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Sustainable production of L-theanine, a nutraceutical, using microbial gamma-glutamyl transpeptidase

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L-theanine (gamma-glutamylethylamide), chemically named as 2-amino-4-(ethylcarbamoyl) butyric acid is a modified amino acid, naturally occurring in tea leaves and few species of mushroom. L-theanine helps in prevailing alpha-waves in human brain which results into a state of relaxation without drowsiness. It has also been known for its immunologic attributes on human health as in cases of cancer and Alzheimer's disease. Thus, has been approved as a food supplement by FDA. Due to the high cost of natural extraction and time consuming chemical synthesis, scientists have been moving to a more eco-friendly and cost effective method for its synthesis. Microbial gamma-glutamyl transpeptidases (GGT) have flourished as a boom for the synthesis of such gamma-glutamyl compounds with utmost specificity. GGTs are unique peptidases which cleave a gamma bond formed between a glutamyl moiety and an amino acid and transfer this glutamyl moiety to an acceptor. In the search of a potent GGT, we have screened various GGTs from *Bacillus* species. GGT from *Bacillus licheniformis* have demonstrated exceptionally high conversion rates in the synthesis of L-theanine using L-glutamine and ethylamine. Subsequently, statistical method (response surface methodology) was employed in order to optimize synthesis of L-theanine using GGT from *Bacillus licheniformis*. However, as the enzyme cost is the major constraint in any enzymatic reaction, immobilization of GGT on chitosan microsphere has been standardized. Also enzyme stability and reusability have been looked into to make the process cost effective. Hence, a bench-scale process has been developed for the sustainable synthesis of L-theanine using immobilized GGT.

Biography

Shruti B Rajput has completed her Masters in Biotechnology from Thapar University, Patiala in 2011 and currently she is a Research Scholar at Department of Microbiology, University of Delhi South Campus.

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