

SYNERGISTIC EFFECT OF DUAL IMIDACLOPRID–METARHIZIUM ANISOPLIAE APPLICATIONS AGAINST ASIAN LONGHORNED BEETLES (*ANOPLOPHORA GLABRIPENNIS*)

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ABSTRACT

Anoplophora glabripennis (Motschulsky) (Coleoptera: Cerambycidae), a longhorned beetle species native to Asia, has been introduced into several North American and European cities. Currently, eradication and preventive measures are limited to identifying and destroying infested trees and protecting uninfested trees with trunk or soil-injections of the systemic insecticides imidacloprid. Because entomopathogenic fungi like *Metarhizium anisopliae* (Metsch.) Sorokin have been identified as virulent against these beetles, we conducted several tests to determine the compatibility of the two agents in combination. In a 2x3 factorial experiment investigating potential interactions between exposure to imidacloprid and *M. anisopliae*, we observed no effect of imidacloprid alone on beetle survival at a single dose of 10 or 100 ppm compared to control insects, a significant effect of exposure to *M. anisopliae*, and a significant interaction

between imidacloprid and *M. anisopliae* representing a synergistic (not additive) effect of dual treatment. Beetles exposed to the fungus alone lived significantly longer than insects treated with a single dose of 100-ppm imidacloprid (9.5 vs. 6.5 days). Consumption of twigs by beetles exposed to imidacloprid and *M. anisopliae* in a factorial experiment revealed a significant reduction in consumption (48 percent and 16 percent) over the 6-day test period as a function of exposure to *M. anisopliae* and imidacloprid, respectively. Beetles fed 100-ppm imidacloprid consumed 32 percent less over the first 3 days compared to beetles not exposed to imidacloprid and thereafter consumed as much as beetles not fed 100-ppm imidacloprid, whereas *M. anisopliae*-exposed beetles consumed significantly less food throughout the test period.