

Studies on Glutaminase and Asparaginase of Bacterial Strains Isolated from Fermented Food

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Various enzymes have been used to improve the processing and quality of food. In this study, to apply microbial glutaminase to food production, screening of glutaminase-producing bacteria, identification of isolates, the production and characterization of their glutaminases have been investigated. The production and characterization of microbial asparaginase, which is considered to be effective to the suppression of formation of acrylamide, carcinogenic compound found in processed food, has been also examined to aim at the application of it to food processing.

Screening of glutaminase-producing bacteria in Thai fermented foods resulted in the isolation of six kinds of bacteria exhibiting glutaminase activity from the traditional fermented sausage, Nham. Morphological, biochemical tests, and phylogenetic analysis based on 16SrDNA sequence revealed that one strain of *Kurthia gibsonii*, four strains of *Weissella cibaria*, and one strain of *Leuconostoc citreum* were included in six isolates. Optimal condition of glutaminase production of these isolates were investigated. When *K. gibsonii* was cultured in the medium containing succinate and glutamine as carbon and nitrogen sources, maximum specific activity (0.041 U/mg) was obtained. Among lactic acid bacteria, *W. cibaria* and *L. citreum*, *W. cibaria* MSS2 exhibited the highest glutaminase activity (0.024 U/mg). The modified MRS medium substituted sucrose for glucose was effective to the growth and glutaminase activity of *W. cibaria* MSS2. Glutaminase from *W. cibaria* MSS2 showed two-fold higher salt-tolerance than that of glutaminase from *Aspergillus oryzae*. This characteristic is favorable to its use for fermented food.

The two types of asparaginases (BsAI and BsAII) from *Bacillus subtilis*, a typical food bacterium, were expressed in *Escherichia coli* and their properties were investigated and compared with those of the other bacterial asparaginases. BsAII was found to be different from BsAI in some basic properties such as pH dependence, temperature stability, salt-tolerance, and substrate specificity. Especially, BsAII showed more stable toward high temperature and salt concentration than BsAI.

This study pursued the productivity and properties of food microbial enzymes, glutaminase and asparaginase, so that these might be usable to food industry.