| Name(s) | Project Number |
|---|---|
| **Gregory M. Martin** | **J1512** |

**Project Title**

**Increasing Lipid Yields in Chlorella vulgaris through Natural Nitrogen Depletion**

**Abstract**

**Objectives/Goals**
The objective was to increase the lipid per cell of Chlorella vulgaris through natural nitrogen depletion by 130% compared to the control.

**Methods/Materials**
A sample of Chlorella vulgaris was grown in a homemade photo-bioreactor over two 10 day trials. Cultures in both trials were grown in a vitamin enriched BBM media with varying amounts of nitrogen. The cultures were sampled and those samples were tested for cell counts, using a hemocytometer and microscope, and lipid content, using Nile red dye and a fluorescence assay. Graphs were made for each trial showing cells per mL, lipid indicated by AFUs, AFU per million cells, and the increase in lipid per cell over the 100% nitrogen control.

**Results**
The lipid per cell increased immensely in the cultures grown in 20%, 10% and 0% nitrogen levels. The highest value was 500% of the control, on day 10 in trial #2 by the 0% culture. This overshot the hypothesis of 130% by almost 4 fold. The 20% culture had the highest overall lipid in trial #2. This culture balanced cell numbers and the amount of lipid per cell.

**Conclusions/Discussion**
The data supported the hypothesis very strongly. The cultures depleted the nitrogen naturally in their media and significant lipid per cell increases were achieved. Cultures started with high nitrogen had the highest cell counts. Cultures started with limited nitrogen yielded the most lipid over a 10 day trial, because they balanced cell count and lipid per cell.

**Summary Statement**

My project tests the efectiveness of Natural Nitrogen Depletion on Chlorella vulgaris.

**Help Received**

Mother: Found the equitment, taught lab techniques, helped in planning the asay and editing the paper. Father: Got lab equipment running, built the bio reactor and helped edit the paper. Elaine Gillium: Helped refine the topic for my project and helped edit the paper.