Lipid Content in Algae: The Foundation of Biofuel Production

Beadle, Katherine

The concern related to a global energy crisis remains at the forefront of modern discussion and scientific research. The use of algae for biodiesel production is growing rapidly in popularity. The purpose of this project is to determine which algal genus possesses the highest lipid content, the basis of biofuel production. If different genera of algae are cultivated in an identical, controlled environment using a photobioreactor that provides optimal living conditions to support the photosynthetic process, each genus will demonstrate a different relative efficiency of lipid production. In this experiment, a photobioreactor was designed and constructed to provide seven genera of algae with identical living conditions. Algae was cultivated, and a non-polar solvent was used to extract the algal lipids. The resulting lipid mass was measured to determine which genus of algae is most efficient in lipid production. Seven algal genera were successfully cultivated in the photobioreactor, and lipids were extracted for each using a standard scientific method. The Ankistrodesmus genus proved to be the most efficient genus for lipid production by a significant margin. The genus of algae most commonly used for biodiesel today, Chlorella, was one of the least efficient. The impact of this experiment could be far-reaching and profound. While both genera of algae are the same price and equally easy to grow, Ankistrodesmus yields nearly 20% more lipids per sample than Chlorella, demonstrating its superiority as the basis for biofuel production.

Awards Won:
Arizona State University: For the project that applies computer science to further inquiry in a field other than computer science
Google CS Connect Award