

Available online at www.sciencedirect.com

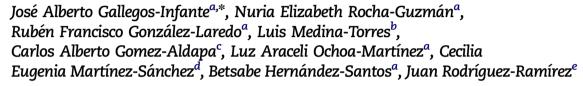
# SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/fbio



CrossMark

# Physicochemical properties and antioxidant capacity of oak (Quercus resinosa) leaf infusions encapsulated by spray-drying



<sup>a</sup>Instituto Tecnológico de Durango, Dpto. de Ings. Química y Bioquímica, Durango, Mexico

<sup>b</sup>Facultad de Química, UNAM, Ciudad Universitaria, México, D.F., Mexico

<sup>c</sup>Facultad de Ciencias Químicas, Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico

<sup>d</sup>Instituto Tecnológico de Tuxtepec, Tuxtepec, Oaxaca, Mexico

<sup>e</sup>CIIDIR-IPN, Oaxaca, Mexico

#### ARTICLE INFO

Article history: Received 18 October 2012 Received in revised form 4 February 2013 Accepted 15 March 2013

Keywords: Antioxidants Herbs Microencapsulation Oak Phenolics Spray-drying

## ABSTRACT

The effect of two wall materials and two feed flow rates on the physical and antioxidant properties of *Quercus resinosa* leaf infusion microencapsulated by spray-drying is reported. Dispersions with lyophilized *Q. resinosa* infusion and wall material (k-carrageenan and maltodextrin [10 DE]) were prepared. Samples were fed at rate flows of 1.6 and 1.7 L/h. Encapsulation yield, total phenolic content, DPPH test, deoxy-D-ribose assayt, rheological and SEM evaluations were made. The highest yield and DPPH scavenging activity were obtained at 100% maltodextrin and 1.7 L/h. Higher polyphenolic retention was observed in blends of carrageenan/maltodextrin (1.6 and 1.7 L/h) and maltodextrin (1.6 L/h). The highest inhibition of deoxy-D-ribose oxidation was found at blends of carrageenan/maltodextrin (1.7 L/h). Dispersions showed pseudoplastic behavior and properties as liquid-like materials. Microcapsules showed particle sizes between 5 and 35  $\mu$ m. The best condition for encapsulation of *Q. resinosa* infusions was suggested as 100% maltodextrin at 1.7 L/h.

© 2013 Elsevier Ltd. All rights reserved.

### 1. Introduction

Quercus resinosa is a deciduous tree belonging to the family *Fagaceae* and is found in the mixed pine-oak forests in Northern Mexico. The bark, leaf and galls have been studied by several researchers in function of their antioxidant capacity (Rivas-Arreola et al., 2011; Rocha-Guzman et al., 2009).

Rocha-Guzman et al. (2012) identified several polyphenol compounds in *Q. resinosa* infusions by HPLC including gallic acid, syringic acid, epigallocatechin gallate. Based in the scientific evidence, it is clear that *Q. resinosa* infusions have antioxidant properties related with its phenolic content.

Unfortunately, phenolic compounds are influenced by several factors as oxygen, temperature and processing. Moreover, the antioxidant capacity could be affected with

<sup>\*</sup>Correspondence to: Blvd Felipe Pescador 1830 Ote, Col. Nueva Vizcaya, CP 34080, Durango, Dgo., México. Tel./fax: 52 618 8 18 69 36. E-mail address: jinfante@itdposgrado-bioquimica.com.mx (J.A. Gallegos-Infante).