

ECONOMIC EVALUATION OF FUSIFORM RUST RESEARCH AND PROTECTION

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Fusiform rust causes the most commercial damage to southern pines of all diseases. Selection for genetic resistance to fusiform rust has yielded substantial improvements in resistance to the disease in loblolly and slash pine trees. We performed an economic evaluation of the research, development, and implementation of fusiform rust resistance in southern pines. Information on past and prospective gains in rust resistance was obtained from a survey of seedling producers in the South. Information on incidence and hazard of rust infection was obtained from several cycles of Forest Inventory and Analysis (FIA) data for the South. Stands level analyses using growth and yield models were used to compute financial gains for fusiform rust protection by site class and region throughout the South. These stand level analyses were aggregated to estimate past and future gains from fusiform rust protection, and the potential gains that could be achieved by greater levels of protection or elimination of fusiform rust. These gains were compared with estimated research expenditures to estimate total returns for fusiform rust protection research.

Three levels of targeting of rust resistant seedlings and four levels of utilization were considered. For random distribution of seedlings, the present value of research benefits for fusiform rust research ranged from \$108 million for full utilization of all trees, regardless of rust, to \$282 million for poor utilization that assumed all rust trees were culled. For optimal targeting of seedlings--placing all resistant seedlings in the highest risk sites--returns ranged from \$261 million to \$999 million. The potential benefits that could occur if rust were totally eliminated could range from \$614 million to \$4.6 billion. The present value of prior research costs was \$49 million. Comparing benefits with costs yielded very positive returns to fusiform rust research, ranging from a low of 2.2:1 under a random seedling distribution and full utilization to a high of 20:1 if all seedlings were targeted to the highest risk areas and utilization was poor. The most likely targeting/utilization scenarios had benefit:cost ratios of about 2.3:1 to 6.9:1. Overall, the investments in selecting and breeding fusiform rust resistant southern pines had very good returns, and opportunity still exists for further gains.

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