SEMESAN FUNGICIDAL DIP CONTROLS CANKER DISEASES OF POPLAR CUTTING IN ALBERTA

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Poplars are an important constituent of shelterbelts in the Prairie Provinces of Canada, but several diseases, pests, and bad weather have caused damage (3, 7). In Alberta, hybrid poplars of the Russian[1] and Northwest [2] cultivars are the most common shelterbelt trees, but unfortunately they are also the most diseased.

Baranyay (2) reported: "A province wide survey in 1963 revealed that cankers caused by *Cytospora chrysosperma* (Pers.) Fr. and *Septoria musiva* Pk. are the most common infectious diseases of shelterbelts in Alberta." Both of these fungi are widespread on the major native poplars in Alberta, *Populus tremuloides* Michx. and *Populus balsamifera* L., but they normally cause little damage to them. *Septoria musiva* (perfect state *Mycosphaerella populorum* Thomp.) is common as a leaf-spotting parasite and *Cytospora chrysosperma* (perfect state *Valsa sordida* Nit.) normally inhabits bark and dead twigs of poplars but is of no consequence except on trees weakened by wounds, drought, frost, fire, or other diseases.

However, many diseased hybrid poplar shelterbelts are found far from nearby sources of inoculum. Baranyay (2) suggested that the Alberta Tree Nursery at Oliver, Alberta, might be introducing disease to these areas by distributing diseased rooted cuttings. This suggestion was borne out by reports (Oosterhuis, personal communications) and by my own observations of cankered shelterbelts whose age and the location of the cankers left little doubt that the infections originated in the nursery.

Quite extensive work has been reported on experimental surface sterilization of poplar cuttings to prevent disease transmission in interstate or intercontinent shipment of cuttings (4, 8, 9). However, poplar clones vary considerably in their tolerance of fungicidal chemicals, even when treated only a few weeks before planting. The evidence suggests that chemicals which give effective surface sterilization, Semesan [3] (28.6 percent hydroxy mercurichlorophenol) is the least phytotoxic. Immersion in a 1-percent water suspension for 20 minutes is recommended.

This paper reports on incidence and identities of canker diseases present on poplar cuttings at two Alberta Government nurseries, and on the effectiveness of an operational Semesan treatment against these diseases.

Nursery Observations and Sanitation Measures

Until recently, the Alberta Tree Nursery at Oliver propagated cuttings produced in stooling beds on the nursery. Table 1 shows the very high infection rate detected in lined-out cuttings in the late summer of 1967.

Isolations and microscopic examinations of 198 Russian and 163 Northwest cuttings showed these infections to be caused by *Septoria musiva,* although some of the large cuttings also had pycnidia of *Cytospora chrysosperma.*

TABLE 1.—*Distribution of healthy, infected, and disease-killed lined-out poplar cuttings, 1967*

	Poplar Variety			
	Russian		Northwest	
Cuttings	*Number*	*Percent*	*Number*	*Percent*
Healthy	....	0	1,161	17
Infected	3,895	54	4,476	62
Killed	3,318	46	1,190	21
Total	7,213	100	6,827	100

1 Russian = P. *X petrowskyana = deltoides X laurifolia.* (6)
2 Northwest = P. *balsamifera X deltoides. (5)*

3 Trade mark, DuPont of Canada Ltd. "Semesan" is now being marketed as "Semesan Turf Fungicide," with 25.8 percent of the active ingredient.

Every tree in a 6-year-old windbreak of Russian poplars in the nursery was infected with *Septoria musiva,* and distinct cankers were present on the bases of the main stems, indicating infection from cuttings. An inspection in 1967 of the stooling beds, close to this infected windbreak, showed that all new shoots or whips were cankered and that old cankers had grossly malformed and killed many of the main stools. *Cytospora chrysosperma* was readily identified on old wood, and *Septoria musiva* on young whips. To remove this source of infection, all infected field shelterbelts and stools were uprooted and burned.

The Horticultural Station at Brooks, Alberta, which is farther removed from naturally infected stands of native poplars and might therefore be expected to produce cleaner cuttings, also failed to produce cuttings free from disease fungi. Isolations made from 10 buds and 10 lenticels (after Ford & Waterman 1954) from each of 50 cuttings selected randomly from a shipment yielded cultures of *Septoria musiva.*

Fungicide Treatments

Cuttings prepared for field planting at Oliver are normally handled in bundles of 20. To disrupt normal operations as little as possible, we ran preliminary laboratory tests to determine the effectiveness of several Semesan treatments on bundled cuttings. Five bundles were subjected to each combination of three immersion periods and two concentrations of Semesan (table 2). Effectiveness was determined after 2 days; five cuttings were selected from the center of each bundle and isolations from buds and lenticels were attempted as before.

Cuttings immersed in the 2-percent Semesan did not exhibit the severe phytotoxicity symptoms described by Waterman and Aldrich (1954). The fact that cuttings were bundled, and that the fungicide might tend to become diluted after repeated use, suggested use of the more concentrated treatment.

All cuttings prepared in the autumns of 1967 and 1968 were therefore bundled in twenties and immersed in 2-percent Semesan for 20-30 minutes. Operationally, the bundles of cuttings were loaded iiato a large perforated metal basket, which was lowered into a tank containing the suspension of Semesan, and the cuttings were submerged with a weighted, perforated cover. After treatment, cuttings were dripdried, packaged in sealed polyethylene bags, stored at 0° F. over winter, and planted the following spring after 5 to 6 months storage.

In addition to the dipping treatment, 20 bundles of cuttings were treated in 1967 before storage. Their cut ends were sealed with either paraffin wax, bees wax, a petroleum-based pruning compound, or latex, as additional protection for the most susceptible infection court.

Results in the Field

Survival of cuttings from all treatments was excellent. Field examination of over 10,000 cuttings at the end of each summer showed no signs of phytotoxicity, nor any mortality that could be attributed to either the fungicide or the end-sealing treatments.

Only six cankered plants were found, indicating very good control of both diseases.

TABLE 2.—*Percentage* [1] *of sterile isolations from bundled cuttings following different periods of treatment with two concentrations of Semesan*

Period of Treatment	Semesan 1	Semesan 2
	Percent	*Percent*
10 minutes		
Buds	26	40
Lenticels	65	77
20 minutes		
Buds	34	90
Lenticels	88	100
30 minutes		
Buds	39	96
Lenticels	100	100

[1] Based on 250 isolations

Discussion

The prescribed chemical treatment of cuttings can ensure that nurseries distribute only "clean" stock to disease-free areas. The very few diseased plants remaining after treatment could be culled easily.

In Alberta, Baranyay (2) has found that a large part of the prairie is free from *Septoria.* An explanation may be that the climate is not conducive to dispersal and infection by the pathogen.

Thus it is reasonable to expect that most hybrid poplars, if disease-free when introduced, would re-

main healthy if given appropriate care, greatly prolonging the useful life of a shelterbelt.

At Indian Head, Saskatchewan, the development of poplar clones resistant to *Septoria musiva* is being pursued as a long-term measure at the Indian Head Tree Nursery of the Prairie Farm Rehabilitation Administration, Government of Canada (1).

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