

Synthesis and analysis of plant-based roasted fish aroma

吕靖玫 (5111)

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Outline

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3. Impact of fatty acid composition on reaction flavor model
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Abstract

Environmental sustainability and animal welfare make plant-based meats being more popular. The current market is in demand with a diverse range of plant-based meat products, while fewer options available for plant-based alternatives with seafood flavors. Flavor is one of the most significant factor influences consumer's preferences in food products. To mimic the original meat flavor, plant-based meats often require the addition of many spices. However, most meat flavorings contain animal-derived fats or hydrolyzed animal protein products, making them unacceptable to vegetarians and raising consumer skepticism. This study aims to use the algae oil rich in EPA and DHA, with a fatty acid composition similar to that of fish oil, to replace fish oil in plant-based roasted fish flavorings. The results showed that mixing alanine, leucine, glutamine, proline, cysteine, glucose, and algae oil, adjusting the pH value, and heating at 121°C for 15 minutes can produce a roasted fish flavor through Maillard reactions and Strecker degradation, particularly under acidic conditions, which promotes lipid oxidation while partially inhibiting Maillard reactions. In models with different fatty acids, EPA, DHA, and EPA + DHA models were similar to the algae oil model. Key aromatic compounds such as isovaleric acid, octanoic acid, 1,5-octadien-3-one, 2,4-octadienal, 2-octenal, furaneol, 2,5-furandicarboxaldehyde, and 2-pentenylfuran were found as important contributors in the reaction flavor model. In conclusion, algae oil containing high amount of EPA and DHA along with amino acids and reducing sugar were able to make plant-based roasted fish flavor through interactions of lipid oxidation, lipid degradation, and Maillard reactions, demonstrating its potential as a substitute for fish oil in plant-based grilled fish flavorings. This application addresses the scarcity of vegetarian seafood flavor products, catering to diverse consumer demands and contributing to innovative developments in the plant-based meat market.