Isolation and characterization of cyanobacteria and algae strains in Alabama, Missouri, Colorado, and Gulf coast regions

Maazeera Fatima[1,2], Ibrahim Alamin[1,2], Lydia DaviesBalogun[1], Victory Obele[1], Khadijah Taite[1,3], and Eric Schaedig[4], Jacob Sebesta[4], Anindita Banejee[5], Michelle Liberton[5], Vida A Dennis[2], Himadri Pakrasi[5,*], Jianping Yu[4,*], and Harvey J.M. Hou[1,2,*]

[1]RENEW Cyanobacteria Collection Center, [2]Center for NanoBiotechnology Research, Alabama State University, Montgomery, Alabama 36104; [3]Deparmtnet of Biological Sciences, Southern Illinois University, Edwardsville, IL 62026; [4]Biosciences Center, National Renewable Energy Laboratory, Golden, Colorado 80401; [5]Department of Biology, Washington University in St. Louis, St. Louis, Missouri 63130. *Email: hhou@alasu.edu, jianping.yu@nrel.gov, pakrasi@wustl.edu

We have previously isolated fast-growing cyanobacteria that can be utilized for biofuel and biochemical production (Yu et al 2015). Recently we used bioprospecting to discover natural strains of microalgae with desired traits (Schaedig et al 2024). Our hypothesis is that Alabama and the Gulf coast region may host unique microalgae and cyanobacteria strains for bioenergy application. In this work, we collected samples from freshwater and coastal locations in Alabama, Missouri, Colorado, and the Gulf Coast to establish pure cultures of cyanobacteria and algae (Figure 1). Characterization of the samples includes physiological assays to evaluate growth and development under diverse light and nutritional circumstances. The cellular protein and pigment abundance in samples were accessed using UV-vis spectroscopy and Fourier transform infrared (FTIR) method. Future work will be placed on 16S rRNA sequencing to verify taxonomic identity. This work has laid a foundation to establish database of cyanobacteria and algae strains at Alabama State University. The data show the ecological diversity of cyanobacteria and algae and offer potential use in biofertilizer production, oil degradation, plastic digestion, and forensic application.

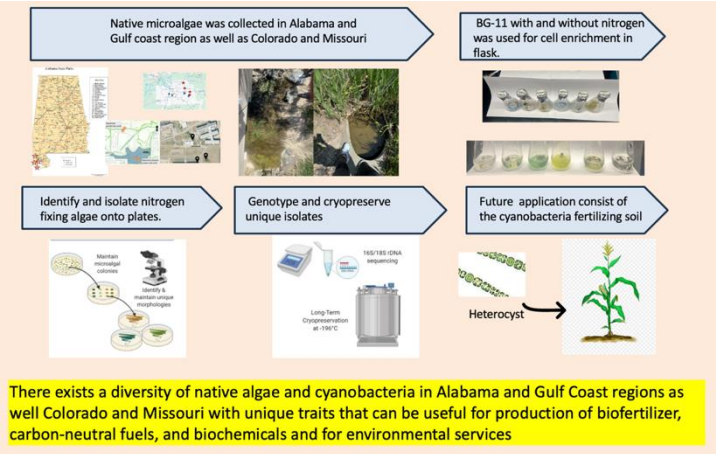

Figure 1: Brief diagram for collection and analysis of cyanobacteria and algae strains.

Yu, J., Liberton, M., Cliften, P. F., Head, R. D., Jacobs, J. M., Smith, R. D., Koppenaal, D. W., Brand, J. J. and Pakrasi, H. B. 2015 "Synechococcus elongatus UTEX 2973, a fast growing cyanobacterial chassis for biosynthesis using light and CO2." Scientific Rep., 5: 8132

Eric Schaedig, Michael Cantrell, Chris Urban, Jacob Sebesta, Katherine J. Chou, and Jianping Yu* (2024) Isolation & bioprospecting of wild microalgae for biotechnology applications, Front. Sci. Technol. Eng. Math, 8: 17-18