

EFFECT OF TREE SIZE AND SEVERITY OF INFESTATION ON EFFICACY OF IMIDACLOPRID AGAINST EMERALD ASH BORER (COLEOPTERA: BUPRESTIDAE)

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Abstract Multiyear studies describing the effects of tree size and initial infestation on efficacy of imidacloprid (Merit 75 WSP) soil drenches against emerald ash borer, *Agrilus planipennis* (Fairmaire), were initiated in spring 2004 at two locations in Michigan. Eighty-five green ash trees (*Fraxinus pennsylvanica* Marsh.), ranging from 18-65 cm trunk diameter (measured at ca. 1.4 m from the base of the tree) and from 10-93% crown dieback, were selected for the study. The efficacy of a single annual imidacloprid soil drenches at 0.58 g AI/cm trunk diameter was described (41 treated trees, 44 controls). Treatments were made each spring (late-April or early-May, depending on the year). To quantify the efficacy, dieback ratings were done every summer from 2004 through 2007. The annual assessment for each treated and untreated tree enabled us to assess whether the dieback on each tree was increasing, decreasing, or unchanged over time. Numbers of dead trees also were counted annually.

Effect of initial infestation (quantified as dieback in 2004) on efficacy - Of the nineteen imidacloprid-treated trees with $\leq 60\%$ dieback in 2004, twelve had $\leq 20\%$ dieback in 2007. Of the twenty-two trees with $> 60\%$ dieback in 2004, the dieback worsened in twelve trees, decreased in nine and stayed approximately the same in two. In contrast, dieback of the untreated trees worsened substantially (i.e., 41 of 44 controls were dead by 2007). For the thirty imidacloprid-treated trees that were still alive in 2007, dieback data show that, over time, treated trees were recovering (mean dieback = 23% in 2007, vs. 54% at the beginning of the study).

Effect of tree size on efficacy - Trees treated with imidacloprid drenches ranged from 20-65 cm dia at the two sites. The 2007 dieback data demonstrate a poor correlation between tree size and efficacy, suggesting that imidacloprid drenches work on large trees as well as on small trees.

Our results show that annual basal soil applications of imidacloprid will effectively protect ash trees regardless of tree size. The results also show that imidacloprid has curative activity on infested trees; if dieback is $< 60\%$ at the time of application, then treated trees will recover after several annual applications.