

Isolation and physiological characterization of phenol-degrading bacteria from municipal and petroleum wastewater samples of Fars province, Iran

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Background and Aims: Phenol is a synthetic as well as a naturally occurring organic aromatic compound which is an important intermediate in the biodegradation of industrial and natural aromatic compounds. Many aerobic bacteria are capable of degrading phenolic compounds using phenol oxidase (phenolase). Apart from their usefulness in bioremediation purposes, they also have many medical applications, including discriminating morphine from codeine, measuring hormonal catecholamines (adrenalin, noradrenaline, and dopamine) and as a potential drug target against human pathogenic fungi. The main objective of this study was seeking to find new phenol-degrading-bacteria with high phenolase activity.

Methods: Twenty five samples were collected from different locations of municipal and petroleum wastewater system and cultured on salt base phenol broth media containing different range of phenol concentration (200-900 mg/L). The rate of phenol degradation was assessed using the 4-aminoantipyrine colorimetric test. The phenol-degrading-bacteria were identified using biochemical tests and molecular (16s rDNA) methods. To study the optimum enzyme production, various parameters (pH, temperature and carbon source) were investigated.

Results: Thirty phenol-depredating-bacteria were isolated. Sequence analysis of 16S rDNA indicated that the most isolates are mainly belonged to Pseudomonaceae and then to Bacillaceae family. Among them, Pseudomonas spp showed a good ability of phenol degradation, ranging from 750-900 mg/L. The best conditions for phenol degradation were found to be pH of 7, temperature, 30°C and 0.20% supplemented glucose level.

Conclusions: Findings showed that the phenol contaminated locations are potent source of robust bacteria with phenolase activity which can be useful in discovery of novel drugs against fungi infections as well as their applications in diagnostic medicine.

Keywords: Isolation; Phenol-degrading-bacteria; Phenolase; Phenol oxidase