

# Dacthal Injury on Douglas Fir and True Firs at the Medford Forest Nursery,

Nancy W. Callan<sup>2</sup>

Abstract.--DCPA applied ten (10) days postseeding caused injury to 50-80% of the Douglas fir and true fir seedlings at the Medford Forest Nursery. Swelling at the ground line was accompanied by disorganization of the vascular tissue and stem brittleness. Top height and top dry weight were reduced in Douglas fir seedlings.

Achieving effective weed control is one of the most challenging problems in nursery seedling production. Pre-emergence herbicides, those which form a chemical barrier to weed seedling emergence, can be an important tool for the nurseryman. However, one of these compounds, DCPA (dacthal, dimethyl tetrachloroterephthalate), caused injury when applied post-seeding to Douglas fir and true fir seedlings at the Medford Nursery.

On May 11, 1978, approximately ten (10) days after sowing, Dacthal 75 WP (8 lb. AI/a) was applied to all but three (3) units at the Medford Nursery. Species treated included ponderosa pine, lodgepole pine, Jeffrey pine, sugar pine, western white pine, Douglas fir (east side and west side), white fir, grand fir, California red fir, and Shasta red fir.

Swelling at the ground line of Douglas fir and true fir seedling stems first became evident in June, 1978. Brittleness of the stem accompanied the swelling. Vascular tissue appeared disorganized in the swollen area. Swelling appeared only on seedlings in the Douglas fir and true fir seedbeds which had been treated with DCPA and in seedlings in the DCPA plots of the Pacific Northwest Experiment Station herbicide study (Stewart, 1977; Stewart et al., 1978). Trees in the control plots of the herbicide test as well as in the untreated beds did not exhibit stem swelling.

<sup>1</sup>Paper presented at the Intermountain Nurseryman's Association Meeting, Aspen, Colorado, August 13-16, 1979.

<sup>2</sup>Horticulturist, USDA Forest Service, Region 6, Rogue River National Forest, Medford Forest Nursery, Central Point, Oregon 97502.

Conifer species were not uniformly affected by DCPA. While DCPA apparently did not injure the pine species, approximately 50-80% of the Douglas fir and true fir seedlings at the nursery suffered damage (Table 1). The small number of true fir seedlots sown in 1978 made a species comparison difficult.

Table 1. The effect of DCPA on stem swelling of conifer seedlings grown at the Medford Nursery. Figures are the means of 6 2-ft<sup>2</sup> blots in each seedlot.

Species	% Damaged Seedlings	No. Seedlots Sampled
Ponderosa pine	0	-
Lodgepole pine	0	-
Jeffrey pine	0	-
Sugar pine	0	-
Western white pine	0	-
Douglas fir (west-side)	72	6
White fir	52	3
Grand fir	76	1
California red fir	64	3
Shasta red fir	75	1

Considerable differences were seen among seedlots of each species. Overall species averages correspond well with PNW herbicide trial observations. Seventy-eight percent (78%) of the Douglas fir and sixty-eight percent (68%) of true fir seedlings from DCPA plots examined had swollen stems. DCPA injury was found in all nurseries involved in the herbicide trials.<sup>3</sup>

<sup>3</sup>Owston, P. W., and II. J. Weatherly. 1979. Semi-operational trials of three herbicides in Pacific coast forest nurseries. Unpublished report on file at the Pacific Northwest Experiment Station, Corvallis, Oregon.

DCPA application at the Medford Nursery resulted in growth reduction of 2-0 Douglas fir seedlings. Top height and dry weight were reduced significantly, but root dry weight was unaffected (Table 2). Hard soil conditions despite soaking of sampling areas may have prevented intact root systems from being obtained.

Table 2. DCPA Effects on 2-0 Douglas Fir, July 1979. Figures are the means of 6 20-tree replications in one seedlot.

	<u>Control</u>	<u>DCPA</u>
Top Height (cm)	20.10	16.80*
Top Dry Weight (g)	1.95	1.50*
Root Dry Weight (g)	1.03	0.93 ns

\* different at 5% level of significance

Reduction in seedling growth may have been due to a girdling effect of the disorganized area of vascular tissue. Stem swelling following DCPA contact was found in tomato, cucumber, and jimsonweed (Nishimoto and Warren, 1971). Apparently, cell division is arrested by DCPA but cell enlargement continues, resulting in large, irregular cells (Audus, 1976).

Cool weather after sowing is reported to aggravate DCPA injury. The 30-day period

following DCPA application at the Medford Nursery averaged 56° F (13° C), resulting in slow early seedling growth.

We intend to follow field performance of one seedlot of Douglas fir in which we have an appreciable number of both treated and untreated seedlings. In addition, studies on 2-0 seedlings will be conducted this fall by Annabelle Jaramillo of PNW to determine whether the disorganized vascular tissue is becoming reoriented in recent cambial production. This will aid in determining to what extent DCPA stem swelling will affect our culling standards.

#### LITERATURE CITED

- Audus, L. J. (ed). 1976. *Herbicides, Physiology, Biochemistry, Ecology*.  
 Nishimoto, R. K., and G. F. Warren. 1971. Stem abnormality induced by DCPA. *Weed Science* 19(4):343-346.  
 Stewart, R. E. 1977. Herbicides for weed control in western forest nurseries. *Proc. West. Soc. Weed Sci.* 30:78-89.  
 Stewart, R. E., P. W. Owston, and H. G. Weatherly 1978. Evaluation of six herbicides for weed control in Pacific Coast forest nurseries. Pages B-127-B-133. *In Proc. West. For. Nursery Council and Intermountain Nurseryman's Assoc.*, Eureka, Calif., State and Private Forestry, USDA Forest Service, San Francisco, Calif.