Auxin Induced Cell Modification, Nutrient Absorption, and Biomass Production in Botryococcus braunii and Chlamydomonas reinhardtii

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In an attempt to control the growing pollution of nature’s precious water resources, an experiment was conducted to study the effectiveness of algal species in addressing the problem. Certain algal species possess great amount of potential to act as biofuel and biofertilizer source. However, it was unclear whether these algal species can absorb all types of nutrients of polluted water, and it was unknown if there is a threshold for nutrient absorption. In addition, an investigation to study the possibility of enlarging algal cells to absorb additional nutrients was conducted. In the first phase, impact of auxin on cell size was investigated in two algal species: Botryococcus braunii (Bb) and Chlamydomonas reinhardtii (Cr). Both species were treated with 0, 100, 200, and 300 ppm of auxin and all bioreactors were injected with same amount of fertilizer. Data showed that both species had larger cell sizes at 300 ppm compared to cell sizes at 0 ppm. Cells of Bb and Cr were 55% and 42% larger respectively at 300 ppm. During the second phase, the potential of enlarged cells in absorbing nutrients was investigated. Fertilizer dosages of 10, 20, and 30 ml in combination with 0, 100, 200, 300 ppm of auxin were used. Residual nutrient analysis showed that both species effectively absorbed nitrogen, phosphorus, and calcium; however, they did not absorb any potassium or magnesium elements. Biomass production was consistent with fertilizer and auxin dosages: Bb had 27% more biomass and Cr had 31% more at 300 ppm than 0 ppm. Results proved that cell size increase had effective nutrient absorption potential and it was directly correlated to biomass production. This experiment showed that cell modification of algae using auxin can effectively control water pollution.

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