Enzymatic Xylose Release from Pretreated Corn Bran Arabinoxylan: Differential Effects of Deacetylation and Deferuloylation on Insoluble and Soluble Substrate Fractions

In the present work enzymatic hydrolysis of arabinoxylan from pretreated corn bran (190 °C, 10 min) was evaluated by measuring the release of xylose and arabinose after treatment with a designed minimal mixture of monocomponent enzymes consisting of α-l-arabinofuranosidases, an endoxylanase, and a β-xylosidase. The pretreatment divided the corn bran material 50:50 into soluble and insoluble fractions having A:X ratios of 0.66 and 0.40, respectively. Addition of acetyl xylan esterase to the monocomponent enzyme mixture almost doubled the xylose release from the insoluble substrate fraction and gave release of 1 mol of xylose/mol of acetic acid released, whereas addition of feruloyl esterase promoted release of only 0.4 mol of xylose/mol of ferulic acid released. For the soluble substrate fraction up to 36% of the xylose could be released by the enzymatic treatment. Acetyl xylan esterase addition on top of the minimal monocomponent enzyme mixture resulted in liberation of up to 0.5 mol of xylose/mol of acetic acid released, whereas feruloyl esterase addition released 1 mol of xylose/mol of ferulic acid released from the soluble substrate. The results imply that on the insoluble material the acetyl xylan esterase was more important for the enzymatic degradation than feruloyl esterase, whereas on soluble arabinoxylan the feruloyl esterase seemed to be more important for the release of xylose.

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