FRACTIONATION AND CHARACTERIZATION OF SWITCHGRASS LIQUID AUTOHYDROLYZATE

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Autohydrolysis is a commonly used method for the fractionation of hemicelluloses from lignocellulosic biomass and as a means for preconditioning and improving cellulose recovery during the later stages of biofuels production. However, there are structural components removed in the autohydrolyzate other than the hemicelluloses and in this study we have characterized them using centrifugal partition chromatography (CPC) and advanced liquid chromatography. Switchgrass, free of ethanol and water extractives, was subjected to autohydrolysis at 160 °C, for 60 min and the resultant liquid hydrolyzate fraction was separated and freeze dried. The freeze-dried autohydrolyzate was then further fractionated using CPC, where a butanol, methanol, water (5:1:4 v/v/v) biphasic solvent system was used to separate the xylose oligomers and other hemicelluloses from the crude mixture. The xylose oligomers and other hemicelluloses were characterized using a high performance liquid chromatography- refractive index detector (HPLC-RID) system, whereas the autohydrolyzate components other than the hemicelluloses were characterized using UV-VIS spectrometry and ultra-performance liquid chromatography – photo diode array detector (UPLC-PDA) systems. The results showed that the hemicellulose fraction of the autohydrolyzate was composed of 45% (w/w) gluco-xylan, 4% (w/w) arabinan and 7% (w/w) galactan. Xylose oligomers such as xylobiose, 7% (w/w), xylotriose, 4% (w/w), xylotetraose, 5% (w/w), xylopentaose, 4.5% (w/w) and xylohexaose, 5% (w/w) were also present in the switchgrass autohydrolyzate. Organic acids such as, 4 g/l of acetic acid was also present in the given autohydrolyzate. CPC fractionation yielded a fraction rich in solubilized lignin, which when analyzed using UPLC-PDA showed the presence of vanillin, *p*-coumaric acid, *t*-ferulic acid, *p*-hydroxybenzoic acid, shikimic acid and gallic acid derivatives. Such characterization studies are useful for developing value-added co-products from the byproduct streams in a biorefinery.