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Analysis of Biogenic Amines and Microflora in Commercial Doenjang

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This study was performed to investigate correlation between biogenic amine (BA) contents and microflora in commercial Doenjang (Korean traditional soybean paste). BAs were determined by HPLC in different types of Doenjang, namely traditional type of Doenjang made from soybean (TD) and modern type of Doenjang made from soybean and wheat powder (MD). While, total 65 bacterial strains isolated from these Doenjang samples were identified according to the Bergey's Manual, and their ability to produce tyramine were determined by the method using a decarboxylating agar medium. TD samples contained relatively high levels of putrescine, cadaverine, histamine, tyramine, spermidine and spermine, reaching to 27.2, 39.9, 10.9, 52.3, 18.4 and 41.4 mg%, respectively. Contrary to the TD samples, contents of putrescine, histamine, tyramine and spermine in MD samples were determined to be 6.0, 6.5, 16.0 and 1.8 mg%, respectively. The dominants in the Doenjang samples used, showing high levels of BAs, were *Bacillus* spp. including *B. coagulans* (47.7%), *B. licheniformis* (36.9%), and followed by *B. pulimus* (12.3%) and *B. polymyxa* (3.1%)., which had different amine productivity. Particularly, the isolates identified as *B. coagulans* were divided into three types of strains characterized as follows: strains with typical characteristics (Type I; 16.1% of *B. coagulans*), strains with similarity to *B. licheniformis* (Type II; 61.3% of that) and strains with similarity to *B. pulimus* (Type III; 22.6% of that). Considering BA contents in the samples used, the majority of BAs in Doenjang might be caused by *B. coagulans* Type II and *B. licheniformis*. Consequently, high levels of BAs such as mutagenic tyramine and carcinogenic polyamines could be formed by these producers, and so a starter culture should be developed to minimize amine contents in Doenjang.

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Analysis of Biogenic Amines and Microflora in Cheongkukjang and Natto

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This study was performed to investigate correlation between biogenic amine (BA) contents and microflora in Cheongkukjang (Korean traditional soybean lump/paste) and Natto (Japanese traditional fermented soybean). BAs were determined by HPLC in different types of Cheongkukjang, namely Cheongkukjang made by a large-scale manufacturer (LC), Cheongkukjang made by small-scale manufacturers (SC) and home-made Cheongkukjang (HC), and Natto. Total 69 bacterial strains isolated from these samples were also identified according to the Bergey's Manual, and their ability to produce tyramine were determined by a decarboxylating agar medium. SC samples contained rather high levels of BAs. LC and HC samples had relatively lower levels of BAs than SC samples. Contrary to the Cheongkukjang samples, Natto sample had considerably high levels of BAs, specifically, spermidine and spermine concentrations were highest. The dominants in LC and Natto samples were *B. coagulans* and *B. pumilus*, and *B. licheniformis*, while microflora in HC included *B. licheniformis*, *B. coagulans* and *B. pumilus*, which showed different BA productivity. Particularly, the isolates identified as *B. coagulans* were divided into three types of strains characterized as follows: strains with typical characteristics (Type I; 10.5% of *B. coagulans*), strains with similarity to *B. pumilus* (Type II; 21.1% and Type III; 68.4%) The majority of BAs in Cheongkukjang could be caused by *B. licheniformis*. While, *B. coagulans* Type III and *B. pumilus* might be weak amine producers, considering BA contents in the sample used (mainly, LC sample), and so seemed to have the potential to be used as starter culture to minimize amine contents in fermented soybean products, especially Cheongkukjang.