SCREENING FOR RESISTANCE AGAINST INSECT HERBIVORES USING CHEMICAL AND ANATOMICAL DEFENSES IN LODGEPOLE PINE AND WHITE SPRUCE

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Insect outbreaks and drought have increasingly caused widespread tree mortality worldwide. Host defenses are important factors that determine tree resistance to these insect disturbances. However, trade-offs between growth and defense may occur and vary with life history strategy of the host tree. We measured defense and growth patterns from mature lodgepole pine (*Pinus contorta* var. *latifolia*) and white spruce (*Picea glauca*) in two progeny trials in Alberta, Canada. These trees have different life history strategies, with lodgepole pine being shade intolerant and white spruce being shade tolerant. Furthermore, the major insect pests for these trees differ; the bark beetle *Dendroctonus ponderosa* is a tree-killing insect on lodgepole pine and defoliation from *Choristoneura fumiferana* is the main disturbance for boreal white spruce. We measured anatomical defenses found in the xylem and monoterpene concentrations within phloem of the stem, which have been associated with resistance to bark beetle attack. Lodgepole pine and white spruce were found to differ in their growth-defense relationships. In addition, we did not find evidence of a trade-off between anatomical defenses and radial growth. Furthermore, we found an effect of the presence of the disease caused by *Endocronartium harknessii* on lodgepole pine on both anatomical and chemical defense traits. Our results preliminarily suggest that the major insect herbivore associated with tree species may influence their relative investment in defense and that understanding the variation in constitutive defense capabilities and the existence of genetic trade-offs between growth and defenses can be important factors for pest resistance screening.

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Citation for proceedings: Nelson, C. Dana; Koch, Jennifer L.; Sniezko, Richard A., eds. 2020. Proceedings of the Sixth International Workshop on the Genetics of Host-Parasite Interactions in Forestry—Tree Resistance to Insects and Diseases: Putting Promise into Practice. e-Gen. Tech. Rep. SRS–252. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 170 p.