

Maintaining Our Yield

Soybean Seed Germination Experiment

What conditions are optimal for a seed to grow?

Design and conduct your own experiment based on information you have learned about germination. This experiment will be based on seedling germination and plant growth. Determine your own variables to test and then conduct your own experiment. Create a “poster” display (this may be digital) of your experiment to be presented to the class.

By completing this project, you will show that you have been able to:

- Determine the basic requirements for plant growth
- Create questions to test for a scientific experiment
- Follow the scientific method to design and carry out an experiment
- Analyze data to develop a conclusion to validate/deny a hypothesis
- Correct or control variables to improve experimental quality.

Background

Some plants can reproduce asexually, or by producing clones. Many other plants produce seeds through sexual reproduction. For these plants, survival depends on germination of seeds and viability of young plants. If a seed germinates in the wrong place or at the wrong time, then life is over for that individual. In this lab, you will design and conduct an experiment on seed germination to explore the effects of abiotic and biotic factors on plant survival.

Plants require certain factors to grow successfully. They need abiotic factors such as water, light, nutrients, a substrate to grow in, and often a suitable temperature. If these are not optimal for a plant, then its ability to germinate and grow can be reduced. They can also be affected by biotic factors such as the age of the seed, predation or mold growth. When you design your experiments, only change one variable.

Procedure

1. Use the Experimental Design worksheet
 - Chose an appropriate control for your experiment (half of the seeds should be controls). Control seeds are handled just like the other seeds, except that they do not receive the treatment.
 - Make sure the hypothesis is something you can test. Decide on what you will measure: the number of seeds germinated over a period of days and/or the growth rates of plants after the seeds germinate. This can easily be calculated by dividing height of the plant by the time they have been growing.
 - Design a procedure to test your hypothesis. Write out your hypothesis, materials, procedure (including what you intend to measure), and how you will compare your data to your control on your worksheet. One copy needs to be turned in from each group to make sure that it is a testable hypothesis and the procedure is something that can be done and the materials can be obtained.
 - After review of the procedure by your teacher, look at the adjustments that may need to be made. Edit your procedure as needed, on your worksheet.
2. Set up your experiment. Determine the best place in the room for your experiment and keep it in that spot throughout.
3. Follow your own procedure to set up your experiment. Keep your own notes for the experiment because you will be putting together a poster at the end of the experiment.
4. Water/monitor your seeds and plants as often as you decided in your procedure (This could occur every day, every other day, etc.)

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5. After data collection is complete (probably about 2 weeks), summarize your data in charts and graphs. These charts and graphs can be made on a computer or by hand on graphing paper.
 - Remember the components of a good graph.
 - X axis—the independent or treatment variable
 - Y axis—the dependent variable
 - Use the proper scale—the scale should allow you to cover most of the page
 - Clearly label the title, axis, values, and units
 - Bar graphs are best for qualitative response variables
 - Line graphs are best for quantitative variables
 - Use a legend to clarify variables
7. Write a lab report based on your experiment. Complete your lab report on a computer and include data charts/graphs in the report.
8. Make a poster of your experiment to put on display for the class. The poster should include your hypothesis, a brief version of your procedure, and your results, including the graphs you made.
9. Place the posters on display in the classroom. Each group will give a short 2-3 minute presentation on their research poster. Afterwards, do a gallery walk, providing constructive and positive comments about each poster by writing it on a sticky note and placing it on the poster.

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