

## Two Pine Species Resistant to *Gremmeniella abietina*, European Race

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**Abstract** – Under field conditions, we have demonstrated that *Pinus banksiana* (Pb) is resistant to the European race of *G. abietina*. Using microscopy, compartmentalization of the invaded tissues has been reported to explain the limited tip blight observed on shoots. Following this finding, inoculation field trials on *P. contorta* (Pc) have been carried out. Pc is located in western North America and is closely related to Pb. These species even hybridize at the junction of the two populations in Yukon, Canada. The field trial was conducted with Pc seedlings situated in a 20-year-old *P. resinosa* (Pr) plantation infested with the disease. Pb and Pr seedlings were also used as resistant and sensitive species respectively. All Pr seedlings had died of the disease while Pb and Pc had survived. There were similarities between the resistant Pc seedlings and Pb: the infection was limited to a 2-3 cm long tip blight. A suberized defensive zone was initiated at the base of healthy needles. This zone reached the vascular cambium before proceeding downward. Tissue regeneration, formation of traumatic resin canals and accumulation of phenols are also associated with the defense system of Pc against this disease. Formation of ligno-suberized boundaries appears significant in the defense system of Pb and Pc. Using naturally infected samples, further cytochemical and immunochemical characterizations of phenols, pectin and callose were carried out to clarify their involvement in the resistance to this disease. Reacting parenchyma cells, including hyperplastic cells, were rich in polyphenols, particularly catechins and condensed tannins. A strong reaction was obtained for pectin in the affected tissue, except for necrotic cells. Enrichment in polyphenols and pectin is considered to be an expression of resistance whereas callose does not seem to play a role in this process.

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