

Bacillus pumilus like micro-organism: A novel and promising ectoine producer isolated from the marine niche

Chirag D. Desai and Rekha S. Singhal

Department of Food Engineering and Technology, Institute of Chemical Technology, India

Ectoine, a zwitterionic, low molecular weight compatible solute found in halophiles offers numerous potential biotechnological applications. There are many reported ectoine producers, but the marine environment offers possibilities of better and other unknown producers of ectoine. During our work on screening potential ectoine producers along the Western coast of India, we isolated and identified an aerobic culture biochemically and using molecular technique as *Bacillus pumilus*. This culture was used for ectoine production by one-factor-at-a-time method and subsequently by Response Surface Methodology. Ectoine production increased from 15.3 mg/L in the initial medium to 99.62 mg/L in the statistically optimized medium containing 55.0 mM glucose, 0.6 % (w/v) mycological peptone, 0.1 % (w/v) ammonium chloride and 3 M sodium chloride. Supplementation of the RSM optimized medium by 4 mM aspartic acid and further optimization of the amino acid enriched medium by Evolutionary Operation (EVOP) yielded 279.68 mg/L ectoine with 70 mM glucose, 2.0 M NaCl and 4.0 mM aspartic acid. Further, the effect of a combined addition of sodium chloride and magnesium chloride and ethylene glycol/glycerol/proline/sucrose on production of ectoine was checked. A second round of EVOP optimization increased the ectoine to 552.61 mg/L with 2.25 M NaCl, 0.75 M MgCl₂ and 1.25 M glycerol as the final optimized medium components. Using this medium in a lab-scale bioreactor increased the ectoine production to 956.06 mg/L. Further work on identifying the gene responsible for the ectoine synthesis in this organism with an aim to enhance the productivity of the culture is under progress.

Biography

Chirag D. Desai is pursuing his Ph. D. (Science) Biotechnology degree under the guidance of Prof. Rekha S. Singhal, Professor of Food Technology, Department of Food Engineering and Technology, Institute of Chemical Technology, Matunga (E), Mumbai-400019, India. The authors are working on the topic "Studies on fermentative production and downstream processing of ectoine".

titodesai28@gmail.com

Design and expression of N-terminal constructs of Arabidopsis thaliana PEX5

Divya Ramkumar

University of Leeds, UK

Peroxisomes in eukaryotes are indispensable organelles that import a multitude of proteins to carry out diverse metabolic functions including detoxification. Many of these matrix-directed proteins are bound by peroxisome receptors that are found to be present in both the cytosol and within the peroxisome matrix. The PEX5 receptor plays a crucial role in the peroxisomal import cycle as it recognizes the PTS1 signal peptide present on most matrix-directed cargo proteins and aids their import into the peroxisome. Despite extensive research on this import mechanism there are several questions that need to be addressed in order to form a clear picture of the protein import machinery. The N-terminal of PEX5, lacking a well-defined three-dimensional structure, plays a pivotal role in membrane docking of the receptor and receptor recycling. In order to obtain a wider perspective of the conformational changes occurring at the N-terminal due to cargo loading, several N terminus constructs with varying lengths were designed to test the presence of an interaction between the N- and C-terminal of PEX5, in the presence and absence of cargo and also check the interactions of these N-terminal constructs with PEX14. These findings help in deriving some conclusive results about the nature of interactions at the membrane and how the cargo is imported into the peroxisomes from there on. These findings can be a starting point for the potential use of peroxisomes for biofuel production and fighting against diseases such as the Zellweger syndrome and Peroxisome Biogenesis Disorders (PBD).

Biography

Divya Ramkumar has recently completed her Masters in Biotechnology from the University of Leeds, UK. She has been awarded a distinction for her research project and also been awarded an overall distinction in her Master's degree. She has also secured a distinction in her undergraduate degree in Bioinformatics from the SRM University, India.

divumania@gmail.com