



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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Project Title Ozone Depletion: A Concern for More than Just Mankind	
Objectives/Goals This experiment looked to discover the effects of higher levels of UV radiation on the health of plants. To determine the health of the plant, I calculated relative amounts of chlorophyll (in %) compared to the control series.	
Abstract Methods/Materials First, I grew ten samples of each plant behind a glass window, with ten seeds of Botanical Interests wheatgrass seeds or Lilly Miller Lima Bean seeds to be sheltered from UV. For each given duration, one sample was placed under the Mineral Light Mild UV lamp, one under the Rayonet Photochemical Reactor Intense UV lamp, and one outdoors. Results would thus compare effects of higher levels of UV on the plant compared to what is currently reaching them with the current strength of the ozone layer. After time elapsed, leaves were clipped from each sample, separately pulverized into aqueous solutions using the 75 HT VWR Sonicator and Coors Scientific pulverizing device, and run through the Cary 50 Scan spectrophotometer. According to the absorption rates of the altered samples compared to the control, percentage losses of chlorophyll molecules were calculated.	
Results In terms of percentage of chlorophyll molecules retained after illumination: Lima Bean: 5 hour mild-66% 10 hour mild- 20% 1 hour intense- 66% 5 hour intense- 20% 10 hour intense- 0% 15 hour intense not included, as plant had already lost all chlorophyll at an earlier time Wheatgrass: 5 hour mild- 92% 10 hour mild- 66% 20 hour- 7% 1 hour intense- 81% 5 hour intense- 7% 15 hour intense- 0% 10 hour no visible change, left in for extra 5 hours, and results followed trend.	
Conclusions/Discussion Global warming is currently cooling the Earth's stratosphere, creating an ideal environment for ozone depletion. Because the UV intensity that reaches the stratosphere (0.08 mW/cm ² /sec) is so comparable to the 0.05 of the "mild" lamp, the effects of the UV on the plants in the mild series would actually occur if the ozone layer were to deplete by 38%. Additionally, this projects will help if humans one day desire to cultivate plants in space as a result of future exploration. Certain planets or moons may have different or no atmospheres and this project shows that UV shelters must be erected to filter the UV intensity that reaches the plants to below 0.05 milliWatts. If one day nations engage in nuclear warfare, or a powerplant facility malfunctions, the effects on nearby plants would be similar to the intense series.	
Summary Statement This experiment explored the effects of higher levels of Ultra Violet radiation on the chlorophyll molecules in plants.	
Help Received Mother helped glue board; Used lab equipment at the University of California, Irvine under the supervision of Professor Eric Potma; Professor Potma helped with data analysis	