Better with Bacteria: The Effects of Bacteria on Chlorella vulgaris

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As fossil fuel depletion continues at an exponential rate, algae biofuels appear to be the most promising alternative. The microalgae, Chlorella vulgaris, is capable of storing 30% of its dry weight in triglycerides, the precursor to creating biofuel, making it an excellent biofuel feedstock. Modern systems of culturing algae for biofuel emphasize the sterility of algae cultures to create maximum efficiency for biofuel production. This project investigated the ecological relationship between C. vulgaris and three plant growth-promoting bacteria (Rhizobium leguminosarum, Rhodospirillum rubrum, and Pseudomonas fluorescens) to determine if the presence of specific bacteria may promote growth and triglyceride production of the algae. Four cultures of algae were grown in separate flasks over a period of seven days. Three of the cultures were inoculated with the specified bacteria while the fourth culture was the control and contained no bacteria. The daily growth of the algae cultures was measured spectrophotometrically, while the biomass and triglyceride content were compared between the four cultures at the end of experimentation. Results indicate that the presence of the bacteria greatly increased algal growth, with some experimental groups undergoing a 42.91% increase of algae biomass compared to the control cultures. In addition, analysis showed no significant decrease between the intracellular triglyceride content of the algae cultured with bacteria and the sterile algae. This new approach to culturing algae could increase the efficiency and viability of C. vulgaris as a biofuel feedstock.

Awards Won:

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