USDA/NIFA Program: ***Plant Feedstock Genomics for Bioenergy***

TITLE: Mechanism of Carbon Partitioning Regulation by *cpg13* in the Bioenergy Woody Crop Poplar

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NON-TECHNICAL SUMMARY: The lignin content of biomass limits bioconversion of wood cellulosics to renewable biofuels by decreasing the available amount of carbohydrate and by hindering cellulose degradation. High lignin content also negatively impacts biomass productivity in several woody species (Fig. 1). We recently identified a previously uncharacterized gene, *cpg13* (carbon partitioning and growth in chromosome 13) as a key regulator of carbon partitioning to lignin and cellulose, and biomass productivity in *Populus*, based on a combination of genetic and genomic approaches. In this project we are identifying the molecular role of *cpg13* in the poplar and the model plant Arabidopsis by (1) characterizing its function in the regulation of gene expression, metabolites, and cell wall chemistry (Fig. 2) and structure, and (2) determining its spatial and temporal expression and subcellular localization. The expected outcome is the development of woody perennial species that can be manipulated for lignin and cellulose composition for bioenergy and the pulp and paper industry, based on the differential regulation of *cpg13*.

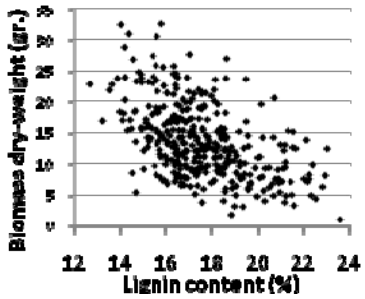

Figure 1. Correlation between biomass and lignin content in a poplar hybrid population used for identification of the gene *cpg 13*.

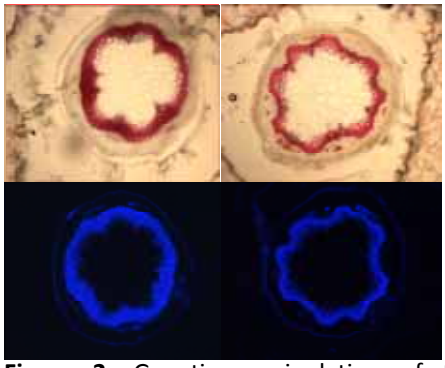

Figure 2. Genetic manipulation of the Arabidopsis homologue of cpg13 (right panel) indicates lower lignin compared to the wild-type. Lignin was visualized after staining with phloroglucinol (upper images) and after irradiation with UV-light (lower images).

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