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Thermostable xylanase production from a thermophilic *Streptomyces eurythermus* MN13 strain degrading lignocellulosic materials

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Depolymerization of lignocellulosic materials provides a promising alternative for renewable biofuel production. Xylan is a major component of hemicelluloses and is the second most common plant material in nature. Actinomycetes produce various lignocellulose degrading enzymes including xylanases and therefore can be potentially implemented in the production of biofuel and different value added chemicals. In this study 5 thermophilic xylan degrading actinomycetes were isolated from compost samples collected from botanical garden of faculty of agriculture Minia University, Minia, Egypt. All isolates were able to grow at 45^0C utilizing xylan as the sole carbon source. Qualitative and quantitative assay for xylan degradation by the isolated actinomycetes was performed. The isolate with the highest xylanolytic activity, yielding a degradation zone of 6 cm on xylan-Congo red agar and producing 1.4 mg ml-1 of reducing sugars, was selected for further molecular, phenotypical and enzymological characterization. The 16S rRNA gene sequence was determined for molecular classification of the isolated strain. Significant phenotypic properties for the taxonomy of MN13 strain were determined according to the methods of the International Streptomycetes Project. Discrepancies between results of phylogenetic analyses and results of phenetic analyses indicated that, MN13 strain taxonomically represents a novel strain of *Streptomyces eurythermus* for which the name *Streptomyces eurythermus* MN13 is proposed. The highest xylanase production was obtained at 45°C and pH 7 after 7 days of incubation with continuous shaking. However the optimum temperature for xylanase activity was at 65°C suggesting the thermostability of this enzyme. Furthermore, *Streptomyce eurythermus* MN13 was able to depolymerize the various lignocellulosic waste materials such as wheat straw, rice straw and sugar cane bagasse. The thermophilic xylanase produced by *Streptomyce eurythermus* MN13 characterized in this study provides a promising enzyme for the deconstruction of ligncellulosic biomass in various industrial applications such as biofuel production.

Keywords: Actinomycetes, congo red, Streptomyces eurythermus, xylanase, xylan.

Biography

Mahmoud N Menshawy is a Demonstrator at Botany and Microbiology department at Faculty of Science, Minia University, Egypt since 2013. He has B.Sc. in microbiology (June 2012), Minia University, Egypt. He is currently completing his Master Degree in the Department of Botany and Microbiology, Faculty of Science, Minia University, specializing in bacteriology and molecular biology. He has a wide experience in teaching microbiology, molecular biology and botany courses. He served as member of the Board of Directors of the Scientific Professions Union and he is Fund Trustee, Minia branch.

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