

19th International Conference on

FOOD PROCESSING & TECHNOLOGY

October 23-25, 2017 | Paris, France

Biogenic amine production in Gat Kimchi, a Korean traditional fermented leaf mustard

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Kimchi is a group of Korean traditional fermented vegetables, which includes Gat (leaf mustard) kimchi. Leaf mustard is one of the main ingredients used for the preparation of various kimchi staple and provides unique flavor and spiciness of Gat kimchi. Lactic acid bacteria (LAB) contribute to the flavor development and preservability of kimchi, but produce biogenic amines (BA) during fermentation, posing potential safety risks. This study was conducted to investigate the BA-related risks by measuring BA content in Gat kimchi samples and determining bacterial contribution to the BA content. Total BA content of the samples did not reach the recommended safety limit (1,000 mg/kg for food) before the over-ripening period. In contrast, high levels of vasoactive (tryptamine, β -phenylethylamine and tyramine) and putrefactive amines (putrescine and cadaverine) were detected in over-ripened samples, reaching the toxic thresholds of several biogenic amines. There also appeared to be positive correlations between BA content (viz., vasoactive and putrefactive amines) and acidity (an indicator of kimchi ripening) of Gat kimchi samples. Taken together, the accumulation of BA in Gat kimchi occurs during fermentation, which indicates that BA-related risks increase as ripening progresses excessively. Meanwhile, BA production by LAB strains from the samples at different ripening stages was measured to evaluate the influence of acidity (viz., ripening degree) on microbial activity (and/or community) to produce BA and, consequently, on BA content in Gat kimchi. Most LAB strains produced BA at low levels, while some LAB strains from over-ripened samples produced high levels of tyramine, which means that the pattern and strength of BA production by LAB strains are dependent upon the ripening period of kimchi, probably because of the change of microbial community. Therefore, the relationship between the successive change of microbial communities and accumulation of BA in kimchi needs to be further investigated to reduce BA formation.

Biography

Jae Hyung Mah has completed his BS, MS and PhD from Korea University, Republic of Korea and Postdoctoral studies from University of Wisconsin-Madison and Washington State University, USA. He is a Professor of Food and Biotechnology at Korea University (Sejong Campus), Republic of Korea. He has published about 50 papers in reputed journals and has been serving as an editorial board member and referee for several peer-reviewed journals in Food Science and Technology. His research focuses on the analyses of hazardous chemicals and microorganisms in fermented foods and development of novel protective and preservative strategies such as application of genetically designed starter culture to food fermentation and inactivation kinetics of foodborne pathogenic and spoilage microorganisms exposed to chemical, physical and biological intervention treatments.

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