate that Dacthal can be used in forest nurseries at rates effective for weed control. On May 18, 1962, commercial treatments of Dacthal at 4 pounds per acre as overall sprays were made on transplant beds in the Griffith State Forest Nursery, Wisconsin Rapids. A few tiny weed seedlings were just appearing at that time. Results were good (table 1); in fact, Dacthal controlled weeds more effectively than certain other herbicides. No visible injury or other deleterious effects could be observed on any of the coniferous species treated. In other experiments, treatment of spruce transplant beds first with Dacthal at 4 pounds per acre and then with Stoddard Solvent to "contact kill" existing weeds gave excellent weed control--somewhat better than that with Dacthal alone (table 2).

Preliminary trials were made with Dacthal on hardwood and coniferous seedlings. Overall sprays with Dacthal at 4 pounds per acre were made on July 13, 1962, on 1-0 white ash (Fraxinus americana L.), sugar maple (Acer saccharum Marsh.), and red pine (Pinus resinosa Ait.) seedlings. Weed counts were made in August 1962 (table 3). None of the tree seedlings were injured.

TABLE 1.--Average number of weeds in nursery seedling and transplant beds 1 month after commercial treatment on May 18 with Dacthal (DCPA) at 4 pounds per acre as an overall spray

Species	Age	Weeds per square foot	
		DCPA	Control[1]
White spruce.....	2-1	0.5	3.05
White pine.....	2-1	.3	2.75
Norway pine.....	2-0	.65	1.3
Norway spruce.....	2-2	.25	5.5
White cedar.....	2-1	1.7	10.0

[1] Untreated check beds.

TABLE 2.--Average number of weeds in Norway spruce 2-2 nursery transplant beds 1 month after commercial treatment first with Dacthal (DCPA) at 4 pounds per acre as overall sprays on May 28, and on June 2 with Stoddard Solvent at 30 gallons per acre to "contact kill" existing weed seedlings

Treatment	Weeds per square foot
DCPA.....	0.55
Solvent and DCPA.....	.05
Control[1].....	32.0

[1] Untreated check beds.

TABLE 3.--Average number of weeds in nursery seedbeds after commercial treatment July 13 with Dacthal (DCPA) at 4 pounds per acre as an overall spray

Species	Weeds per square foot	
	DCPA	Control[1]
White ash.....	1.4	3.2
Sugar maple.....	.4	3.5
Norway pine.....	.45	.9

[1] Untreated check beds.

Literature Cited

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