The Fungus That Causes Scleroderris Canker Survives Field Exposure in Plastic Bags

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A currently used method for disposing of branches infected with Gremmeniella abietina *in green garbage bags was tested. Contrary to original beliefs, the fungus was found to survive in the bags. The hazards associated with this method are noted.*

The fungus *Gremmeniella abietina* (Lagerb.) Morelet, which incites the disease of pines known as Scleroderris canker, causes enough damage that active control or eradication programs are in progress in critical areas. In Canada, pine plantations in settled areas and those involving provincial-private owner cooperation (6) are open to frequent public observation. Public objection to the damage caused by the disease justifies the use of available labor intensive sanitation methods (4), and managers accept the cost involved in order to get a return on their investment. The only method of control known at present involves sanitation removal and the disposal of infected plants and plant parts. In Austria, Donaubauer (2) indicated that large quantities of spores are formed in piles of slash that remain on the ground. Dorworth (3) and Magasi (5) found that one spore stage (ascospore) was formed on infected tissue left on the ground. These mainly wind-dispersed spores would pose a real threat of reinfection to surrounding trees if left in the plantation or disposed of near other host trees. Bergdahl (1) reported that the water-splash-dispersed spores from the second spore stage (conidial) did not present a danger of reinfection under similar circumstances in North America. At one time, we recommended disposing of slash in green garbage bags. Laboratory studies and fungal characteristics indicated that leaving the bags in sunlight would quickly generage enough internal heat to kill the fungus and render the contents harmless. Weevil disposal is another type of pest control in which plastic bags are used in this way. However, the bags are somewhat fragile under working conditions and loss of some slash is inevitable, either in transport or when bags are subjected to the elements. This test was designed to evaluate the safety of this method of treatment with respect to *G. abietina.* The possibility of release and/or dissemination of *G. abietina* was tested in the spring of 1982.

Materials and Methods

Red pine (*Pinus resinosa* Ait.) branches infected with *Gremmeniella abietina were* collected in late spring and early summer when sanitation work is normally done. These were handled as in a typical sanitation pruning operation and placed in 90-by 65-centimeter, green plastic garbage bags, the tops of which were then sealed. For purposes of this experiment, care was taken not to puncture the bags. A Taylor maximum-minimum thermometer was placed in each bag and a Feuss recording hygrothermograph was placed in one bag per replication. All bags but one (control) were set in an open area exposed to the elements. One bag was removed after 1, 2, 4, 6, 7, and 14 days of exposure and was immediately placed in a freezer at -4° C. The entire experiment was replicated twice in green bags and once in 45-kilogram clear polyethylene bags.

Branches were subsequently thawed and removed from bags and examined for the presence of active perfect and imperfect fruiting structures. Portions of diseased tissue were then sectioned and surface-disinfected in Javex diluted 50 percent with water supplemented with 1 drop of Tween 20 per 250 milliliters. These tissue portions were placed in petri plates on a medium consisting of 200 milliliters of Campbell V-8 juice to

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800 milliliters of distilled water to 20 grams of Difco Bacto Agar. The fungus was incubated at 20° C. for 20 days and checked daily for the presence of *G. abietina.* Spores, when found, were germinated on media to determine their viability.

Additional branches were sealed in green garbage bags and placed in a Fisher Isotemp oven at 45° C ±2° C for 2-, 4-, 6-, 16-, 18-, and 24-hour periods. Infected tissue was then sectioned and cultured as previously described.

Results and Discussions

The fungus remained viable to some extent in all bags exposed to sunlight. *G. abietina* was isolated from 33 to 70 percent of all the branches checked. By comparison, *G. abietina was* isolated from 98 percent of the branches not exposed to sunlight, an indication that the exposure treatment killed the fungus in some cases. Temperatures inside the green bags went as high as 45° C during the 4 hottest midday hours. Temperatures varied with such factors as cloud cover. Temperatures inside the clear bags tended to be as much as 8° C higher than those in the green bags. Large numbers of viable spore-producing pycnidia (conidia) (fig. 1) and apothecia (ascospores) (fig. 2) were found in all bags, encouraged by wet, humid conditions that resulted from alternate heating and cooling.

The fungus survived in bags exposed to constant heat in the oven

Figure 1—*Apothecia of* G. Abietina *unopened (left) and opened (right) (10X).*

Figure 2—*Pycnidium of* G. abietina *with spore tendril (12X).*

at a rate comparable with that of survival after sunlight exposure, and this further suggests that temperatures in the field are not sufficiently high to kill *G. abietina* within infected branches.

Under operational-conditions, holes accidentally punched in bags could reduce the effectiveness of the system by providing exit holes for released spores and would reduce maximum inside temperatures. Where this method is used, special care must be taken to remove all bags from the sanitation site daily and not to lose any while transporting them. They must then be disposed of in such a way as to offer no further threat to plantations that maybe near the disposal site; that is, they should be buried or burned.

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