Quantifying glycerol concentrations produced by the marine microalga, Dunaliella tertiolecta, under hyperosmotic conditions

Climate change and global warming are a worldwide concern, and utilizing alternative fuels is one way to reduce carbon dioxide emissions to the atmosphere. Microalgae are promising as a potential replacement for fossil fuels via biofuels. This study was aimed to show that the microalga Dunaliella tertiolecta is a viable species for biofuel production. The microalga Dunaliella tertiolecta was chosen for this study because of its previously demonstrated rapid glycerol production in response to hyperosmotic shocking. The microalga D. tertiolecta was cultured and hyperosmotically shocked over a four hour period to induce glycerol production. The glycerol was measured and quantified utilizing the Nash method of glycerol oxidation. Hyperosmotic shocking solutions of 1 M, 3 M, and 5 M NaCl with and without NaHCO3 to provide additional carbon were applied to the algal cultures. The shocking solutions showed no significant differences between the like treatments (1, 3 and 5 M without NaHCO3) at any of the time points. There was also no significant difference between the shocking solutions with NaHCO3 at any of the time points. However, there was a significant difference in time zero and time 240, due to the increase of glycerol production at both of those time points. D. tertiolecta produced glycerol under hyperosmotic conditions and the glycerol production increased over time for all three NaCl treatments without additional NaHCO3. The glycerol produced reached 30 mg mL-1, higher than other studies of a similar nature. This mass of glycerol production is promising for future biofuel production and warrants further research. The microalga D. tertiolecta is a viable candidate for biofuel synthesis.

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