Florida Citrus Advanced Technology Program

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

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2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
◉ *Quarterly Report* ○ *Annual Report* ○ *Final*	Psyllid	1/1/10

WHAT IS THE "HEADLINE" FOR THIS REPORT (e.g. a one-sentence "newspaper headline" describing what you accomplished)

γ-Butyrolactone attracts ACP parasitoids and Methyl salicilate also shows promise as a natural enemy attractant

TITLE and CONTACT INFORMATION

Proposal Title Development of attractants for Tamarixia radiata, a parasitoid of Asian citrus psyllid (ACP), for improved biological control of ACP

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Organization University of Florida/IFAS	*Total Direct Funds (current year)* 43098

REPORT UPDATE (650 words; provide details about your headline)

The main objective of this series of investigations has been to develop an effective attractant for Tamarixia radiata, the main parasitic wasp attacking Asian citrus psyllid (ACP) in Florida. Development of an effective attractant for this insect will allow for accurate monitoring of this beneficial insect and it will allow us to recruit and establish high populations of this beneficial insect to improve biological control of ACP. The first goal of this proposal was to conduct an in depth morphological investigation of the antenna sensilla of this wasp parasitoid, including functional morphological studies, which would reveal the functional details of the discovered sensilla. This first objective was completed and the investigation was published in a peer-reviewed scientific journal (Onagbola, E.O., D.R. Boina, S.L. Herman, and L.L. Stelinski. 2009. Antennal sensilla of Tamarixia radiata (Hymenoptera: Eulophidae), a parasitoid of Diaphorina citri (Hemiptera: Psyllidae). Annals of the Entomological Society of America. 102: 523-531). Next, we moved onto conducting an in depth analysis of the chemicals produced by both sexes of this parasitoid. We discovered that both male and female ACP parasitoids release several volatile compounds. Our analyses revealed Propa-2-one, 1-Butanol and 4,6,8-Trimethyl nonene as female parasitoid-specific volatiles; Dodecane, 4,6-dimethyl, Acetc acid, γ-Butyrolactone, and Diphenylamine as male specific volatiles while Decanal and 3-Methyl diphenylalamine were produced by both sexes. In laboratory behavioral tests, we found that male parasitoids were attracted to γ-Butyrolactone to the same degree as to female parasitoids, indicating that this is likely the sex-attractant pheromone females produce and release to attract males. Subsequently, we developed a polyethylene-tube dispenser for releasing this chemical in collaboration with our industry partner, Alpha Scents. Field trapping tests indicated that in the early summer traps baited with γ-Butyrolactone caught more Tamarixia radiata than unbaited traps, but this trend did not hold up in the late summer months. In addition to investigating the chemicals that Tamarixia radiata produces, we conducted an initial investigation with another chemical that is known to attract natural enemies of insect pests and reduce their populations. Methyl salicylate (MeSA) is a known herbivore-induced plant volatile which has been shown to attract natural enemies (e.g. parasitoids, coccinellid beetles, predatory mites) and repel plant pests (e.g. mites, herbivorous beetles, aphids). Recent field studies deploying synthetic sachets of MeSA in grapes and hops showed that populations of pest species were reduced and populations of natural enemies were increased. We have conducted an initial proof of concept experiment in a small plot setting evaluating the effect of deploying Methyl Salicylate (MeSA) dispensers obtained from AgBio Inc. (Denver, CO) in small plots (35 tree). The treatments compared were plots treated with MeSA versus untreated control plots; all treatments were replicated five times. Two dispensers were deployed per tree in April of 2009 and populations of psyllids and their natural enemies were monitored through September. Our preliminary data indicate that treatment of citrus plots with MeSA increased populations of natural enemies such as llady beetle and fly predators of ACP and well as the ACP parasitoid, Tamarixia radiata. In addition, populations of ACP were lower in MeSA-treated plots compared with untreated controls. This data need to be confirmed on a large scale and in a wide variety of commercial citrus grove settings. Our goal is to investigate the use of MeSA as a control tool for ACP on a larger scale in a future investigation that has been submitted as a separate new proposal to the CRDF. For other insect pests, MeSA has been shown to not only attract beneficial insects to a source and thus improve biological control, but may have some repellent properties. Field demonstration of the efficacy of MeSA would provide citrus producers an easy, inexpensive, and biorational tool to conserve natural enemies and reduce pesticide use while controlling the ACP vector of citrus greening.