A STUDY OF THE ANTIMICROBIAL ACTIVITY, SYNERGISTIC ACTION AND EFFECT OF ACTIVE BIOPOLYMER ADDED WITH THYME, BASIL AND MARJORAM ESSENTIAL OILS AGAINST Escherichia coli and Staphylococcus aureus

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In order to replace synthetic preservatives, several essential oils have been tested in foods and food packaging due its antimicrobial properties. The aim of this study was to observe the antimicrobial activity, synergistic action and effect of a chitosan-gelatin based active biopolymer incorporated with essential oils (EOs). The antimicrobial agents were tested against Staphylococcus aureus and Escherichia coli strains. The antibacterial activity of thyme, basil, marjoram, and synergism among them was assessed from Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) using the microdilution method. Chitosan-gelatin based active biopolymers were developed and added with 23% (w/w) of essential oil. The antimicrobial effect of active films was measured using the disc-diffusion method. ANOVA followed by Tukey test (p<0.05) were performed on the results. For E.coli, MIC values were 2.44 mg mL⁻¹ for thyme, 7.72 mg mL⁻¹ for basil, and 1.81 mg mL⁻¹ for marjoram. For S. aureus, MIC values were 1.02 mg mL⁻¹ for thyme, 5.56 mg mL⁻¹ for basil, and 1.39 mg mL⁻¹ for marjoram. There was no statistically significant difference between thyme and marjoram treatments. Just thyme essential oil showed bactericidal activity for all strains. About synergistic effect, the marjoram-basil oil combination displayed an additive effect for all strains.
and basil-thyme oil combination for *E. coli*. The others combinations were non-active. For *E. coli*, growth inhibition zone measurement was 25,6 mm for marjoram film and 29,4 mm for thyme film. For *S. aureus*, the diameter of the growth inhibition zone was 48,1 mm for thyme film. Active films added with essential oils have the potential to be used as active packaging, especially those which demonstrated inhibition zones. The combination among EOs antimicrobial compounds can be used to improve the antimicrobial activity, allowing for a dosage reduction used in active packaging and decrease association with adverse organoleptic characteristics.

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