Evaluation of commercial soy sauce koji strains of Aspergillus oryzae for γ-aminobutyric acid (GABA) production

ABSTRACT

In this study, four selected commercial strains of Aspergillus oryzae were collected from soy sauce koji. These A. oryzae strains designated as NSK, NSZ, NSJ and NST shared similar morphological characteristics with the reference strain (A. oryzae FRR 1675) which confirmed them as A. oryzae species. They were further evaluated for their ability to produce γ-aminobutyric acid (GABA) by cultivating the spore suspension in a broth medium containing 0.4 % (w/v) of glutamic acid as a substrate for GABA production. The results showed that these strains were capable of producing GABA; however, the concentrations differed significantly ($P < 0.05$) among themselves. Based on the A. oryzae strains, highest GABA concentration was obtained from NSK (194 mg/L) followed by NSZ (63 mg/L), NSJ (51.53 mg/L) and NST (31.66 mg/L). Therefore, A. oryzae NSK was characterized and the sequence was found to be similar to A. oryzae and A. flavus with 99 % similarity. The evolutionary distance (K_{nuc}) between sequences of identical fungal species was calculated and a phylogenetic tree prepared from the K_{nuc} data showed that the isolate belonged to the A. oryzae species. This finding may allow the development of GABA-rich ingredients using A. oryzae NSK as a starter culture for soy sauce production.

Keyword: Aspergillus oryzae; Glutamic acid; γ-Aminobutyric acid; Fermentation; Soy sauce