2016

Lipid content and biomass analysis in autotrophic and heterotrophic algal species

Addie M. Lauder  
*Liberty University, amlauder@liberty.edu*

Daniel P. Jones  
*Liberty University, ddjones7@liberty.edu*

Thomas E. Walker  
*Liberty University, tewalker4@liberty.edu*

Todd Allen  
*Liberty University, tmallen1@liberty.edu*

Follow this and additional works at: [http://digitalcommons.liberty.edu/montview](http://digitalcommons.liberty.edu/montview)  
Part of the [Analytical Chemistry Commons](http://digitalcommons.liberty.edu/montview), [Biotechnology Commons](http://digitalcommons.liberty.edu/montview), and the [Plant Biology Commons](http://digitalcommons.liberty.edu/montview)

**Recommended Citation**

Available at: [http://digitalcommons.liberty.edu/montview/vol2/iss1/4](http://digitalcommons.liberty.edu/montview/vol2/iss1/4)

This Presentation is brought to you for free and open access by DigitalCommons@Liberty University. It has been accepted for inclusion in Montview Liberty University Journal of Undergraduate Research by an authorized administrator of DigitalCommons@Liberty University. For more information, please contact [scholarlycommunication@liberty.edu](mailto:scholarlycommunication@liberty.edu).
produce both the highest lipid content and the highest percent of biomass. We predict the algae grown with access to both sunlight and exogenous glucose will grow the same species heterotrophically, with exogenous access to glucose, but the highest amount of lipids. In addition to serving as a key component of cell and such as water, vitamins, and inorganic ions. Algae grown photoautotrophically use pigments in cellular photosensitizers to convert energy from light into adenosine triphosphate (ATP), an energy source, and produce glucose. It also requires water, oxygen, and inorganic ions to perform photosynthesis. Some algal species, such as Chlorella vulgaris, can be grown both photoautotrophically and heterotrophically. This algae species fulfills the subject of our experiment.

Our experiment seeks to discover the most efficient way of growing algae to produce the highest amount of lipids. In addition to serving as a key component of cell and inorganic membranes, lipids are a common form of high efficiency, long term energy store for living organisms, which why lipids are extracted and processed to form biofuels. We propose growing new species of algae photoautotrophically by providing it with proper amounts of light but eliminating any glucose available. We also grow the same species heterotrophically in the absence of glucose, but eliminating all exposure to light sources. Finally, we will grow the same species simultaneously with access to both glucose and light. Once the algae is grown, it will be harvested and analyzed for its lipid profile to determine which algae sample has the highest percent lipid content. We will also measure the total amount of each sample to determine which primary energy source leads to the greatest amount of total algal growth, percent organic material, and percent lipid content.

We predict the algae grown with access to both sunlight and exogenous glucose will produce both the highest lipid content and the highest percent of biomass.

Lipid content and biomass analysis in autotrophic and heterotrophic algal species
Addie M. Lauder, Daniel P. Jones, Thomas E. Walker, Todd M. Allen
Liberty University Department of Biology and Chemistry

Abstract

Lipid content and biomass analysis in autotrophic and heterotrophic algal species
Addie M. Lauder, Daniel P. Jones, Thomas E. Walker, Todd M. Allen
Liberty University Department of Biology and Chemistry

Results

Conclusions

• For this theoretical experiment, we hypothesize that the heterotrophic algae will grow faster than the autotrophic algae.
• We predict the algae grown with access to both sunlight and exogenous glucose will produce both the highest lipid content and the highest percent of biomass.

Future Work

1. We suggest repeating this experiment with other species of algae that can also be grown photoautotrophically such as C. vulgaris and C. proteoseudus. Other species may exhibit a preference toward one energy source over the other.
2. We suggest repeating this experiment with varying amounts of exogenous glucose and light in the presence of varying nutrient sources. The optimal conditions for lipid production in algae may be determined by varying the ratio of the nutrient sources.
3. We suggest repeating this experiment with changes to environmental factors, such as temperature and salinity to determine the most effective environment in which to grow algae.

References & Acknowledgments

We wish to acknowledge Grant Wiltshire for his invaluable help in chemistry in beginning this research. We thank the following for their help and advice: James E. Morse, Scott A. Johnson, and Alphonse M. Labrosse. We also thank the following for their help and advice: James E. Morse, Scott A. Johnson, and Alphonse M. Labrosse. We thank the following for their help and advice: James E. Morse, Scott A. Johnson, and Alphonse M. Labrosse.