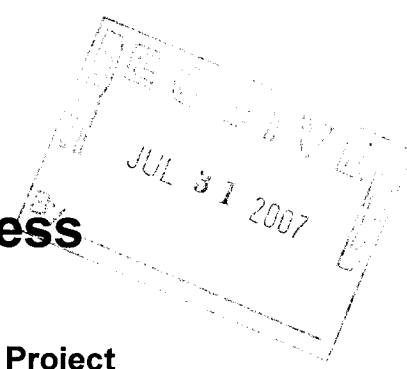




FY 2006-2007 Report on Progress

(September 1, 2006 – August 31, 2007)

Texas Imported Fire Ant Research And Management Project



Title of project: Fire Ants: The Honey Bee's Friend AND Foe?

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Lay Summary of Major Accomplishments:

In Texas, where fire ants are a pest of honey bees, beekeepers spend on average \$11 per colony on control measures, primarily insecticides. Recently, another invasive pest of honey bees, the small hive beetle, emerged as a problem for beekeepers. The larvae of these beetles eat pollen and other sources of protein in honey bee colonies. Beetle larvae destroy wax combs, defecate in the nest, and eventually cause so much damage that the colonies die and the hive is destroyed. Small hive beetles pupate in the ground outside bee colony entrances and consequently are vulnerable to predation by fire ants. In a series of experiments using field collected ant colonies in the lab, we demonstrated that fire ants are effective predators of small hive beetle larvae and pupae, located on the soil surface and even buried at a depth of 2 inches. Additionally, fire ants were observed to act as beneficial scavengers in apiaries by removing dead bees deposited outside colonies that otherwise may act as a reservoir for pathogens or attract pests. Also tested were a range of non-toxic fire ant foraging repellents and identified two that showed significant efficacy, one suitable for use in the field and one for home and garden applications.

Technical Description of Progress on Individual Objectives:

1. Butyric anhydride soaked wood chips planted 2 cm beneath the soil surface showed promising efficacy for preventing fire ant colonization in honey bee apiaries. Butyric anhydride is a commonly used repellent used in commercial honey harvesting. As such it is non-toxic to honey bees and readily available to beekeepers. Butyric anhydride has immanent potential benefits realized from the development of a new technology for the non-toxic control of fire ants in apiaries. Environment benefits lessening reliance on insecticides. Butyric anhydride has potential for use in other rural agricultural applications where fire ant colonization deterrence is preferred over the use of an insecticide.
2. Fire ant laboratory colonies readily burrowed up to 5 cm in soil to forage of pupating small hive beetles. Fire ant laboratory colonies show no feeding preference between live small hive beetle immatures and freeze-killed adult crickets. Results demonstrated the potential for fire ants to act as a biological control agent of small hive beetles pupating in the soil in apiaries.
3. A mimic of a honey bee pheromone significantly deterred fire ant foraging in lab colonies for up to 72 hr. This result represents the potential for controlling fire ants without the use of an insecticide; an environmental benefit.

4. The honey bee pheromone mimic above additionally was demonstrated to deter other venomous colonizing Hymenoptera in numerous contexts. Potential uses include preventing the colonization of fire ants and other stinging Hymenoptera in and around homes, gardens, and many other rural buildings. Decreases the number of honey bee stings to less than the human LD₅₀ during a massive defensive response. Potentially used to protect people from receiving massive number of bee stings.

Relevance to Achieving the Overarching Goals of the Texas Imported Fire Ant Research and Management Project (see RFP guidelines):

1. The outcome of this research pointed to necessary 1) educational programs that enhance the ability of the Texas Imported Fire Ant Research and Management Project to accomplish its programmatic goals with respect to "The management of imported fire ant to below economic levels on agricultural lands..." by using non-toxic barriers to deter fire ants from insecticide sensitive beneficial insects.
2. Increase beekeeper awareness of fire ant management practices by demonstrating that a) non-toxic fire ant barriers are practical in some apicultural situations, b) where colonies are strong and fire ants are not a threat, they may act as a biological control agent of the small hive beetle and serve as scavengers improving apiary hygiene.
3. This study addressed methodologies and technologies with reasonably high probabilities for yielding positive treatment-based fire ant colonization deterrents.

Manuscripts Published/In Press/Submitted:

Bahr, SM, Pankiw T., Jackman JA, and Vestal TA. Responding to a need for information on honey bee pests and diseases. Submitted for posting at <http://honeybee.tamu.edu/>.

Pankiw T (3 February 2007) Pheromone mimic to repel colonizing and aggregating hymenoptera. TAMUS-2466 Disclosure of Invention

Invited and Submitted Presentations/Posters Presented at Scientific/Technical Meetings/Conferences:

Bahr, SM, Pankiw T. Increasing knowledge of honey bee pests and diseases via the world wide web. Entomology Science Conference, College Station, TX. October 24, 2006.

Bahr, SM, Pankiw T. Do fire ants eat small hive beetles? Texas Beekeeper's Association Annual Convention. Kerrville, TX. November 4, 2006.

PI Signatures:



July 31, 2007

Signature

Date

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