

Project Concluded: Final Report

Evaluation of Fipronil in Male Annihilation and Ground Treatments for Control of Mediterranean Fruit Fly, Oriental Fruit Fly and Melon Fly

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Economically important fruit flies in the family Tephritidae are among the most serious agricultural pests throughout the Pacific region. Conventional fruit fly area-wide control methods such as bait spray, male annihilation and ground area-wide treatments rely heavily on organophosphate (OP) insecticides. Continued registration of many OP insecticides for use in the U. S. is in doubt.

As part of efforts to register new insecticides for fruit fly control, we tested fipronil in male annihilation treatments for melon fly [*Bactrocera cucurbitae* (Coquillett)] and oriental fruit fly [*B. dorsalis* (Hendel)]. We also tested fipronil and several other non-OP insecticides in soil treatments for Mediterranean fruit fly [*Ceratitis capitata* (Wiedemann)], oriental fruit fly, and melon fly.

Over 90% of the *Bactrocera* species respond to either methyl eugenol (ME) or cue-lure (CL). Each year one or more of these *Bactrocera* are introduced into California, often requiring expensive eradication procedures with OP insecticides. In male annihilation studies, Amulet™ C-L and Amulet™ ME molded paper fiber “attract and kill” dispensers containing fipronil were tested under Hawaiian weather conditions against melon fly and oriental fruit fly, respectively.

In paired tests (fresh vs weathered), C-L dispensers were effective for at least 77 days, while ME dispensers were effective for at least 21 days. Thus, C-L dispensers exceeded, while ME dispensers did not meet the label interval replacement recommendation of 60 days. Addition of 4 ml of ME to 56-day-old ME dispensers restored attraction and kill for an additional 21 days. This result suggested the fipronil added at manufacture was still effective. By enclosing and weathering ME dispensers inside small plastic bucket traps, longevity of ME dispensers was extended up to 56 days. Fipronil ME and C-L dispensers were also compared inside bucket traps, to other toxicants: spinosad, naled, DDVP, malathion, and permethrin. Against oriental fruit fly, fipronil ME dispensers compared favorably only up to 3 weeks. Against melon fly, fipronil C-L dispensers compared for at least 15 weeks.

Our results suggest that fipronil C-L dispensers can potentially be used in Hawaii and California; however, fipronil ME dispensers need to be modified or protected from the effects of weathering to extend longevity and meet label specifications. Nonetheless, Amulet C-L and ME dispensers are a novel prepackaged formulation containing C-L or ME and fipronil, that are more convenient and safer to handle than current liquid insecticide formulations used for area-wide suppression of oriental fruit fly and melon fly in Hawaii.

In soil treatment studies, we completed laboratory evaluations of the following products for three species of fruit flies (Mediterranean fruit fly (MFF), oriental fruit fly (OFF), and melon fly (MF)): Admire (imidacloprid), Regent 200SC (Fipronil), Force (Tefluthrin), Platinum (thiamethoxam), and Warrior (lambda cyhalothrin). These products were compared to Diazinon AG 500 (LC 50's: 0.2, 0.1, 0.9 ppm for MFF, OFF, and MF, respectively).

Force (0.8, 0.7, 1.4 ppm) and Warrior (0.9, 0.8, 0.8 ppm) were the most promising insecticides for all three fruit fly species. Regent (>1,000, 2.3, 3.2 ppm) was a good control for OFF and MF. Admire (2.2, 2.7, 7.8 ppm) and Platinum (3.2, 0.6, 4.8 ppm) were good controls for MFF and OFF. During FY06, we will undertake field studies of Diazinon, Force, and Warrior against MFF, OFF, and MF. These studies are important to fruit fly area-wide suppression/eradication programs worldwide.