

## Seed Banks Lab – “Variety is the Saving of Life”

*Standard(s):*

9.4.3.3.4 Explain why genetic variation within a population is essential for evolution to occur.

9.4.3.3.5 Explain how competition for finite resources and the changing environment promotes natural selection on offspring survival, depending on whether the offspring have characteristics that are advantageous or disadvantageous in the new environment.

*Objective:* The student will be able to conduct an experiment that tests the growth of a variety of pea plants in various condition. Growth could be rate, size, fruit production, taste, etc.

Type of Activity: Lab

*Duration:* Two Weeks

*Timing in relation to Nobel Conference:*

- pre-conference activity
- during conference activity
- post-conference activity

*Connection to Nobel Conference:* Cary Fowler

*Teacher Tips:*

- Recommended Prior Student Knowledge:
- Genes control traits
- Sexual reproduction leads to genetic variation
- Natural selection acts upon genetic variation

*Concepts, Connections, and Terms:*

- Genes
- Traits
- Sexual and Asexual Reproduction
- Genetic Variation
- Natural Selection

*Materials:*

- Three varieties of pea seeds ([www.seedsavers.org](http://www.seedsavers.org))
- Pots
- Soil
- Green House or Grow Lights

*Description of Activity:* The student will experiment with a variety of pea plants. The pea plants will then be exposed to a selective pressure (i.e. light, water, nitrogen) factor that may affect their growth and/or pea quality (i.e. size, appearance, taste).

*Procedure:*

Teacher Preparatory Work

1. Plant four pea plants of each variety for each group or student one week prior to the student experimental work.

Student Procedure

1. Obtain four pea pots with actively growing seedlings.
2. Label seedlings pots according to the selective pressure of your choice.
3. Measure stem and leaf lengths of seedlings. Observe leaf color, lesions and spotting on leaf and stems, presence of dead leaves, and any other signs of damage. Take photos of plants.
4. During the week, tend to the seedlings.
5. Measure stem and leaf lengths at the end of the week. Observe leaf color, lesions and spotting on leaf and stems, presence of dead leaves, and any other signs of damage. Compile class data. Calculate averages and graph data. Take photos of plants.
6. Again during the week, tend to the seedlings.
7. Measure stem and leaf lengths at the end of week two. Observe leaf color, lesions and spotting on leaf and stems, presence of dead leaves, and any other signs of damage. Compile class data. Calculate averages and graph data. Take photos of plants.
8. Construct a formal lab report. In the summary of the lab report, answer the following questions:
  - a. Why genetic variation within a population is essential for evolution to occur?
  - b. How would competition for finite resources affect the populations of pea plants?
  - c. If the environment changed, how would offspring survival be affected by natural selection?

*Assessment:* A Formal Lab Report including the answers to the summary questions.

*Extensions:*

1. Observe plant growth while manipulating multiple variables.

2. When flowers bloom, self-pollinate or cross-pollinate the plants. Once the fruit ripens, conduct a taste test in the classroom.