

A New Thioacidolysis Method Allows for Improved Throughput in Linking Biomass Recalcitrance with Lignin Structure and Composition

Background

- Thioacidolysis is a method used to measure the relative content of coumaryl (H), syringyl (S) and coniferyl (G) alcohol lignin monomers bound by β -O-4 linkages.
- Current thioacidolysis methods are low-throughput as they require tedious steps for reaction product concentration prior to analysis using standard GC methods.

Approach

- This thioacidolysis method was optimized to operate at the microscale. It was tailored for higher-throughput analysis which utilizes lignin arylglycerol monomer standards for calibration and was quantified using fast-GC techniques, including a Low Thermal Mass Modular Accelerated Column Heater (LTM-MACH).
- Standard and sample concentration were eliminated to sustain a high sample throughput for large screening experiments. The method was quantitatively validated against a commonly used thioacidolysis method and across two different research sites with three common biomass varieties to represent hardwoods, softwoods, and grasses.

Outcome

- This thioacidolysis method was developed with significantly higher throughput than traditional techniques and was found to measure statistically similar S/G ratios in lignin from different lignocellulosic biomass types relative to a traditional low-throughput technique.

Significance

The composition and structure of lignin based on the relative amount of monomers bound by β -O-4 linkages can be more rapidly determined for screening purposes allowing for improved throughput in linking biomass recalcitrance with lignin structure and composition.

