Optimization and partial purification of protease, lipase and amylase enzymes from the newly identified strain of *Aeromonas taiwanensis* strain Persiangulf ST16 in the northern Persian Gulf

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Abstract

Microbial enzymes isolated from marine environments have found special applications in various industries, due to their unique properties. The Persian Gulf is a pristine place for the isolation of bacterial strains with the potential to produce new enzymes due to its rich biodiversity. Protease, lipase, and amylase are among the most widely used enzymes in various industries and due to the increasing importance and demand for microbial-marine enzymes in industry, this study aims to optimize and partial purify these enzymes from new strains isolated in port. Choubdeh (north of the Persian Gulf) was performed for the first time. Sampling was performed in November 2019 from 10 different stations (water and sediment samples). A new strain, *Aeromonas taiwanensis* - Persiangulf ST16 (accession number: OM189448) capable of producing protease, lipase, and amylase were identified by phylogenetic analysis of 16 SrRNA sequences. Optimal conditions for the growth of this bacterium included temperature of 30-37 ° C, pH 6, and salt concentration of 2.5%. The highest enzyme activity was observed for all three enzymes on the second day of incubation. The highest production of protease was reported at 37 ° C, pH 7, with the presence of maltose as a source of carbon and casein as a source of nitrogen, and the lowest was observed in the presence of dextrose and Beaf extract. The optimal conditions for lipase production at 37 ° C were 6-7 pH, and in the presence of olive oil and tryptone. The use of tween 20 and casein produced the lowest amount of enzyme. Optimal amylase production was observed at 35 ° C, pH 7, and the use of starch and yeast extract, but sorbitol and ammonium sulfate-induced the lowest production. During the purification steps, the specific activity of all three enzymes increased so that in the last stage of purification, protease, lipase, and amylase enzymes were purified by 16.23, 2.69, and 2.43 times respectively compared to the crude enzyme. Optimization of production of all three enzymes with significant activity by *Aeromonas taiwanensis*-Persiangulf ST16 showed that this bacterium could be a good candidate for further studies and use in industry.

Keywords: *Aeromonas taiwanensis*, Protease, Lipase, Amylase, Persian Gulf.