ATTRACTION OF EMERALD ASH BORER TO TRAP TREES: CAN MEJA OR MANUKA OIL COMPETE WITH GIRDLING?

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ABSTRACT

To date, girdled trap trees remain the most effective method employed by regulatory and resource management agencies for detecting low-density populations of emerald ash borer (EAB), *Agrilus planipennis* Fairmaire. Locating suitable trees can be difficult, however, and felling and debarking trap trees is expensive. Alternative options for EAB detection could include enhancing the attraction of adult EAB to ash trees without requiring destruction of the trees. Preliminary studies with ash seedlings showed that the stress-eliciting compound methyl jasmonate caused changes in foliar volatiles similar to those induced by physical stress such as girdling. In addition, blends of volatile compounds associated with ash leaves or bark elicit a positive response by adult EAB. Manuka oil contains many of the same volatile compounds present in ash bark and has been at least somewhat effective in attracting EAB to traps. We assessed the relative effectiveness of methyl jasmonate, Manuka oil, and physical stresses for EAB attraction.

In 2005, we estimated the larva densities from adult EAB captured on trees that were girdled, treated with Garlon 4 herbicide, exposed to methyl jasmonate, or left as untreated controls. We used a randomized block design with 18 replicates of each treatment at three sites varying in EAB density. We found that significantly more EAB adults were captured on sticky bands (placed at 1.5 m aboveground) on girdled ash trees than on trees treated with methyl jasmonate or on healthy, untreated trees (control). The number of EAB captured on trees treated with Garlon 4 herbicide did not differ significantly from the girdled or methyl jasmonate-treated trees. We felled and debarked 10 trees of each treatment to quantify larva densities in the winter. Significantly more galleries per m^2 were found on the girdled trees than on the MeJA, herbicide, or control trees. Results from this study and related work in 2004 demonstrated that herbicide-treated trees are generally dead or dying by mid- to late-summer and are either unattractive to ovipositing EAB females or unsuitable for larva development.

In 2006, we conducted a similar study to compare adult EAB capture rates and larva densities on trees treated with different stress agents—girdling, MeJA, and Manuka oil—and control trees. We used a randomized complete block design and implemented the study at five sites with EAB densities categorized as high (more than 35 adults captured/tree attacks/m^2 on

control trees), moderate (10-15 EAB/tree), or low (fewer than three EAB/tree). At four sites all treatments were included (n=40). Three of the four treatments (girdle, MeJA, and control) were included at the fifth site (n=30). Blocks of trees were selected to represent a range of sun exposure conditions, including, open-grown, full exposure, edge settings, densely wooded, and closed-canopy settings. Exposure of each individual tree was ranked as (1) all sides open, (2) super dominant/above canopy, (3) two or three sides open, (4) one side open/edge or (5) closed canopy/shaded.

All EAB on sticky bands were removed weekly throughout the summer to monitor adult beetle activity. Results showed that beetle activity peaked in early July, consistent with results from previous years' studies. Girdled trees captured significantly more EAB than the control trees at all sites, regardless of EAB density. The number of EAB captured on the trees treated with MeJA or Manuka oil tended to be slightly higher than the number on the control trees, but differences were not significant. At two sites where trees in all canopy exposure rankings were represented, more than 90 percent of the EAB captured were on trees that were fully exposed or had two or three sides exposed to sunlight. We plan to fell and dissect half of the blocks of trees during the winter to quantify larva density among treatments.

APPLICATION OF REMOTE SENSING TECHNOLOGY FOR DETECTION AND MAPPING OF HARDWOOD TREE SPECIES AND EMERALD ASH BORER-STRESSED ASH TREES

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