

Introduction to Wisconsin Fast Plants® Phenotypes

A Carolina Essentials™ Investigation

Student Worksheet



Overview

Wisconsin Fast Plants® (*Brassica rapa*) are widely used to study inheritance. In this investigation, Fast Plants® seeds are germinated and observed. Observations of **phenotypes**, or appearances, are noted for both stem color and leaf color.

Anthocyanin is a common purple pigment produced by many plants. In Wisconsin Fast Plants®, anthocyanin is easily observed on the stems (hypocotyls) of seedlings germinated in the presence of light. The gene *ANL* regulates the expression of anthocyanin. In plants that are homozygous recessive for this gene (*anl/anl*), anthocyanin production is completely suppressed and the stem is green. Plants that have heterozygous (*anl/ANL*) or homozygous dominant (*ANL/ANL*) genotypes produce anthocyanin and display the purple stem phenotype. The same is true for leaf color. Green leaves are dominant and appear from the YGR/YGR or YGR/ygr genotypes. Yellow-green leaves appear from the ygr/ygr genotype.

Essential Question

What are the typical variations in traits, or phenotypes, found in Wisconsin Fast Plants®?

Activity Objectives

1. Observe differences in phenotypes in Wisconsin Fast Plants®.
2. Predict the possible phenotypes resulting from various parent crosses.

Safety Procedures and Precautions

Understand and adhere to safe laboratory practices when performing any activity in the classroom or lab. Use personal protective equipment such as safety glasses or goggles, gloves, and aprons when appropriate. Adhere to all laboratory safety rules.

Procedure

1. Place a filter paper or paper towel disk in the bottom of a petri dish. The paper should cover the bottom of the dish.
2. Space the 10 seeds out evenly on the filter paper.
3. Use the spray bottle to moisten the seeds and paper. The paper should be damp, but not sitting in a puddle.
4. Cover the petri dish and place it under a fluorescent lamp.
5. Observe the seeds daily for 4 or 5 days, or as directed by your teacher. Record your observations on the data sheet.
6. Use the spray bottle to mist the seeds as needed. They should be kept moist, but not wet.

Disposal

Dispose of all plants and moist paper in a resealable bag provided by your teacher. Wash your petri dish and return it to the designated area.

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SAFETY REQUIREMENTS



MATERIALS

- 10 seeds
- 1 petri dish
- 1 filter paper or paper towel disk
- Spray bottle
- Fluorescent lamp



Data and Observations

Record the number of seeds germinated each day for 4 or 5 days, or as your teacher instructs. Identify the color of the stem and the color of the leaves for each seed germinated.

Fast Plants® Seed Germination Data					
Day	Number of Seeds Germinated	Stem Color A: _____	Stem Color B: _____	Leaf Color A: _____	Leaf Color B: _____
Day 1					
Day 2					
Day 3					
Day 4					
Day 5					
Total					

Analysis and Discussion

1. What are the 2 possible stem phenotypes?
2. What are the 2 possible leaf phenotypes?
3. Given your data, which phenotype appears to be dominant? Why?
4. How could you determine if a phenotype is inherited?
5. Using the genotypes provided by your teacher, perform a dihybrid **homozygous** cross for purple stem color and green leaves with green stem color and yellow-green leaves. What are the phenotypes of the F₁ generation?