THE '06 TRAP TREES IN '07

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ABSTRACT

To date, use of 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, 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 (MeJa) caused changes in foliar volatiles similar to those induced by insect feeding and physical stress, which attracts beetles. 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 found to be attractive to EAB in trapping experiments.

In 2006, we initiated a study to compare adult EAB capture rates and larval densities on trees that were a) girdled, b) exposed to MeJa, c) had Manuka oil dispensers attached to the trunk, or d) left as untreated controls. We used a randomized incomplete block design and implemented the study at five sites with EAB densities that varied from relatively high (more than 35 EAB captured per tree) on control trees to very low (fewer than three EAB captured per tree). All treatments were included at four sites (n=40 trees per treatment). At the fifth site, three of the four treatments (girdle, MeJa, and control) were included (n=30 trees per treatment). Blocks of trees were selected to represent a range of sun exposure. Exposure of each individual tree was ranked as a) fully exposed, b) super dominant tree/canopy mostly exposed, c) 2-3 sides open, d) 1 side open/edge, or e) closed canopy/shaded. Sticky bands, 30 cm wide, were placed 1 m aboveground on the trunk of each tree.

Adult EAB were removed from sticky bands 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 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; however, the differences were not significant.

Half of the blocks of trees at each site were felled and peeled to assess larval densities. Girdled trees at all sites had significantly more EAB larvae per m^2 than the other trees; trees treated with MeJa or Manuka oil did not differ significantly from the controls.

The amount of exposure to sun, as predicted, significantly affected adult beetle capture and larval density. Trees that were fully exposed to sun, had two or three sides exposed to sunlight, or were dominant above the canopy captured significantly more adult EAB (34.0 ± 7.9, 13.1 ± 2.7, and 9.4 ± 3.0, respectively) than trees that were only open on one side or were in a closed canopy (3.2 ± 1.1 and 2.1 ± 0.8, respectively). Open and partly-open grown trees also had significantly higher larval densities than trees grown in closed or partly-closed canopies.

We compiled data from 237 trees used in trap tree studies we conducted over the past four years (2003-2006) and analyzed them to determine if adult capture on sticky bands could be used as a predictor of larval density in trees. Larval density increased linearly as adult capture rates increased ($y=1.8x + 24.0$; $R^2=0.45$).

We continued to evaluate the remaining trees in 2007 at four of the sites used in 2006; at the fifth site, new trees were selected. Trees used as controls in 2006 remained as control trees in 2007, trees girdled in 2006 now represented a two-year girdle treatment, and trees previously treated with Manuka oil were girdled in the spring of 2007 (one-year girdle). Trees treated with MeJa in 2006 were wounded by removing a vertical strip of bark of the same area of bark as a standard girdle, leaving most of the phloem around the circumference of the tree intact.

Results show that beetle activity peaked in mid-June in 2007, slightly earlier than previous years. Beetle densities increased three- to 10-fold between 2006 and 2007 at all five sites. Seven of the 20 trees girdled in 2006 died by early summer in 2007. High numbers of adult EAB were captured on all trees remaining from 2006. We plan to fell and dissect the remaining trees this winter to quantify the increase in larval density from 2006 to 2007 among treatments.