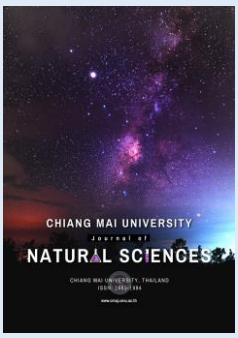

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Research article

Production of Xyloligosaccharides from Rice Straw by Microwave-assisted Enzymatic Hydrolysis and Evaluation of Their Prebiotic Properties

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Abstract Rice straw (RS) is a by-product from rice production process. It is rich in cellulose, hemicellulose and lignin. RS hemicellulose mainly composes of arabinoxylan (AX). This research aimed to investigate the potential of microwave-pretreatment in AX extraction from RS and substrate to produce xylooligosaccharides (XOS) via enzymatic hydrolysis. The extractive-free RS was pretreated by microwave process at 160°C for 5-15 min, then the AX was extracted with 4% sodium hydroxide. The total sugar and reducing sugar content of AX exhibited that increasing microwave-pretreatment time increased the yield of AX. The highest AX content was found at 160°C for 10 min as 7.73%, reducing sugar content of 11.89 mg/g, and total sugar of 165.85 mg/g. The crude AX obtained by microwave-pretreatment was then used as a substrate for XOS production by two commercial xylanases of Pentopan mono BG (BG) and Ultraflo Max (UM), at the enzyme concentration of 50-300 U/g AX (50°C, pH 6.0) for 24 h. The reducing sugar content and sugar profiles were monitored by DNS assay, and thin layer chromatography (TLC) which revealed that BG 50 U/g at 12 h and UM 50 U/g at 24 h showed the promising reducing sugar of 16.4 and 25.44 mg/g, respectively. The composition of XOS derived from RS (RS-XOS) prepared by BG was xylobiose (X2), xylotriose (X3), xylotretraose (X4), and xylopentaose (X5) while by UM was xylobiose (X2), xylotriose (X3) and xylotretraose (X5). Moreover, XOS produced by BG contained very low amount of xylose (X1). In addition, the RS-XOS could the growth of Lactobacillus brevis greater than commercial XOS.

Keywords: Arabinoxylan, Microwave-assisted enzyme hydrolysis, Rice straw, Xylooligosaccharides

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