

Effects of sonication on the extraction of free-amino acids from moromi and application to the laboratory scale rapid fermentation of soy sauce

ABSTRACT

Soy sauce fermentation was simulated in a laboratory and subjected to 10 min of sonication. A full factorial design, including different cycles, probe size, and amplitude was used. The composition of 17 free-amino acids (FAAs) was determined by the AccQ-Tag method with fluorescent detection. Main effect plots showed total FAAs extraction was favoured under continuous sonication at 100% amplitude using a 14 mm diameter transducer probe, reaching 1214.2 ± 64.3 mg/100 ml of total FAAs. Moreover, after 7 days of fermentation, sonication treatment caused significantly higher levels ($p < 0.05$) of glutamic acids (343.0 ± 22.09 mg/100 g), total FAAs (1720.0 ± 70.6 mg/100 g), and essential FAAs (776.3 ± 7.0 mg/100 g) 3 days sooner than the control. Meanwhile, enzymatic and microbial behaviours remained undisturbed. Collectively, the sonication to moromi resulted in maturation 57% faster than the untreated control.

Keyword: Ultrasound-assisted extraction; Sonication; Free-amino acid; Fermentation; Soy sauce