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Isolation and characterization of thermophilic and psychrophilic lipase-producing organisms

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Background and Aims: High capability of lipase to perform a specific range of biotransformation with chemo- regio- and/or enantio-selectivity make them one of the most favorite enzymes in different industries such as pharmaceutical,food, detergent, cosmetic, leather and paper. The aim of the current study was to identify and characterize native extracellular lipase producing bacterial strains for industrial uses.
Methods: Biochemical and molecular tests were used for identification of isolated lipase-producing microorganisms. After cell disruption using Micro homogenizing system PCR amplifications of the 16S rDNA regions was performed using the universal primer. The sequence of these regions was blasted in NCBI for further study. Rhodamine B plate method was used as preliminary test for screening of lipolytic activity. In next step, pH-stat method using auto-titrator was applied for quantitative measurement of extracellular lipase activity at different temperatures for identification of thermophilic and psychrophilic lipases. The activity of isolated lipases was also studied in the presence of different cationic ions. Fermentation of the isolated strains and semi-purification of isolated lipases using a FPLC system was also performed.
Results: From numerous samples that were collected, 6 samples showed the highest activity on rhodamine B plates. Blasting the sequences of PCR products confirmed the results of biochemical tests and showed that the best lipase-secretory strains belonged to genus Bacillus. The pH-stat assay confirmed the rhodamine plate results. The maximum activity of ZR-5 was seen after 20 h and for the PG it was 6.54 U/ml after 22 h. Among these isolated strains CT1 showed the maximum activity at 5 °C and ZR-5 at 55 °C.
Conclusions: The overall lipase activities obtained in this study were comparable with the published data. The stability of these enzymes at high and low temperature was special feature of these isolated lipases which have a good potential for industrial application.

Keywords: Secretory lipase; Thermophilic and psychrophilic lipase; Fermentation;