

AMERICAN SYCAMORE BREEDING STRATEGIES FOR GROWTH MAXIMIZATION AND DISEASE RESISTANCE

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An open-pollinated progeny test of Westvaco's High Wood Density American Sycamore (*Platanus occidentalis* L.) Seed Orchard, selections from their First-Generation Seed Orchard, selections from the 1983-1984 Limited-Range Provenance/Progeny Test, and six control-pollinated families was established in 2002 and 2003. All 55 open-pollinated families were planted at two sites in western Kentucky and south-eastern Missouri. The control-pollinated families were generated from selections that exhibited disease resistance and susceptibility to a variety of diseases, where symptoms included bronzing of leaves and crown dieback. A mating design using resistant and susceptible parents resulted in two families representing resistant by resistant, resistant by susceptible, and susceptible by susceptible. These six full-sibling families were also incorporated with the half-sibling plantings and were given to the US Forest Service Center for Bottomland Hardwood Research for testing near Stoneville, MS. All Stoneville trees were challenged by inoculation fall 2002 with the leaf-scorch-causing bacterium, *Xylella fastidiosa*. Diameter and height data were recorded at ages three, five, seven, and nine. Bacterial leaf scorch disease presence on all Stoneville families was recorded as symptomatic or asymptomatic/mildly symptomatic. Among the half-sibling families at four ages of measurements (i.e., three, five, seven, and nine) the average family heritability was 0.59 for both height and diameter and 0.53 for volume. These strong heritability values indicate that superior growth can be captured through family selection. Furthermore, age-age correlations indicate that making selections based on age-five data results in the greatest precision for gains at age nine for half-sibling families. Analysis of presence and absence of disease among control-pollinated families also indicates that breeding of bacterial leaf scorch resistance can be achieved simply through crossing two parents that show resistance. This results in slightly more than a 4.5 fold decrease in the probability of infection by age nine. Overall, these results indicate that sycamore has a large capacity for improvement through traditional breeding.