Biomass recalcitrance in willow under two biological conversion paradigms

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Biomass recalcitrance is commonly evaluated using miniaturized high-throughput pretreatment and saccharification (HTP) assays, which aims to recreate conditions used for pretreatment–enzymatic hydrolysis (EH) biorefineries. However, other biorefinery modalities exist, of which anaerobic digestion (AD) is probably the most widely deployed. Using pyrolysis–molecular beam mass spectrometry (py-MBMS) we have characterized biomass samples from a population of natural willow (*Salix viminalis*) accessions, and correlated the results with yields from both EH and AD. The results show that the AD process is generally less affected by the chemical composition of the biomass, compared to EH, although correlations are in the same direction. Specific cell wall components correlated with decreased recalcitrance were syringyl lignin and carbohydrate, whereas guaiacyl lignin, ferulic acid, and *p*-coumaric acid were linked to increased recalcitrance. Several low methane producing outliers were distinguished by unidentified phenolic compounds, warranting further study.