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FUNDAÇÃO LUSO-AMERICANA

SELECTION OF THE OPTIMAL SOLVENT SYSTEM TO BE USED IN THE EXTRACTION OF ANTIOXIDANT COMPOUNDS FROM HAZELNUT (*CORYLUS AVELLANA* L.) KERNELS

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Hazelnuts are highly nutritious and contain significant amounts of fat and protein, being reported nowadays that they are also especially rich in antioxidants. Antioxidants limit the oxidative stress that is thought to contribute to the occurrence of several human diseases. Owing to this, it is very important to search natural products with antioxidant properties to be used in the prevention of such illnesses. Numerous methods have been used to evaluate the antioxidant efficacy. Their choice depends on the chemical structure of the active components, being recommended to perform studies for selecting the best extraction technique. In this context, the main objective of this study was to optimize the extraction process, in terms of solvent and extraction time that maximizes the extraction of total phenols and antioxidant activity of hazelnut kernels. Different experiments were conducted. In the first, phenolic compounds were extracted with boiling water (45 minutes) and methanol (room temperature for 24 and 24 + 24 hours). Higher extraction yields were obtained with water (18.7% ± 4.0) than methanol (10.2 - 14.0%). Total phenolic compounds were extracted in a higher extent in the aqueous extraction (25.6 mg gallic acid equivalents/g extract ± 9.9), than in the methanolic extractions (9.82 to 12.1 mg gallic acid equivalents/g of extract). In the second set, hazelnuts were again subjected to the extraction with water (12.4% ± 1.7) and acetone 80% (v/v) during 24, 24+24 and 24+24+24 hours. The highest extraction yields were obtained with acetone (17.8 - 29.5 %). In relation to the total phenol content, the highest value was again obtained with water (44.3 mg gallic acid equivalents/g extract ± 7.7), varying between 28.2 and 36.2 mg gallic acid equivalents/g extract in acetone extractions. In terms of antioxidant activity, acetone extracts, with EC_{50} values of 1.12 to 1.53 mg/ml, showed the highest antioxidant capacity. On contrary, the methanolic extracts presented the lowest one, not being observed a significant increase on the antioxidant activity with the increase of the extraction time.

In conclusion, the results showed that hazelnut kernels have phenolic substances, as well as antioxidant properties. However, their extraction depends on the solvent used, with acetone 80% (v/v) at room temperature during 24 hours the most promising method.

KEYWORDS: Hazelnuts, extraction procedure, total phenols, free radical scavenging activity.

INFLUENCE OF FREEZE-DRYING ON THE TEXTURE OF MUSHROOMS

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Agaricus bisporus, known as button mushroom, is an edible basidiomycete fungus occurring naturally in grasslands, fields and meadows across Europe and North America. Although the original wild form had a brownish cap and dark brown gills, presently the more familiar variant, which it is one of the most widely cultivated mushrooms in the world, has a white form with white cap, stalk and flesh and brown gills.

The preservation of aroma is essential for accessing quality of processed food products, and in particular for the case of mushrooms, which are very much used for culinary preparations because of their unique aroma. Freeze-drying, being a low temperature process, causes less deterioration in the aroma compounds of food products. In this process water is eliminated by sublimation from a frozen state, and the temperature of the product remains very low during the operation[1].

In the present work Texture Profile Analysis (TPA) was performed to fresh and freeze-dried mushrooms, in two parts (cap and stalk), to evaluate the influence of this processing operation in the texture attributes of mushrooms.

Table 1 shows that both the fresh and freeze-dried mushrooms have no adhesiveness and that hardness decreases very much with this treatment, either in the cap or in the stalk. Chewiness is another texture attribute that varies quite much with freeze-drying, contrarily to Cohesiveness, which practically does not change. Springiness also decreases with drying, although not in a very accentuated way. When the two parts of the mushroom are compared, it is observed that the cap is much harder (almost 2 times harder), has slightly higher cohesiveness and springiness and a little lower chewiness.

Table 1 – Texture attributes obtained for fresh and freeze-dried mushrooms measured by TPA compression tests

	Adhesiveness (N.s)		Hardness (N)		Cohesiveness		Springiness (%)		Chewiness (N)	
	Cap	Stalk	Cap	Stalk	Cap	Stalk	Cap	Stalk	Cap	Stalk
Fresh	0.004	0.006	15.441	8.580	0.701	0.801	82.250	90.304	8.932	6.228
Freeze-dried	0.000	0.000	3.571	2.576	0.645	0.628	72.033	75.558	1.665	1.206

[1] Kompany E, René A (1995) Note on the Freeze-drying Conditions for Improved Aroma Retention in Cultivated Mushrooms (*Agaricus bisporus*). *LWT*, **28**, 238-240.

KEYWORDS: Mushroom, dried mushroom, texture, TPA.

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Certificado

A Divisão de Química Alimentar da Sociedade Portuguesa de Química certifica que **Elsa Cristina Dantas Ramalhosa** participou no **9º Encontro de Química dos Alimentos**, realizado em Angra do Heroísmo, de 29 de Abril a 2 de Maio de 2009.

Pela Comissão Organizadora

Célia Costa Gomes da Silva