

IT ISN'T EASY BEING GREEN

Name(s) _____

Introduction:

One variety of pea plant produces short vines while another variety produces tall vines. A little observation shows, however, that the size of the plant is affected by the kind of soil in which the plants grow. Scientists can control this variable by growing all test plants in the same soil.

However, we may still raise these questions:

1. To what extent is the phenotype of an organism the result of its genotype?
2. To what extent is the phenotype influenced by its environment?

Problem:

A student observed a number of tobacco seedlings growing in a dimly lit corner of the room. She noticed that some of them were bright green while others were a creamy yellow. She wondered if their appearance was due to their genes or due to the fact they were not getting enough light.

Hypothesis:

As a lab group, develop a hypothesis that could be tested in a controlled experiment that addresses the problem stated above. (Be sure to write it using an "if... then..." format. The "if" is the independent variable and the "then" is the dependent variable.)

Materials: each lab group will have access to the following

60 tobacco seeds	hand lens or dissecting microscope
2 petri plates containing non-nutrient agar	glass-marking pencil
2 forceps (tweezers)	large cardboard box

Procedure:

On a separate piece of paper design an experiment to test your hypothesis using only the materials listed above.

HINT: You should have a detailed written procedure that addresses each of the following points before you begin your experiment. Make sure that all of the members in your group agree and understand each step of the procedure.

1. What data are you going to collect? Why?
2. How long will you carry out the experiment?
3. What variables, if any have you controlled?
4. What will be the role of each member of the lab group?
5. Have you designed and made a table for collecting data?
6. How are you going to statistically analyze the data?

Be sure your teacher has approved your experiment's procedure before you proceed!

Data Collection:

After you have passed the safety check by your teacher carry out your experiment and make needed observations. Compile your data in an easy to read chart. Be sure to analyze the data using statistics.

HINT: Percentages and ratios are often more useful in genetic studies than raw numbers.

Analysis and Conclusions: Answer the following questions on a separate piece of paper

1. From the data, compare the percentages of yellow seedlings in your control group with those in the experimental group.
2. What experimental variable may be associated with the observed difference?
3. Can this variable alone be considered the cause of yellow color in the tobacco seedlings? Why or why not?
4. What would happen to your experimental group if they were allowed to grow in the light? Try a new experiment to answer this question. Record your results.
5. Do you have any data that supports the hypothesis that yellow color of tobacco seedlings is caused by the environment? If so, which data?
6. Do you have any data that support the hypothesis that the yellow color of tobacco seedlings is caused by heredity? If so, which data?
7. Try to formulate a statement that accounts for all the data.

Lab Report:

At the conclusion of this period of inquiry you will write a lab report that includes a copy of your lab data, graphs and the answers to the analysis and conclusion questions. In your lab report you should try to explain the connection your experiment's data had to the original questions

1. To what extent is the phenotype of an organism the result of its genotype?
2. To what extent is the phenotype influenced by its environment?