Wisconsin Fast Plants® Monohybrid Crosses Inquiry

A Carolina Essentials™ Investigation

Student Worksheet

Overview

Wisconsin Fast Plants® (*Brassica rapa*) are widely used to study inheritance. In this inquiry investigation, Fast Plants® seeds are germinated and observed. Observations of **phenotypes,** or appearances, are used to predict the **genotypes** of both parents. 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.

SAFETY REQUIREMENTS

MATERIALS

10 Fast Plants® seeds, F_2 generation

1 petri dish

1 filter paper or paper towel disk

Spray bottle

Fluorescent lamp

Essential Question

How can monohybrid crosses be used to predict the genotypes and phenotypes of the parent generation?

Investigation Objectives

1. Observe phenotypes for the F_2 generation of Wisconsin Fast Plants®.
2. Identify the genotypes of the F_2 generation plants.
3. Use monohybrid crosses to predict the genotypes and phenotypes of the F_1 generation, and then of both parents, P_1 and P_2.

Safety 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 dish's bottom.
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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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 for each seed germinated.

Fast Plants® Seed Germination Data F_2 Generation			
Day	**Number of Seeds Germinated**	**Stem Color A:** _____	**Stem Color B:** _____
1			
2			
3			
4			
5			
Total			

Analysis and Discussion

1. What are the 2 possible stem phenotypes?

2. Calculate the ratio and percentage for each phenotype.

3. Given your data, which phenotype appears to be dominant? Why?

4. For each stem phenotype, identify the possible genotypes.

5. Using a monohybrid cross, predict the phenotypes and genotypes of the F_1 generation plants.

6. Using a monohybrid cross, predict the phenotypes and genotypes of the parent (P_1 and P_2) generation plants.

7. Design an experiment to test your predictions. (Check with your teacher about performing your experiment.)