

Estimating the LC_{50} of 1-Naphthyl-N-methylcarbamate in Sevin Using Different Percentages of

Concentration on *Apis mellifera*

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HYPOTHESIS

My hypothesis is if different concentrations of Sevin concentration are used to estimate the LC_{50} of carbaryl on *Apis mellifera*, then it will be demonstrated that Sevin with carbaryl is not that toxic of a chemical because of how accessible it is for anyone who wants to purchase it for their own use.

PROCEDURES

1. Collected 10 bees in 3 insect capsules each from the same colony
2. Placed capsules into the refrigerator for 30 minutes
3. Prepared stock solution by calculating correct ratios of Sevin to water for a total of 50mL
4. Used an analytical balance to zero out the weight of the plastic medical vial cap (3 caps for 3 trials) and added 1.38g of honey in each
5. Used a disposable serological pipette to measure 1 mL of solution for each
6. Placed the solution in the cap with honey and mixed with wooden toothpick
7. Used duct tape to tape on the cap to the center of the plastic cup
8. Placed 10 of the bees into each cup, sealed with the cotton cloth and cap, and labeled accordingly
9. Collected data by counting number of bees alive after 1 and 2 days
10. Repeated steps 1-9 for the following stock concentrations: 100%, 75%, 50%, 25%, 12.5%, 6.25%, 0%
11. Steps 1-2 were repeated for a trial where bees were directly sprayed with Sevin to double check that the pesticide was effective on honeybees
12. Inputted data into SigmaPlot to calculate mean and standard deviation and placed all data into graphs
13. Calculated concentration at which 50% of the bees are alive from the equation given on the chart based on data
14. Multiplied concentrations with .126% (% of active ingredient carbaryl in Sevin)

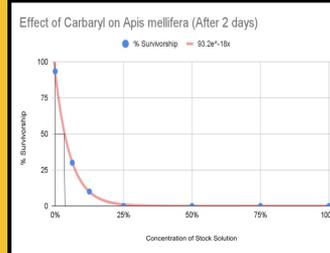
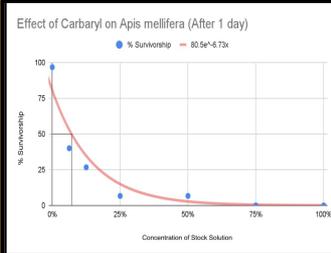
ABSTRACT

The purpose of my project was to find the LC_{50} of 1-Naphthyl-N-methylcarbamate, a highly toxic insecticide, in Sevin on honeybees on Guam. Bees are currently an endangered species so this project aims to save their population by discovering the actual lethality of the solution and what the concentration of the solution that kills 50% of the bees after the observation time is.

Different percentages of stock concentration with the according carbaryl concentration were mixed in with honey and ingested by the bees. Observations were made after one and two days, and all data was collected to be graphed as an exponential function. The LC_{50} found was much smaller than what was anticipated, signalling the toxicity of Sevin and just how dangerous it is to bees at the current state, given how easy it is for one without a pesticide license to obtain and use it.

RESULTS

	Concentration of stock solution at which LC_{50} occurs for total volume of 50mL	LC_{50} of carbaryl within the stock solution
After 1 day	7.06% stock = 3.54 mL of Sevin	0.0000889% of carbaryl
After 2 days	3.46% stock = 1.73 mL of Sevin	0.0000436% of carbaryl



VARIABLES

Independent: different percentages of stock concentration (100%, 75%, 50%, 25%, 12.5%, 6.25%, 0%) which has corresponding active ingredient percentages as well (0.126%, 0.0945%, 0.063%, 0.0315%, 0.01575%, 0.007875%, 0%).

Dependent: # of bees alive after 1/2 days

Control: trial of bees fed with a solution of 0% stock

CONCLUSION/RECOMMENDATIONS

My hypothesis was wrong, the LC_{50} of carbaryl was .0000889% after the first day and .0000436% after the second day. Therefore, I underestimated the toxicity of Sevin and demonstrated how it should not be made accessible for anyone to buy over the counter without a pesticide license due to the possible damage it could cause.

In the future, I would like to test more doses with more trials to have more accurate data and graphs.

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