Section 3 Abstracts: Chestnut Tree Breeding, Propagation and Physiology

An Engineering Approach to Controlling Chestnut Blight with Hypovirulence. F.V. Hebard. Wagner Research Farm, The American Chestnut Foundation, Meadowview, VA 24361, USA

Hypovirulent (H) strains of *Endothia parasitica* can be applied to chestnut trees by spray methods to convert virulent strains that currently infect the tree and those that will subsequently infect (Scibilia and Shain, Plant Disease 73:840). Using spray methods, it would be feasible to apply spores of H strains over large areas (> 10^5 ha). The key questions are what to put in the spray and how often and when to spray. Scibilia and Shain's method could be used to determine what concentration of spores to use, what spray volumes and pressures are possible, what conversion compatibility groups to use, whether conversion compatibility groups and H agents should be mixed or applied separately, how often and when to spray, and what adjuvents to add to the spray mixture. The method also could indicate, partially, the type of H agent to use. These parameters could be determined in two or three seasons of experimentation.

Before large (ca. 1-10 ha) field experiments are begun, one could spray series of individual trees in plots to compare the efficacy of various spray mixtures, assessing the efficiency of the mixtures in protecting trees from naturally occurring inoculum, Such experiments could be done in clearcut areas of various ages to vary the level of naturally occurring inoculum. They would take 2-3 yr each. Then, small (< 1 ha) plots could be established to determine parameters related to the establishment of populations of H strains. These include the rate of growth of chestnut trees and their density and size when treated, canopy structure, blight incidence, duration of treatment, and the type and mixture of H agents. Such experiments would take 5-30 yr each. They would establish what degree of blight control is possible. It would be necessary to determine the frequency of the various vegetative or conversion compatibility groups in the fungus population before the experiments were started.

Molecular biologists could assist such efforts by developing rapid, inexpensive methods of determining vegetative compatibility groups (with markers) and the occurrence of H agents (using probes) suitable for large sample numbers. It would be helpful also, to classify the various H agents more rigorously.

The key contribution of the Scibilia-Shain procedure is that is provides a method of optimizing the components of a spray mixture before it is taken to the field for exposure to natural inoculum. Thus, once 1 ha field experiments began, one could concentrate on optimizing parameters related to field experiments rather than optimizing both spray parameters and field parameters simultaneously.