### Project Title

**Pond Drool to Biofuel: What Factors Increase the Growth of Oil-producing Microalgae Cultivated in Photo Bioreactors?**

### Abstract

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.

### Objectives/Goals

My project was to determine which nutrients would increase the density of oil-producing algae when grown in a photo bioreactor.

### Methods/Materials

Five different solutions were tested to determine which nutrients would increase the production of microalgae. I grew an unknown species of Nannochloropsis 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.