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Microencapsulation of citrulline extract from watermelon (*CitrullusLanatus*) rind by spray drying using response surface methodology (Rsm)

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Abstract

Citrulline is a non-essential amino acid present in watermelon (*Citrulluslanatus*), which has antioxidant, vasodilator and free radical scavenger properties, which may present instability to environmental factors such as light, temperature, pH, among others, so that encapsulation can improve its stability and expand its applications in the food field. The objective of this research was to optimize the microencapsulation of citrulline extract obtained from watermelon rind (Santa Amelia) by spray drying, using the response surface methodology through a Box-Benhken design, concentration of commercial pectin (0-0.125% w / v), experimental pectin (0 - 0.125% w / v) and temperature (150-170 ° C) in maltodextrin up to 20% solids and as response variable encapsulation performance (%), humidity (%), water activity, dissolution (seconds) and encapsulation efficiency (%) with five repetitions at the central point and 95% confidence. The morphology was also evaluated by SEM to determine the particle size, using software ImageJ®. Encapsulation yields were obtained between 48.5 - 78.67%, moisture content (3.66 - 6.24%), water activity (0.107-0.371), dissolution (172-383.96 seconds) and encapsulation efficiency (32.77-52.53%). Optimal conditions are obtained with commercial pectin (0.0%), experimental pectin (0.0%), and 150.9 ° C but to obtain low humidity, a low concentration of pectin must be used. To achieve higher yields, high concentrations of commercial pectin must be used, to obtain low dissolution, a low concentration of pectins must be used, and to obtain greater efficiency, a high pectin concentration should be used. The efficiency values found indicate that the encapsulation of citrulline extract could be established by spray drying using commercial and / or experimental pectin as encapsulating matrix because the powders obtained had a semi-spherical shape with dents on their surface with a particle size of $8.50 \pm 0.24 \mu\text{m}$.

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