

Do herbicides have an effect on the rate of productivity of bees?

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Background

- A crucial food source for bees is the pollen found in flowers (Pain, 2017) and 75 percent of farmland has been treated with a variety of pesticides (Who, 1998), including flowering crops.
- Herbicides may have harmful, or lethal, effects on bees, and, as their populations decrease (Pollinators and Pesticides) it becomes increasingly important to limit harmful human impacts on these bees.



Figure 1 Bees collect nectar from plants which they store in the hive in the form of honey. The plants in which the nectar is gathered from are often sprayed with herbicides which can affect the individual's health.

Motivation

Bees do more than just make honey, they play an enormous role in the ecosystem. Bees pollinate almost every major food crop that we eat. They are responsible for around ½ of the cooking oils we use, they pollinate 180,000 flowering plant species, they pollinate around 1,200 food crops, and are responsible for between 1.2 and 5.4 million dollars to the economy (All About Pollinators).

Hypothesis

We hypothesize that there is a relationship between the rate of honey produced by bees and the use of specific herbicides on flowering plants.

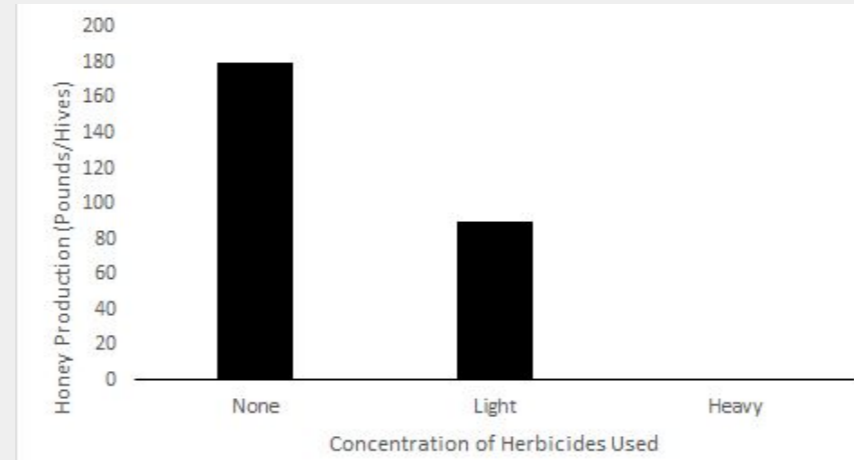


Figure 2 Prediction of the productivity of bees when different concentrations of herbicides are used on flowering plants

Predictions

We predict that as the concentration of herbicides increase on a flowering plant, the lower the rate of production of honey will be for the studied bees.

Study Design

- The study will occur in a lab setting
- Four hives of 30,000 bees will be observed for each test group (bees with access only to flowers with herbicides, and those with uncontaminated flowers).
- Data on the production of the bees will be collected at the beginning of the experiment and after each honey producing season.
- Productivity will be measured by the pounds of honey per hive.

Intended Analysis

- Given that the response variable is the productivity of bees (continuous) and our treatment groups — bees not affected by herbicides, bees affected by herbicides — (the independent variable) is categorical with 2 groups, we will analyze the data by using a t-test.
- The result of the t-test will allow us to determine whether the use of herbicides on plants affects the amount of honey produced by bees.

Expected Benefits

- Honeybees are very important to the production of agriculture and the economy of the U.S. (Medicine). Bees are often purposefully put in fields in order to help with pollination (Figure 3). Although herbicides can be helpful, it is important to remember that bees are the main pollinators of agriculture. In this study, we can inform farmers about the use of different herbicides and the bees used in production to make honey. It will give an idea of the rate of their production.



Figure 3 Honeybees play a very important role in agriculture and are often purposefully placed in a field to aid in the pollination process (D.).