SHORTLEAF PINE HYBRIDS: GROWTH AND TIP MOTH DAMAGE IN SOUTHEAST MISSISSIPPI

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EXTENDED ABSTRACT

It is well known that shortleaf pine (*Pinus echinata* Mill.), loblolly pine (*Pinus taeda* L.), and Virginia pine (*Pinus virginiana* Mill.) sustain significantly more Nantucket pine tip moth (*Rhyacionia frustrana* Comst.) damage than do slash pine (*Pinus elliotti* var. *elliotti* Engelm.) and longleaf pine (*Pinus palustris* Mill.) (Berisford and Ross 1990, Wakeley 1928). Understanding the cause of this difference in susceptibility is important since tip moth can be a serious pest, especially in commercial pine plantations. This study provides further information about the inheritance of susceptibility to tip moth damage in southern pine trees.

Three shortleaf pine x loblolly pine inter-specific F1 hybrid trees were control pollinated with shortleaf pine, loblolly pine, and slash pine trees and field tested at two sites in southeast Mississippi—Harrison Experimental Forest and Erambert Seed Orchard. In addition to the control-pollinated families, each parent was also tested as an open-pollinated (OP) family. Nineteen families were evaluated for height growth, number of branches, and percent of trees damaged by tip moth over 2 years (Table 1).

Overall, test trees were almost twice as tall at Erambert (129 cm vs. 70 cm). Both sites exhibited a relatively low amount of tip moth damage, although there was significantly more damage at Harrison (35.4 percent trees infested vs. 26.2 percent). F1 x OP families had the highest tip moth damage at both sites (46 percent and 38 percent), while the slash pine x OP families had the lowest (<10 percent). The average number of branches per tree was similar at each site, but slightly higher at Erambert (19.7 vs. 17.7). Inter-species crosses having lesser amounts of shortleaf pine per family were taller than those with larger amounts (Figure 1A), and, as expected, the opposite was true for loblolly pine. For tip moth, crosses with intermediate amounts (~50 percent) of shortleaf pine or loblolly pine were most damaged (Figure 1B).

These findings are in keeping with results of other coastal plain experimental plantings of susceptible and resistant pines and their inter-specific hybrids (Highsmith and others 2001, Highsmith and others 2003, Highsmith and Lott, unpublished), as well as earlier reports by Chapman (1922) and Grano and Grigsby (1968). Although this study is small and only 2 years old, it suggests that tip moth resistance in shortleaf pine might be advanced through hybridization and backcrossing with slash pine. The usefulness of this approach should be tested using many parents and crosses, preferably in BC1 intercrosses (BC1 x BC1) to allow for selection for tip moth resistance and adaptability to shortleaf pine environments.

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Table 1.—Means for height, number of branches, and tip moth damage over both planting sites.

Family Type	Families	Trees	Height[1]	Branches[1]	Tip Moth[1]
	number	*number*	*cm*	*number*	*% damage*
Slash x OP	4	254	97.4 b	13.2 c	5.1 b
Loblolly x OP	5	315	114.1 a	21.7 a	39.7 a
Shortleaf x OP	3	169	78.8 c	18.5 ab	34.9 a
(Shortleaf x Loblolly) x OP	3	170	92.2 b	19.2 ab	49.4 a
(Shortleaf x Loblolly) x Slash[2]	1	12	112.3 a	16.3 bc	.
(Shortleaf x Loblolly) x Loblolly	2	124	97.6 b	22.2 a	36.3 a
(Shortleaf x Loblolly) x Shortleaf[2]	1	18	78.1 c	16.9 b	.

[1]Means followed by the same letter are not significantly different at $p < .05$.
[2] '.' indicates that tip moth damage was not evaluated due to small sample size.

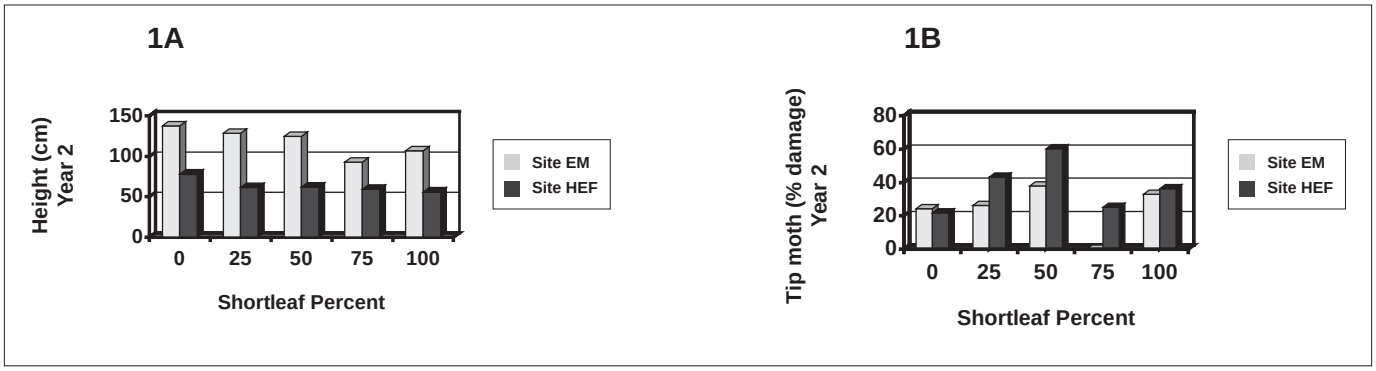

Figure 1.—Mean tree heights and mean tip moth damage by percent shortleaf pine in the cross after 2 years in the field at Erambert (EM) and at Harrison (HEF).