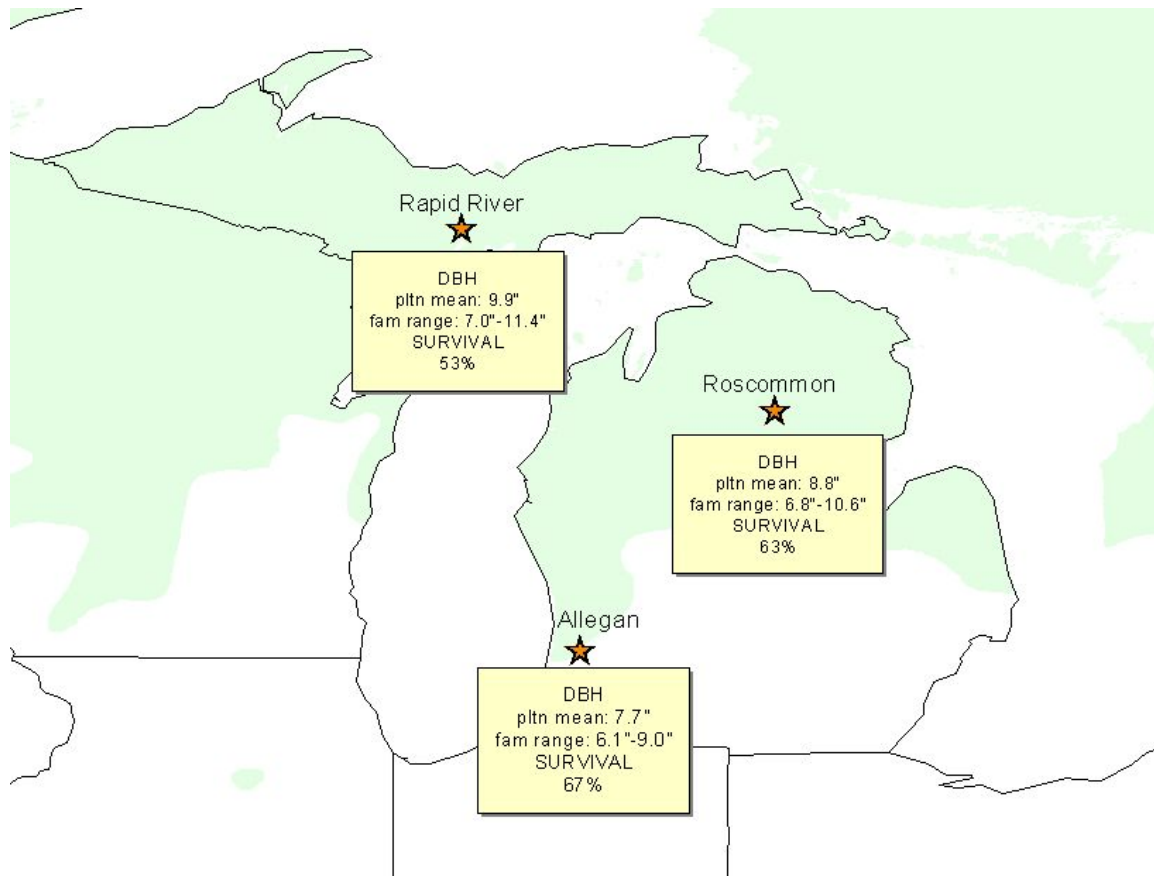


# Age 41 Results of a Half-Sib Red Pine Progeny Test on Three Michigan Sites

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## Abstract

Age 41 diameter and survival were measured in two Lower and one Upper Michigan plantings of a half-sib red pine progeny test (Figure 1). The majority of families in the test originated from Michigan's Upper and Lower Peninsulas, although families from New Brunswick, Maine, New York, Ontario, and Manitoba were also included. There were no significant differences ( $Pr > \chi^2 = 0.05$ ) in survival among collection regions or among families. Collection region, collection region X site, family and family X site effects were all significant ( $Pr > F = 0.02$ ) for diameter.



**Figure 1. Mean survival and DBH at age 41 of half-sib red pine families planted on three Michigan sites. Shaded area denotes native range of red pine within mapped region.**

Diameter of Michigan families was under relatively strong genetic control on an individual site basis (Table 1). However, single-tree and family heritability estimates for multiple-sites were

substantially lower due to strong family X site effects (Table 2). The importance of family by site effects were also evident in low  $r_B$  estimates (paired-site  $r_B$  estimates: 0.16 – 0.45) and must be considered in the design of future genetic improvement programs. Broadly adapted families were identified and various strategies for using them to produce genetically improved red pine for Michigan discussed.

**Table 1.** Age 41 DBH single-site heritability estimates for 85 half-sib Michigan families planted at the Allegan, Roscommon, and Rapid River test sites. Standard errors of  $h^2_{tree}$  in parentheses.

<b>Test Site</b>	<b><math>h^2_{tree}</math></b>	<b><math>h^2_{fam}</math></b>
Allegan	0.41 (0.10)	0.69
Roscommon	0.30 (0.11)	0.49
Rapid River	0.18 (0.14)	0.37

**Table 2.** Age 41 DBH multiple-site heritability estimates for 85 half-sib Michigan families planted at the Allegan, Roscommon, and Rapid River test sites. Standard errors of  $h^2_{tree}$  in parentheses.

<b>Test Sites</b>	<b><math>h^2_{tree}</math></b>	<b><math>h^2_{fam}</math></b>
Allegan - Roscommon	0.19 (0.08)	0.44
Allegan – Rapid River	0.13 (0.09)	0.28
Roscommon – Rapid River	0.03 (0.08)	0.07
All 3 sites	0.13 (0.06)	0.36