

EFFECTS OF THIRAM ON DOUGLAS-FIR SEEDLINGS

Max Halber
Forest Research Laboratory, Oregon State University
Corvallis, Oreg.

Douglas-fir seedlings were sprayed with Thiram (tetra methyl thiuram disulfide) to test its fungicidal and therapeutic action against Botrytis sp. The study was made after an unexpected frost injured many 1-year-old seedlings in the Oregon Forest Nursery, north of Corvallis, in November 1959. Within a short time, infection of the damaged plants by Botrytis became general, as shown by isolations at the laboratory.

Part of a regular nursery bed 48 inches wide was divided into nineteen 3-foot plots with 3-foot buffer blocks between plots. Aqueous solutions of Thiram were applied in two concentrations, 0.3 and 0.6 percent. The plots were sprayed in 1960 one to eight times with two concentrations (fig. 1). One plot was sprayed on April 8, and an additional plot was sprayed on April 22, May 6, May 20, June 3, June 17, July 8, and July 22. Thus, eight plots were sprayed on July 22.

The condition of the seedlings was recorded early in November 1960 and in November 1961 (table 1). On each plot, data were taken on four 12-inch lengths of row, randomly selected from the six inside rows of the eight-row bed. The appearance of the nursery stock changed considerably during the first year after frost damage. Foliage had filled in the holes in the stand, obliterating dead and damaged trees.

These data indicate that little or no new disease appeared in the beds in 1961.

In December 1961, two sets of 25 seedlings each were dug from each of the 19 plots representing the remaining two 12-inch lengths of row, and they were then planted in 38 individual and randomized rows in a plantation 107 by 61 feet. In November 1962, annual apical shoots were measured on the seedlings. Similar measurements also had been made during November of the preceding 2 years while assessing the damage on stock in the nursery beds (fig. 2). Annual height growth was greater for treated than for untreated seedlings. It also increased with an increase in number of sprays but was greater in seedlings sprayed with .3 percent solution than with .6 percent solution.

Discussion

Several factors need consideration in attempting to interpret figure 2. The most decisive factor is probably the cumulative quantity of Thiram applied to the seedlings. This quantity, 3 and 6 grams of Thiram in 1,000 ml. of distilled water for the 0.3 and 0.6 percent aqueous solutions, respectively, ranged from 24 to 3 grams of fungicide for plots sprayed with 0.3 percent solution, and 48 to 6 grams for plots sprayed with 0.6 percent solution; the plots sprayed the most times received the most fungicide. The length of apical shoots also decreased with the decrease in number of sprays. The increased concentration or frequency of the spray tended to produce more stimulation of growth than was observed on unsprayed plots. The most likely explanation is that a slight fertilizing effect occurred because of the availability of sulphur from Thiram. Other edaphic phenomena, such as change in pH, mycorrhizae, or microbiology, are other possible solutions, but they have not yet been verified.

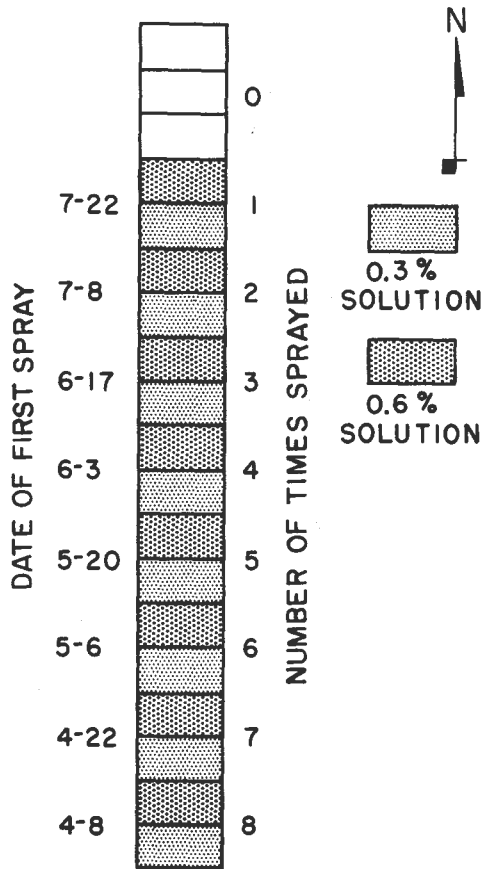


Figure 1.--Thiram was sprayed at intervals of 2 weeks in two concentrations on alternate blocks in a nursery bed of Douglas-fir seedlings. The first spraying for each plot was on the date indicated.

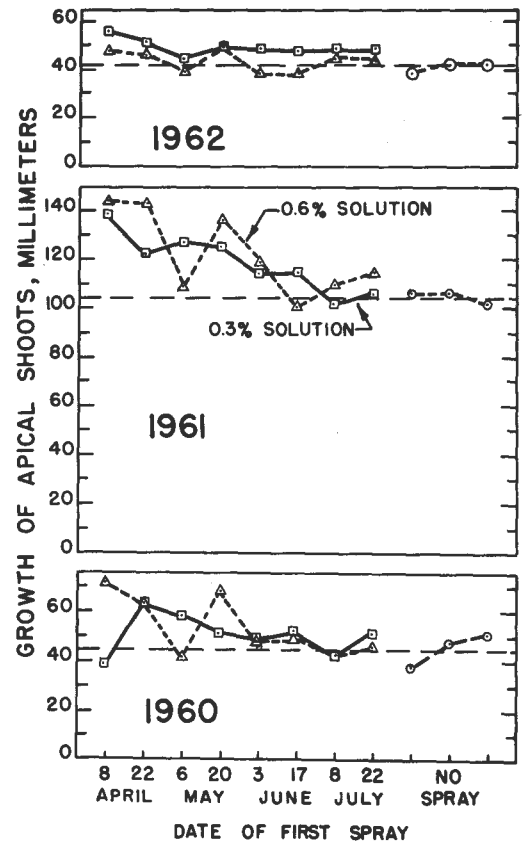


Figure 2.--Apical shoots in plots of sprayed Douglas-fir seedlings frequently grew more than did shoots in unsprayed plots. The horizontal broken line indicates average growth in unsprayed plots.

TABLE 1.--Condition of seedlings in November 1960 and November 1961

Year	Number of dead trees			Number of trees with brown terminals		
	Thiram on plot, percent					
	0.3	0.6	0	0.3	0.6	0
1960.....	10.3	11.7	15.3	76.2	74.7	70.6
1961.....	1.5	1.5	3.0	4.6	6.6	3.0

Unexplainable remains the erratic behavior on plots sprayed with 0.6 percent solution, especially at the plots first sprayed on May 6 and May 22. These two characteristics are carried over to the third growing season, even though the seedlings had been transplanted and removed from any residual chemical influence in the soil. Also observable in the curve for 1962 is the unmistakable, but statistically unconfirmed, variance between the unsprayed and the sprayed plots, the latter showing greater apical growth.

Why should this phenomenon carry over when the habitat changes? While systematic action caused by Thiram is a conceivable answer, it is not yet substantiated by experimental evidence.

Literature Cited

Volger, Christiane. 1957. Probleme der Bekämpfung von pilz-Parasitaren Keimling-skrankheiten bei Nadelbaumen. Gent. Landbouwhoogesch. van de Staat. Meded. de Opzoekingsstations 22 (3): 517-525.