

Coursework - Auxins and Root Growth

Investigating the effect of changing the concentration of auxin on the formation of roots in willow shoots.

Introduction

Background:

I have to find out the effect of changing the level of auxin concentration on the formation of willow shoots. This will include taking cuttings and planting them in compost and recording how much they grow. The cuttings will be fed on an auxin solution of a maximum of 0.001%. Shops, to reduce their costs of supplying plants to the public, commercially use this technique.

Hypothesis:

The higher level of concentration of the auxin solution, the higher the level of growth rate that will occur.

Prediction:

I think that the higher the concentration of the auxin, the more the plant cuttings will grow in a certain period of time because auxin is a plant hormone which controls how much the plant will grow and in which direction the plant will grow.

I think that the shape of the graph with the end results will have a steady rising. I will not use concentrations that are too high because this will inhibit the plants growth and eventually will kill the plant. Before the auxin inhibits growth, it stops the development of the lateral bud. This will make the plant bush out and produce more branches and fruit before it dies. This is not what I want so I will use a relatively weak concentration with the highest being 0.001% as given.

The overall shape of the final results will be a positive steady straight line.

Plan

Method:

I will use 5 different concentrations for the cuttings so that I will be able to get a more accurate line of best fit. The 5 concentrations I will use will be 0.001%, 0.0005%, 0.00025%, 0.000125%, and 0%

Each concentration will be used on three separate occasions just in case I come over an anomalous result (a result that doesn't follow the pattern). In total, I will take 15 cuttings from a willow plant.

Each cutting that is going to be taken must be cut under the lateral bud so that it is possible that the cuttings can form roots if they are left in water or auxin solution. The cutting must be dipped into rooting powder and planted in a test tube. A measured amount of 5cm³ of the water or auxin

solution will be put at the bottom of the test tube and will be given an extra 5cm³ every day at the same time of day. For the results, I will count the number of roots that have formed.

Variables:

The input variable is the concentration of the solution. The outcome variable will be the number of roots that have formed. The input variable will be measured by the percentage of the auxin/water solution. The percentage will be accurate because I will add a certain amount of water to the original 0.001% solution. Each percentage will be half the concentration of the next strongest solution.

The outcome variable will be measured by the number of roots that are larger than 1mm in length.

The input variable has a direct effect on the outcome variable because auxin controls how much cells grow and in which direction how quickly they reproduce. Auxin, in roots, controls the roots to grow downwards by the act of gravity (gravitropism).

The controlled variables will be:

- To keep the amount and intensity of light the same for all 15 cuttings.
- To keep the temperature the same for all 15 cuttings.
- To keep the amount of plant at the beginning the same for all 15 cuttings.
- To get all 15 cuttings from the same plant.
- To keep the amount of water vapour in the air the same for all 15 cuttings.
- To keep the amount of water/auxin solution the same for all 15 cuttings.
- To make sure that all the results are recorded at the same time.

Safety Aspects:

I will ensure that I will be wearing safety goggles as will anybody around me watching me preparing and carrying out my experiment. I will also ensure that anybody with long hair will tie it up so that it is off his or her face. Also I will make sure every thing is out of the way so that nobody will trip over any thing like stools, bags etc.

Specimen Results Table:

This is the specimen results table that I have thought of for this experiment:

Time (Days)	Solution														
	0.001%			0.0005%			0.00025%			0.000125%			0%		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1															
2															
3															
4															
5															
6															
7															
Etc.															