Screening of *Pseudomonas Sp.* LN-08 Isolated from Soil as Potential Bioremediator of BTEX Hydrocarbon

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ABSTRACT

Introduction: Hydrocarbon utilization and demand cause the environmental pollution (water, air and soil) due to human activities like Petroleum industrial activities, Combustion of fossil fuels, Industrial processes and Discharge of wastewater (Prathyusha *et al*., 2016). BTEX (Benzene, Toluene, Ethyl benzene and Xylene) hydrocarbons are the most commonly encountered pollutants in soil toward ecosystem as reported by US Environmental Protection Agency (EPA) having toxic effect towards environment (Lueders, 2017). Their accumulation has been reported to cause genetic mutations, immunotoxicity, teratogenicity, carcinogenesis etc. (Ehis-Eriakha *et al*., 2020) (Mekonnen *et al*., 2024).

To overcome the BTEX (Benzene, Toluene, Ethylbenzene, and Xylene) contamination in the environment, different strategies have been used including physical, chemical, and biological approaches (Befkadu & Chen, 2018). Among them, we used the biological approach of using Pseudomonas sp. LN- 08 as a bioremediator. Pseudomonas sp. LN-08 used the BTEX hydrocarbon as a sole energy source and transformed them into less toxic and less mobile form including H2O, CO2, and microbial biomass (Smułek *et al*., 2020).

Objective: The aim of the present study was to screen the resistance of Pseudomonas sp. LN-08 isolated from soil against BTEX (Benzene, Toluene, Ethyl benzene and Xylene) hydrocarbon. Environmental factors (temperature, pH, hydrocarbon concentration and time course) for biodegradation were optimized.

Methodology: In the current study, Lipase producing Pseudomonas sp. LN-08 was isolated from soil and evaluated for its potential as bioremediator of BTEX hydrocarbons. Pseudomonas sp. LN-08 was screened for its ability to grow in the presence of Benzene, Toluene, Ethyl benzene and Xylene. The growth medium was supplemented with 2% (w/v) yeast extract, 1% (w/v) $CaCl_2$, 0.01% (w/v) KH_2PO_4, 0.1% (v/v) TWEEN 80, 1% (v/v) palm oil. Fermentation conditions for maximum growth of Pseudomonas sp. LN-08 were optimized in the presence of each hydrocarbon. Pseudomonas sp. LN-08 was grown at different temperature ranging from 37°C – 70°C, at different medium pH (5 -9), and for different time intervals (24 to 96 hours).

Result: The result showed that the Pseudomonas sp. LN-08 had the ability to degrade the BTEX compounds. It was noticed that by optimizing growth factors (temperature, pH, concentration and time course) Pseudomonas sp. LN-08 showed more bacterial resistance. The newly isolated Pseudomonas sp. LN-08 was found maximally resistant towards Ethylbenzene as compared to Benzene, toluene, and Xylene at 37°C. Pseudomonas sp. LN-08 showed maximum growth at40°C in the presence of Benzene, and at 37°C in the presence of Toluene, Ethyl benzene and Xylene. Time course and medium pH for maximum Pseudomonas sp. LN-08 growth were observed as 96 hours and pH 9.0 in the presence of all BTEX Hydrocarbon. Pseudomonas sp. LN-08 showed maximal resistance at 0.5% (v/v) benzene, 2% (v/v) ethylbenzene, 3% (v/v) toluene and 2.5% (v/v) xylene.

Conclusion: It has been concluded that the Pseudomonas sp. LN-08 had showed remarkable potential to be used as a bioremediator for hydrocarbon contamination in soil and water.

Keywords: Bioremediation, BTEX Hydrocarbons, Pseudomonas sp.

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