

# Science Fair Projects in Plant Science

Dr. Jodie Ramsay  
Northern State University  
Biology Department

## Many botany-related projects revolve around:

- Effect of fertilizers
- Effect of different soils
- Seed germination
- Tropisms (response to light, gravity, etc.)

## Why choose plants for projects?

- No risks that require special forms! (except in the case of pathogens, such as the Tobacco Mosaic Virus)
- Can be easy to grow large numbers of test subjects
- Few supplies are needed for maintenance of test subjects

## Before choosing a project

- Consult outside sources to see sample projects
  - Intel site has lots of information and links to interesting sites
  - <http://www.sciserv.org/isef/>
- Consider why student wants to use plants
- What is the question to be asked? How is it different from similar experiments that have already been done?
- Develop a clear, testable hypothesis

## **Titles should be descriptive but not too wordy**

- Are organic or inorganic fertilizers more effective?
- Do gases that are released in smoke enhance the germination rate of black pine seeds?
- Does a pineapple grow best in sand, soil or water?

## **Common problems**

- Inconsistent growing conditions
  - Light exposure
  - Watering regime
  - Soil type
  - Different numbers of test subjects (*e.g.* 3 seeds in one treatment vs. 5 in another)

## Problems

- Trying to test too many variables at once
- One thing should be tested with all other variables being constant
  - *e.g.* testing the effects of 3 different fertilizers. All plants should be in the same light conditions and should be watered the same amount.

## Working with seeds

- Seed viability: Do a test run before the experiment begins to test germination percentage. Stored seeds may lose germination ability even after only one year. It's best to use 'fresh' seed.
- Research requirements for seed germination in that specific plant (some may require 'scarring' so that the seedling can expand through the seed coat)

## Watering

- What is the quality of water used?
  - Distilled—may have too few nutrients
  - Tap water—can contain less than optimal concentrations of various nutrients
  - Overwatering: Consistent watering is important, but don't over do! If the top of the soil is wet, it's best to wait.

## Lighting

- Lighting quality
  - Regular fluorescent lights; relatively cheap and throw off a lot of light, but wavelengths are not optimal for plant growth.
  - Gro-lights (with specific wavelengths more similar to that of sunlight); can be expensive
  - Incandescent light—cheap, but may throw off too much heat
- Photoperiod
  - Many plants respond to the length of the dark period, so timers may be necessary

## Fertilizers

- If testing different brands, make sure that the numbers on the back are the same (should contain the same levels of K, N, and P)
- Over-fertilizing can cause stress and even be lethal to the plant.
- Use about half of the recommended strength to prevent burning.

## Other things

- Ambient temperature
  - Problems with growing plants in windows over the winter
  - Fluctuations in temperature
- Humidity can also be an important factor in plant growth.

## **Is the plant healthy initially?**

- Check for signs of insects (trails, waste products, living or dead organisms)
- Check for fungal diseases (discoloration, raised bumps, powdery appearance)
- If plants are stressed due to pathogens or inadequate growing conditions, they will not be good test subjects!

## **General ideas for middle school projects**

- What conditions do plants grow best in?
- How does changing certain variables affect growth and/or development?
- Responses of plants to stimuli
- Qualitative observations

## More advanced projects

- Propagation methods
- Tissue culture
- Plant extracts and their effects
- Plant compounds and their role in metabolism
- Projects involving statistical analysis

## A few sources

- <http://www.all-science-fair-projects.com/category50.html>
- [http://www.ergonica.com/ergonica\\_frame.htm?educators.htm&1](http://www.ergonica.com/ergonica_frame.htm?educators.htm&1)
- <http://biology.about.com/library/weekly/aa032201a.htm>