METHOD FOR OBTAINING BUOYANT TRIACYLGLYCEROL-FILLED CHLAMYDOMONAS REINHARDTII

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There is currently keen interest in cultivating eukaryotic algae as sources of triacylglycerides (TAGs) to be converted into diesel and jet transportation fuel. Recent studies from numerous labs have shown that when stressed by nitrogen (N)-starvation, Chlamydomonas reinhardtii produce TAGs that can readily be converted to diesel fuel. Previous (N)-starvation methods have resulted in micro-algae containing at most 50% TAG, and harvesting of these cells would be problematic and energy-consuming.

Researchers at Washington University recently modified the TAG-induction protocol in 2 respects: the culture was provided with an additional acetate “boost” after 48-hr of N-starvation and the induction was allowed to continue for 10 days. Under these circumstances, the cells destroy most of their cytoplasm and overload with TAG (judged to be >90% TAG by microscopy), becoming fully buoyant (floating on the surface of the aqueous medium and impervious to centrifugation) and often pop after 10 days. This process would allow the TAG to be readily harvested and increase TAG load per harvest cycle. While C. reinhardtii has not been considered a practical organism for manufacturing biofuels, the amount of TAG produced under these conditions suggests a use for C. reinhardtii as an organism for biofuels production.

Advantages: An estimated >90% lipid content in microalgae cells; Ease of harvesting TAGs as the “obese” algal cells float on water