

MASS CULTURE OF DIATOMS FOR FUN AND PROFIT

Zachary Ditmarsen & Matthew L. Julius

St. Cloud State University, Department of Biological Sciences

Algal biomass production is an emerging for profit industry with target algal strains produced in kilogram quantities for biofuels, nutraceuticals, and animal feed supplements. While research is ongoing with taxa grown in these commercial settings, topics are typically focused on enhancing growth rates while minimizing nutrient inputs and enhancing the biochemical composition of the biomass produced. Application of these results to the broader scientific community is often limited. Diversity among these target strains is often limited as the number of governmentally approved taxa is limited to a few dozen species. The expense of building an algal bioreactor often bars use in a laboratory settings. We present protocols for establishing and maintaining large batch diatoms cultures along with the applications and experimental utility of these cultures. The protocols and results were produced a small (~200L) low cost (~500€) laboratory scale bioreactor. Both marine and freshwater strains were produced at the grams per week scale. Products from the bioreactors have had broad utility in laboratory environments. These have included use as a) calibration materials for $^{18}\text{O}/^{16}\text{O}$ ratios in isotopic analysis, b) a tracer material in paleolimnological analysis, and c) as tracer particles in flow dynamic investigations. Experimentation conducted with large culture volumes has considered the rate of size diminution in single cell isolates and the degree of genetic diversification in single cell isolates.