Effect of stirring and ultrasound-assisted extraction conditions in flavonoids, tannins, antioxidant and antimicrobial activities of chestnut outer shells (*Castanea sativa* Miller)

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Introduction

Portugal is one of the main producers of chestnut (*Castanea sativa* Miller) in Europe.

Chestnut shells are rich in total phenols and hydrolisable tannins. These compounds can protect against the harmful effects of free radicals, reducing the risk of several diseases as cancer, cardiovascular and neurodegenerative diseases, diabetes and inflammation.

The demand for biologically active molecules has stimulated the search for natural antioxidants.

Several solvents have been employed in the extraction of chestnut by-products, such as methanol, ethanol, acetone, or their aqueous solutions, and water. Ethanol is considered a "GRAS" (Generally-Recognized-As-Safe) solvent, and the extracts obtained can be used in food industry.

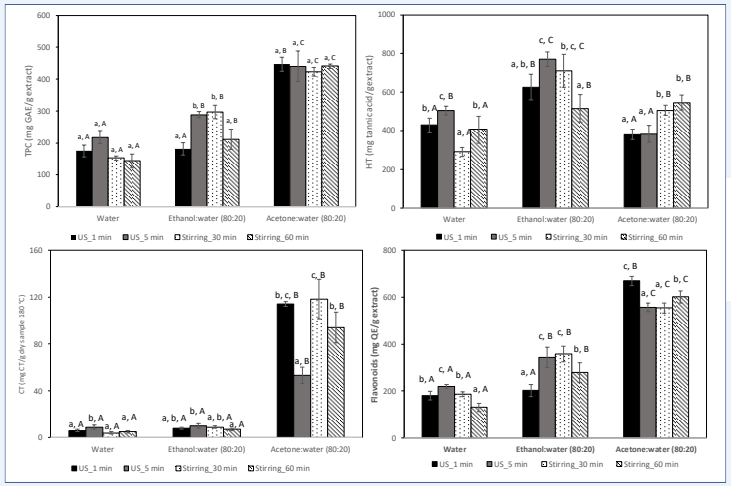
Objective

This work aimed to study the role of the extraction conditions (solvent type, extraction time and method) in the polyphenolic compouds isolated from chestnut outer shells. The antimicrobial activity of the extracts were studied using different types of microorganisms.

Materials and Methodology

Results and Discussion

Aqueous acetone solution showed a better extraction yield and extracted significantly higher amounts of phenolics, flavonoids and condensed tannins than the other solvents. Aqueous ethanol solution revealed to be a better solvent for the extraction of hydrolysable tannins.



- Gallic acid
- Ellagic acid
- Tannic acids
- ...

Extracts of ethanol:water and US method showed antimicrobial activity against *Staphylococcus aures, Bacillus cereus, Bacillus subtilis, Enterococcus faecalis* and *Candida albicans.*

Extracts obtained with acetone:water and US method showed a good antimicrobial activity against *Proteus mirabilis.*

Conclusion

The solvent and extraction method influenced the extracted compounds. Good results were obtained with acetone:water and US.

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