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Effect Of Sterilizing Treatments On Survival And Growth Of Hybrid Poplar Cuttings

Fungus diseases of poplars might be spread to new locations if hybrid poplar cuttings (now being test-planted in various parts of the Northeast) were not sterilized before shipment. Among these diseases are the canker-producing fungi Septoria musiva and Dothichiza populea and the leaf-blotch fungus Septotinia populiperda.

A method of sterilization was needed that would not harm the planting stock. To find such a method, an experiment was made to test a number of fungicidal treatments on cuttings. Of the fungicides tried, mercuric chloride, Ceresan M, and Semesan were found to be effective sterilizers.[1]

Treated cuttings were tested in field plantings at the Beltsville Experimental Forest in Maryland to determine whether the treatments had any harmful affect on survival or growth. The cuttings were planted 1 foot apart in rows 3 feet apart. Each treatment (and untreated control) was represented by 100 cuttings. All cuttings of each treatment were assigned to a row at random. The placement of clones in each row was also at random.

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[1]For details of the treatments, see Forest Research Note No. 32 or Waterman, A. M., and Aldrich, K. F., Additional information on the surface sterilization of poplar cuttings, U. S. Dept. Agr. Plant Dis. Rptr. 38 (2): 96-100, 1954.

See also: Ford, H. F., and Waterman, A. M., Effect of surface sterilization on survival and growth of field-planted cuttings, U. S. Dept. Agr. Plant Dis. Rptr. 38 (2): 101-105, 1954.

Mention of these commercial products is not to be construed as endorsement of them by the Forest Service or the Department of Agriculture.

Table 1.--Effect of fungicidal treatment on the average survival and height growth of different hybrid-poplar clones grown in field plantings[1]

Clone (Populus hybrid)		Average survival	Height[2] growth
Number	Parentage		
		Percent	Inches
OP- 8	P. nigra x P. laurifolia	68	29.6
10	P. nigra x P. trichocarpa	74	24.3
28	P. charkowiensis x P. trichocarpa	68	46.0
45	P. maximowiczii x P. berolinensis	82	36.8
52	P. maximowiczii x P. nigra plantierensis	64	34.5
201	P. deltoides virginiana x P. trichocarpa	60	42.2
221	P. deltoides virginiana x P. caudina	52	31.0
283	P. nigra x P. laurifolia	76	33.4
302	P. nigra betulifolia x P. trichocarpa	90	36.1

[1]Fiducial limits for comparison of clonal means: Survival data--1% level = 25.0; 5% level = 18.5. Growth data--no significant differences at 5% level.

[2]Based on surviving cuttings.

Table 2.--Effect of fungicidal treatment on the average survival and height growth of cuttings grown in the field for one season

Treatment	Average survival	Height[1] growth
	Percent	Inches
$HgCl_2$	38	21.3
$HgCl_2$ (rinsed)	46	41.8
Ceresan M	76	26.3
Semesan	94	49.2
Untreated controls	99	35.7

[1]Based on surviving cuttings.

The planting was machine-cultivated and later hoed as necessary during the growing season. Artificial watering was used four times to supplement inadequate rainfall. At the end of the growing season, the height of the rooted trees was measured to the nearest $\frac{1}{2}$ inch, and data on survival were taken.

Results

Clonal differences.--Some clones showed significantly better survival than others (averages for all treatments). Clones 232 and 313 did poorly; none of these cuttings sur-

vived the unrinsed mercuric chloride treatment. Clone 45, a fast grower and consistently good in other experiments, survived well. There were no significant differences in the average height growth of all clones for all treatments (table 1).

Treatment differences.--The most important result was the relative effects of the various treatments on survival (table 2). Cuttings treated with mercuric chloride showed poorest survival. The next most toxic treatment was mercuric chloride with rinsing. Rinsing lessened the harmful effect, but this treatment did not sterilize so well, according to Waterman. Of the cuttings treated with Ceresan M, 24% died. The Semesan treatment had no harmful effect on survival. Survival in that treatment was as good as in untreated controls.

In the field tests two of the treatments, unrinsed mercuric chloride and Ceresan M, resulted in significantly less growth than the other two treatments. The most effective sterilizing treatments, Semesan and Ceresan M, differed significantly in their effect on height growth. The greatest average height growth was by cuttings treated with Semesan.

Conclusions

Since Semesan was found to be effective for sterilizing hybrid-poplar cuttings to prevent spread of fungus diseases, and since this chemical has no harmful effects on the hybrid-poplar cuttings, it can be used safely for this work. For most effective results, the poplar cuttings should be completely immersed in a 1% water suspension of Semesan for 20 minutes. No rinsing is necessary.

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