HOST RESISTANCE TO EMERALD ASH BORER: DEVELOPMENT OF NOVEL ASH HYBRIDS

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ABSTRACT

In contrast to the rapid destruction of ash trees in the United States by emerald ash borer (EAB, *Agrilus planipennis* Fairmaire), outbreaks of EAB in Asia appear to be isolated responses to stress, such as drought, and do not devastate the ash population. This indicates that in Asia, ash trees may have a level of inherent resistance. This resistance may be the result of the co-evolution of the Asian ash species with the borer. The hypothesis that native trees may be more resistant to their native pests is upheld by several well documented examples, including a study of birch resistance to the bronze birch borer, a close relative of EAB that is native to North America (Nielsen & Herms, in prep.). In this study, 100 percent mortality was observed in Asian birch species but 75 percent of the birch species native to North America survived. Another example is the high level of resistance that the Asian silver linden has to the feeding of the Japanese beetle (*Popillia japonica*) while basswood native to North America and European lindens are both seriously defoliated by the beetle.

Our goal is to identify Asian ash species that have resistance to EAB and to use them to hybridize with North American ash species to generate novel ash hybrids that retain the EAB-resistant phenotype. A longer-term goal of this research is use backcrossing to generate EAB-resistant ash trees that retain all the characteristics of the native ash species and maintain only the minimum portion of the Asian species required to maintain EAB-resistance. The establishment of such a breeding program will provide the foundation for understanding the mechanism(s) and mode of inheritance of EAB resistance.

A multi-pronged research approach is being taken to generated novel ash hybrids. Efforts at hybridization have focused on crosses between *F. chinensis* and *F. Americana* or *F. pennsylvanica* and between *F. mandshurica* and *F. nigra*. Seed yield has been relatively low. However, pollen germination tests have demonstrated that maximum germination rate is obtained at different pH levels for different *Fraxinus* species, which likely will impact the success of hybridization attempts. Methods to circumvent this problem are being developed. Work is also being done to optimize seed germination for all the *Fraxinus* species of interest. Finally, molecular techniques are being developed to allow hybrids to be distinguished from their parent species.