

可食コーティングの基礎と青果物保存への応用

Fundamental Principles of Edible Coatings and Their Application to Fresh Produce Preservation

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Abstract

Edible coatings are emerging as an effective and sustainable technology for preserving the quality of fresh fruit and vegetables. These coatings function as thin, consumable barrier films that regulate water vapor transmission, gas permeability, and microbial growth, thereby mitigating postharvest deterioration. This article provides a comprehensive overview of edible coating materials, their structural design principles, and their functional performance in fruit preservation. Particular emphasis is placed on hydrophilic–hydrophobic composite films, Pickering emulsions stabilized by nanocellulose or chitosan nanoparticles, and the incorporation of essential oils and metal nanoparticles to enhance barrier and antifungal properties. Case studies using gelatin–konjac glucomannan films, chitosan-based nanocomposites, and essential-oil-infused coatings demonstrate how membrane microstructure, gas barrier characteristics, and antimicrobial activity influence preservation outcomes. Furthermore, fruit storage trials –including *Botrytis cinerea*– infected Japanese pear and X-ray CT –based internal structure analysis of strawberries– highlight the ability of edible coatings to suppress tissue degradation, reduce water loss, and maintain internal density distribution during storage. These findings confirm that edible coatings offer a low-environmental-impact, equipment-free alternative to conventional packaging and controlled-atmosphere systems and hold strong potential as a next-generation technology for reducing food loss and extending the shelf life of fresh produce.

キーワード：水蒸気透過性、ガス透過性、抗微生物作用、青果物、品質保持

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