John A. Mulrennan, Sr. Arthropod Research Laboratory

EntGuide

...A publication of Florida A & M University EG#2

Honey Bees and Mosquito Control

Noor S. Tietze, Ph.D.
Medical Entomologist and Research Leader
Pesticide Environmental Impact Section
John A. Mulrennan, Sr. Arthropod Research Laboratory
Florida A&M University

IMPORTANCE OF HONEY BEES

The European honey bee, Apis mellifera (L.) (Figure 1) is a domesticated insect of vital importance to agriculture as a pollinator and producer of honey. In the U.S.A., economic value of honey bee pollinating activities exceeds that of honey and beeswax production by about 143 times ($18.9 billion vs. $140 million for U.S. in 1981). In Florida, bees are indispensable pollinators of citrus, cucurbits, melons, and other fruits and vegetables. Florida has recently led the nation in honey production in 1988, 1989, and 1990 (Florida Agricultural Statistics Service, Orlando, Florida). During 1988 alone, 25 million gallons of honey were produced worth an estimated 12.8 million dollars.

THE PROBLEM

While the majority of bee kills may be attributed to agricultural sprays, ultra low volume (ULV) mosquito adulticide sprays pose a significant threat due to the extensive area treated, particularly during disease outbreaks. In Florida, aerial ULV sprays of Cythion (malathion), Dibrom (naled) and Baytex (fenthion) are routinely used to reduce mosquito populations due to their biting nuisance and potential for transmission of diseases such as St. Louis Encephalitis. Because beehives are maintained in and near agricultural areas,

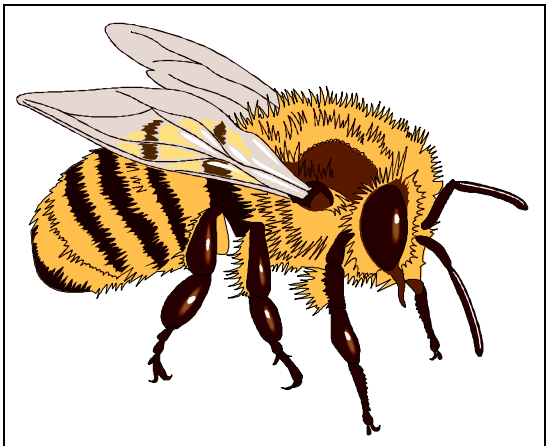

Figure 1. The honey bee, Apis mellifera.

urbanized zones (e.g.. backyards) and forested areas, overspray by mosquito control may pose a potential hazard. This problem is further complicated by the beekeepers' need to relocate hives to service crops as commercial pollinators or to optimize honey production between seasons. Florida Pesticide laws (Ch. 5E-13.037) were instituted specifically to safeguard honey bees and state that, unless treating for disease epidemics involving day-time active, Aedes aegypti or Ae. albopictus, "(aerial) application shall not be later than 2 hours after sunrise nor 2 hours before sunset." These rules help to reduce the number of applications made during times of honey bee activity.

HONEY BEE SUSCEPTIBILITY

Honey bee toxicology has been a fertile area of research, particularly regarding the effects of organophosphates and pyrethroids commonly used in agriculture and mosquito control. Caron[1] (1979) measured the effects of truck-based applications of ULV Cythion, pyrethrum and Dibrom sprays on caged bees and colonies in a Maryland community. Dibrom killed more caged bees at 98 and 197 ft than at 49 ft from the path of the spray truck. ULV Cythion on the other hand was more toxic at 49 and 98 ft, with little kill at 197 ft. Pyrethrum ULV was only slightly toxic at 49 and 98 ft. Little or no effect was reported at 197 ft using any of the three compounds tested. Caron (1979) found that night applications had no effect on bee colonies, while day applications resulted in consistent losses. Atkins[2] (1972) studied the effects of aerial ULV sprays of Dursban (chlorpyrifos) in a rice field in California. Honey bee colonies directly oversprayed always had higher mortalities than those downwind of the spray application. These findings indicate that most significant bee kills are due to aerial treatments during day-light hours. However, during warm nights bees may be exposed to mosquito adulticide applications as they cluster outside the hive to help ventilate the brood.

PROTECTING HONEY BEES

Several methods have been recommended for protecting honey bees from pesticides[3]. The simplest technique is to confine the bees within the hive during the time of pesticide application by covering hives with black plastic sheeting or burlap. Heat builds up rapidly under plastic exposed to the sun, therefore confinement using plastic should be limited to a few hours after sunrise. Burlap, however may be soaked with water for more prolonged confinement (2 days or more) without risking severe brood damage. Since honey bees remain in the hive during rainy weather, sprinkling and vibration devices have been invented to mimic rain and thus arrest foraging behavior. Moving hives to avoid mosquito sprays may not be an advisable solution, due to added stress to the bees, time and financial cost of moving hives and uncertainty of a colony's success in the new area. The best protection for honey bees may be to establish an open channel of communication between beekeepers and mosquito control directors. Beekeepers should let mosquito control directors know where colonies are located. In turn, mosquito control directors should instruct their operators to avoid spraying in these areas. Also, mosquito control directors should alert resident beekeepers prior to widespread pesticide applications, particularly during disease suppression campaigns.

References for More Information

[1]Caron, D.M. 1979. Effects of some ULV mosquito abatement insecticides on honey bees. J. Econ. Entomol. 72:148-151.

[2]Atkins, E.L. 1972. Rice field mosquito control studies with low volume Dursban sprays in Colusa County, California. V. Effects upon honey bees. Mosq. News 32:538-541.

[3]U.S. Department of Agriculture 1972. Protecting honey bees from pesticides. Leaflet No. 544. U.S. Government Printing Office Washington, D.C. 20402.

EntGuide publications are a series of 2-4 page leaflets on the biology and recommended control of Florida's medically important arthropods and related topics. They are produced as a service to governmental agencies and the public. Mention of a proprietary product does not constitute an endorsement nor recommendation by Florida A&M University. Trade names are used only to simplify information for the reader. EntGuide publications can be reproduced and distributed without permission. Copies can be obtained from the JAMSARL home page at: **http://www.famu.edu/jamsarl**, by calling (904) 872-4184 or by mailing or faxing a letter of request indicating the publication number or title to: **John A. Mulrennan, Sr. Arthropod Research Laboratory, Florida A&M University, 4000 Frankford Avenue, Panama City, Florida 32405-1933; Fax: (904) 872-4733.** The concept and layout for EntGuide was developed by **Dr. John P. Smith**. All EntGuide publications have been peer reviewed by Florida A&M entomologists prior to publication.