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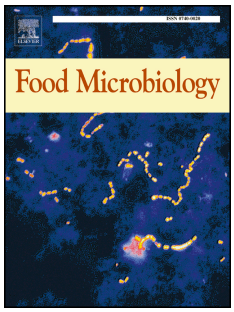

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The impact of vegan production on the kimchi microbiome

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Abstract

Despite previous inquiry into the fermentative bacterial community of kimchi, there has been little insight into the impacts of starting ingredients on the establishment and dynamics of the microbial community. Recently some industrial producers have begun to utilize vegan production methods that omit fermented seafood ingredients. The community-level impacts of this change are unknown. In this study, we investigated the differences in the taxonomic composition of the microbial communities of non-vegan kimchi and vegan kimchi prepared through quick fermentation at room temperature. In addition to tracking the community dynamics over the fermentation process, we looked at the impact of the constituent ingredients and the production facility environment on the microbial community of fermenting kimchi. Our results indicate that the bacterial community of the prepared vegan product closely mirrors the progression and final structure of the non-vegan final product. We also found that room temperature-fermented kimchi differs minimally from more traditional cold-fermented kimchi. Finally, we found that the bacterial community of the starting ingredients show a low relative abundance of the lactic acid bacteria in fermented kimchi, whereas the production facility is dominated by these bacteria.

Keywords

Kimchi; Vegan; Microbiome; High-Throughput Sequencing; Fermentation; Artisan; Probiotics

Highlights

- The bacterial community of vegan kimchi closely mirrors the non-vegan final product
- Lactobacillaceae and Leuconostocaceae dominate the final kimchi microbial community
- LAB in fish sauce and miso paste do not carry over to the kimchi microbiome
- Vegetable ingredient bacteria do not contribute markedly to the kimchi microbiome
- Production facility is enriched with high-abundance kimchi LAB

1. Introduction

Kimchi, a fermented food commonly made from cabbage, radish, and various seasonings, is a staple of traditional Korean cuisine (Jung et al., 2011). It is also growing in popularity in the United States and around the world, where both commercial and artisanal preparations are sold in Asian supermarkets and high-end retail stores. The process of making kimchi is thought to be largely dependent on microbial composition, the ingredients used, and fermentation conditions (Cheigh and Park, 1994; Ick, 2003). Because kimchi is made without the use of a starter culture, the raw ingredients play a key role in establishing the bacterial community that is responsible for fermenting kimchi (Jung et al., 2011; S. H. Lee et al., 2015). Temperature is also a known