Determination of Protease Producing Potentials of Moderately Halophilic and Halotolerant Bacterial Isolates for Leather Industry

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Objectives: Moderately halophilic and halotolerant bacteria were isolated from two different regions of İzmir Bird Paradise sea water ponds and commercial salt samples obtained from Çamaltı Saltern, İzmir. Proteolytic twenty one isolates, developed a transparent halo within the selected sixty nine (69) isolates, were chosen as extracellular protease producers and in the study, the potential usage of these proteolytic isolates in enzymatic dehairing process was investigated to reduce the negative environmental impact of conventional dehairing chemicals for leather industry.

Materials and Methods: The isolation and purification of moderately halophilic and halotolerant bacteria were performed by using conventional microbiological techniques. The Gram staining, colony morphology, EPS production, the growth on Cetrimide Agar, the growth on Phenol Red Mannitol Salt Agar, the growth on Mac Conkey Agar, the reduction test of nitrate to nitrite and denitrification test, the growth properties in different salinities such as 0, 0.5, 1, 2, 5, 7.5, 10, 15, 20, 25%(w/v) total salt containing MH media were performed in order to select the different isolates. As a result of these phenotypical and biochemical tests, sixty nine (69) isolates were selected due to their different characteristics and twenty one (21) of these isolates were found positive for extracellular protease activity in 5%(w/v) skimmed milk and 7.5%(w/v) total sea salt containing MH medium at 37°C in 3 days. The zone diameters of these isolates were recorded and the cultures were grown in batch cultures in liquid media for the determination of keratinolytic, collagenolytic and elastolytic enzyme activities from culture supernatants spectrophotometrically. The keratinolytic, collagenolytic and elastolytic activity were measured with keratin azure (Sigma), azocoll (Sigma), and elastin-congo red (Sigma) respectively. All proteolytic activities were defined as absorbance change per time.

Result: Environmental-friendly leather processes based on enzymatic systems have become a potentially attractive issue for leather industry due to the increasing health and environmental regulations and restrictions during the last few decades. Traditional dehairing processes using lime and sulphide solutions are some of the most pollutant operational steps in leather manufacturing and several researches concerning this issue have been attempted. Accordingly, moderately halophilic and halotolerant isolates could be appreciated the terms of newly potential dehairing enzymes for leather industry due to their dehairing capability.

Conclusion: The proteolytic enzymes of newly isolated moderately halophilic and halotolerant isolates could be useful alternatives to conventional dehairing chemicals and these novel extracellular enzymes producers obtained from our national sources leads to a very important role for leather industry in the view of environment and biotechnology.

Keywords: Moderately halophilic bacteria, halotolerant bacteria, keratinase, collagenase, elastase, dehairing, leather industry.

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