279c Enzymatic Production of Xylo-Oligosaccharides from Corn Stover/Cobs Treated with Aqueous Ammonia

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A novel method of producing food grade xylo-oligosaccharides from corn stover and cobs was investigated. The process starts with pretreatment of the feedstock with aqueous ammonia, which results delignified and xylan-rich substrates. The pretreated substrates were then subjected to selective enzymatic hydrolysis of xylan fraction using endo-xylanase. The hydrolysis products contain mostly xylo-oligosaccharides and small amount of xylose. This process is simpler than the conventional enzyme-based method. The latter involves extraction of xylan with alkali to generate a mixture of soluble xylan and a variety of extraneous materials. A complex purification process is required before the extracted xylan can be used as a substrate for enzymatic hydrolysis. In the present method, the xylan exists in solid form after pretreatment, and becomes a substrate for direct enzymatic hydrolysis after simple water washing. The complex step of xylan purification is therefore eliminated. Further refining of xylo-oligosaccharides is accomplished with charcoal adsorption followed by ethanol elution. Xylanolytic hydrolysis of the pretreated corn stover generated a residue rich in glucan. This substrate is highly digestible by cellulase enzyme giving digestibility above 80% @10 FPU/g-glucan. As a feedstock for xylo-oligosaccharides production, corn cobs are superior to corn stover because of high xylan content and high bulk density. The high density of feedstock reduces water input contributing to low process energy and high product concentration.