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Antioxidant activity of carob seeds and chemical composition of their bean gum by-products

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Abstract:

Background: The carob (*Ceratonia siliqua* L.) is very old edible fruit, flavorful and often used in foods and beverages. In this present study the composition of phenolic compounds, the antioxidant activity and the production locust bean gum (LBG) of seeds grown in Algeria was explored.

Methods: The phenolic contents (total phenolics, total tannins, total flavonoids, condensed tannins and flavonols) and the antioxidant activity of the aqueous methanolic, ethanolic and acetonetic extracts (70, 80 and 80v/v, respectively) of the seeds were determined using colorimetric methods. Furthermore, the carob bean gum from seeds was extracted and its chemical composition was evaluated.

Results: Aqueous acetonetic extract of carob seeds give the highest contents of total phenolics, total flavonoids, flavonols, total tannins and condensed tannins which were 12.24 ± 0.02 , 1.33 ± 0.01 , 2.97 ± 0.01 , 4.29 ± 0.2 and 0.53 ± 0.01 mg/g of dry weight, respectively. The same extract showed also the best antioxidant activity in all assays compared to other extracts.

Keywords: antioxidant, antioxidant activity, polyphenolics

DOI: 10.1515/jcim-2017-0158

Received: November 21, 2017; **Accepted:** June 4, 2018

Introduction

The carob (*Ceratonia siliqua* L. Leguminosae) is a Mediterranean evergreen tree which is considered to be an important constituent of flora in this area [1]. The fruit of carob is a brown pod, constituted of pulp (90%) and seeds (10%), the pulp contain many bioactive substances including carbohydrates, proteins, dietary fibers and polyphenols. The roasted powder of this part (carob powder) can be substituted for cocoa [2, 3]. The seeds are consisted of three parts; germ, endosperm and husk [4, 5].

Many investigations showed the biological effects of carob mainly attributed to its polyphenolic components known for their antioxidative properties [6, 7]. In point of fact, Makris and Kafalas [6] postulated that there was a direct correlation between antioxidant capacity and phenolic compounds of carob pod. However, in the literature data on carob seeds antioxidant properties related to its polyphenolic composition are limited. In fact Custodio et al. [7] and Durazzo et al. [8] reported correlation between the phenolic content of the carob germ flour and antioxidant activity. To our best knowledge, this is the first study which used aqueous solvents to extract bioactive compounds from whole carob seeds, then quantified phenolic compounds and evaluated the antioxidant activity.

Locust bean gum (LBG) or carob bean gum acquired from endosperm contains galactomannan. LBG can hence have many applications as nature-derived texturizing ingredient like thickener, stabilizer, emulsifier or gelling agent [5]. They are no published data on Algerian LBG. In this line, the purpose of this research was to quantify phenolic compounds, and assess the antioxidant activity by using three methods (i) DPPH• radical scavenging assay, (ii) reducing power and (iii) total antioxidant capacity (TAC) of carob seeds. The extraction and purification of carob bean gum from seeds were also achieved and the chemical composition of the by-product was determined.

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