EVALUATION OF ANTIBACTERIAL POTENTIAL OF ECO-FRIENDLY PACKAGING BASED ON BEES PRODUCTS AND PLANT EXTRACTS

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The aim of the research is to develop the environmentally friendly and reusable antimicrobial packaging based on the beeswax with antibacterial agents: propolis and sage extracts and evaluation of its storage abilities and antibacterial properties.

Cotton fabrics, beeswax, propolis, sage leaves, emulsifiers and antioxidants were used as materials for the development of the packaging. Samples of beeswax wraps were produced using three technologies. According to the 1st method, a homogeneous alloy of beeswax and 10% propolis oil extract was prepared and applied to a cotton fabric. According to the 2nd method beeswax wraps with oily propolis and dense sage extracts were prepared by emulsion method. According to the 3d method, a wax base was prepared and applied to a cotton cloth. After that, the wax wrap was sprayed with alcohol extracts of propolis and sage and dried until the ethanol evaporated completely.

Obtained wraps samples have been tested on a basic set of products available in every household: bakery products, hard cheeses and ready-made sausages. Beeswax wrapping prepared by all methods was found to be the best for cheese storage. Bread stored in wrappers made according to the 1st and 2nd method with the addition of emulsifiers showed a tendency to dry out and weathering faster than other samples, but there were no signs of microbiological spoilage observed. This can be explained by the increase in air permeability caused by a decrease in the density and viscosity of the wrapper with the addition of more aqueous phase and emulsifiers. And the best bread is stored in wrappers obtained by the 3rd method. As for sausages, no clear correlation was found between the method of preparing the wrapper, the content of antibacterial agents and the quality of the stored product.

Results of the experiment on the determination of the antimicrobial activity of beeswax wraps and antimicrobial agents against Staphylococus aureus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans have shown that sage extract has high activity against S.aureus and moderate activity against E. coly and P. aeruginosa. Propolis oily extract possess moderate activity against tested microorganisms and both extracts had low antifungal activity.

Determination of the antimicrobial activity of beeswax wraps and antimicrobial agents against Staphylococus aureus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans have shown moderate and low activity against microorganisms and no antifungal activity.

Beeswax wraps can act as a promising packaging for a food products. It is advisable to continue research in this direction regarding the use of a wider range of antibacterial and antifungal agents, and the study of the antibacterial activity of the developed wrappers in relation to other groups of food microorganisms and fungi, as well as considering the possibilities of storing a wider range of food products.