## PP20.1. POLYMERIC CARRIERS OF NATURAL BIOACTIVE COMPOUNDS AND PLANT EXTRACTS AS INNOVATIVE FOOD PRESERVATIVES

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Increasing consumer awareness of food safety and sustainability has driven the search for natural alternatives to synthetic preservatives. Plant-derived bioactive compounds - including essential oil constituents, polyphenols, and crude botanical extracts - exhibit well-documented antimicrobial and antioxidant properties, yet their direct application to food is often constrained by volatility, poor aqueous solubility, and sensitivity to processing conditions. Embedding these compounds within biopolymer-based carrier systems addresses these limitations by enhancing stability and enabling precise formulation of the active phase. Among available biopolymers, chitosan stands out as a particularly attractive matrix due to its inherent antimicrobial activity, film-forming capacity, biodegradability, and compatibility with a wide range of bioactive guests.

Two delivery formats are presented as illustrative examples. The first involves chitosan particles crosslinked with sodium tripolyphosphate, loaded with ginger extract. Encapsulation efficiency and structural characterisation by ATR-FTIR confirmed successful incorporation of the extract, and antimicrobial evaluation demonstrated meaningful activity against selected food-relevant microorganisms.

The second example concerns active packaging films based on chitosan crosslinked with citric acid, incorporating a β-cyclodextrin/thymol inclusion complex at varying concentrations. ATR-FTIR analysis confirmed complex formation and its integration into the polymer network. The films were further characterised in terms of water vapour transmission rate, water absorption, solubility, optical transparency, and surface wettability, providing a comprehensive picture of their physicochemical suitability as food packaging materials.

Together, these systems illustrate how biopolymer matrices can be tailored to specific application needs, offering a flexible platform for the development of natural preservation strategies in food technology.