

Vital parameters for high gamma-aminobutyric acid (GABA) production by an industrial soy sauce koji *Aspergillus oryzae* NSK in submerged-liquid fermentation

ABSTRACT

In submerged-liquid fermentation, seven key parameters were assessed using one-factor-at-a-time to obtain the highest GABA yield using an industrial soy sauce *koji Aspergillus oryzae* strain NSK (AOSNSK). AOSNSK generated maximum GABA at 30 °C (194 mg/L) and initial pH 5 (231 mg/L), thus was able to utilize sucrose (327 mg/L of GABA) for carbon source. Sucrose at 100 g/L, improved GABA production at 646 mg/L. Single nitrogen sources failed to improve GABA production, however a combination of yeast extract (YE) and glutamic acid (GA) improved GABA at 646.78 mg/L. Carbon-to-nitrogen ratio (C8:N3) produced the highest cell (24.01 g/L) and GABA at a minimal time of 216 h. The key parameters of 30 °C, initial pH 5, 100 g/L of sucrose, combination YE and GA, and C8:N3 generated the highest GABA (3278.31 mg/L) in a *koji* fermentation. AOSNSK promisingly showed for the development of a new GABA-rich soy sauce.

Keyword: *Aspergillus oryzae*; GABA-enriched foods; Gamma-aminobutyric acid (GABA); Glutamic acid; Soy sauce koji