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Alkaliphilic Microalgae for Biofuel Production: Scaling-up to 50 Liter Bag Bioreactors

The use of microalgae for the production of biofuels is in the spotlight due to a reputation for high photosynthetic efficiency, rapid growth rates, high oil productivity and potential for growth in saline or brackish waters in landscapes not suited for crop production. Research and engineering efforts are now focused on overcoming a variety of hurdles to reduce production costs and attain economic viability. Extremophilic algae have unique attributes that can potentially be used to overcome some of the problems associated with biofuel production, including resistance to competitive organisms. The objective of this research was to characterize the growth three extremophilic algal strains in 250 mL shaker flasks, and then characterize growth of the most promising strain in a larger scale (100 L) bag reactor. Of the three algae examined, strain PGV-8 showed the most promise for scaling-up based on growth rate (cell counts) and oil production as measured by Nile Red fluorescent staining. Strain PGV-8 demonstrated a maximum doubling time of about 1.5 d and produced significant quantities of oil in a 100 L bag reactor system, revealing that it has potential for use in larger scale systems.