

## A COLLABORATIVE MULTI-AGENCY PROGRAM TO DEVELOP RESISTANCE TO BEECH BARK DISEASE IN AMERICAN BEECH (*FAGUS GRANDIFOLIA*)

Title presented at workshop:

### BEECH BARK DISEASE RESISTANCE BREEDING PROGRAM IN AMERICAN BEECH

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American beech is typically not a desired timber species, but it is among the most ecologically important trees of the Eastern United States. Beech nuts, a common component of mature forests, provide an important source of food for many birds and mammals. Beech bark disease (BBD) has been killing American beech trees since the late 1890's, but it is only over the last 15 years that significant progress has been made in developing techniques to identify, screen, propagate and breed resistant beech trees. Beech bark disease is caused when feeding of the invasive beech scale insect (*Cryptococcus fagisuga*) creates cracks in the bark, providing entry points for spores of *Neonectria* species of fungi. Although it is the growth of the fungus that weakens and may kill the tree, beech trees that remain disease-free despite long-term exposure to BBD have been shown to have heritable resistance to the scale insect. Genetic studies have shown that when two resistant parents are bred, about 50 percent of the progeny will be resistant. Working collaboratively with State and national forest managers, we have taken a participatory breeding approach to develop regional seed orchards of genetically diverse, grafted, BBD-resistant genotypes. Workshops are conducted to provide partner guidelines for the identification of resistant beech trees, training on the use of scale eggs to artificially inoculate candidate trees to confirm resistance, and instructions on the collection of beechnuts (to be used as root stock) and scion. After identifying and confirming scale-resistant trees, partners ship scion to U.S. Forest Service researchers in Ohio, or Region 9 personnel in Wisconsin, for grafting. A total of nine grafted regional beech seed orchards have been established or are underway in seven different States. Prior to seed orchards becoming productive, grafted containerized seed orchards are being used to accelerate seed production for genetic studies and restoration plantings.

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