

Paenibacillus illinoisensis CX11: A Cellulase- and Xylanase-Producing Bacteria for Saccharification of Lignocellulosic Materials

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Abstract : Biomass can provide a sustainable source for the production of high valued chemicals. Under the uncertain availability of fossil resources biomass could be the only available source for chemicals in future. Cellulose and hemicellulose can be hydrolyzed into their building blocks (hexsoses and pentoses) which can be converted later to the desired high valued chemicals. A cellulase- and xylanase- producing bacterial strain identified as *Paenibacillus illinoisensis* CX11 by 16S rRNA gene sequencing and phylogenetic analysis was found to have the ability to saccharify different lignocellulosic materials. Cellulase and xylanase activities were evaluated by 3,5-dinitro-salicylic acid (DNS) method using CMC and xylan as substrates. Results showed that *P. illinoisensis* CX11 have cellulase (2.63 ± 0.09 mg/ml) and xylanase (3.25 ± 0.2 mg/ml) activities. The ability of *P. illinoisensis* CX11 to saccharify lignocellulosic materials was tested using wheat straw (WS), wheat bran (WB), saw dust (SD), and corn stover (CS). DNS method was used to determine the amount of reducing sugars that were released from lignocellulosic materials. *P. illinoisensis* CX11 showed to have the ability to saccharify lignocellulosic materials and producing total reducing sugars as 2.34 ± 0.12 , 2.51 ± 0.37 , 1.86 ± 0.16 , and 3.29 ± 0.20 mg/l from WS, WB, SD, and CS respectively. According to the author's knowledge, current findings are the first to report *P. illinoisensis* CX11 as a cellulase and xylanase producing species and that it has the ability to saccharify different lignocellulosic materials. This study presents *P. illinoisensis* CX11 that can be good source for cellulase and xylanase enzymes which could be introduced into lignocellulose bioconversion processes to produce high valued chemicals.

Keywords : cellulase, high valued chemicals, lignocellulosic materials, *Paenibacillus illinoisensis* CX11, Xylanase

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