

Strengthening Education and Research Capacity for Bioenergy Science at Alabama A&M University Through a Combination of Education, Research, and Partnerships

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Alabama A&M University (AAMU) investigators have been conducting genetics and breeding research for a suite of related, model C4 bioenergy crops including *Miscanthus* and sorghum. The proposed research will leverage this strong foundation to enhance and build an up-to-date bioenergy science research and education program at AAMU. With guidance from collaborating partners, and new investments in modern research tools for high-throughput phenotyping, genomics, bioinformatics, and gene editing, AAMU students will be exposed to the latest cutting-edge technologies available. Specifically, the research will leverage the diverse and well-established populations of *Miscanthus* genotypes and ongoing sorghum projects at AAMU's Winfred Thomas Agricultural Research Station (WTARS).

Miscanthus field trials will be used to study genotype by environment ($G \times E$) by incorporating high-throughput phenotyping in partnership with the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI)/University of Illinois–Urbana-Champaign, through which two undergraduates will be trained each year. These *Miscanthus* trials also will be used to conduct microbiome wet-laboratory and bioinformatics studies in partnership with the DOE Joint Genome Institute (JGI), through which the project expects to train two undergraduates each year. A Sorghum Association Panel (SAP) planted at WTARS will be used to study the effect of nitrogen deficiency, through which two undergraduate students will be trained each year; phenotypic and molecular characterization of gene-edit sorghum lines will be used to train one graduate student. The sorghum research and student training will be in partnership with CABBI and the HudsonAlpha Institute for Biotechnology.

This research project aims to enhance the bioenergy science program at AAMU, within the areas of high-throughput phenotyping, omics and bioinformatic analysis, and plant genomics and biotechnology, strengthened by a partnership with and receiving support from JGI and CABBI. The recruitment and training of 18 undergraduates and one master's student in this bioenergy science program will establish a recruitment pipeline for the bioenergy workforce and graduate training programs.