**Expression of a Hyperthermophilic Endoglucanase in Poplar to Improve Ethanol Production**

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http://asfaculty.syr.edu/pages/bio/Coleman-Heather.html

**Project Goals: This project investigates the effect of *in planta* expression of a hyperthermophilic endoglucanase on plant development and cell wall structure in poplar. The ultimate goal is to produce transgenic biomass that requires less input of commercial cellulases with the same yield of fermentable sugars, thus reducing the cost of bioethanol production.**

Ethanol produced from non-food lignocellulosic biomass holds advantages over fossil fuels and corn-derived ethanol for a number of well-documented reasons. During lignocellulosic ethanol production, cellulases are required to hydrolyze cellulose to glucose following by ethanol fermentation. Currently, microbial-derived cellulases are the only available option, but they remain too expensive for successful commercial lignocellulosic ethanol production. Expression of cellulases in the biomass feedstock itself is a potential solution for more affordable ethanol production. This project aims to produce a hyperthermophilic endoglucanase in poplar, thereby improving efficiency of hydrolysis and reducing the cost of cellulosic ethanol production. Transgenic poplar trees harboring a *Thermotoga neapolitana* endoglucanase (TnCelB) under the control of the Cauliflower Mosaic Virus 35S promoter have been generated and are growing in the greenhouse. Preliminary data in tissue culture shows that poplar-derived TnCelB kept high activity to substrates at 100°C. Transgenic poplar will be assessed for plant growth phenotype, levels of TnCelB expression and activity, and cell wall composition. In addition, the biomass will undergo enzymatic hydrolysis to assess improvements in breakdown due to the expression of the gene. It is anticipated that expression of TnCelB will result in biomass that is more easily digested following thermochemical pretreatment, resulting in an improvement of sugar release and ethanol yield.

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