Using Tempo to Control Emerald Ash Borer: A Comparison of Trunk and Foliage Sprays

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ABSTRACT

Insecticide sprays may provide arborists, landscapers, and regulatory officials with a useful option to control emerald ash borer (EAB) in some situations. In our 2003 studies, we found that two applications of Tempo (a pyrethroid insecticide) significantly reduced the density of EAB larvae relative to unsprayed trees. It was not clear, however, whether this control reflected mortality of adult EAB that fed on sprayed foliage or mortality of newly eclosed larvae chewing through the bark. In 2004, we set up a study to determine if EAB could be controlled by spraying only the foliage or only the trunk and large branches of trees. We also compared larval density between trees that received one spray with those that received two sprays.

We selected 40 green ash street trees in Ann Arbor and randomly assigned them to one of five treatments: 1) Control (no spray), 2) Foliage-only spray (twice), 3) Trunk-only spray (twice), 4) Trunk & Foliage spray (twice), 5) Trunk & Foliage spray (once). A private contractor applied Tempo SC Ultra (160 ml per 378 l) on 10 June and again on 2 July for trees that were sprayed twice. During sprays, the trunk and large branches of Foliage-only trees (Treatment 2) were wrapped with plastic wrap and the ends sealed with clay to ensure that the spray did not contact the bark. On average, Trunk only trees (Treatment 3) received 1.1 gal of spray compared with 4.3 gal of spray applied to Foliage only trees and 5.3 gal applied to Trunk & Foliage trees. Similarly-aged adult EAB were caged with bark or with a leaf from each treated tree on July 7 (27 days post-spray) for five days. Mortality of beetles in the bioassay was recorded daily. In September, bark was removed from three to four windows (ca 400 cm^2) on the trunk and three to four windows in the canopy to estimate larval density.

Bioassay results showed that Tempo remained toxic to EAB adults for at least 27-30 days post-spray. More than 80 percent of beetles had died by Day 3 of the bioassay when they were caged with either bark or foliage that had been sprayed. During the same period, average mortality of beetles caged with unsprayed trees, unsprayed bark or unsprayed foliage was less than 20 percent.

Density of young EAB larvae (L1 to L3) feeding on tree trunks was reduced by 88 percent compared with Control trees when only the foliage or the trunk and foliage had been sprayed, and by 40 percent when the only the trunk had been sprayed. Density of young larvae feeding in the canopy was reduced by 66 percent to 90 percent when only the foliage or both trunk and foliage were sprayed, but only by 14 percent when only the trunk was sprayed. Efficacy did not significantly differ between trees that were sprayed only in June and those sprayed in June and July.

We also noted that some of the late instar larvae (L4) feeding on trees in September were actually two-year-old larvae—i.e., they began feeding in 2003, overwintered as immature larvae, and were still feeding in 2004. These larvae could be distinguished from the current-year L4 larvae by the dark, discolored appearance of the oldest part of the gallery and the presence of wood and callus tissue formed by the tree over the early part of the gallery. Obviously, cover sprays will have no effect on larvae that are already feeding below the bark when sprays are applied. Preliminary data indicated that roughly 60-70 percent of L4 larvae on unsprayed trees were two-year-old larvae while at least 90 percent of the L4s on twice-sprayed trees were two-year-old larvae. Additional sampling is planned to refine estimates of the density of one-year and two-year L4 larvae.