

Antimicrobial activity of organic acids against some common food spoilage and pathogenic microorganisms



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Introduction

In recent years, the food industry is challenge of producing high-quality products using natural preservatives instead of synthetic ones, driven by increasing consumer demand for clean-label food products. Organic acids, which are prevalent in fruits and medicinal plants, possess well-documented antioxidant, antibacterial, and anti-inflammatory properties that are beneficial to human health (1). These acids have potential as alternative preservatives due to their antimicrobial activity and GRAS (Generally Recognized as Safe) status. They are utilized as antimicrobial agents, antioxidants, acidulants, flavor enhancers, and pH adjusters in various food products (2). Additionally, organic acids help enhance nutritional and physicochemical properties. As a natural approach to inhibiting food contaminants and pathogens, their antimicrobial properties contribute to improved food safety and extended shelf life (3). The objective of this study was to investigate the antimicrobial activity of organic acids against common food spoilage and pathogenic microorganisms for potential application in food formulation.

Objective

The objective of this study was to investigate the antimicrobial activity of organic acids against food spoilage microorganisms.

Methods and Results

Methods: 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*.

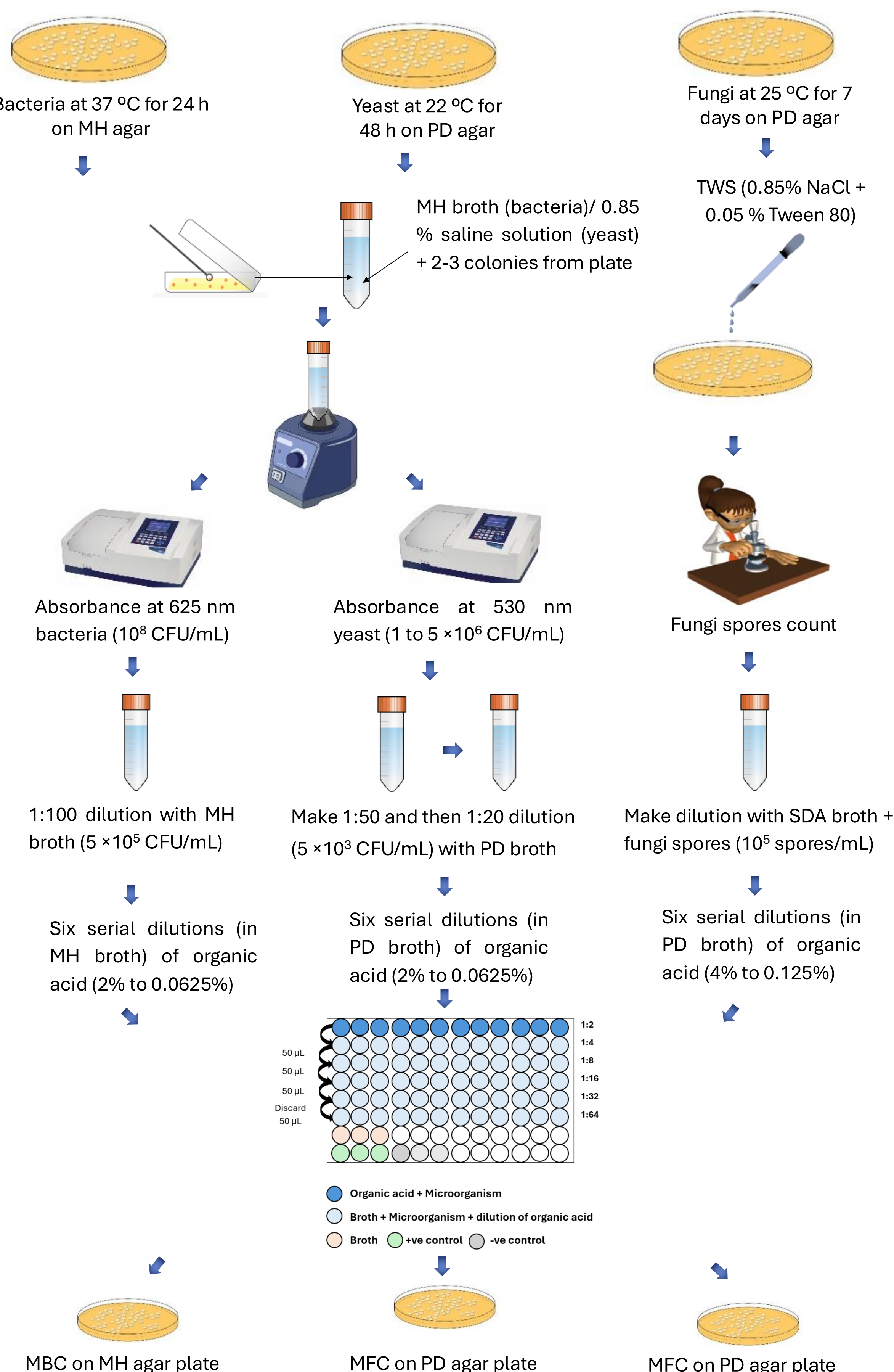


Table 1: Organic acid MIC (Minimum Inhibitory Concentration) and MBC (Minimum Bactericidal Concentration) against bacteria

Organic acid	<i>E. coli</i>		<i>L. plantarum</i>	
	MIC (%)	MBC (%)	MIC (%)	MBC (%)
Lactic acid	0.25	0.5	0.25	0.5
Citric acid	0.125	0.5	0.125	0.5
Propionic acid	0.125	0.5	0.125	0.5

Table 2: Organic acid MIC (Minimum Inhibitory Concentration) and MFC (Minimum Fungicidal Concentration) against Yeast

Organic acid	<i>C. intermedia</i>		<i>P. fermentans</i>	
	MIC (%)	MFC (%)	MIC (%)	MFC (%)
Lactic acid	1	1	2	2
Citric acid	2	2	2	2
Propionic acid	0.125	0.25	0.5	0.5

Table 3: Organic acid MIC (Minimum Inhibitory Concentration) and MFC (Minimum Fungicidal Concentration) against Fungi

Organic acid	<i>P. glabrum</i>		<i>A. niger</i>	
	MIC (%)	MFC (%)	MIC (%)	MFC (%)
Lactic acid	4	4	4	4
Citric acid	-	-	-	-
Propionic acid	0.25	1	0.5	2

-: No inhibition

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.

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References:

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