

MICRO BIOTEC 25

CONGRESS OF MICROBIOLOGY
AND BIOTECHNOLOGY 2025

04/05/06
DECEMBER
2025



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ID645 | Synergistic combination of essential oil and organic acid: substitute for potassium sorbate in fruit preparation

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Background: Chemical preservatives, such as potassium sorbate (PS), are widely used in food preservation; however, they raise concerns due to potential health risks and increasing consumer demand for clean-label products. The replacement of synthetic antimicrobials with natural antimicrobial has emerged as a sustainable strategy to improve food quality and shelf life. Propionic acid (PA) and lemongrass essential oil (LEO) exhibit potential antimicrobial activity and their combination enhances inhibition of spoilage and pathogenic microorganisms. This study investigated PA and LEO combinations as natural preservatives to enhance microbiological safety and extend the shelf life of strawberry preparations for use in yogurts.

Method: Different treatments were investigated using the strawberry preparation with the addition of different concentrations of the combinations of LEO and PA ranging from $\frac{1}{4}$ to $2\times$ MIC, and PS (0,1%) as the negative control, and standardized inoculum of bacteria (10^5 CFU/mL - Lactobacillus plantarum, Escherichia coli), yeast (10^3 CFU/mL - Candida intermedia, Pichia fermentans) and fungi (10^2 or 10^5 spores/mL - Penicillium glabrum, Aspergillus niger) for 28 days. All systems were kept at refrigeration temperature ($5 \pm 2^\circ\text{C}$) and microbial growth was evaluated on days 0, 1, 7, 14, 21 and 28.

Results: The combination of LEO and PA at $2\times$ MIC exhibited greater antifungal activity than PS. The combination of $\frac{1}{4}\times$ MIC inhibited 10^2 spores/g but not at 10^5 spores/g, while the combinations of $\frac{1}{2}\times$ MIC and MIC inhibited fungal growth at both inoculum levels (10^2 and 10^5 spores/g). No bacterial or yeast growth was detected at any time point across all tested concentrations of the LEO + PA combination.

Conclusions: The results showed that LEO and PA are effective natural alternatives to replace PS for fruit preparation. However, further studies are needed to understand the effect of this combination on the fruit preparation when incorporated into yogurt and sensory tests to evaluate the effect of these antimicrobials on the sensory attributes of the final product.

Acknowledgements (optional): This work was supported by PRR (Programa de Recuperação e Resiliência) agenda VIIAFOOD - Platform for Valorization, Industrialization and Commercial Innovation for Agro-Food (no. C644929456-00000040).