
2004 UPDATE ON STUDIES OF BOTANI^GARD[®] FOR CONTROL OF EMERALD ASH BORER ADULTS AND LARVAE

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ABSTRACT

The emerald ash borer (EAB), *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), native to northeastern Asia, was identified as the cause of ash (*Fraxinus* spp.) mortality in southeastern Michigan and southern Ontario in 2002. Subsequent infestations were found in Ohio, Indiana, Maryland, and Virginia due to transport of infested nursery stock, firewood, timber, and natural spread. Programs designed by regulatory agencies to eradicate localized infestations of EAB involve detection and removal of infested ash trees (*Fraxinus* spp.) and creation of an ash-free zone around each epicenter to prevent EAB spread. Conventional insecticides are being tested to aid in the eradication effort and to protect landscape ash trees; however, methods are also needed to manage EAB in more environmentally sensitive areas such as forests and riparian areas. To this end, we are studying the efficacy of BotaniGard[®], a biopesticide formulated with the insect-pathogenic fungus *Beauveria bassiana* var. GHA.

In 2002-2003, we began studying the natural enemy complex of EAB in Michigan. We found insect-pathogenic fungi were the most prevalent natural enemy of immature EAB (approximately 2 percent). Thus, we began laboratory and greenhouse studies of BotaniGard[®], a registered biopesticide for control of insect pests of forests, shade trees, and agriculture. To summarize, we found both BotaniGard ES (petroleum based) and BotaniGard O (vegetable-oil based) were highly virulent against EAB in standardized laboratory studies. Subsequent studies of caged EAB-infested trees in the field demonstrated >80 percent adult mortality due to *B. bassiana* infection when BotaniGard[®] was applied before EAB emergence (pre-emergent trunk sprays). The application of BotaniGard[®] to EAB-infested tree trunks in the fall resulted in 10-20 percent larval mortality due to *B. bassiana* infection.

This spring, we initiated two field trials of BotaniGard® in Ann Arbor, Michigan:

1. In a 20-year-old ash plantation, a commercial applicator sprayed 73 ash trees with BotaniGard ES at the rate of 6 qts/100 gallons of water every two weeks from June 23 to August 3, 2004. Prior to application, levels of EAB infestation were ranked as low, moderate, or high for each tree. To achieve good coverage on these relatively large trees (approximately 20 feet tall), two to three gallons of BotaniGard® suspension was needed to spray the crown and trunk of each tree to drip point. The trees are being felled and dissected to evaluate the efficacy of this treatment.
2. In a separate study, uninfested ash trees, transplanted from a nursery apparently outside the infestation during the previous summer, were sprayed with BotaniGard ES using a CO₂ backpack sprayer every two weeks from June 25 to August 5, 2004. The canopies of these trees were small, and 600-ml of BotaniGard® suspension was sprayed to drip point on leaves, branches, and trunk of each tree at the rate of 6 qts/100 gallons of water. A gallon of fungal suspension can treat as many as six trees of this size. We evaluated the persistence of *B. bassiana* spores on ash foliage in full sun by exposing EAB adults for 72 hours to ash leaves harvested 0, 4, 7, and 11 days after BotaniGard application. After 7 days, EAB mortality due to *B. bassiana* infection was 100, 96, 88, and 78 percent, respectively. This is good persistence for a biopesticide, and the addition of UV protectants to the BotaniGard® tank mix may improve these results. The ash trees are being felled and dissected to evaluate efficacy of BotaniGard® in reducing EAB infestation.