CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Brooke J. Rothschild-Mancinelli

Project Number
J1722

Project Title
Plant Growth Flexibility: Phototrophy vs. Heterotrophy

Abstract

Objectives/Goals
Plants normally produce sugar through photosynthesis. I asked the question, does a plant prefer to metabolize like an animal and use sugar (heterotrophy), or does a plant prefer to photosynthesize (photoautotrophy)? I hypothesized that if plants were given sugar they would prefer to use it than photosynthesize, because it would save energy by not requiring the energy for carbon fixation. I also hypothesized that if the plants were given sugar they could survive without light.

Methods/Materials
For the first two experiments I used two types of seeds, radish and rye grass (n=30 in each treatment). For each plant I did dark and light experiments with distilled water (control), and 25 mM solution of D-glucose and sodium acetate (independent variables). For experiment 3 (n=15 in each treatment), I made five different concentrations of glucose, with water as a control. I grew the seeds in their imbibing solutions. I added more of the solution as needed to keep the seedlings covered. On days 3 and 6 I measured their length.
For experiment 4 (n=15 in each treatment), I imbibed the seeds in their proper solutions for one hour then set them up. To set them up I took sheets of plastic then cut them. Chromatography paper was put on one piece of plastic and a bit hanging down. The seeds are then placed in the chromatography paper. Another strip of plastic is placed on that and held in place with duct tape. All of the experiments were in the light.

I measured the time to germinate and plant length after germination.

Results
My results showed that plants treated with water grew to the longest lengths. Experiment 3 suggested that the D-glucose does enhance growth in the dark with a 100 µM concentration. However, in the light the water had the longest seedling length. The first experiment I did 30 replicates for each treatment and the second and third time I did 15. Experiment four showed that radish plants grew longest in 100 µM D-glucose and rye grass seeds in DI water.

Conclusions/Discussion
From this I conclude that radishes prefer to take in low amounts of exogenous sugar and rye grass prefers to make its own sugar by taking in the water.

Summary Statement
To find out whether when plants are given fixed carbon if they will use that for growth rather than photosynthesizing their own sugar.

Help Received
Mother got the supplies and helped with the original idea.