



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <p style="text-align: center;"><b>Jacob R. Gibbs</b></p>	<b>Project Number</b> <p style="text-align: center;"><b>J1508</b></p>
<b>Project Title</b> <p style="text-align: center;"><b>Thinking About the Future: Most Superior Way to Grow Algae</b></p>	
<div style="display: flex; justify-content: space-between;"><div style="width: 40%;"><b>Objectives/Goals</b><p>Algae is the superfood of the future. Algae are a diverse group of eukaryotic organisms that can be unicellular or multicellular. A fast-growing microscopic blue-green algae, spirulina produces more than 20 times more food protein than other land plants such as soy, using far less water, land and energy than conventional crops. In the future humans are going to be running out of food. Algae is a promising alternative and contains 60% protein which is a great nutritional substitute. Not only can algae be used for food, it can also be used as biofuel, medicine, pollution control, beauty products, and fertilizer. This experiment was designed to figure out the effect of light, temperature and fertilizer concentration on algae growth. My hypothesis was that algae will grow faster in a microenvironment that is heated, with more fertilizer and with natural sunlight. My goal is to find a better way to grow algae to meet future needs.</p></div><div style="width: 40%;"><b>Abstract</b></div></div> <div style="padding-left: 5px;"><b>Methods/Materials</b><p>Materials: Algae (Spirulina), grow light (Incandescent), Miracle Gro fertilizer, 1 liter water bottles, heating mat</p><p>Methods: 40 cc of Spirulina algae were placed in each of eight 1 liter plastic bottles of water. 4 bottles received 40 cc of high concentration fertilizer made by mixing 5g Miracle Gro in 1 liter water. 4 bottles received 40 cc of low concentration fertilizer made by mixing 0.5 g Miracle Gro in 1 liter water. Half of the bottles were placed in natural sunlight and the other half were placed under grow lights for 24 hours per day. Half of the bottles were placed on heating mats, and half were exposed to ambient temperature. The experiment was simultaneously duplicated, for a total of 16 bottles. Controls using only fertilizer and only algae were used. A color scale was used as an index of algae growth and measurements taken weekly.</p></div> <div style="padding-left: 5px;"><b>Results</b><p>The experiment showed clearly that the algae grew best with continuous artificial light, low concentration fertilizer and with a heating mat with warmer temperatures. This was also true for the duplicate bottles.</p></div> <div style="padding-left: 5px;"><b>Conclusions/Discussion</b><p>Spirulina algae grows best at warmer temperatures around 25 Degrees Celsius, versus outdoor ambient temperatures ranging from 10-15 degrees Celsius.</p><p>Continuous artificial light grows algae better than natural sunlight.</p></div>	
<b>Summary Statement</b> <p>This project studied the best way to grow spirulina algae by using different types of light, temperature, and fertilizer concentration.</p>	
<b>Help Received</b> <p>My parents helped order the algae and set up the grow light.</p>	