

Abstract

Nowadays, the use of edible films is becoming increasingly important due to the quality, moisture, flavor and bio-degradability. In this study, the use of chitosan / potato starch biopolymers in combination with methanolic extract of *Withania Somnifera* and *Caparis spinose* in two concentrations of MIC and MBC as oral antimicrobial films in laboratory conditions on fish fillets (*Cyprinus carpio*) were examined for 20 days of keeping at refrigerator conditions. Prepared film samples were investigated in terms of moisture content, solubility, thickness, water vapor permeability, chemical composition, morphological study, mechanical properties, colorimetry and opacity, as well as antimicrobial effect against *Listeria mononucleosis cytogenes*, *Shigella dysenteriae*, *Staphylococcus aureus*, *Bacillus cereus* and *Vibrio cholera* using disc diffusion method. The results showed that by adding the extracts, permeability to water vapor and the percent of increasing the length of the films were increased; while, the elasticity and elastic modulus levels were reduced. Also, the moisture and solubility of the films were reduced and increased by adding *Withania Somnifera* and *Capparis Spinosa* extracts, respectively ($P < 0.05$). Adding the extract caused a significant change in the colorimetric properties of the prepared films ($P < 0.05$). The highest antioxidant activity was observed in the films containing *Withania Somnifera* extract with an MBC concentration ($P < 0.05$). Film samples containing *Capparis Spinosa* extracts with an MIC concentration were effective on the five studied microorganisms and showed a significant inhibitory growth rate on *Bacillus cereus* growth, while the film samples containing *Withania Somnifera* with an MIC concentration did not show a strong inhibitory growth rate on *Vibro cholera* and *Shigella dysenteriae*. The results obtained from fish fillets revealed that the highest growth rate of bacteria in the control sample (uncoated fish fillets) and the lowest growth was seen in the film sample containing extract of *Capparis spinosa* with an MBC concentration ($P < 0.05$). Based on microbial and chemical tests, shelf-life of control samples coated with pure chitosan / potato starch, films containing MIC and MBC concentrations, and film extracts containing *Withania Somnifera* with MIC and MBC concentrations were equal to 13 days, 14 days, 18 days, 20 days, 17 days and 19 days, respectively.

KEYWORDS: Chitosan film, Potato Starch, Extract, *Caparis spinose*, *Withania Somnifera*, Antioxidant.



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**Thesis submitted to fulfill the requirements of a Master's
Degree in Food Science and Technology**

**Preparation of biodegradable active
packaging by using chitosan /potato
starch biopolymers, containing leave
extracts of *Withania Somnifera* and
*Caparis spinosa***

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December 2018