



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Ashley N. Muirheid	Project Number S1614
Project Title A Fluoridation Revelation: How Does the Introduction of NaF Affect the Rate of Photosynthesis in Isolated Chloroplasts?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project investigates whether NaF concentrations above the optimum fluoride level (.7-1.2 ppm) would affect the rate of photosynthesis in isolated chloroplasts when exposed. I hypothesized that all chloroplast specimens tested within concentrations of NaF below or within the desired level will show no adverse effects.</p> <p>Methods/Materials The measurement technique involved with measuring the rate of photosynthesis deals with the reduction of the dye, DPIP, which acts as an electron acceptor. The transfer of electrons during light-dependent reactions of photosynthesis reduces DPIP, changing it from blue to colorless. I compared photosynthetic rates while exposing the chloroplasts to varying fluoride concentration levels.</p> <p>Three control groups for each of the three concentration levels for fluorine were used to eliminate any variations in consistency during experimentation. NaF concentration levels were tested at 1 ppm, 2 ppm, and 5 ppm, which reflect solution levels projected from the environment's accumulation of natural water runoff from water treatment facilities. The water in the control was left unaltered.</p> <p>Results I used statistical analysis to determine whether the difference between the control and the experimental groups was significant, or if it was due to chance alone, by using a t test as a probability guide for all of my results. I was able to reject the null hypothesis. Therefore, the results were not due to chance and I could conclude that probability supported the difference, which were the fluoride concentration variables of my experiment.</p> <p>Conclusions/Discussion I found that my hypothesis was partially supported in that water treated with concentrations above the optimum fluoride level (.7-1.2 ppm) affected the rate of photosynthesis when exposed. However, all the isolated chloroplasts tested at the 1 ppm concentration level also were affected, in terms of photosynthetic rate, by the fluoridation. For both the boiled and unboiled chloroplasts, as the fluoride levels increased the actual percentage of light transmittance was continuously lower and followed the trend of the control. As future research begins to bring potential ecological impacts of fluoride into better focus, it seems very likely that proof will develop that the ecosystem does suffer damage when fluoride levels of the magnitude discussed here are present.</p>	
Summary Statement If a significant threat is posed on certain autotrophic organisms by the presence of a fluoride compound, serious damage will result in the ecosystems upon which man is ultimately dependent.	
Help Received My science fair advisor graciously provided me with the majority of the materials that I needed to conduct my experiment, along with the laboratory space.	