Effects of Insecticides on Honeybees

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Introduction:

Do you enjoy eating apples, strawberries, blueberries, and cucumbers? If so, you may want to pay attention to what is happening to our honeybees because without them, these food items and about 2/3 of our diet would disappear. I am talking about the Colony Collapse Disorder, or CCD, that is striking many of the hives around the world. The honey bees are leaving the hives and not returning and we have no idea where they are disappearing to. One idea we have is that maybe one or more of the insecticides we are using on our crops may be affecting them. This summer at the Southern Insect Management Research Unit, I helped in spraying some honeybees to see which insecticides are harmful and which are safe.

Materials and Methods:

Because pesticides are mainly sprayed onto crops with aerial application (figure 1), we used a very similar concept. In the lab, we have a "spray tower" that sprays whatever pesticide we put in it (figure 2). We put one brand of pesticide on one tray each. One tray consists of 21 cages and each cage contains 25 honeybees. Every three cages, we spray a different dosage of pesticide. The first three cages are the control group, which we just spray with water (Ck1, Ck2, Ck3). Then we start from cages 1-1 to 1-3, which is sprayed with the lowest dose of the pesticide, and go to cages 6-1 to 6-3, which was sprayed with the highest dose (figure 3).

Figure 1

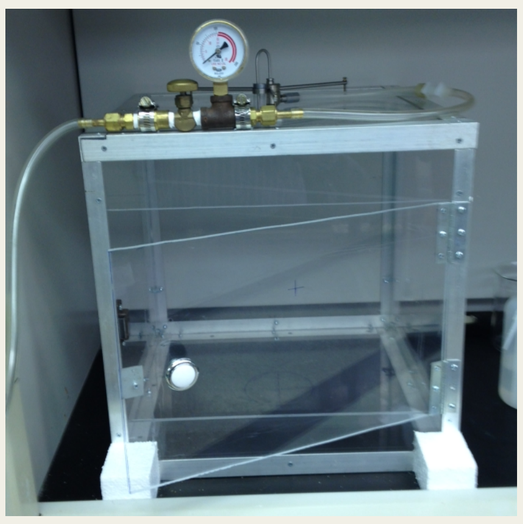

Figure 2

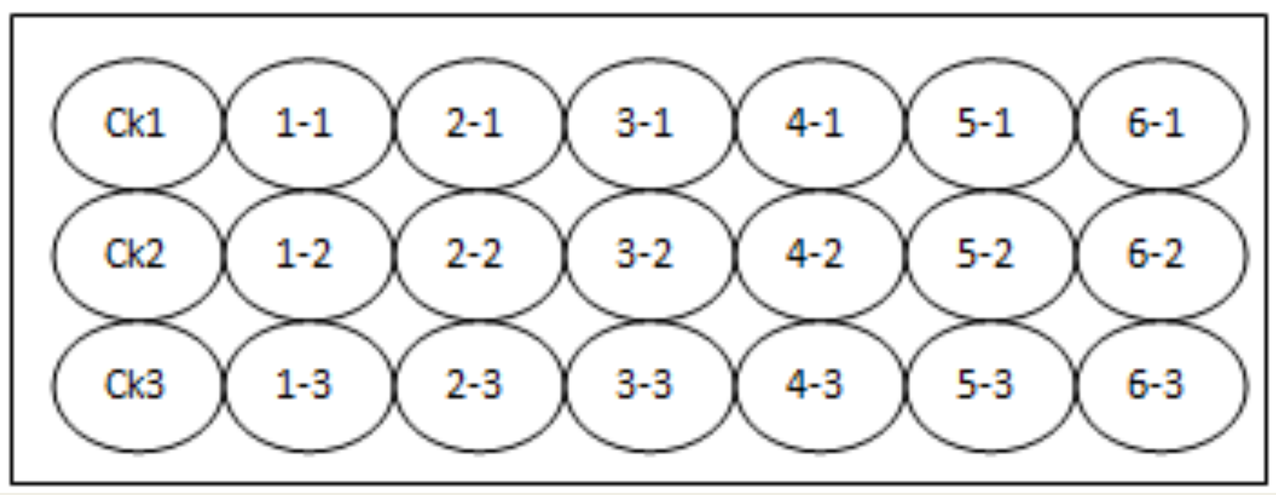

Figure 3

Results and Discussion:

After spraying them, we wait 48 hours and then record how many of the bees died and how many lived. Some pesticides are very harmful because most of the bees die and some of the pesticides are not harmful at all because hardly any bees die. Table 1 shows two examples, one lethal and one nonlethal. Bidrin is lethal because you only need 20 mg/L to kill 50% of of the test population whereas Transform requires 200 mg/L. Bidrin also has a larger use rate than Transform which means more area is affected. Since we only check the bees we spray after 48 hours, we are checking for acute toxicity. Checking for chronic toxicity would require a longer exposure of the insecticide.

Insecticides	Use rate	LD_{50} (mg/L)
Bidrin/dicrotophos	4.8-8 oz/acre	~20
Transform/Sulfoxaflor	1.5-2.25 oz/acre	~200

Table 1

References:

Anonymous. Pollination: Protecting Pollinators from Pesticides.
http://www.ent.uga.edu/bees/pollination/protecting-pollinators-pesticides.html
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Acknowledgements:

I would like to thank Dr. Yu Cheng Zhu for helping me with this project.