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Optimization of Lipid Accumulation in Green Algae Using a Photobioreactor and Connections between Algal DNA

The lipid in algae, triacylglycerol (TAG), can be made into biofuel using a trans-esterification reaction. Algae accumulate more TAG when stressed, often by pH, light cycle, or nutrient availability. The effects of a different light cycle during stationary phase of growth were assessed in green algae strain 92. Daily measurements of pH, population, and nitrate presence monitored growth. Nitrate depletion indicated stationary phase, at which point the light cycle was changed from 14:10 (light:dark) to 24-hour light. Nile red fluorescence measurements monitored lipid accumulation. Strain 92 DNA was extracted, amplified, sequenced and identified using BLAST results. Cells grown under 24-hour light post nitrate depletion showed higher Nile red fluorescence and dry cell weight than those on the 14:10 (l:d) cycle. Cell yield and pH were comparable for both conditions. The high Nile red fluorescence and dry cell weight in 24-hour light show more TAG accumulated than in 14:10 (l:d). Cells grown under both light cycles had the same cell yield and pH, confirming increased fluorescence is due to TAG accumulation, not higher biomass concentration. The pH similarity confirms that light cycle is the only changing variable. Strain 92 has been identified by 18S rDNA as *Monoraphidium sp.*