



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

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Project Title Green Oil	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Diatoms produce within their cell membranes fatty lipids and triglycerides from which an abundant amount of oil may be extracted. A large number of factors affect fatty acid production; notably, NaCl concentration of the growth medium. A higher salinity content of the water may force the cells to produce more fatty acid material in the membranes as to counter the pressure from influx of water from osmosis. The purpose of this experiment was to test the hypothesis that higher salt concentration in the growth medium would yield a higher lipid concentration in the diatom mixture.</p> <p>Methods/Materials Marine diatom mixtures were obtained and separated into 15 identical beakers, each which contained 100 mL of distilled water. Every 5 beakers were classified into one saline level: 1.5%, 3.5%, 5.5%. Diatoms were allowed to grow for a period of 3 weeks, then beakers were filled with 500 mL of distilled water in an attempt to induce osmotic shock. Then the liquid in 3 of 5 beakers in every saline level was mixed with sand and blended. All liquid was then filtered. Subsequently 100 mL of every mixture was placed into glass containers and 3 drops of the Sudan IV stain were added. Every liquid was then analyzed under a microscope.</p> <p>Results The marine diatom mixture showed a higher count of red lipid stains in the higher concentration of NaCl. Mixtures from 1.5% saline content had the lowest average lipid count and those of the 5.5% saline content had the highest average lipid count, despite several discrepancies within individual groups. Lipid stains were generally higher in count for mixtures that had been blended in the blender.</p> <p>Conclusions/Discussion Though a generally positive correlation was spotted between lipid count and concentration of NaCl, uncontrollable factors such as light intensity, pH level of water, etc. may be the reason for discrepancies within every saline group. However the hypothesis was thus proved with the large experimentation group. The Sudan IV, which stains lipid cells in liquids red, were higher in number for the liquids that had been growing diatoms in higher NaCl concentration. The practicality of this experiment is self-explanatory. The scramble for clean oil as alternatives to fossil fuels grows ever higher as speculation of global warming continues to mount. Any alternative fuel source is seen as a boon to both economy and environment.</p>	
Summary Statement The purpose of this project was to test whether a higher salt concentration in the growth medium of marine diatoms would yield a higher lipid production within the cells of the diatoms.	
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