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Nanoencapsulation of essential oils to enhance their antimicrobial activity in foods

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Abstract

This work focuses on the encapsulation of essential oils into nanometric delivery systems for incorporation into fruit juices, in order to enhance their antimicrobial activity while minimizing the impact on the quality attributes of the final product. A terpenes mixture and D-limonene were encapsulated into nanoemulsions based on food-grade ingredients, prepared by high pressure homogenization at 300Â MPa.

The effect of the delivery systems on the antimicrobial activity of terpenes was investigated by determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for three different classes of microorganisms (*Lactobacillus delbrueckii, Saccharomyces cerevisiae, Escherichia coli*). The increase of the antimicrobial activity resulted to depend on the formulation and mean diameter of the delivery systems as well as on the microorganisms class. Additionally, GCâC“MS analysis revealed that high intensity processing for nanoemulsion production

GCâ€“MS analysis revealed that high intensity processing for nanoemulsion production may affect the chemical stability of several active compounds.

The application of the most efficient antimicrobial nanocapsules was tested in pear and orange juices inoculated with *L.Â delbrueckii*. Due to the higher antimicrobial activity of the nanoencapsulated compounds, lower antimicrobial concentrations are required for a bactericidal action under accelerated aging at 32Â Â°C, with a minimal alteration of the organoleptic properties of the juice.

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Keywords

Nanometric delivery system; Essential oil; Antimicrobial activity; High pressure homogenization; Nanoemulsions

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