The Effects of Silica on Nitzschia sp.’s Lipid Production and Nutraceutical Contents

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Many renewable energy sources are inadequate to replace the cheap and ubiquitous fossil fuels; however, microalgae may provide a solution to our enormous consumption of carbon-producing energy sources. Microalgae produce more oils than any terrestrial crop, and the oils produced can be converted into biodiesel through transesterification. Diatoms, an important group of algae, are more productive and efficient than most other algal classes. For this experiment, Nitzschia sp., an indigenous species to the Hawaiian Islands, was analyzed to determine the effects of silica on its lipid production and nutraceutical contents, which may be used as novel co-products. Research has shown that the depletion of a vital nutrient from the diatoms may significantly increase the amount of triacylglycerols (the desired non-polar lipid) produced. The diatoms were cultivated in an indoor environment with their respective growth media, varying the amount of silica present. An optimized growth media served as the control for the experiment. After cultivating the diatoms with varying amounts of silica, the samples collected were analyzed to determine the levels of lipids, chlorophyll a and b, fucoxanthin, and the optical density. Both an Ash Free Dry Weight and a Gas Chromatograph analysis further defined the effects of silica on the diatoms. The data analyzed demonstrated that the complete absence of silica from diatoms increased its non-polar lipid production substantially, which is reported in ratios, providing a ratio of 21716.122 compared to the control with a ratio of 232.835, a ninety-three fold increase in the amount of lipids produced.

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