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ივანე ჯავახიშვილის სახელობის თბილისის

სახელმწიფო უნივერსიტეტი

PolyChar 26

World Forum on Advanced Materials

მსოფლიო ფორუმი მოწინავე მასალებში

10-13 September

Tbilisi, 2018

10-13 სექტემბერი

თბილისი

Abstract

ANTIOXIDANT AND ANTIMICROBIAL EDIBLE FILMS BASED ON DEXTRAN CONTAINING POLYPHENOLS FROM YARROW EXTRACT

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Current trends in food biotechnology are focused on replacing synthetic polymers used for food packages by the natural ones. Biopolymers are made by sustainable processes in a cheap way. Moreover, they are nontoxic and can serve as a good alternative to traditional (petroleum) food packaging, due to great film-formation properties in a form of edible films and coatings for food products. Various polysaccharides, proteins, and lipids have been intensively investigated as edible materials that could improve the food quality, freshness, and provide food safety. However, natural polymers usually lack of antioxidative and/or antimicrobial properties. Therefore, many synthetic and natural additives can be incorporated into edible films. Among them, extracts of medicinal plants are giving more attention due to their safeness and proved health benefits.

The aim of this study was to obtain edible films based on dextran, with antioxidative and antimicrobial properties. Dextran obtained in our lab was used for preparing edible film with sorbitol as a plasticizer, while pulverized waste biomass obtained from the processing of medicinal herb yarrow (*Achillea millefolium*) was used as a source of polyphenols. It has previously been shown[1] that dextran-based films had excellent mechanical and water vapor barrier properties. In this work, spray dried ethanol extract of *Achillea millefolium* dust (AME) was incorporated into dextran films in concentrations 2, 3, and 4% (w/v). The composite films were analyzed regarding antioxidative, antimicrobial, and mechanical properties. All films showed high antioxidative activity (90% reduction of DPPH radical). However, to obtain high antimicrobial activity (higher than 50%), 4% of AME was required. Composite films showed antimicrobial activity against three Gram-positive bacteria (*Staphylococcus aureus*, *Listeria monocytogenes* and *Enterococcus faecalis* and one Gram-negative bacterium (*Pseudomonas aeruginosa*). Incorporation of AME into dextran film showed positive effect on tensile strength and negative effect on elongation. Composite film with the best mechanical properties (tensile strength 3.5 MPa and elongation at break 37%) was the film containing 4% AME.

Acknowledgement: The authors gratefully acknowledge the financial support of Ministry of Science, Education and Technological Development of the Republic of Serbia under the project TR 31035.

References

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