PHENOTYPIC EXPRESSION IN PLANT SEEDS

Introduction

Brassica rapa seeds show a dominant / recessive pattern of inheritance within their stems, where a purple pigment is dominant to a non-purple pigmentation. Scientific companies have undertaken genetic crosses to cultivate the seeds of heterozygous parents. All seedlings should conform to the phenotypic ratios expected of a cross between two heterozygous parents.

Aim

To investigate how a phenotypic characteristic (colour) arises in plants through genetic inheritance.

Hypothesis

Complete a Punnett grid to determine the expected ratio of green and white shoots grown in light.

Alleles: P = purple p = non-purple

P generation: Pp × Pp (purple × purple)

Predicted Phenotypic Ratio:

Methodology

1. Place a circular piece of filter paper inside two petri dishes.
2. Into each petri dish, place twenty *Brassica rapa* seeds.
3. Add water to each dish until paper is moist (but not soaked).
4. Add a few drops of water each day to ensure seeds stay moist.
5. Leave seedlings to germinate (will typically take 3 – 5 days).
6. Count the number of purple vs non-purple shoots on the plate.

Results

Phenotypic Ratios for *Brassica rapa* seeds:

	Group 1	Group 2	Group 3	Group 4	Group 5	Total	Ratio (%)
Purple							
White							

Discussion

1. Define genotype and phenotype.

2. Account for the differences in ratios seen between groups.

3. Identify one external factor that could influence the colour of the stem (phenotypic plasticity).

4. Purple stems are caused by the accumulation of anthocyanins, which help retain water content and provide resistance to drought. Describe how phenotypic ratios might be expected to change if the plant was grown in the Australian desert.