



The Effects of Fungicides on Bumble Bee Colonies

Time 0:00 Introduction

You will watch a short video about a research study on bees. At various points, the video will pause and you will be asked to think about the research.

As you answer the prompts, keep in mind that some questions do not have a "right answer" and that you will have the opportunity to revisit your responses at the end of the video.

Time 0:09 Embedded Prompt

Before you start the video, consider the following statement: People are concerned that bee populations throughout the world are declining. Write down a few sentences that summarize what you know about which factors may be contributing to the decline of bee populations.

Time 0:46 Embedded Questions

The narrator is interested in investigating the impact of fungicides on bees. Which of the following best describes a fungicide?

- A. A type of pesticide that uses toxins extracted from fungi to kill pests.
- B. A type of pesticide that kills fungi and bacteria.
- C. A type of pesticide that makes plants resistant to fungal pathogens.
- D. A type of pesticide that kills fungi or inhibits their growth.

Extension Questions:

- What kinds of chemicals are used in agriculture? How do we apply them to crops?
- What is the question the narrator is trying to answer?

Time 2:05 Embedded Question

Shawn wants to determine which species of bacteria and fungi live with bees. In a few sentences, describe a method you might use to identify the microbes.

Time 3:24 Embedded Question

Shawn has a hypothesis that fungicides harm bee development. Using what you now know, describe an experiment to test Shawn's hypothesis. Be sure your response includes what data should be collected and how you would collect it.

Extension Question:

- In your own words, explain the logic behind why the scientists think fungicides are causing bee declines. Are they concerned that the fungicide is directly harming the bees or bee larvae?

Time 3:46 Embedded Questions

Shawn plotted the data in a bar graph with two bars: one representing the number of bees per colony in the control cages and the other representing the number of bees per colony in the cages exposed to the fungicide. If the results support the hypothesis that fungicides harm bee development, what would you expect this bar graph to show? Describe the expected pattern in a few sentences.

Time 4:03 Embedded Questions

Are the results consistent with what you expected? Yes No

What do you conclude from this experiment? Write your conclusion in a few sentences.

Extension Questions:

- In the bar graph, the error bars (white lines extending above and below each bar) represent 95% confidence intervals. Explain what 95% confidence intervals are and why the scientist may have wanted to show them on this graph.
- Based on the error bars in this graph, are you confident that there is a difference between the control and fungicide plots? Explain your answer.

Time 4:35 Embedded Questions

Shawn explains that many studies have shown that directly spraying bees with fungicides doesn't harm them. Are those results consistent with what Shawn has discovered? Explain your answer in a few sentences.

Shawn has made progress in understanding how fungicides may impact bee colonies, but there is still work to be done. Can you suggest additional research that you think would help us better understand how fungicides affect bees?

Time 5:20 Embedded Question

How could farmers use the knowledge gained in this study to reduce possible harmful effects of fungicides on bees?

Extension Questions:

- Scientists suggest that bee populations could be helped by changes in policy regarding fungicide use and application. How might a change in policy help solve bee population declines?
- Who regulates policies regarding use and application of pesticides?

Time 6:04 Embedded Questions

Do people have a responsibility to protect bees? Yes No

Write down a few sentences to capture your thoughts.

Extension Question:

- If fungicides have harmful effects, why do we continue to use them?