UPDATE ON EXOTIC ASH COLLECTION FOR HYBRID BREEDING AND SURVEY FOR EAB-RESISTANCE IN NATIVE NORTH AMERICAN SPECIES

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ABSTRACT

Contrary to the high levels of devastation observed on North American ash species infested with emerald ash borer (EAB) (*Agrilus planipennis* Fairmaire), reports from Asia indicate that EAB-induced destruction of Asian ash species is limited to stressed trees. This indicates that Asian ash species have co-evolved resistance, or at least a high degree of tolerance, to this insect. We are investigating whether inter-species hybrids between Asian and North American ash species can be used to introgress EAB resistance into native ash species.

We have made progress toward addressing the following six pressing research needs:

1. Make accessions and propagate Asian ash trees
2. Confirm species identity, clonal ID, and relatedness of Asian ash accessions
3. Determine ploidy level of all species and of individual trees where ploidy varies within species
4. Develop methods to overcome obstacles to hybridization such as species differences in pollination system and phenology
5. Determine resistant Asian ash species and the level of phenotypic variability within species
6. Determine if "lingering ash" are EAB tolerant, and if so, what allows them to survive longer than other ash in the stand

The long-term goal of our research is to identify resistance to EAB in exotic ash species and/or select North American individuals (lingering ash) for use in establishing a breeding program. The use of exotic ash species to generate F1 hybrids may have immediate value to the nursery industry as street trees. F1 progeny as well as subsequent generations will also be valuable genetic resources for determining the heritability and molecular mechanisms of resistance through the use of genomics, transcriptomics, proteomics, and metabolomics. Backcross generations created through careful selection of parents for both North American characteristics and EAB resistance may someday provide the resources needed to re-establish EAB-resistant North American ash species in our forests. Gene conservation activities involving North American ash species are a critical component of such a breeding program so that genetic diversity across the native range is preserved for use in advance generations of breeding.