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ScienceDirect
(1-3)
Forest Ecology and Management 234 (2006) 97–106

Survival, growth and wood specific gravity of interspecific hybrids of *Pinus strobes* and *P. wallichiana* grown in Ontario

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Abstract
Interspecific hybrids between eastern white pine (Pinus strobes L.) and Hinalayan blue pine (P. walliechiana A. Jacks.) were created in Ontario, Canada, to introduce blister rust (caused by Cramarium ribicola Fisch.) resistance genes in the former. In this paper, we report the survival growth. and uuinl specific gravity of these interspecific from field trials established between the 1970s and 1990s. Results indicate that while P wallichiana generally performed poorly due to insufficeint cold hardiness, progressive improvement in survival and growth was evident fur the first generation hybrids) and backcrosses(B, Ito P. strobus, with a trend of better performance with increasing parentage al P In Ontario. where climatic conditions were relatively mild, mane interspecific hybrids outperformed in 20- to 40-year-old trials. In northern Ontario, insufficient cold hardiness seemed to limit the survival and growth of the interspecific hybrids. Measured wood specific gravity was highest for P wallichiana and lowest for P. strobus with that of the interspecific hybrids being intermediate Implications of the field trial results to breeding for increasing rust resistance of eastern white pine are discussed.

Keywords: White pine: Himalayan blue pine: Adaptation: Growth performance: Blister rust resistance

1. Introduction

Breeding of eastern white pine *(Pinus strobus L.) for* blister rust (caused by *Cranartium ribicola Fisch.*) resistance has occurred in North America for more than half a century (Riker et al.. 1943: Riker and Patton, 1954: I Heimburger. 1962. 1972: Pinion 19671 Patton and Johnson. 1970). Relatively resistant white pine genotypes were selected wilt Various resistance niechanims, such as ontogenetic resistance, slow rusting. and bark react ions (Patton, 1907; Patton and Johnson, 1970; Jurgens et. al., 2003). and genetic gains were shown in some field tests (Zsuffa 1981; Sinclair, 2003). In cases where blister rush inoculum density is high. such as in an artificial inoculation, evidence suggests that the levels of resistance in *P. strobus* may be insufficient to withstand heavy blister rust attack. especially at seedling stages (Heimburger, 1972; Zsuffa, 1981: Sniezko and Kegley, 2002: Lu et al., 2(R)5).

An alternative strategy in developing stronger genetic resistance to C. ribicola in *P. strabus* is to integrate resistance genes from Eurasian white pine species that have co-evolved with *C. ribicola* and demonstrate strong natural resistance to the pathogen Heimburger 1962, 1972: Bingham, 1972: Kriebel, 1983; Garrett, 1985; Zsuffa. 1985). In Ontario. Canada. interspecific hybrids of *P. strabus* and *P. wallichiana* lacks., a five-needle pine species that originated in the Himalayas, were developed, followed by backcrossing to P.

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