

## Resin Flow, Symptom Development, and Lignin Biosynthesis of Two Pine Species in Response to Wounding and Inoculation with *Fusarium circinatum*<sup>1</sup>

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### ABSTRACT

Resin flow, symptom development, and lignin biosynthesis in response to wounding and fungal inoculation were investigated in *Pinus rigida* and *Pinus densiflora*. The two-year-old seedling stems were subjected to three types of treatments: (i) wounding without inoculation, (ii) wound-inoculation with a conidial suspension of *Fusarium circinatum*, and (iii) pre-wounding wound-inoculation with the fungus 20 days after the initial wounding. Resin flow from wounding sites was more evident in *P. rigida* than *P. densiflora* in all treatments. The wound-inoculation with the fungus induced almost two-fold higher levels of resin flow than the other treatments in both species. The pre-wounding wound-inoculation appeared to result in a decrease in pitch canker development in the two pine species. Some reductions in disease severity were observed in the pre-wounding wound-inoculated *P. rigida*, showing a mean disease severity of less than 85%, compared with approximately 100% in the wound-inoculated stems. Disease severity was approximately 50% in the wound-inoculated *P. densiflora*, whereas 10% in the pre-wounding wound-inoculated stems. Higher amounts of lignin were found from bark (ca. 40%) than from xylem (ca.30%). The wound-inoculated bark and the pre-wounding wound-inoculated bark exhibited higher amounts of lignin among the other treatments. These results suggest that the wound-inoculation apparently prompt the increase in resin flow and lignin biosynthesis from the two pine species, and the prior wounding may be involved in decreased disease severity against the further invasion of *F. circinatum*.

Keywords : *Fusarium circinatum*, Inoculation, Lignin, Pitch, Resin

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