

Title - Lipid content and biomass analysis in autotrophic and heterotrophic algal species

Program of Study - School of Health Sciences

Presentation Type - Print Poster

Mentor/Mentor Email - Dr. Todd Allen (tmallen1@liberty.edu)

Students Name/Email - Addie Lauder (amlauder@liberty.edu)

Daniel Jones (ddjones7@liberty.edu)

Thomas Walker (tewalker4@liberty.edu)

Category - Experimental (Theoretical)

Abstract:

In light of the recent push for more sustainable energy sources, scientists have begun experimenting with various species of algae to produce lipids that can be used for biofuels. Algae can be grown quickly and produce high quantities of lipids when exposed to the proper levels of nutrients, sunlight and temperature. In addition to the lipid content found in the cell and organelle membranes, some algae species create lipids to be stored within the cells when exposed to various stressors, such as nutrient shortages. Different algae species can be grown photoautotrophically, in which the algae cells use a photosynthetic pathway to produce lipids or they can be grown heterotrophically, in which the algae is given glucose to be used as a food source for lipid synthesis. Our experiment seeks to discover the most efficient way of growing algae in order to produce the highest amount of lipids suitable for biofuels. We propose growing one species of algae photoautotrophically by providing it with proper amounts of light but eliminating any glucose available to it. We will also grow the species heterotrophically, with exogenous access to glucose, but eliminating all exposure to light sources. Finally, we will grow the species heterotrophically with access to both glucose and light. Once the algae is grown, it will be harvested and analyzed for its lipid profile. Then, the percent of the biomass that is composed of lipids will be determined. Our expectation is that for each way the algae is grown, a different lipid profile and biomass composition will be obtained.

Christian Worldview Integration:

Much of the debate concerning algae biofuels and alternative energy sources in general stems from a concern for increasing the longevity of life on the Earth. A specific concern is that the world's reliance upon carbon-based fossil fuels is both unsustainable due to the rate at which these nonrenewable resources are being consumed and irresponsible due to the release of carbon dioxide and other greenhouse gasses into the atmosphere. Researchers are connecting the release of these greenhouse gasses to increases in temperatures on earth and other elements of global climate change. As scientists and researchers holding a Biblical Christian Worldview, we share these concerns, which come from our understanding that God created the world and everything in it, then gave it to man for our care of it and dominion over it. Knowing this, we want to explore everything we can learn about algae and other carbon-neutral energy sources and the best methods of producing them so we can be good stewards of the earth God has blessed us with. Algae biofuels are classified as carbon neutral because, while the burning of those biofuels releases carbon into the atmosphere, carbon is removed from the atmosphere during normal growth. Individuals in the culture at large, even those who do not subscribe to the same worldview that we do, are still interested in exploring these alternative energy sources, both for economic and environmental purposes. Through our research in alternative energy we are demonstrating our concern for the sustainability of the earth and its resources in fulfillment of the dominion mandate. The wide appeal of our research gives us a platform with which to share our beliefs, worldview, and ultimately, the Gospel with those in the scientific and environmental communities who would otherwise not have exposure to it.