

NANOENCAPSULATION AND NANOEMULSION OF BIOACTIVE COMPOUNDS TO ENHANCE THEIR ANTIOXIDANT ACTIVITY IN FOOD

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ABSTRACT

This work aims at investigating the effect of the nanoemulsion and nanoencapsulation delivery systems on the antioxidant and antimicrobial activity of different bioactive components. Thymol, carvacrol, linalool and eugenol hydrophobic compounds were encapsulated in dextran of oil-in-water (o/w) nanoemulsions prepared by ultrasonic homogenization method and stabilized by different types of emulsifier Tween 20, 40 or 80 and distilled water. The results showed that the reducing power, antioxidant capacity, H₂O₂ scavenging and antioxidant activity of un-encapsulated eugenol was the highest percent compared others essential oils. The highest essential oils nanoencapsulated yield (EY%) and efficiency (EE%) were observed for eugenol 91.74 and 97.81 %, respectively by using Dex/T₂₀ treatment. Nanoencapsulation of eugenol can enhance the aqueous solubility of eugenol at 25, 35 and 45 °C. Thermal stability of eugenol increased from 63.5 to 143 °C after nanoencapsulation by using Differential Scanning Calorimetry (DSC). Antioxidant activity of nanoencapsulated eugenol 0.5 mg/ml in linolic acid system compared with BHT activity at different periods storage were 98.97, 98.42, 98.12 and 97.89 % at 0, 60, 120 and 180 days, respectively. Sensory evaluation of jelly prepared with different levels of nano-encapsulated eugenol compared to 1% its un-encapsulated showed the Dex/T₂₀ (0.3 %) formation was the most accepted by testers. The antimicrobial activity of nano-encapsulated eugenol was measured against three different microorganisms, such as Molds & yeasts, coliforms and salmonella. Significance and Impact of the Study: nanoencapsulation affects positively essential oils main compounds, improves antioxidant activity and retains antimicrobial activity, enhancing the quality of the oils.

KEYWORDS: Nano-Emulsion, Nano-Encapsulation, Bioactive Compounds, Thymol, Carvacrol, Eugenol, Linalool