

## RESTORING GREEN ASH (*FRAXINUS PENNSYLVANICA*): BREEDING FOR RESISTANCE TO THE EMERALD ASH BORER (*AGRILUS PLANIPENNIS*)

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The invasion of emerald ash borer (*Agrilus planipennis*) threatens the survival of green ash (*Fraxinus pennsylvanica*) in the United States. Green ash is extensively used for soil conservation, rural water management, urban green spaces, and is a common component mixed hardwood forest, especially riparian and swamp hardwoods forest. Initial selection of green ash is from long term monitoring plots in EAB infested natural forests where surviving, or “lingering” ash trees, are those trees with DBH greater than 10cm and healthy canopies for at least two years after all other ash trees have died. Lingering ash are grafted and ramets are tested in EAB egg bioassay experiments, which have confirmed that these trees possess an increased level of resistance due to multiple types of host defense responses. Lingering ash phenotypes include increased mortality (defense killing) of early instar larvae, development of larvae having significantly lower weights, and reduced adult feeding preference of foliage. Replicated field test are also being installed for the first 42 green lingering ash to be accessioned and complete bioassay. Field test will allow identification of additional phenotypes potentially related to adult EAB preference and correlation of bioassay and field results. Lingering ash that perform well in bioassays are being used as parents to produce control cross families to directly investigate inheritance of EAB resistance. To date we have produced and are testing 16 full-sibling families utilizing 8 female trees and 15 male trees bred in a systematic cross design. Additional families will be added as select parent trees begin to flower. Bioassay evaluation of seedling progeny from 7 lingering x lingering families demonstrate variation both within and between families. Between 15 to 40% of lingering x lingering progeny had a more effective defensive response to EAB than either parent suggesting a polygenic or quantitative model of inheritance. Progeny (including re-sprouted bioassay seedlings) are also being evaluated in field trials being planted over the next 2-5 years. Polycross seed orchards will be installed using the best lingering ash parents based upon parental and progeny phenotypes. In addition, progeny test plantings may be rouged by selecting both the best families and individuals within families to produce seedling orchards if results suggest genetic gains will be sufficient.