

CHARACTERIZATION OF SWITCHGRASS EXTRACTIVES BY SUPERCRITICAL FLUID CHROMATOGRAPHY

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As a potential feedstock for biofuel production, switchgrass (*Panicum virgatum L.*) has higher extractives content than most woody biomass. Some components in switchgrass extractives have an inhibitory effect during enzymatic saccharification of carbohydrates for biofuel production, while others show antioxidant, antimicrobial, anti-plant and anti-food pathogens properties. Complete characterization of these non-structural compounds of switchgrass is essential to efficiently utilize switchgrass as a competitive biofuel feedstock. In this study, switchgrass was extracted with ethanol using a flow-through pressurized reactor. Free sugars, total phenolics, hydroxycinnamic acid, and flavonol were identified and quantified. In addition, supercritical fluid chromatography (SFC) was used to further study the composition of the extractives. Compared to liquid chromatography, SFC using carbon dioxide as solvent and methanol as co-solvent is a rapid and environment-friendly analytical method providing accurate, and reproducible results. Chemicals with antibacterial and antifungal properties, such as garlic acid, caffeic acid, vanillic acid, ferulic acid, p-coumaric acid, etc., were identified by this advanced technique in switchgrass extractives. This study demonstrates that the complex switchgrass extractives could be rapidly evaluated by SFC with little sample preparation.