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OUTBREAK OF *LOPHODERMELLA* NEEDLE CAST
ON LODGEPOLE PINE WITHIN THE CONDON
TREE IMPROVEMENT PLANTATION, MONTANA

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During early May of 1990 managers of the tree improvement plantation at Condon, Montana noticed a rapid browning of the previous years' needles on lodgepole pine (*Pinus contorta* Dougl.) trees. Managers visiting the plantation a couple of weeks previously, had found little or no foliage discoloration. However, during the first week of May they noticed extensive changes in the appearance of trees. Foliage from the 1989 crop of needles had extensive elongated bands of reddish-brown discoloration (Figure 1); often the bases and tips of needles remained green. The current season's needles had not yet emerged, although candles were rapidly expanding.

Close examination of the foliage indicated presence of the common needle cast fungus *Lophodermella concolor* (Dearn.) Darker. Needles examined in May were just beginning to form straw colored perithecia within necrotic areas on needles. These concolorous fruiting bodies were immature and would probably take a few weeks to mature and produce ascospores capable of infection. Not all trees in the young plantation were equally affected by the disease. It was clear that certain individuals had more severe symptoms than others. Damage appeared so severe because the current seasons' needles had not yet formed and most trees lacked several years of needles. For example, the 1988 and 1987 needles were either sparse or missing on many trees.

Lophodermella concolor usually sporulates on infected needles in the late spring or early summer (Hunt 1981). Spores infect current years' foliage shortly after needles are produced; however, disease symptoms are not evident until the following spring. Therefore, the extensive damage seen in 1990 within the plantation was due to extensive infection during 1989. Some other fungi can also cause similar symptoms. However, their fruiting bodies are usually darker (often black) and are easily recognized against a background of necrotic foliage (Hunt 1981). Outbreaks of *Lophodermella* needle cast are common in the northern Rocky Mountains and British Columbia (Hunt 1981; Williams 1976). Sometimes outbreaks occur over vast areas of native stands (Krebill 1975; Wood and others 1984). Because outbreaks occur in "wave years", they are likely associated with prolonged periods of cool, wet weather during spore production, release, and needle infection (Hunt and others 1987; Krebill 1975). Unfortunately, because of the lag time involved in symptom expression, it is difficult to predict damage in advance.



Figure 1. Lodgepole pine infected with *Lophodermella concolor* during May, 1990 at the Condon Tree Improvement Plantation.

Several investigators have shown that different lodgepole pine provenances display varying levels of susceptibility to *Lophodermella* needle cast (Hoff 1985; Hunt and others 1987). Hunt and others (1987) suggested that resistance or susceptibility to the fungus is a population characteristic under strong genetic control. They also stated that large provenance differences and a high heritability ratio indicate that selection for resistant trees can be achieved quickly. Also, growth and disease resistance are highly correlated. Damage from *Lophodermella* needle cast often increases considerably on provenances from higher elevations (Hoff 1985; Hunt and others 1987; Rehfeldt 1985). This elevation effect is likely related to phenological differences of lodgepole pine at various elevations together with requirements for successful infection by the pathogen (Hoff 1985).

Previous outbreaks of *Lophodermella* needle cast in western Montana and northern Idaho have occurred periodically but have not been well documented (Williams 1976). Therefore, it is difficult to relate expected damage to specific weather conditions. Fortunately, this disease does not usually cause tree mortality (Williams 1976), although growth impacts likely occur (Hoff 1985; Williams 1976). Because of the close correlation between growth and disease resistance (Hunt and others 1987), selecting more resistant progeny in tree improvement plantations may result in selection of the fastest growing individuals. However, it is important to remember the elevational differences in susceptibility exhibited by different provenances.

Disease control by fungicides has not been evaluated. However, it is possible that common foliar protectants might provide some level of disease control. However, rates and timing of fungicide applications have not been determined for this disease. More research on the basic biology of the pathogen is needed to formulate more effective control measures.

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