

Testing Efficacy of Essential Oils Against Cowpea Weevils

Introduction

At the end of the previous lab, you were asked to conduct some background research into the use of essential oil as insect repellents/insecticides and to bring one peer-reviewed journal article with you today. You were also asked to:

- 1) Conduct a search for and answer the following questions:
 - a) What are essential oils?
 - b) Why is the cowpea weevil considered a pest species and what damage does it do to pulse (bean stores) around the world?
 - c) Can essential oils be used against cowpea weevils? If so, how?

How could the use of essential oils provide relief to farmers in areas of Africa and Asia?

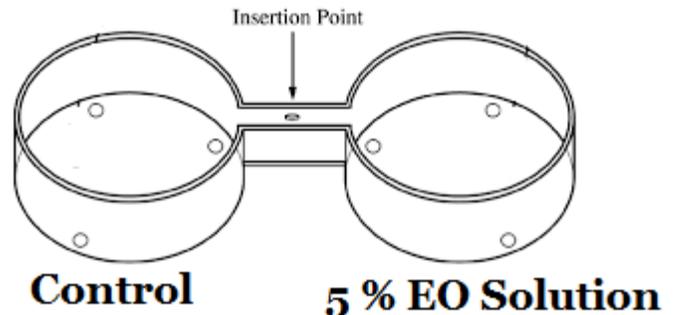
As we begin this lab, you and your group members should come to a consensus on the requested information above. You should also reflect on your reading of the bean beetle handbook at the start of the semester.

You should also provide a brief summary of your article and its findings to your group.

Using the materials listed below and the sample protocol, you can follow the provided protocol or, to test your own novel hypothesis, modify the protocol to meet your needs. Prior to beginning your experiments, seek your instructor's permission to proceed.

Materials:

6 Small Choice-chambers
Whatman Filter Paper
1 mL Transfer Pipettes
Essential Oils
Acetone
Brushes
Disposable spatulas
60 Male and 60 female Bean Beetles
2 Petri Dishes with lids
Labeling tape & sharpie



5% Essential Oil Solution * I begin with a 5% EO

solution, but allow students that wish to test their own hypothesis regarding a different percentage of oil (or combination of oils) to do so after consulting with the instructor.

To produce a 10mL 5% solution of each of your essential oils, follow these instructions:

Using a new pipet, obtain 9.5mL of acetone in small vial.

Using a new pipet, add 0.5mL of your essential oil to the acetone

Close vial, and invert several times to mix the oil and acetone solution.

Do this for all the essential oils you are assigned (chosen) and be sure to label solutions

Experiment

For each of your 6 choice chambers, do the following:

- Cut Whatman filter paper to fit into each side of a choice chamber
- Obtain 60 male and 60 female beetles and place into separate petri dishes.
- Sterilize your lab bench with appropriate cleaning solutions and let air dry. Place your filter papers on the newly, dried sterilized area. Using a sterile pipet, add one drop of the essential oil solution to one filter paper to be placed into a choice chamber, and using another sterile pipet, add one drop of acetone



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to the other filter paper to serve as a control. Allow the acetone time to evaporate (10 min). Then place each filter paper to it side of the chamber. ***Be sure to add oils outside of the chambers, as they dry, they will become glued to the dish.

- After 10 minutes, using your brush and spatula, place 10 male beetles into the center of one choice chamber and place lids on each side. Do this for the remaining male beetles and female beetles. You should have 6 male and 6 female choice chambers.
- Allow the beetles to move freely for 20 minutes undisturbed
- After 20 minutes, using the center of the chamber apparatus as the dividing point, count how many male or female beetles are on each side of your chamber (control vs. 5% solution of EO).
- Record your counts
- Repeat this for each of your essential oil 5% solutions.
- After you have finished, clean up your lab table and submit your data for your group

Record what EO solutions you are testing: _____

Hypotheses:

Null-

Alternate-

Number of Beetles per Side			
Choice Chamber		Control (Acetone)	Essential Oil Solution _____
Males	1		
	2		
	3		
	4		
	5		
	6		
	Mean:		
	Median:		
Choice Chamber		Control (Acetone)	Essential Oil Solution _____
Females	1		
	2		
	3		
	4		
	5		
	6		
	Mean:		
	Median:		

How would you go about analyzing these data? What other information (data) do you think should be included?

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What behaviors did you observe when the beetles were placed in their choice chambers? Were there any noticeable differences between behaviors observed with different essential oils?

One individual from each group should submit your data here, through this [GOOGLE FORM](#).