

Plant Signalling Experiments

Introduction

Plants produce signalling chemicals called phytohormones to regulate growth and developmental processes. One example of a phytohormone is auxin, which is responsible for the growth and turning movement of a plant in response to directional stimuli (tropism). Another example of a phytohormone is ethylene, a gaseous compound that promotes ripening and longevity in the fruits of the plant.

Aim

To investigate how different plant processes are triggered by signalling chemicals (phytohormones)

EXPERIMENT 1: Phototropism in Seedlings

Method

1. Place a layer of paper towel or cotton wool in three petri dishes
2. Add five rapidly growing seeds to each dish (e.g. barley seeds)
3. Moisten the dish with tap water to promote seed germination
4. Place two of the dishes in light boxes with the openings facing in opposing directions (mark the dishes to show directionality)
5. Leave the third dish outside the boxes (with no directional light)
6. After seeds germinate, measure shoot angles with a protractor



Draw a diagram of the experimental set up, including the predicted directions of seedling growth

Results

Light Condition	Curvature of seedlings (0 – 180°)						
	Seed 1	Seed 2	Seed 3	Seed 4	Seed 5	Mean	Std Dev
No direction							
Left source							
Right source							

Discussion

1. Compare the standard deviations for each light condition and suggest reasons for any differences

2. Explain the experimental results in terms of the distribution of auxin within the seedlings

EXPERIMENT 2: Fruit Ripening

Method

1. Collect six pears and three bananas (significant ethylene producers)
2. Place the six pears into six different Ziploc bags (tightly sealable)
3. Add a banana to three of the Ziploc bags (experimental groups)
4. Leave the bagged fruit for a number of days (at least 3 – 5 days)
5. Compare pear ripeness in the control group and experimental group (this may include assessing the colour, texture, firmness and aroma)



Hypothesis

State a valid hypothesis for this experiment (include a justification that relates to ethylene production)

Discussion

1. Suggest one way the results of this experiment could be quantitated to become more accurate

2. Propose three factors that could act as independent variables if this experiment were expanded