

Time Trend and Genetic Difference of Rust Infection in a Diallel Loblolly Pine Population Across Four Tests

Hua Li, Henry Amerson and Bailian Li ¹

Abstract

Loblolly pines from a six-parent half diallel mating were planted in a randomized complete block field design at four test sites. Fusiform rust infection (gall presence / absence) was recorded annually through age 8. A Bayesian model with logistic regression was used to estimate genetic parameters and variance components for the half-diallel cross design with binary data. The percentage of rust infection on each site was low in the first two years, and then increased dramatically at age 3 with little change in percentage galled thereafter. Large genetics differences among parents were found for rust infection. The rank of infection for the 6 parents was consistent over time and across sites even though infection rates were significantly different among test sites. No significant genotype by environmental interaction was found. A time trend showed that additive genetic variance increased from age 3 to 4 and remained stable through age 8. For genetic control in rust infection among families, the parental general combining ability (GCA) due to additive genetic effect was much more important than specific combining ability (SCA) of full-sib combination due to non-additive genetic effect. Results supported selection for rust infection at age 6 or earlier.

¹ Department of Forestry, North Carolina State University, Raleigh, North Carolina 27695