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Effect of high pressure processing on a functional acorn beverage

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In recent years, consumers have become increasingly aware of the impact of nutrition on their health, increasing the demand for healthy and nutritious products.¹ The current lifestyle has led consumers to look for more convenient and ready-to-eat products. In this sense, consumption of plant-based beverages is an interesting healthier alternative once it can be an excellent way to increase the intake of bioactive compounds.² Although unprocessed plant-based beverages have a short shelf life, the high pressure processing (HPP) opens the door to obtaining nutritional and sensorial improved fresh products in relation to traditional thermal processed products.³ The acorn is very abundant in Portugal but still is sub-valorised to the point of staying in the field without any use, despite their high nutritional value, phytochemical compounds, antioxidant, anticarcinogenic and cardioprotective properties.^{4,5} This fruit has potential use in the treatment of specific diseases such as cardiovascular or neurodegenerative diseases, which triggered the interest in integrating the acorns into the human diet.⁵

This work aimed to develop a functional acorn beverage, free of gluten and lactose, only with acorn and water as ingredients. Thereafter, the impact of pasteurization by HPP (450 and 600 MPa during 5, 12.5 and 20 minutes) and conventional thermal processing (85°C for 30 minutes) on physical-chemical characteristics of the final product was assessed.

In terms of colour, the parameter b^* , was different, mainly between the thermal processed and the rest of the samples. The pH of the untreated samples was lower than that of the pasteurized ones. The degree brix is very low in all samples, which indicates that the presence of simple sugars is almost null, with slight differences in the thermally processed samples. Total phenolics (Folin Ciocalteu method) as well as antioxidant activity (ABTS and DPPH methods) did not show great differences between treatments, and the phenolic profile was evaluated, giving gallic acid as the main phenolic compound of this beverage. In addition, the effect of the initial acorn leaching and of the processing on the content of hydrolysable tannins was studied, since these compounds are responsible for the undesirable astringency of the acorn. With this study, some basic physical-chemical aspects of an acorn beverage were determined, in order to proceed with the development of a functional beverage with this fruit that is a surplus in Portugal.

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