Cultural characteristics, vegetative compatibility, and spatial pattern of white hypovirulent strains of *Cryphonectria parasitica* on grafted American chestnut trees

by

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ABSTRACT

In 1982-1983, naturally formed blight cankers, within a zone ranging from the ground to 183 cm on three grafted American chestnut trees, were inoculated with a mixture of four European (white), and six, pigmented hypovirulent strains of *Cryphonectria parasitica*. A total of 202 *C. parasitica* isolates were recovered from 49 cankers located outside of the inoculated zone. Ninety-five isolates (47%) were white and 107 (53%) were pigmented. Forty-eight vegetative compatibility groups were identified among 110 white isolates collected from this and previous studies. The ratio of VC groups to isolates tested (S/N), and Shannon diversity index were calculated to be 0.43 and 3.64 respectively. Of the 48 VC groups identified, 25 consisted of two or more isolates. These 25 groups were found to be vegetatively incompatible with all four of the original hypovirulent white inoculated strains, consisting of three VC groups, but were compatible with five of the 11 most common pigmented VC groups recovered from previous studies. These data provide evidence for spread of the original European hypoviruses (*Cryphonectria hypovirus 1*, CHV1) but not for spread of the original inoculated strains. Forty-five VC groups therefore represent the minimum number of "new" VC groups into which one or more of the original hypoviruses (CHV1) have spread. Single-spore colonies of the white isolates recovered from the 49 cankers were placed into four cultural morphology (CM) groups based on degree and pattern of pigmentation, and type of colony margin in culture. The two largest CM groups contained 37 (CM group 3) and 33 (CM group 1) isolates. Single-spore colonies from the original, white inoculated strain, EP-49, were classified to CM groups 3 and 1, while colonies of EP-51W were classified into CM group 1. The spatial pattern of white isolates within cankers was evaluated using a 7 x 7 lattice plot. Spatial pattern determination using the join-count statistics, described by Pielou, indicated that three of the four cankers containing white isolates had random patterns of white isolates. Vegetative compatibility tests of *C. parasitica* isolates in the two cankers sampled for spatial pattern indicated that the majority of both white and pigmented isolates in the cankers were within the same VC group for each canker. This was frequently the case even when pigmented and white isolates occurred in adjacent lattice cells. Isolates in each of the cankers identified to VC group had random patterns of the major VC groups (includes pigmented and white isolates). Using a double matrix statistical test, the spatial pattern of white VC groups among the 49 cankers was found to be aggregated (P=0.019), whereas the spatial pattern of white isolates was found to be random (P=0.325). The Lloyd's index of patchiness value for the pattern of white isolates in all cankers was 0.91. This value is just less than 1.0, which would indicate a random pattern.

DEDICATION

This thesis is dedicated to my parents, Donald and Susan Hogan.

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