Susceptibility of Southern Pines to Nantucket (*Rhyacionia frustrana*) Tip Moth Damage is Proposed to be Largely Controlled by a Single Dominant Locus

M.T. Highsmith[1], L.H. Lott[2], and C.D. Nelson[3]

[1]Associate Professor Department of Natural Science and Mathematics, Shaw University, Raleigh, NC and Department of Forestry & Environmental Resources, NC State University, Raleigh, NC, [2]Biological Sciences Technician, [3]Research Geneticist and Project Leader Southern Institute of Forest Genetics, USDA Forest Service, Southern Research Station, Saucier, MS

Nantucket tip moth is the most serious insect pest of southern pines. Pine species vary greatly in their susceptibility to tip moth. For example, loblolly pine (*Pinus taeda* L) and shortleaf pine (*P. echinata* Mill) are susceptible, while slash pine (*Pinus elliottii* var. *elliottii* Engelm.) and longleaf pine (*P. palustris* Mill) are resistant. We measured the susceptibility (as % tip moth damage) of these species and their interspecific hybrids to investigate the genetic basis of susceptibility. We used a mixed planting of twenty-eight different pine families of various genetic origins that included two susceptible species used as parents (loblolly pine, and shorleaf pine,) along with resistant slash pine and longleaf pine parents. The interspecific hybrids were F1 and three-way crosses, as well as one test cross. Resistance ranged from 3 to 10 % tip moth damage, while susceptibility ranged from 76 to 90 %. Progeny of resistant parents appear resistant. Progeny of susceptible parents appear susceptible. Hybrids of susceptible x resistant crosses are susceptible. A three-way hybrid of a susceptible species x a hybrid of two resistant species is also susceptible. A testcross of a resistant /susceptible hybrid x a resistant parent is intermediate in susceptibility (35 to 40%). Based on these results, we propose that susceptibility in southern pine trees is controlled by a single dominant locus and that a simple major gene model may explain the genetic basis for resistance or susceptibility in these species. Further work is needed to confirm this hypothesis.