Name_____

DATA Nugget

Pollination matters

Featured scientist: Cynthia Nuñez from Florida International University

Research Background:

Pollination is one of nature's most important processes. Without pollen moving from one plant to another, many plants would not be able to produce fruits or seeds. Without pollination, we wouldn't have food like apples, strawberries, or even chocolate! But not all pollination works the same way. Some plants rely on pollinators like bees and butterflies, while others can reproduce without any help at all. Scientists are still exploring why plants have these different strategies.

Reproductive parts of a Mexican petunia flower.

As a science teacher, Cynthia is always looking for ways to bring real science into her classroom. To learn more about the work of scientists, she joined a summer research program. While there, she had the opportunity to design and carry out a study on pollination in a plant species, Mexican petunia.

Mexican petunias are a flowering plant found in gardens, parks, and wild spaces. They have bright purple flowers. This plant has two ways it can be pollinated, called **pollination methods**. First, insect pollinators visit and move pollen. When pollen is moved from one plant to another, this is called **outcrossing**. Second, these plants can **self-pollinate**, meaning pollen from a single flower can pollinate that same flower.

Pollination methods make a big difference for plants. Outcrossing mixes the genetics of two different plants together, which creates new genetic combinations that may help offspring survive and thrive. In contrast, self-pollination means the genetics of the plant are the same as the parent plant and no new genetic combinations are made. Plants that use self-pollination don't need to rely on pollinators, however many times the seeds they produce are not viable and are not able to grow.

Cynthia predicted that outcrossing would produce the most fruits and seeds, and flowers that relied on self-pollination would produce fewer seeds. She designed a garden experiment where she could control how Mexican petunias were pollinated. To set up her study, she used four different treatments.

Bagged – Cynthia put mesh bags around the petunia flowers. This prevents pollination from other plants, so this treatment shows whether flowers are able to successfully *self-pollinate on their own.*

Open pollination – Cynthia left these flowers open to visits from insects. These plants could be *self-pollinated or outcrossed.*

Self-pollinated by hand – Cynthia hand-pollinated these flowers using pollen from another flower on the same plant. *This treatment shows whether the plant produces fruit when the flowers are self-pollinated by hand.*

Outcrossed by hand – Cynthia hand-pollinated these flowers with pollen from a different Mexican petunia plant. *These plants are all outcrossed.*

Cynthia monitored the Mexican petunia plants in her four treatments for three weeks. She checked the flowers every few days to see which ones developed fruit. If a flower made a fruit, she counted the number of seeds per fruit. In the open pollination treatment, a few times the fruit opened and launched out its seeds before Cynthia could count them, meaning she could get fruit data from the flower, but not a seed count. At the end of her experiment, she had collected data on **percent fruit development,** or the chance of successful development of a fruit from a flower, and the number of seeds produced within those fruits, called **seed count**.

Scientific Question: How does pollination method affect fruit set and seed production in Mexican petunia?

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

Left: Flowers in the bagged treatment. Center: Flower being hand pollinated.
Right: Dissecting fruit to count seeds.

Name_____

Scientific Data:

Use the data below to answer the scientific question:

Flower ID	Treatment	Fruit Developed	Seed Count
1	Bagged	No	—
2	Bagged	Yes	18
3	Bagged	Yes	14
4	Bagged	Yes	6
5	Bagged	Yes	5
6	Open pollination	No	—
7	Open pollination	Yes	fruit opened
8	Open pollination	No	—
9	Open pollination	No	—
10	Open pollination	Yes	fruit opened
16	Open pollination	Yes	fruit opened
17	Open pollination	No	—
18	Open pollination	Yes	fruit opened
19	Open pollination	No	—
20	Open pollination	Yes	fruit opened
11	Self-pollinated by hand	No	—
12	Self-pollinated by hand	No	—
13	Self-pollinated by hand	Yes	19
14	Self-pollinated by hand	No	—
15	Self-pollinated by hand	No	—
50	Outcrossed by hand	Yes	19
51	Outcrossed by hand	Yes	17
52	Outcrossed by hand	Yes	12
53	Outcrossed by hand	Yes	5
54	Outcrossed by hand	Yes	13

Treatment	% Fruit developed	Average Seed Count
Bagged		
Open pollination		
Self-pollinated by hand		
Outcrossed by hand		

Name_____

What data will you graph to answer the question?

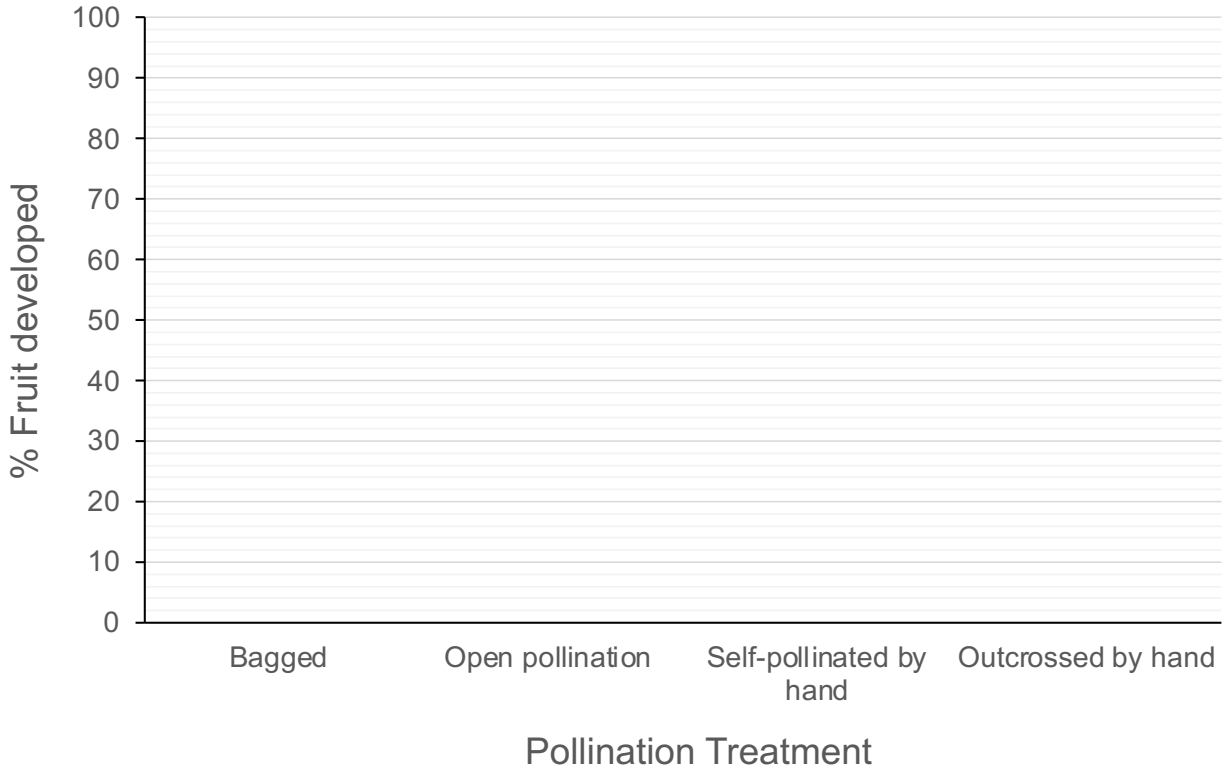
Independent variable(s): _____

_____

Dependent variable(s): _____

_____

Draw your graphs 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.



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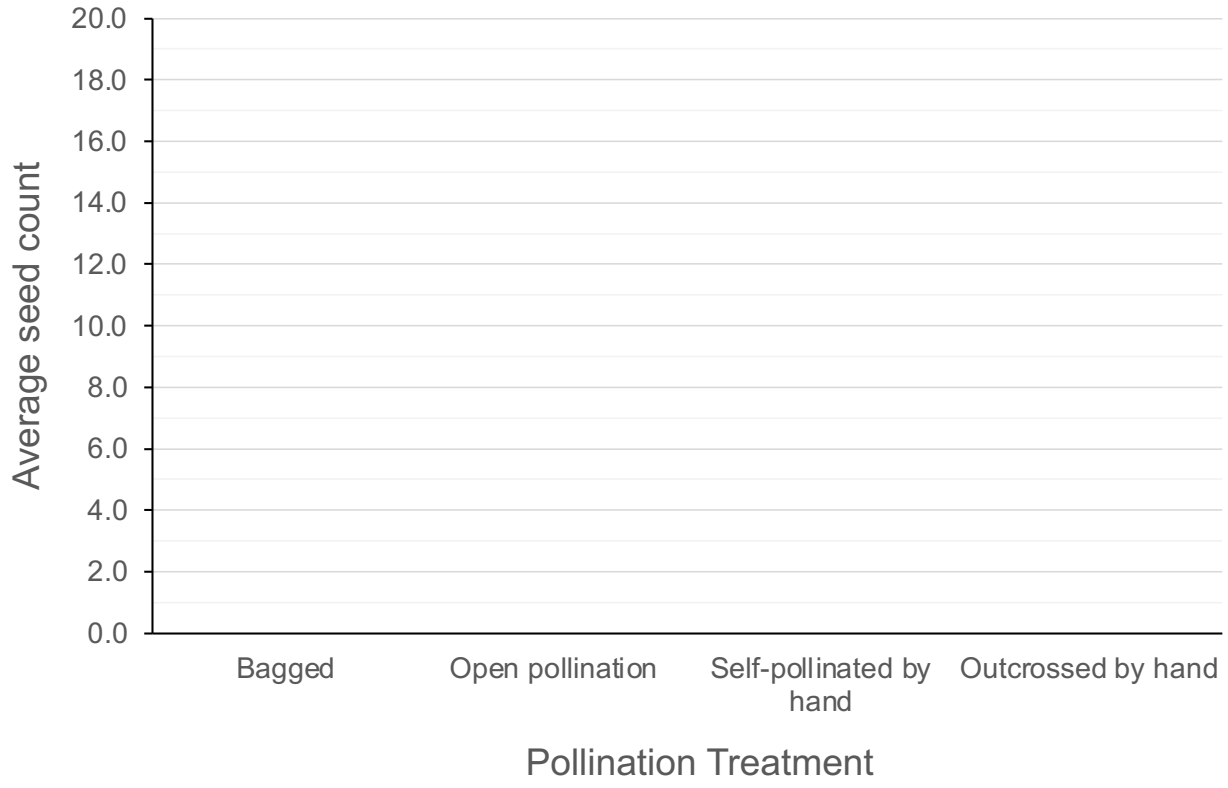

Interpret the data:

Make a claim that answers the scientific question: How does pollination method affect fruit set and seed production in Mexican petunia?

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

Name_____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about how pollination techniques could affect reproductive success.

Did the data support Cynthia's 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 Cynthia's research? How do your questions build on the research that has already been done?