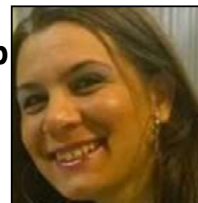


## Chestnut spiny burs and roasted hazelnut skins extracts as functional ingredients in bioactive packaging films

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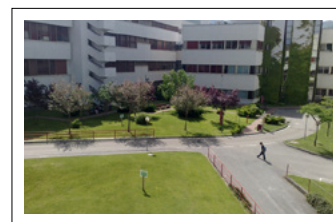
### Abstract

The agro-industrial processing produces large volumes of wastes and by-products. These last have attracted attention as excellent renewable source of active compounds with beneficial effects for human health. Thus, polyphenolic-rich extracts from chestnut spiny burs (CSB, *Castanea sativa* Miller.) and roasted hazelnut skins (RHS, *Corylus avellana* L.) were selected to design edible pullulan-based active films. Phenolic-containing extracts of CSB (rich in ellagic acid and chestanin) and RHS (rich in proanthocyanidins) present antioxidant activity and antifungal power against either polymorphic fungus *Candida albicans* and fungal strains causing plant infections, inhibiting the mycelial growth and spore germination of *Alternaria alternata*, *Fusarium solani* and *Botrytis cinerea*. The CSB and RHS hydroalcoholic extracts were separately combined (1 %, 5%, and 10% w/w) with the filmogenic pullulan (PL) exopolysaccharide to obtain flexible and bioactive films via simple solvent casting technique. The flexible PL-based films present thermal stability up to 200 °C, good mechanical performance with Young's modulus values higher than 2.6 GPa, and UV-light barrier properties, also showing a minimum antioxidant activity of ca. 94 % (DPPH scavenging activity) with a loading of only 1 % of hydroalcoholic extracts (w/w relative to PL, i.e. 192 µg of extract per cm<sup>2</sup> of the film). The films also exhibited antibacterial activity towards *Staphylococcus aureus* as the hydroalcoholic extracts content increases, reaching a maximum 2 of 4-log CFU mL<sup>-1</sup> reduction for the PL/RHS\_10 film after 6 h. As result, PL-based films containing hydroalcoholic extracts from agri-food by-products are potential applicable in producing active food packaging.

Keywords: Active packaging, Chestnut spiny burs, Roasted hazelnut skins Polyphenol-rich extracts, Pullulan films, Bioactive additives.

### Biography

Tiziana Esposito is graduated with a pharmacy degree from the university of salerno, Italy. She received her Ph.D in drug science at the department of pharmacy of the university of salerno. Her research is focused on technologies for the development of health products based on up-cycling of agro-food by-products. Her expertise is in analytical, biological and technological studies of medicinal plants and food industry by-products, and the R&D of new cosmetic and nutraceutical ingredients and products. She has published original research papers and presentations at meetings and different training courses.



6<sup>th</sup> [international conference on Food science and Food safety](#) | October 16, 2020

**Citation:** Magdalena Polak-Berecka , *In vitro* digested bread enriched with polyphenols prevents growth of tumor, Food Safety Summit 2020, 6th International Conference on Food Science and Food Safety, October 16, 2020, 02