

LEAF SENESCENCE

Prepare an amplified abstract for submission.

Observations: You have observed green and yellow leaves on plants. In the mineral nutrition exercise, the lower leaves turned yellow presumably because of lack of nutrients. In plants grown in the dark, the leaves unexposed to light were yellow and did not become green. Chlorophyll appears to be an expensive molecule to make and is clearly not produced if the plant is under certain types of environmental stress.

Question: Do plant growth regulators play any role in the production or maintenance of chlorophyll in leaves?

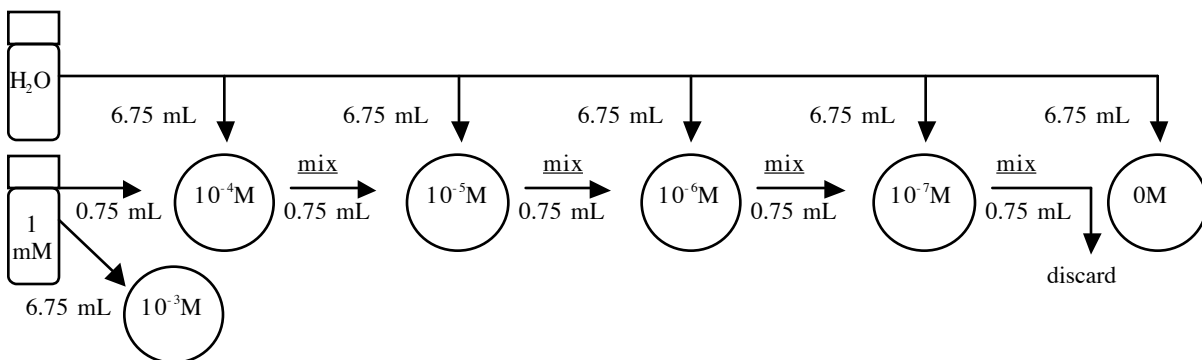
Hypothesis: Hormones may stimulate the maintenance or destruction of chlorophyll.

Prediction: If the hypothesis is true, then green leaves placed under nutrient deficiency in the dark should turn yellow unless some senescence-inhibiting hormone is supplied in sufficient quantity. They should also turn yellow more rapidly if senescence-enhancing hormones are supplied.

Experiment: Wheat (*Triticum*) plants were germinated in the greenhouse and grown for three weeks until several leaves were formed on each plant.

The distinctive first leaf tip was excised and the apical 2 cm piece was placed in vitro in contact with hormone solutions. Ten apical sections were placed horizontally in a Petri dish containing a filter paper disc and 6.75 mL of a hormone solution. The treatment solutions included benzyl adenine, kinetin, gibberellic acid, indole acetic acid, abscisic acid, aminocyclopropane carboxylic acid, and ethephon at concentrations ranging from 10^{-3} to 10^{-7} M. A control dish for each series contained distilled water in lieu of a treatment solution. The dishes were placed in the dark at room temperature and the leaf tips were observed daily over five days.

For each observation, each leaf in the dish was scored based upon color; a completely green leaf tip was scored as 2 points, a half-green leaf tip was scored as 1 point and a yellow leaf tip was scored as 0 points.



Analysis: The individual leaf scores for each dish were added together and presented graphically as total score vs concentration with each day's results overlaid as a line plot (in other words a dose response for each day!). The dose responses of the various compounds were compared to determine the relative efficacy of the treatments.

Decision: on the hypothesis: Reject cannot Reject Explain:

2 cm