ENCAPSULATION OF CARVACROL IN LIPOSOME: OPTIMIZATION AND CHARACTERIZATION

TAVARES[1], A.G.; CHAPAL[2], J.C.; MARQUES[3], C.S.; SOUSA[4], M.M.; SILVA[5], R.R.A.; SILVA[6], J.O.R.; SOARES[7], N.F.F.

[1]Universidade Federal de Viçosa – MG, adassa_tavares@hotmail.com
[2] Universitat Politècnica de València, ing.jcandrade@gmail.com
[3]Universidade Federal de Viçosa – MG, supraniclara@gmail.com
[4]Universidade Federal de Viçosa – MG, mirianesousa@yahoo.com.br
[5]Universidade Federal de Viçosa – MG, rafaelmega@yahoo.com.br
[6]Universidade Federal de Viçosa – MG, joseosvaldobm@gmail.com
[7]Universidade Federal de Viçosa – MG, nfsoares10@gmail.com

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Liposomal encapsulation can prolong the effects of preservative agents in food. The purpose of this study was to determine the formulation that results on the highest encapsulation efficiency (EE) of one potential preservative agent, carvacrol, and other caracteristics of the resulting liposomes. The Response Surface Method was used to evaluate the effect of the concentrations of lecithin (LEC), 2000-6000 $\mu g \cdot mL^{-1}$, cholesterol (CHO), 0-3000 $\mu g \cdot mL^{-1}$ and carvacrol (CAR), 0-6000 $\mu g \cdot mL^{-1}$, on the EE, measured after 24 hours. Carvacrol liposomes (LCAR) were prepared by the method of lipid film hydration. The EE of LCAR was determined by calculating the difference between the amount of total and free CAR using spectrophotometer UV-vis. The particle size, polydispersity index (PdI) and zeta potential (ζ) of LCAR produced using the optimum formulation were measured at 25° C in Zetasizer Nano. CHO and CAR had a linear and positive effect on the EE and CAR also had a quadratic and negative effect. This indicates that higher amounts of CHO and CAR result in higher EE and that after reaching the optimum value of CAR, the EE of the liposomes reduces quadratically with the increase of CAR. LCAR with the highest EE was obtained with the concentrations of: 3.000 $\mu g \cdot mL^{-1}$ CHO and 4.000 $\mu g \cdot mL^{-1}$ CAR. In order to validate the reliability of the model equation, a verification experiment was performed, determining the EE for three liposome samples, produced using the optimized formulation. The mean experimental EE (59.0 $\pm$ 1.99%) was validated at 95% confidence level. Particle size, PdI, and ζ-potential of LCAR were: 180,6 $\pm$ 8,94 nm, 0,196 $\pm$ 0,01 and -56,13 $\pm$ 4,12, respectively. The CAR was efficiently entrapped in the liposomal formulation determined and has potential to be applied in food preservation.

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