The Effects of Growth Promoting Rhizobacteria and Endophytes on Switchgrass Growth and Root Architecture

Bana Abolibdeh,[1]* (libdehba@msu.edu), Laney Hult,[1]Katheryne Johnston,[1]Maren Friesen[1], Sarah Evans[1,2] and **Lisa Tiemann**[1]

[1]Michigan State University, East Lansing; [2]Kellogg Biological Station, Hickory Corners, MI

http://rhizosphere.msu.edu

Project Goals: The primary goals of this projectare to increase are understanding of how rhizosphere microbiomes in perennial biofuelcropping systems (PBCS) gain C resources to fuel N-transformations and interact with plant root exudation patterns and physiological pathways.

In this study, we aim to understand interactions between plant growth promoting bacteria in the switchgrass rhizosphere and endosphere.Various populations of microorganisms inhabiting the same environment often compete for resources in that environment through the secretion of enzymes or chemicals that are inhibitory to their competitors. In this study we will focus on known plant growth promoting bacteria including two N_2-fixing bacteria, *Azospirillumbrasilense*(a Gram negative rhizobacterium) and *Paenibacilluspolymyxa*(a Gram positive endophyte), and two non-N_2-fixing bacteria, *Pseudomonas penetrans*(a Gram negative rhizobacterium) and *Bacillus cereus*(a Gram positive endophyte). After planting and through growth,switchgrass seedlings will be inoculated with all individual, all paired combinations and the four-way combination of bacteria by adding 5 ml of 10^7 CFU ml^{-1} culture broth to an otherwise sterile sand growth media .A modified Hoagland solution will be added to support switchgrass growth, but N levels in the growth media will be halved. Switchgrass seedling growth will be observed and monitored over the course of four weeks and 12 weeks, until harvest. Switchgrass seedling growth will be assessed through tissue analyses of root, shoot and leaf C and N and characterization of root architecture.Microbial growth and abundance will be assessedvia MPN counts on selective media after isolating organisms in the rhizosphere (root surfaces) and endosphere (root, stem and leaf tissue). These data will help us understand how N_2-fixing bacteria and other growth promoting bacteria interact with each other and influence switchgrass growth.