ISOLATION AND CHARACTERIZATION OF THERMOPHILIC BACTERIA FROM GOMARANKADAWALA AND KANNIYA HOT WATER SPRINGS IN SRI LANKA FOR FUTURE BIOTECHNOLOGICAL APPLICATIONS

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Industrial processes often take place under harsh conditions that are hostile to microorganisms and their biocatalysts. So, microorganisms that grow and survive at higher temperatures like 50 ^{0}C or above are biotechnical treasures for high-temperature bioprocessing due to their thermo-stable biocatalysts/thermozymes. In Sri Lanka, there are only very limited studies on the thermophilic bacteria. So, the purpose of this study is to isolate and characterize thermophilic bacteria from two selected hot springs, *Gomarankadawala* and *Kanniya* Springs in Sri Lanka for future biotechnological applications. To achieve this, first, all the bacterial strains in the water samples were cultured on Nutrient agar media and incubated at a moderate temperature (40 ^{0}C). Then, the isolates were subcultured and incubated at 50 ^{0}C to isolate thermophiles. From the 85 bacterial isolates, 7 isolates were grown above 50 ^{0}C. To confirm them as thermophiles or thermotolerants, a temperature assay was conducted. Isolate GI 60 was able to grow up to 70 ^{0}C and isolate KI 15 was able to grow up to 65 ^{0}C. For morphological characterization, colony characters such as the size, colour, shape, margin, elevation, pigmentation, texture, opacity and the surface appearance of the colonies were observed. Then, Gram's staining and motility test were done. All seven isolates were gram-positive bacteria. Except GI 39 which was a diplococcus, all other bacteria were bacilli. KI 3 was motile and all others were non-motile. Biochemical tests such as oxidase, catalase, urease, citrate, indole, methyl red (MR), Voges-Proskauer (VP) and triple sugar iron tests were done. Further, the ability to produce protease, amylase, cellulase and lipase enzymes was tested. All 7 isolates were indole positive, urease positive and MR positive whereas VP negative and oxidase negative. Only GI 34 and GI 39 were catalase positive. Isolates KI 3, GI 16, GI 39 and GI 60 were citrate positive. At 50 ^{0}C, protease and amylase enzymes were produced by GI 60. And at 50 ^{0}C, amylase was produced by GI 16 and KI 3. This indicates that these bacteria and their enzymes can be used for future biotechnological applications.

Keywords: *Thermophilic, Kanniya, Gomarankadawala, Hot springs, Enzymes.*

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