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Essential Oil Encapsulation at Nano-Scale Level: Formulation, Stability Assessment and Antibacterial Efficiency Monitoring

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This work aimed to nanoencapsulate *Thymus capitatus* essential oil as natural food preservative. To fix ingredients type and concentrations, preliminary formulations were tested for their droplet size average and distribution. Emulsions stability was investigated for 12 days and the antibacterial activity of bulk and encapsulated essential oil were studied. Results showed that nanoemulsions containing 1% of SDS as emulsifier and 10% of dispersed phase containing 70% of the essential oil have an appropriate droplet diameter average (around 110 nm). Stability tests demonstrated that nanoemulsions, stored at 4°C,

showed the highest stability. Moreover, antibacterial activity results exhibited the improvement of encapsulated *T. capitatus* essential oil efficiencies as compared to bulk one. In fact, nanoemulsion presented higher bacterial growth inhibition, lower minimum inhibitory and bactericidal concentrations, and better time kinetic results, as compared to bulk one. Gathered results provide useful information for designing effective natural preservatives that inhibit food bacterial spoilage.

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