

## Kinetic release of geranylgeraniol from annatto seed oil microparticles

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### Abstract

This work aimed to study the influence of the drying method (DM) of annatto seed oil emulsion, stabilized with gum Arabic (GA), using freeze-drying (FD) and spray-drying (SD) techniques over the particle's morphological characteristics, particle size distribution (PSD), geranylgeraniol (GG) retention and kinetic release of GG. The DM unaffected this bioactive compound retention and the difference on the kinetic release of GG is linked to the difference on the particles' morphology and PSD.

*Keywords: Bixa orellana L., freeze-drying, HPLC.*

### Introduction

Annatto seed oil is rich in GG, drug with diverse biological activities such as the promotion of apoptosis of cancer cells<sup>1</sup>, and others. The encapsulation of oil is a promising alternative for preservation and availability of this compound. The objective of this study was to evaluate the release kinetics of GG from annatto seed oil microparticles obtained by different DMs, FD and SD, with GA as wall material. We evaluated the kinetic release of GG in lipid medium using soy oil at 35°C. The microparticles were characterized with respect to its morphology by Scanning electron microscopy (SEM), PSD by light scattering technique using laser diffraction. GG content in the pure annatto seed oil and in the microparticles was determined by HPLC.

### Results and Discussion

According to the SEM micrographs, microparticles formed using FD presented morphology of irregular plates similar to flakes of porous structure while microparticles formed using SD presented heterogeneous shriveled spheres with rough surface and high polydispersity. GA-FD microparticles presented a monomodal distribution and GA-SD presented an irregular distribution. Crude oil presented  $25.0 \pm 0.6$  g of GG/100 g of oil. The DM unaffected this bioactive compound retention. Image 1 exhibits the kinetic release of GG entrapped on GA-FD and GA-SD. We observed influence of the DM on the kinetic release of geranylgeraniol. The first stage (5 to 15 min of releasing) represents the stage of fast release (burst effect). This stage defines the highest rate of releasing the bioactive compounds. The next stage represents the gradual reduction of the rate until reaching a constant value after 2 h for GA-FD and 3 h for GA-SD. Therefore, based on results presented, we infer that GA-SD microparticles released more geranylgeraniol as a

consequence of the shortest diffusion path and highest superficial area.

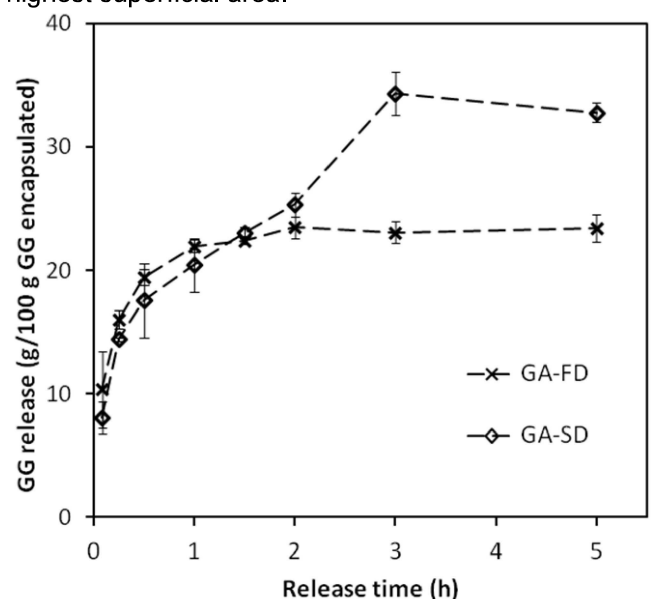


Image 1. Kinetic release of geranylgeraniol.

### Conclusions

The difference on the kinetic release of GG is linked to the difference on the particles' morphology and PSD. GA-FD and GA-SD are potential ingredients for food, pharmaceutical and cosmetic products

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1. Marcuzzi, A.; Zanin, V.; Piscianz, E.; Tricarico, P. M.; Vuch, J.; Girardelli, M.; Monasta, L.; Bianco, A. M.; Crovella, S., Lovastatin-induced apoptosis is modulated by geranylgeraniol in a neuroblastoma cell line. *International Journal of Developmental Neuroscience* **2012**, *30* (6), 451-456.