229. The Genetics of Divergence Between Upland and Lowland Ecotypes of Panicum virgatum

Elizabeth Milano1, David Lowry2, and Thomas Juenger1*(tjuenger@austin.utexas.edu)

1University of Texas at Austin, Department of Integrative Biology, Austin, Texas; 2Michigan State University, Department of Plant Biology, East Lansing, Michigan.

https://w3.biosci.utexas.edu/juenger_lab/?q=switchgrass-overview

Project Goals: The overall goal of the proposed research is to utilize genetic and genomic analyses to better understand the growth and development of Panicum grasses. This project will characterize the phenotypic diversity in Panicum virgatum and Panicum hallii accessions to better understand growth architecture and developmental characteristics using QTL mapping, gene expression studies, and experimental manipulations.

Abstract: Panicum virgatum (switchgrass) is an outcrossing C4 perennial grass native to most of North America. Wild populations are predominantly found in tall grass prairie and agronomic cultivars are being developed as a feedstock for cellulosic bioethanol. Because of its economic importance, there is interest in developing genomic tools for marker-assisted breeding programs and crop development. However there is abundant natural variation in Panicum virgatum that lends itself well to the study local adaptation. Two predominant ecotypes are found in overlapping ranges across the Midwestern United States. The northern upland ecotype is adapted to colder climates and shorter growing seasons, whereas the lowland ecotype is found in riparian areas and has a longer growing season. We have developed a 4-way outbred mapping population of 400 individuals that captures the variation observed between upland and lowland ecotypes to study the underlying genetic architecture of locally adaptive traits. Genetic markers were developed using a double-digest RAD scheme and assembled using both a reference-based and de novo approach. The population is currently growing in Austin, Texas but will be clonally propagated and planted at several sites spanning a latitudinal gradient across the US. Thus far we have created a linkage map and found many QTL associated with traits measured in the initial field season. In future years we will compare QTL across environments to discover loci underlying trait divergence between locally adapted ecotypes.

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