ISOLATION AND CHARACTERIZATION OF INDUSTRIALLY IMPORTANT ENZYME PRODUCING BACTERIA FROM HOT SPRINGS OF SRI LANKA

Sadeepa HDD[1,2], Manage PM[1,2]* and Sirisena KA[3]

[1]Centre for Water Quality and Algae Research, Department of Zoology,
University of Sri Jayewardenepura, Sri Lanka
[2]Faculty of Graduate Studies, University of Sri Jayewardenepura, Sri Lanka
[3]Department of Environmental Technology, Faculty of Technology,
University of Colombo, Sri Lanka.
pathmalal@sjp.ac.lk

Abstract

The industrial sector which uses excess amount of chemical catalyst and raw materials, create various negative impacts on the ecological balance of the environment. Continuous discovering of novel enzymes and enzyme-producing bacteria is an eco-friendly alternative to overcome the problem. Hot springs have been identified as a rich source of harsh conditions-tolerant microbes. Therefore, the present study focused on isolation and identification of bacteria from hot water springs which have a potential of producing industrially important extra cellular enzymes. Water and soil samples were collected from seven hot water springs located in Mahaoya, Wahava, Madunagala, Kivlegama, Gomarankadavala, Kanniya, NelumWeva in the country during May 2018 and 2019. Temperature, conductivity, pH, and Dissolved Oxygen (DO) were measured at the site itself, using portable meters. Standard pour plate method was performed to isolate potential bacteria from water samples and isolates were screened for enzyme producing ability using plate assays. Temperature stability of crude enzyme extracts was measured for Amylase, Cellulase, and Proteinase. Temperatures of the sampling locations were ranged between 37.0 ^{0}C - 55.4 ^{0}C, and the highest temperature was recorded from Mahaoya. Conductivity, pH and DO were ranged between 800 - 1500 µS/cm, 7.2 - 8.2 and 1.1 - 3.5 mg/L, respectively. Fifty different types of bacteria were isolated from collected samples and, nineteen isolates were positive for amylase production, twenty isolates were positive for cellulose production and twenty-seven isolates were positive for proteinase production. Four bacterial isolates: $MH2_7$, K1, GS2 and W_{10} were screened as the most potential candidates who produce amylase, cellulase and proteinase enzymes at optimum 45^{0}C temperature.

Keywords: *thermophilic bacteria*, enzymes, extracellular enzymatic activities, hot springs, Sri Lanka