

Antimicrobial Activity of Organic Acids against Some Common Food Spoilage and Pathogenic Microorganism

K. Sorathiya¹, A. Melo¹, C. Rodrigues², L. Paulico², R. Barracosa³, D. Correira³, M. Pintado¹

1 Universidade Católica Portuguesa, CBQF- Centro de Biotecnologia e Química Fina -

Laboratório Associado, Escola Superior, Porto, PORTUGAL

2 FRULACT - Headquarters & Frutech RDI Centre, Rua do Outeiro, Maia, PORTUGAL

3 MC Sonae, Rua João Mendonça, Porto, PORTUGAL

Background: In recent years, the food industry is challenged to produce high-quality products using natural preservative alternatives instead of synthetic ones, owing to the increasing consumer demand for clean-label food products. Organic acids have potential as an alternative due to their antimicrobial activity and high food safety (GRAS). Therefore, the objective of this work was to investigate the antimicrobial activity of organic acids against some common food spoilage and pathogenic microorganisms for use in food formulation.

Method: The antimicrobial activity of the organic acids (lactic, citric, and propionic acid) was tested at different concentrations ranging from 0.06 to 4% by microdilution method in 96 well plates against *Lactobacillus plantarum*, *Escherichia coli*; *Candida intermedia*, *Pichia fermentans*, *Penicillium glabrum*, and *Aspergillus niger*. The minimum inhibitory concentration (MIC) was recorded as the lowest concentration at which complete inhibition of visible growth occurred.

Results: The MICs of lactic, citric, and propionic acid for *E. coli* were 0.25, 0.25, and 0.125% respectively, while for *L. plantarum*, they were 0.25, 0.25, and 0.06% respectively. Regarding the yeasts, the MIC of lactic, citric, and propionic acid for *C. intermedia* were 1, 2, and 0.125%, respectively and for *P. fermentans* they were 1, 0.5, and 0.5%, respectively. Propionic acid also shows fungicidal potential against *A. niger* and *P. glabrum* with MIC values 0.5 and 0.25, respectively. Lactic acid displayed a MIC value of 4% representing the highest MIC value observed for both, while citric acid did not inhibit these fungi.

Conclusion: The organic acids tested showed significant antimicrobial potential at low concentrations, particularly lactic and propionic acids. Future studies will incorporate the most promising acids as substitutes for synthetic preservatives to verify their ability to maintain antimicrobial effectiveness over time when incorporated into foods.