



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Trevor J. Fobel	Project Number S1112
Project Title Growing Green: A Study of the Effects of Chemical Fertilizers on the Biofuel-Producing Algae Dunaliella salina	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals If chemical fertilizers that simulate runoff are applied to the biofuel algae <i>Dunaliella salina</i>, growth will be accelerated.</p> <p>Methods/Materials A culturing station and light stand were assembled. Cultures were inoculated with approx. 1 mL of algae solution. 10 mg of each fertilizer was dissolved in 250mL of solution to synthesize the experimental mediums. One solution contained 7 ppm of dissolved nitrogen (labeled solution N), the other 7 ppm each of nitrogen, potassium and phosphorous (labeled solution NPK). A third group was the control. Point counts were conducted during the 1 week growing period. Average growth rates were used to compensate for variances in the initial algae populations of the individual cultures. Cell totals and growth percentages were determined and the variances analyzed.</p> <p>Results After 1 week of growth all test groups exhibited exponential growth. A daily point count was calculated to yield growth %s for the three test groups. Daily growth rates, total growth averages and differences in %s were documented. The NPK yielded the most dramatic increases in the 1 week growth period, maintaining an ave. growth rate of 166.9% per day. The control group experienced the second highest increases in growth, averaging 88.47% daily. The N group experienced the lowest increases, at 81.45% per day. Growth of the NPK test experienced significantly retarded initial growth compared to the other test groups, but accelerated within 24hrs. The control exhibited a large starting growth %, but never exceeded the NPK group; the growth % of the control varied widely in comparison to the other test groups.</p> <p>Conclusions/Discussion The data indicated that the presence of some fertilizers will cause a dramatic growth increase in <i>Dunaliella salina</i> cultures. <i>Dunaliella salina</i> is tolerant to fertilizers and excels under appropriate conditions. The algae require the presence of equally proportioned fertilizers to experience this large growth. The presence of a solution containing only dissolved nitrogen is slightly detrimental to the growth of <i>Dunaliella salina</i>. Within a solution containing approx. 7ppm each of nitrogen, potassium and phosphorus, the algae thrives. Because of <i>Dunaliella salina</i>'s ability to thrive in solution containing fertilizer, the question is: May <i>Dunaliella salina</i> be used for the purposes of bioremediation while simultaneously being harvested and processed into #algae-fuel#?</p>	
Summary Statement Studying the effects of simulated chemical fertiizer runoff on the biofuel algae <i>Dunaliella salina</i> .	
Help Received Father helped assemble growing station; Chemistry teacher advised on stoichimetric calculations; Mother helped format data tables	