California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Sakina F. Palida

Science Fair Use Only

J0317

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
How Does Light Affect Proteins Involved In Photosynthesis

Division
J Junior (6-8) J Senior (9-12)

Preferred Category (See page 5 for descriptions.)
3 - Biochemistry / Molecular Biology

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: To determine if the amount of light that a plant receives affects the amount of protein in the leaves of the plant, specifically the protein RuBisCO which is the major protein present in leaves. My hypothesis is that plants grown in direct sunlight will have more proteins and will grow bigger and stronger.

Materials and Methods: I grew six black-eyed bean plants under indentical conditions except for the amount of light that they received. Two plants were each exposed to direct light, indirect light, and total darkness. On the twelfth day, I took two leaves from each plant to the lab to be analyzed. I punched a 6 mm sample from each leaf and ground them in tubes with glass beads and buffer to extract the proteins. Then I spun the tubes in a centrifuge and used the supernatant to analyze the protein content by adding a blue colored reagent with a spectrophotometer. To see the individual proteins in the samples, I used polyacrylamide gels and the electrophoresis process.

Results: First, the plants that were exposed to direct sunlight had a higher protein content compared to the other two samples. Second, the levels of RuBisCO were clearly decreased in the plants that were in total darkness. Finally, plants in direct sunlight were stronger but much smaller than the other plants.

Discussion: The results did not completely support my hypothesis. Compared to plants grown in reduced light, plants grown in direct sunlight were stronger but were not tall and did not have large leaves even though the protein levels were greater. This suggests that the plants that received less light were attempting to adapt in order to survive by structural modification and were weak and the leaves were pale in color. I could obtain more information from these studies by running more resolving polyacrylamide gels to see differences in other proteins present in the leaves and also by including some biochemical assays that would measure the activity of some of these proteins.

Summary Statement (In one sentence, state what your project is about.)
In this project, I tried to find out if the amount of light that a plant receives affects the amount of protein in the leaves of that plant.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
I did these experiments at ProteinLabs under the supervision of Dr. Fakhruddin A. Palida.