

Confirmation: Will Mustard Seeds Germinate with only Water?**Background:**

When mustard seeds are exposed to the right conditions in the environment they will germinate, or sprout. A white root will emerge from the small seed and you may even see some fine root hairs (which can be mistaken for mold) growing out of the emerging root. The longer the emerging root, the more developed the root hairs, and if the seed coat (protective covering of the seed) is shed from the seed, the better the germination of seeds.

In this lab you will learn about a variety of concepts related to experimentation. Below is a list of the terms that are used throughout many of the labs that we will perform this year.

- *Independent variable* - The variable that you purposefully change. Plotted on the x-axis of a graph. Example: temperature, space, water, soil type...
- *Dependent variable* - The variable that responds to the change in the experiment. Plotted on the y-axis of a graph. Example: the amount of growth in a plant with changing amounts of light.
- *Constant* - All things that remain the same throughout the experiment.
- *Control* - What you use to compare your results to in an experiment.
- *Qualitative observations* - Descriptions about the object or event you are observing. Qualitative observations cannot be measured, looking at the "quality". Example: color, shape, texture...
- *Quantitative observations* – Measurements, usually numerical, of an object or event you are observing. Quantitative observations look at the "quantity". Example: amounts such as length, volume, mass...

2. Purpose:

You and your lab group will be trying to discover if mustard seeds will germinate (sprout) with just water.

3. Hypothesis:

If mustard seeds are placed in a container **with / without water** (circle one), then the seeds **will / will not** germinate (circle one).

4. Materials:

2 containers	Graduated cylinder	Plastic wrap
20 mustard seeds	Water	Marker

5. Procedures:**Day I -**

- Obtain two containers and label them with:
 - Period
 - Table
 - With Water or Without Water
- Place 10 mustard seeds into each container.
- Add 10 mL of water to the container labeled "With Water" using the graduated cylinder.
- Use Table 1 to make qualitative observations of your mustard seeds, such as are the seeds floating, etc.
- Cover the containers and leave them near the back of your lab table.

Day II -

- Uncover and observe your mustard seeds.
- Use Table 2 to record both qualitative and quantitative observations of your results.
- Using the quantitative data from Table 2, create a bar graph in the **Results** section that compares the number of mustard seeds that germinated with water and without water. Be sure to label the graph appropriately.
- Clean up the lab materials according to your instructor.

6. Data:

Table 1: Day I Mustard Seed Observations

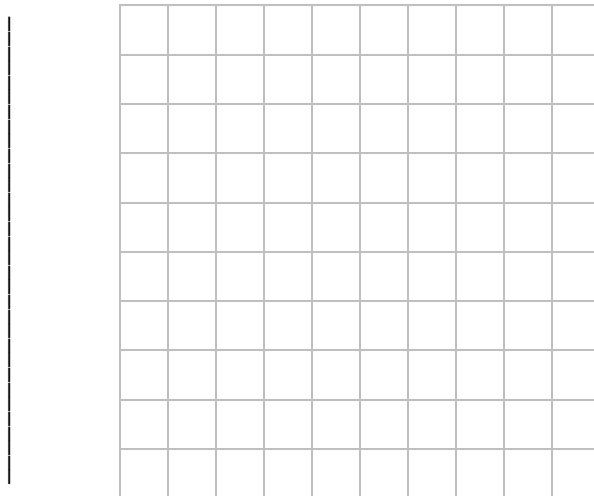
	Without Water	With Water
Qualitative		

Table 2: Day II Mustard Seed Observations

	Without Water	With Water
Quantitative (# Seeds Germinated)		
Qualitative		

7. Results:

Amount of Mustard Seed Germination



8. Conclusion:

1. What did you learn about what plant seeds need to germinate by completing this lab?

2. What other questions might you ask about what plant seeds might need in order to germinate?