

DATA *Nugget*

Mowing for monarchs, Part 2

Featured scientists: Doug Landis and Nate Haan from Michigan State University and Britney Christensen and Gabe Knowles from Kellogg Biological Station LTER

Research Background:

In Part 1 you explored data that showed monarchs prefer to lay their eggs on young milkweeds that have been mowed, compared to older milkweed plants. But, is milkweed age the only factor that was changed when Britney and Gabe mowed patches of milkweeds? You will now examine whether mowing also affected the presence of monarch predators.



A scientist counting the number of monarch predators on milkweed plants in the experiment.

The bright orange color of monarch butterflies signals to their enemies that they are poisonous. This is a warning that they do not make a tasty meal. Predators, like birds and spiders, that try to eat monarch butterflies usually become sick. Many people think that monarch butterflies have no enemies because they are poisonous. But, in fact they do have a lot of predators, especially when they are young.

Monarchs become poisonous from the food they eat. Adult monarchs lay their eggs on milkweed plants, which have poisonous sap. When the eggs hatch, the caterpillars chomp on the leaves. Young caterpillars are less poisonous because they haven't eaten much milkweed yet. And monarch eggs are not poisonous at all to predators.

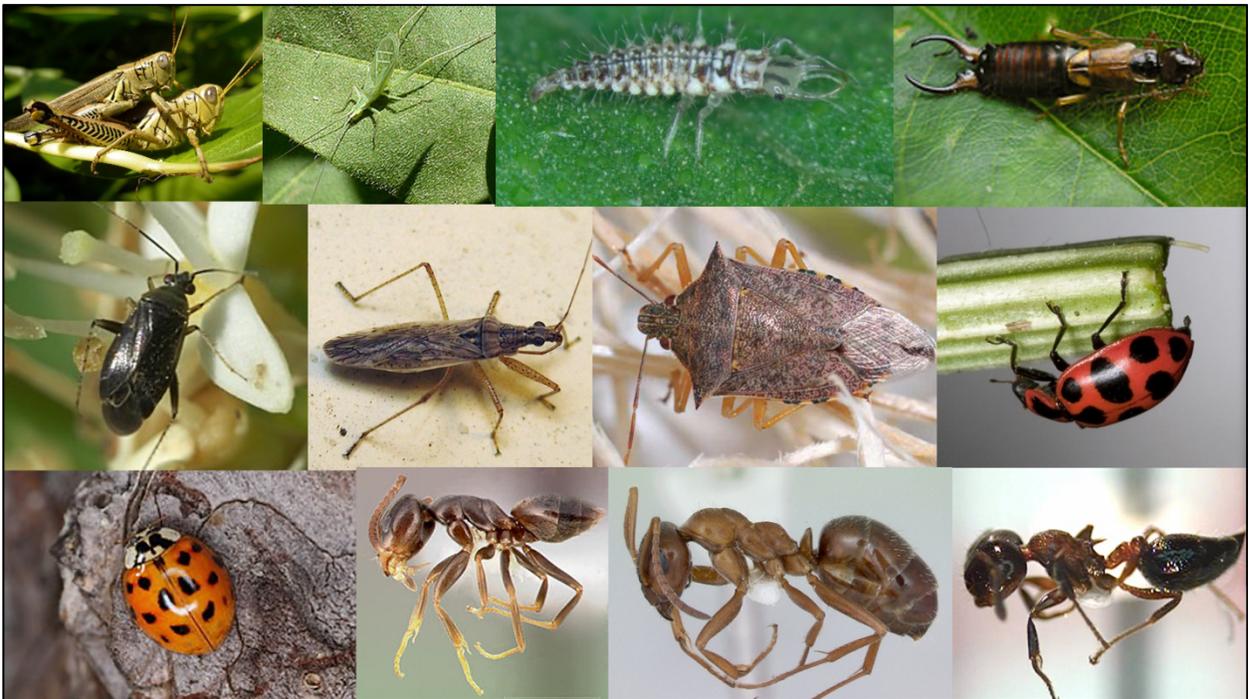
Britney and Gabe met with their friends, Doug and Nate, who are scientists. Doug and Nate thought that Britney and Gabe's experiment might have changed more than just the age of the milkweed plants in the patches they mowed. By mowing their field sites they were also cutting down the plants in the rest of the community. These plants provide habitat for predators, so mowing all of the plants would affect the predators as well. These ideas led to another potential explanation for the results Britney and Gabe saw in their data. Because all plants were cut in the mowed patches, there was nowhere for monarch predators to hang out. Britney and Gabe came up with an

alternative hypothesis that perhaps monarch butterflies were choosing to lay their eggs on young milkweed plants because there were fewer predators nearby.

To test this new idea, Britney and Gabe went back to their experimental site and started collecting data on the presence of predators in addition to egg number. Remember that in each location, they had a control patch, which was left alone, and a treatment patch that they mowed. The control patches had older milkweed plants and a full set of plants in the community. The mowed patches had young milkweed plants with short, chopped plants nearby. For the whole summer, they went out weekly to all of the patches. They counted the number of predators found on the milkweed plants so they could compare the mowed and unmowed patches.

Scientific Question: Does mowing milkweed and surrounding plants reduce the number of monarch predators?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.



There are many different species that eat monarch butterfly eggs and young caterpillars. These are just a few of the species that Gabe and Britney observed during their experiment.

Scientific Data:

Use the data below to answer the scientific question:

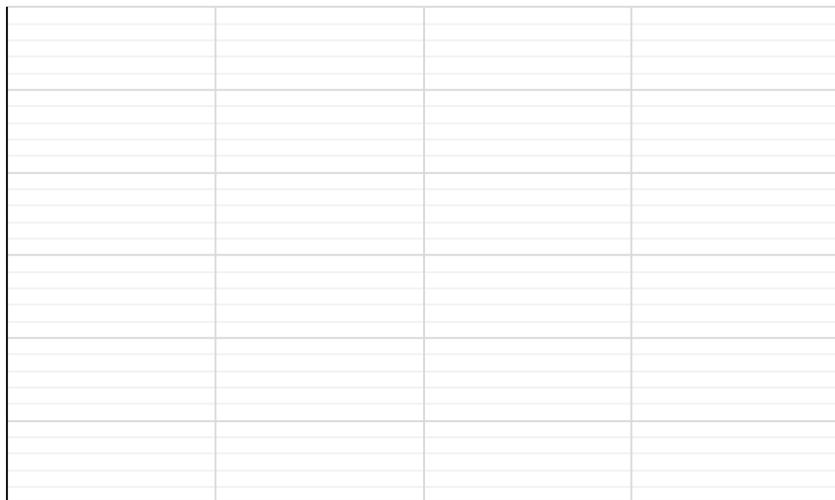
Average Number of Monarch Predators Observed per 100 Milkweed Plants				
	Week 1	Week 2	Week 3	Week 4
Control Patches	73	79	84	98
Mowed Patches	0	8	13	79

What data will you graph to answer the question?

Independent variable(s): _____

Dependent variable(s): _____

Draw your graph below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Name _____

Interpret the data:

Make a claim that answers the scientific question, does mowing milkweed and surrounding plants reduce the number of monarch predators?

What evidence was used to write your claim? Reference specific parts of the table or graph.

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about monarch butterfly preferences for where they should lay their eggs.

Name _____

Did the data support Britney and Gabe's new hypothesis? Use evidence to explain why or why not. If you feel the data are inconclusive, explain why.

Your next steps as a scientist: Science is an ongoing process. What new question(s) should be investigated to build on Britney and Gabe's research? How do your questions build on the research that has already been done?