ASSESSING HYBRID POPLAR BIOMASS FEEDSTOCK QUALITY USING NEAR INFRARED SPECTROSCOPY AND MULTIVARIATE DATA ANALYSIS

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Evaluating wood chemical and physical component traits in large-scale breeding programs, and estimating biofeedstock quality for conversion efficiency using standard wet-chemistry techniques is time consuming, cost prohibitive, and impractical. Near infrared spectroscopy (NIRS) together with multivariate statistical analysis has been demonstrated by the pulp and paper industry to rapidly and inexpensively estimate pulp yield, cellulose and lignin content, and wood density to improve manufacturing efficiency. Research by others has demonstrated that NIRS technology can be used to sample live trees nondestructively and spectral analysis of milled increment cores can be used to reliably predict whole-tree wood properties. Utilizing two different portable NIRS systems and multivariate data analysis software we have developed partial least squares calibration equations for cellulose and lignin content in clonal populations of hybrid poplar being developed for cellulosic ethanol conversion. To develop more robust and simplified prediction models, we have used targeted NIR spectral regions for each chemical component, and are investigating the potential of these systems for sampling wood traits *in situ* versus dried and milled increment cores.

KEY WORDS: NIR spectroscopy, predictive model, biofeedstock, cellulosic ethanol

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