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Encapsulation of 1,8-cineole with chitosan by emulsion formation: Optimization of parameters for a stable emulsion

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The antifungal activity of both chitosan and 1,8-cineole is reported. An attempt was made to combine these two antifungal agents in the form of an encapsulated product. With the aim of developing a bio-pesticide of natural origin, 1,8-cineole was encapsulated with chitosan. The encapsulation was carried out by droplet formation *via* oil-in-water emulsion. During this study, different parameters, concentrations of wall material (chitosan), stabilizer (maltodextrin), 1,8-cineole, emulsifier (Tween 80) and oil phases (soybean oil, coconut oil, olive oil) were optimized to obtain a stable emulsion. The stability of the emulsion droplets was characterized using creaming index which was monitored for one month under room temperature. When the creaming index of the emulsion became constant, the emulsion was considered as stable. All oil-in-water emulsions were prepared by using an Ultra turrax (T 25) homogenizer.

There was a significant difference ($P < 0.05$) in the stability of emulsion when the parameters were varied. Soybean oil based emulsion showed a better emulsion stability than the coconut oil and olive oil based emulsions. The optimal combination of emulsion parameters was found to be 2.0% chitosan, maltodextrin (20.00 g/ 100.0 ml of continuous phase (chitosan), Tween 80 (2.50 ml/ 100.0 ml of continuous phase (chitosan)). The concentration of 1,8-cineole in the range of 12.5 µl to 112.5 µl /100 ml of oil phase does not affect the emulsion stability significantly.

Keywords: 1,8-cineole, chitosan, creaming index, encapsulation, oil-in-water emulsion

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