POPULATIONS OF FORAGING HONEYBEES IN MIDSOUTH COTTON AND OTHER CROPS

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Abstract

In recent years there has been a global decline in populations of both native and managed pollinators. Pesticides are considered to serve some role in these declines. A study was conducted to see when and at what densities honey bees forage agronomic crops in the Midsouth. Fields of corn, cotton, and soybeans were visually sampled for foraging honeybees across Arkansas, Mississippi, and Tennessee. Honey bees were observed at three time intervals and at four distances into each field. Significantly more honey bees were observed in soybeans than in corn and cotton. The midday time interval had the significantly most number of honey bees per acre observed. More honey bees were observed in the morning time interval than the evening time interval. Based on these data, insecticide applications should be made in the evenings when honey bees are less active in crop fields. This allows for the most time for the residual activity of insecticides to diminish before foraging honey bee numbers increase in the morning and maximize in the middle of the day.

Introduction

Populations of honey bees have declined worldwide in recent years. One suspected cause is the widespread use of pesticides in agriculture. The major concern with pesticides stems from the possibility of foraging honey bees returning to their hives with sublethal doses of insecticides that could potentially affect the behavior and performance of honey bee tasks that contribute to overall colony health. One suggested option to reduce foraging honey bee exposure to pesticides is to start applying pesticides at night when honey bees are less active.

Materials and Methods

An experiment was conducted in 2013 to determine when, and at what densities, honey bees visit agronomic crops across the Midsouth region of the United States consisting of Arkansas, Mississippi, and Tennessee. Fields of cotton, corn, and soybeans were scouted for honey bees at three time intervals: Morning, Mid-day, and Evening. "Morning" was defined as the three hours after sunrise. "Evening" was defined as the three hours before sunset. "Mid-day" was defined as the time interval from 11:30 AM to 1:30 PM. For each time interval and location, weather parameters were measured that included temperature, humidity, wind speed and direction, and cloud cover. Field data was also taken consisting of crop sampled, plant growth stage, average plant height, average canopy closure, row spacing width, and distance to nearest apiary if known. Scouting consisted of three observers slowly walking 50 meters of row and counting the number of honey bees within the field using a hand counter. The 50 meters of row were sampled at the distances of 0 meters, 20 meters, 50 meters, and 100 meters from the field edge. An unchecked planted row was used as a buffer between each observer. The three observers served as three repetitions at each distance from the field edge. The number of honey bees was recorded at each distance. Fields were randomly selected throughout the agricultural regions of each state. A total of 82 fields were sampled: 28 corn fields, 36 cotton fields, and 18 soybean fields. The number of honey bees per 50 meters of row was converted to honey bees per acre using the row width obtained from each field.

Results and Discussion

Significantly more honey bees were observed in soybeans than in any other crop (Table 1). Distance was found not to have a significant effect on the number of honey bees observed. The highest number of honey bees were observed during the Mid-Day time interval, and the least number of honey bees were observed during the Evening time interval (Table 2). Therefore, applying pesticides during the evening may be more effective than applying them at night to reduce foraging honey bee exposure. If pesticides are applied during the evening when there are fewer honey bees in the fields, there is more time to allow the residual activity of the pesticides to diminish before the middle of the day when there are more honey bees foraging in the fields.





*means subjected to log transformation



Table 2: Bees/Acre by Time of Day

*means subjected to log transformation