



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Daniel M. Shane	Project Number S1710
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Project Title Ozone Depletion: A Concern for More than Mankind: Year 2

<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This experiment explored the effects of increased intensities of UV radiation on two primary groups of chromophores in a plant.</p> <p>Methods/Materials After the plants were grown behind a glass window (a vacuum for UV), they were exposed to the planned UV intensity for the set duration. Once finished, a sample of one leaf was clipped, the mass documented, and pulverized into an aqueous solution with ethanol as the solvent. Next, the solution was filtered using a syringe .22um filter, and syringed into a vial. Then, the ethanol was pipetted into the spectrophotometer, and run as a baseline so that all light absorption of this would be deducted from the absorption of the sample. The samples were then scanned by the spectrometer, and then the peaks of the chlorophyll A and carotenoids were recorded. Finally, the chlorophyll A peak was scaled to equal the peak of the control, to find the amount of carotenoids relative to the chlorophyll. Three trials were done for each same time/duration series.</p> <p>Results Under mild illumination for 5 hours, the lima bean plant contained an average of 106.654% of its carotenoid molecules relative to chlorophyll. After 24 hours of mild illumination, the cartenoid depletion was 11.111% more than of the chlorophyll A. After 32 hours, in the samples exposed to mild illumination, 31.794% more carotenoids were damaged relative to chlorophyll A molecules. The outside sample for all these durations showed no chromophore loss. Illuminated under intense UV for 30 minutes, the lima bean plant contained 67.218% of its original healthy carotenoids compared to healthy chlorophyll molecules. After 1 hour of intense UV, 58.408% of the carotenoids remained compared to the chlorophyll, and 78.123% after 2 hours. As shown last year, the plant lost all light-absorbing molecules after 10 hours of intense illumination.</p> <p>Conclusions/Discussion My hypothesis that the chlorophyll A would be more sensitive was proven incorrect, as the carotenoid contents decreased faster relative to the chlorophyll. With the color change phenomenon, increased UV is even more damaging to plants during the autumn and winter. During this time, carotenoids are responsible for sustaining the plants until the resurgence of chlorophyll in the spring, and they clearly suffered greater damage from the UV light than did the chlorophyll A molecules.</p>

Summary Statement My project explores the effect of higher levels of ultraviolet radiation on chromophores in Phaseolus limensis.

Help Received Mother helped glue report; Father and Mother helped with transportation to and from lab; Used lab equipment at the University of California, Irvine under the supervision of Professor Eric Potma.
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