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Isolation and characterization of a thermophilic, cellulose-degrading *Streptomyces griseorubens* SH15 strain from agricultural waste compost in Egypt

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Cellulose is the main component of plant primary cell wall and is the most abundant carbon source on earth. Biodegradation of cellulose which constitutes from 33 to 50 percent of lignocellulosic biomass provides a sustainable source for biofuel production. Cellulosic ethanol provides a cleaner and greener alternative to hydrocarbon fuels. Actinomycetes play a significant role in deconstruction of lignocellulosic biomass. In the current study, compost samples were collected from botanical garden of faculty of agriculture Minia University, Minia, Egypt. Thermophilic, cellulose degrading actinomycetes from compost samples were isolated on culture medium supplemented with amorphous cellulose (carboxy methyl cellulose) and crystalline cellulose (Avicel) as the sole carbon source at 45^{0}C. A total of 15 actinomycete isolates were selected and tested for their qualitative ability to degrade both CMC and avicel on congo red agar medium. The isolate with the highest cellulase activity on CMC and avicel was selected for further investigation. The 16S rRNA gene sequence was determined for molecular classification of the isolated strain. On the basis of phylogenetic analysis of 16S rDNA gene sequences, the isolate was classified as Streptomyces griseorubens (100% similarity). Identification was further confirmed by taxonomical criteria listed in the International Streptomycetes Project that aligned the isolated strain to the same species; hence the isolated strain was designated as Streptomyces griseorubens SH15. Factors affecting the production of cellulolytic enzymes by Streptomyces griseorubens SH15 were investigated. The highest enzyme activity was obtained at 45^{0}C and pH7. Moreover, it exhibited cellulolytic activity on various lignocellulosic substrates including wheat straw, rice straw and sugarcane bagasse. The thermophilic nature and the ability of depolymerize cellulose makes the isolated Streptomyces griseorubens SH15 a potential candidate for application in biofuel production.

Keywords: Actinomycetes, Avicel, cellulase, CMC, congo red, *Streptomyces griseorubems*.

Biography

Shimaa F. Ahmed is currently a master student in Microbiology (Bacteriology and Molecular Biology) at Department of Botany and Microbiology, Faculty of Science, Minia University, Egypt, since (2013), and had her BSc. of Microbiology, 2013 from the same Department. She accumulated 3-years of experience as a researcher in an international project on "Nanotechnological approach for the development and implementation of microbial fuel cell for energy harvesting from waste water", funded from European Union in associated with Research Development and Innovation (RDI) program, Faculty of Engineering, Minia University. She participated in a number of regional and international workshops as a member of Organizing Committee.

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