Hindawi
Archaea
Volume 2020, Article ID 8844811, 9 pages
https://doi.org/10.1155/2020/8844811

Research Article

Identification and Characterization of a Newly Isolated Chitinase-Producing Strain *Bacillus licheniformis* SSCL-10 for Chitin Degradation

Abirami Sasi,[1] **Nagarajan Duraipandiyan**,[2] **Kannan Marikani**,[3] **Sugapriya Dhanasekaran**,[4] **Noura Al-Dayan**,[5] **and Divya Venugopal**[4]

[1]*Department of Microbiology, Kamaraj College, Thoothukudi, India*
[2]*Department of Zoology, Kamaraj College, Thoothukudi, India*
[3]*Department of Zoology, V.H.N.S.N.College (Autonomous), Virudhunagar626001, TN, India*
[4]*Department of Medical Lab Sciences, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Wadi ad-Dawasir Campus, Saudi Arabia*
[5]*Department of Medical Lab Sciences, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia*

Correspondence should be addressed to Sugapriya Dhanasekaran; sughaphd@yahoo.com

Received 22 July 2020; Revised 9 September 2020; Accepted 15 October 2020; Published 9 November 2020

Academic Editor: Yu Tao

Chitinases or chitinolytic enzymes have different applications in the field of medicine, agriculture, and industry. The present study is aimed at developing an effective hyperchitinase-producing mutant strain of novel *Bacillus licheniformis*. A simple and rapid methodology was used for screening potential chitinolytic microbiota by chemical mutagenesis with ethylmethane sulfonate and irradiation with UV. There were 16 mutant strains exhibiting chitinase activity. Out of the chitinase-producing strains, the strain with maximum chitinase activity was selected, the protein was partially purified by SDS-PAGE, and the strain was identified as *Bacillus licheniformis* (SSCL-10) with the highest specific activity of 3.4 U/mL. The induced mutation model has been successfully implemented in the mutant EMS-13 (20.2 U/mL) that produces 5-6-fold higher yield of chitinase, whereas the mutant UV-11 (13.3 U/mL) has 3-4-fold greater chitinase activity compared to the wild strain. The partially purified chitinase has a molecular weight of 66 kDa. The wild strain (SSCL-10) was identified as *Bacillus licheniformis* using 16S rRNA sequence analysis. This study explores the potential applications of hyperchitinase-producing bacteria in recycling and processing chitin wastes from crustaceans and shrimp, thereby adding value to the crustacean industry.

1. Introduction

Shrimp production in India was estimated to be 700,000 tons in 2019, with the state of Tamil Nadu being one of the main producers. The seafood industry makes a significant contribution to the global food supply providing an essential source of protein. The commercialization of this aquaculture has generated economic profits while the wastes produced by these industries have had an adverse effect on the ecosystem [1, 2]. The global fish production is estimated to rise from 154 million tons in 2011 to 186 million tons in 2030 [3]. Approximately 5% of shrimp wastes are processed into flours and extracts which form a base for animal feed [4]. Shrimp wastes consist of 40% chitin, a polysaccharide made up of N-acetylglucosamine units [5] and a significant primary resource for the source of bioactive molecules [6].

Chitin is degraded most frequently by the chemical pathway to generate oligosaccharides. However, this involves adverse consequences such as processing costs and harmful effects on the ecosystem with the use of highly corrosive chemical reagents [7, 8]. On the other hand, the biotechnological pathway is an ecofriendly approach [9] where