

Variation in Families/Populations of Plants

Annotation

Using Wisconsin Fast-Plants, we will explore how members of plant families and populations vary, and what significance this has for the population.

Problem

How do members of families and populations vary and of what significance is this to the population?

Hypothesis: _____

Primary Learning Outcomes

- Define variation as it applies to the inherited and expressed traits of a family and a population.
- Identify environmental factors that may contribute to or mask variation that exists in a family or population.
- Explain how variation among individuals in families and populations can be detrimental. Explain how it can be beneficial.

Assessed GPS

Habits of Mind:

SCSh2, SCSh3, SCSh4, SCSh5, SCSh6, SCSh7

Content:

SB2

Assessed QCC's

General Agriculture: 106, 113

Science, Technology and Society: 1, 3, 6, 7

General Agriculture: 106, 113

Duration

One hour day 1

10 – 15 minutes for several days

Materials

- Fast-plants with seed pods attached, seeds or seed pods from several plants stored separately
- Magnifying glasses (5x)
- A family data chart or pod data chart
- Clear tape
- Mini pots (film canisters work well)
- Potting soil
- Water
- Permanent markers
- Graph paper

VARIATION IN FAMILIES/POPULATIONS OF PLANTS

Background

One of the basic characteristics of all living organisms is variation. Understanding how variation is generated and maintained are important questions. However, understanding how variation affects survivability and how environmental factors affect variability are equally important. In this Exercise it is possible to examine all or any one of these questions.

In order to carry out this experiment you will need several mature Fast Plants with seeds intact, saved seed pods from individuals or saved seeds from individuals. In order to save pods carefully remove the pods from the parent plant and gently place them between pieces of clear adhesive tape. Be sure to mark what plant each came from and from where on the plant. To do this, begin numbering with the lowest pod on the plant and number them in succession from bottom to top of the plant. Each taped pod would then be labeled with a family name or number and a pod number. It helps to color code families for ease in identification later.

Have students examine the adult (parent or Mother) plant and make detailed note about its appearance. If using seed pods or seeds instead, they can make notes about these. A good way to preserve the appearance of the mother plant is to take a picture of it which you can supply to the students for their initial evaluation of the mother, or both parents, or even grandparents. When the seeds they plant grow to maturity, these descriptions will be used for comparative anatomy.

You will need to have several different growing conditions available and /or let the students choose where they want to plant the seeds in their pods. Plant the seeds from each pod in mini pots – two to a pot. Mark the pots with the appropriate family and pod information and place them in the chosen environments. Be sure that some of each family being studied is included in each type of environment.

Have students watch the plants, water them every day or two and take notes on each individual according to the traits you have planned to observe. To cut down on time spent in daily observations you can split the characteristics being observed into groups of students and have different groups observe only one characteristic each. Data can be compiled for analysis at a later time.

Prior to the lab, students will need to choose what environmental conditions they wish to expose the families of plant to and prepare these. It will be important to place members of all families in all conditions so that family and population variations can be noted – unless you are testing these separately.

VARIATION IN FAMILIES/POPULATIONS OF PLANTS

Procedure

1. Obtain a plant, pod or seeds from your instructor and make sure to write down the family and pod information on your data sheet.
2. Obtain mini pots, soil and permanent marker of appropriate color and plant two of your seeds in each pot and label them with the Family and pod numbers. Water your seeds and place two pots of each in the environments chosen for the experiment.
3. Record the date and the time that you placed the plants into their environment.
4. Each day check your plants for growth and changes. Record the information you are required to in the data chart that you made. Record other observations in your experiment log being sure to note the date, time and family and pod numbers for the observations you made that day.
5. At the end of the experiment, you will share your data with the class so make sure you are accurate and neat.
6. When you have received the data from the class, make appropriate color coded graphs and write a synopsis of your analysis of your results.

Assessment

1. What family were your seeds a member of?
2. What environmental factors were the members of each family and population exposed to?
3. What positive or negative effects did the environmental factors have on family traits as compared to the control conditions? On population traits?
4. Were there particular variations within a family that seemed to be of benefit under particular circumstances?
5. Within the population as a whole?
6. What type of environmental conditions may mask certain traits in a family? A population?
7. What type of environmental factors may cause the expression of masked traits in a given family? A population?
8. Discuss how variation within a family or population may be harmful.
9. Discuss how variation within a family or population may be beneficial.
10. When you have answered all of these questions hand them in along with your color coded graphs.