

Developing and Testing a Device to Monitor Fire Ants in and around Honey Bee Colonies

Project Leaders: **Dr. Gordon I Wardell**, Collaborator USDA-ARS, Carl Hayden Bee Research Center, Tucson, AZ 85719 and **Dr. Gloria DeGrandi-Hoffman**, Research Leader, USDA-ARS, Carl Hayden Bee Research Center, Tucson, AZ 85719

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Summary

In the United States, the increasing incidence of the imported red fire ant (*Solenopsis invicta*) poses a problem to agricultural crops, especially where pollination is involved. Commercial pollination with honey bees is a highly mobile business, and bee colonies are frequently moved on pallets between holding yards to over-wintering locations and eventually to pollination. In the United States, most beekeepers living in northern latitudes over-winter their bees in the southern states where the fire ants are abundant. These activities increase the probability that *Solenopsis invicta* will be inadvertently transported from ant-infested areas to non-infested areas with beehives or in soil adhering to apiary equipment. In the past several years, truck loads of bees have been held in quarantine at state borders because of feared fire ant infestation in or on the colonies. Several of these instances have resulted in entire semi-truck loads of bees dying in quarantine.

Our goal is to develop a monitoring station that will identify the presence or lack of *Solenopsis* in and around honey bee colonies. We will be testing this product in conjunction with USDA's Animal Plant Health Inspection Service and hopefully provide a monitoring tool that will allow speedy cargo certification and prevent the quarantine impoundments at state borders that have occurred in the past.

We have drawn upon our background in developing insect diets and our experience with volatile plant compounds that act as feeding stimulants to honey bees. We are using the same screening methodology with ants as used in screening honey bee diets. Several attractant formulas have been identified and are currently being prepared for field testing. A professional plastics manufacturer in Tucson, AZ has been approached to design a prototype monitoring station. Once the formula is finalized, the monitoring station can be designed to accommodate the formula.

Objectives and Results :

1. Screen our existing library of plant volatiles and known feeding stimulants for attractants that routinely attract fire ants.

We have successfully identified three products that attract fire ants and would be compatible with a monitoring station technology. The first is a mix of lipids and sugars. The second formulation involves volatile components found in natural pollen impregnated into a starch/lipid complex, and the third formulation is strictly a mixture of lipids. We plan to continue testing other products and determine the range at which the products will draw in the fire ants. Our goal is to develop a product that will draw in the ants from the greatest distance to give the best possible monitoring capability.

2. Optimize successful formulations through successive preference tests.

Preference testing will continue with formulation modifications being made to increase attractiveness of the baits. At present, we are increasing volatile components in the baits to see if

we can draw in the ants from further distances. This is done by putting out bait on a concentric circle from a point source of the ants and monitoring how long it takes the ants to find the bait.

3. Work with an Arizona based plastics manufacturer to develop an effective monitoring station.

Prior to investing in specially designed bait stations we have used off the shelf bait holders. The stations were modified to project specifications. Once the bait formulation is decided upon, D &D Custom Mold of Tucson will assist in developing an effective bait station. The concept of the bait station will be to draw in the ants to the bait, and by the design of the station, some of the visiting ants will become entangled in a sticky monitoring area. A clear plastic viewing panel will be used to monitor the results.

4. Field test the prototype stations through growers and beekeepers to determine ease of use and efficacy of the product.

Cooperating beekeepers and university researchers have been lined up to test the prototype products.

5. Field test the successful product with collaborative partner USDA Animal Health Plant Inspection Service (APHIS).

Dr. Ron Weeks at USDA, APHIS, PPQ, CPHST Soil Inhabiting Pests Laboratory in Gulfport, Mississippi has agreed to test the prototype monitoring stations once they are ready. He has also consulted with our development team in the concept phase of the project, a collaboration that has proven very productive.

Discussion:

For decades, monitoring stations have been used in Integrated Pest Management programs to quantify pest presence and population numbers. The goal of this project is to develop a device that will indicate the presence or absence of fire ants in migratory beekeeping operations. Such a device will promote interstate transport of honey bee colonies for pollination and honey production. Preliminary results of the investigations conducted under this grant indicate that a fire ant monitoring station is feasible and practical. Our goal is to have a prototype monitoring device in the field for the winter migratory season of 2004 – 2005.