



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Taylor S. Davis	Project Number J1012
Project Title Pond Drool to Biofuel: What Factors Increase the Growth of Oil-producing Microalgae Cultivated in Photo Bioreactors?	
Objectives/Goals My project was to determine which nutrients would be most effective in increasing the density of oil-producing algae when grown in a photo bioreactor.	
Abstract Methods/Materials Five different solutions were tested to determine which nutrients would increase the production of microalgae. I grew an unknown species of <i>Nannochloropsis</i> microalgae in a system of photo bioreactors made from 2-liter soda bottles. The control contained 1600 ml of distilled salt water with 16 drops of Micro Algae Grow (similar to Guillard's F/2). Four other bottles contained varying amounts of additives. One bottle had only half the algae grow and another bottle had twice as much algae grow required for proper growth. A third bottle added sucrose. A fourth bottle substituted the 1600 ml of distilled water with 1600 ml of carbonated water. During a 17-day period of growth, density was tested each day using a secchi stick. Density readings were recorded and compared to the control.	
Results Out of the 5 methods I tested, the photo bioreactor with the carbonated water showed the most consistent growth and produced the most algae with a density reading of 13.3 million cells/ml. This reading was 3.6 million cells/ml over the control, which resulted with the second highest growth. The method of feeding algae with twice the amount of food resulted in the lowest growth of all the methods.	
Conclusions/Discussion I conclude that the best method for increasing growth of microalgae is to use carbonated water because it has a presence of CO ₂ , which is needed for photosynthesis. I can also conclude that overfeeding microalgae can be detrimental to its growth.	
Summary Statement My project was to determine which nutrients would increase algae growth, thereby increasing the oil produced for use in biofuels.	
Help Received Mother helped me build my board and read densities; Father helped construct framework for photo bioreactors; Professor Alan McHughen, from UC Riverside, answered a few questions for me twice on e-mail	