

# Beneficial Microbes: Food, Pharma, Aqua & Beverages Industry

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## Bioprocess optimization and purification of highly stable protease from a novel thermophilic strain of *Streptomyces* sp. MST-3

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Proteases with greater stability against temperature, pH and chemicals are of great industrial demand. A novel thermophilic *Streptomyces* sp. MST-3 from desert soil was optimized for production of protease at 50 °C, pH 8.0 and 150 rpm by 5% inoculum of 96 h in submerged fermentation experiments. Maximum production was achieved using 1.5% starch, 0.5% potassium nitrate, 0.5% malt extract, 0.3% gelatin, 0.5% sodium chloride, 0.5% casein enzymatic hydrolysate and 0.09% CaCl<sub>2</sub>. Enzyme production remained independent of growth and 17-fold increase in production was recorded after optimization of all parameters. Process was up-scaled to 3L biofermenter with maximum production at 192 h (338.45 U/mg proteins). Optimum pH for activity of crude and purified enzymes were 11.0 and 12.0 with residual activities of 120.58% and 151.3%, showing maximum stabilities of crude (126.44%) and purified enzyme (175.1%) at pH 12.0 and 10.0, respectively. Optimum temperature for crude and purified enzyme was 60°C with high stability from 20-60 °C. Lead acetate and calcium chloride showed stimulatory effect on enzyme activity. The 35 kDa protease showed high stability and enhanced activity against ethylene glycol, butanol, ethanol, methanol, chloroform, acetone, DMSO and benzene. Protease activity was increased by increasing concentrations of hydrogen peroxide, SDS, Tween 20 and Tween 80. Protease has Km value as 5.26 mg/ml and Vmax as 1828.0 U/mL with azocasein as substrate. Crude preparations were successfully used to lyse blood clot and coagulated egg white and for dehairing of cow's skin suggesting its industrial applications.

### Biography

Maryam Shafique has completed her PhD from Department of Microbiology, Quaid-i-Azam University, Pakistan and worked on isolation of thermophilic actinomycetes for production of proteases followed by purification and characterization studies. Currently, she has been working as an Assistant Professor (TTS), Department of Microbiology, Federal Urdu University of Arts, Science and Technology, Karachi, since 2011. Her area of interest is applied microbiology and she is supervising her research students on many ongoing projects including fermentation technology, microbial enzymes, bioactive metabolites and biodegradation. She has nine publications to her credit with many in progress. Her main focus is development of strong industry-academia linkages for the implementation of lab scale research on industrial scale.

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