

Antifungal activity of reuterin and its potential for yogurt biopreservation

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Introduction

Molds are ubiquitous eukaryotic spoilage microorganisms responsible of deterioration of dairy products and causing significant losses. Chemical antifungals are now used for the control of molds in yogurt. However, the use of these compounds are controversial and increasingly being challenged by the consumer. This makes the search for alternative solutions more and more urgent. The use of bioprotective lactic cultures and some of their metabolites is one of the most promising natural alternative investigated recently. Reuterin, an aldehyde produced by *Lactobacillus reuteri* from glycerol, has demonstrated broad spectrum antibacterial activity. However, the antifungal potential of this molecule has rarely been studied. The main objective of this work is to produce, purify and evaluate the antifungal activity of reuterin in yogurt

Methods

Reuterin was produced by fermentation of glycerol by *L. reuteri* strain ATCC53608 under anaerobic conditions. The reuterin concentration was determine by HPLC and its inhibitory activity was evaluated by the agar diffusion technique against *Escherichia coli* ATCC 25922 and *Listeria ivanovii* HPB28, *Aspergillus versicolor*, *Mucor racemosus* and *Penicillium chrysogenum*. The antifungal activity was then evaluated in yogurt samples stored at 4 °C. for 21 days inoculated with *M. racemosus* or *P. chrysogenum*.

Results & Discussion

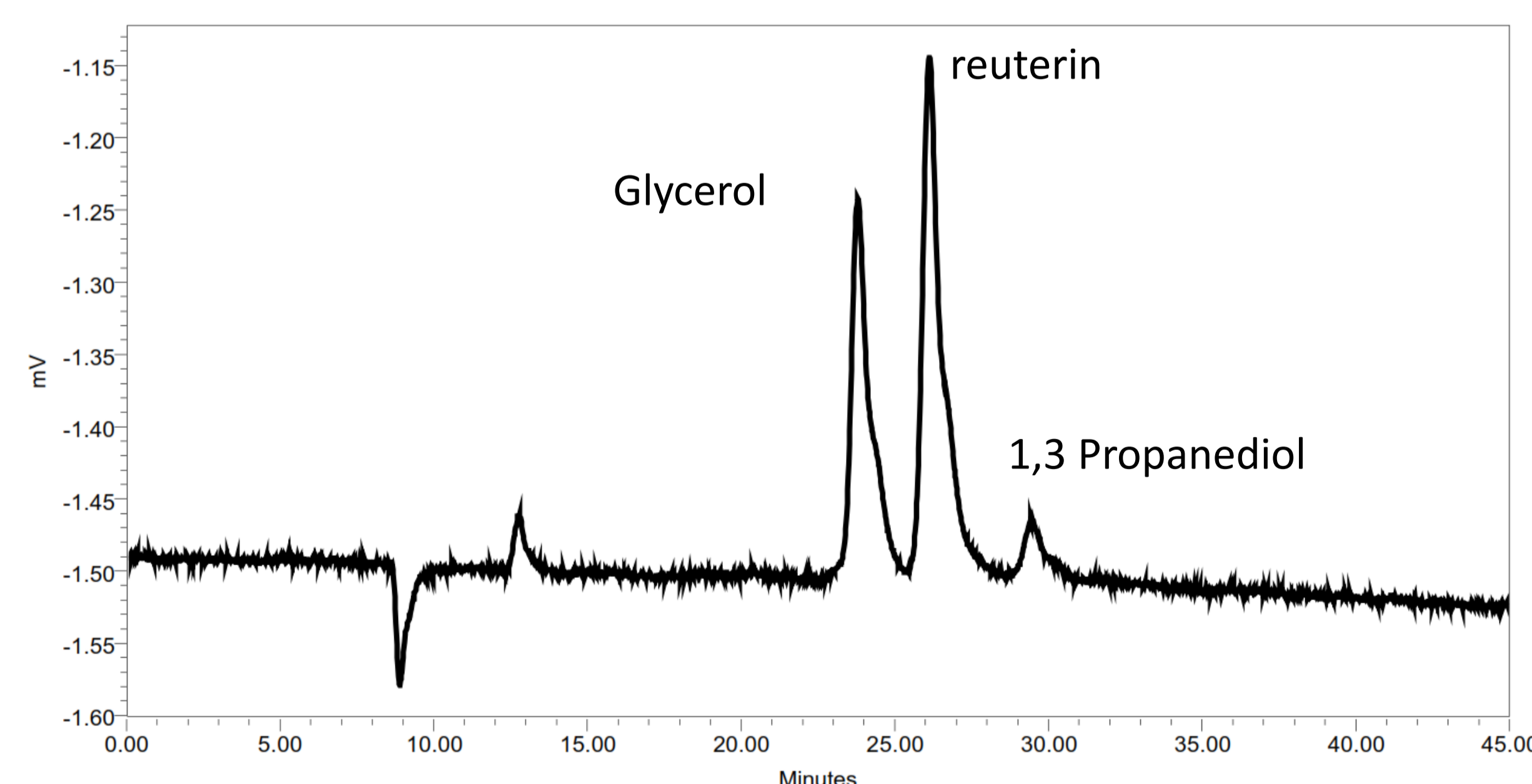


Figure 1. HPLC profile of reuterin preparation

Acknowledgment



Results & Discussion

Reuterin showed antifungal activity against the three strains tested at concentrations of 138 mM and above.

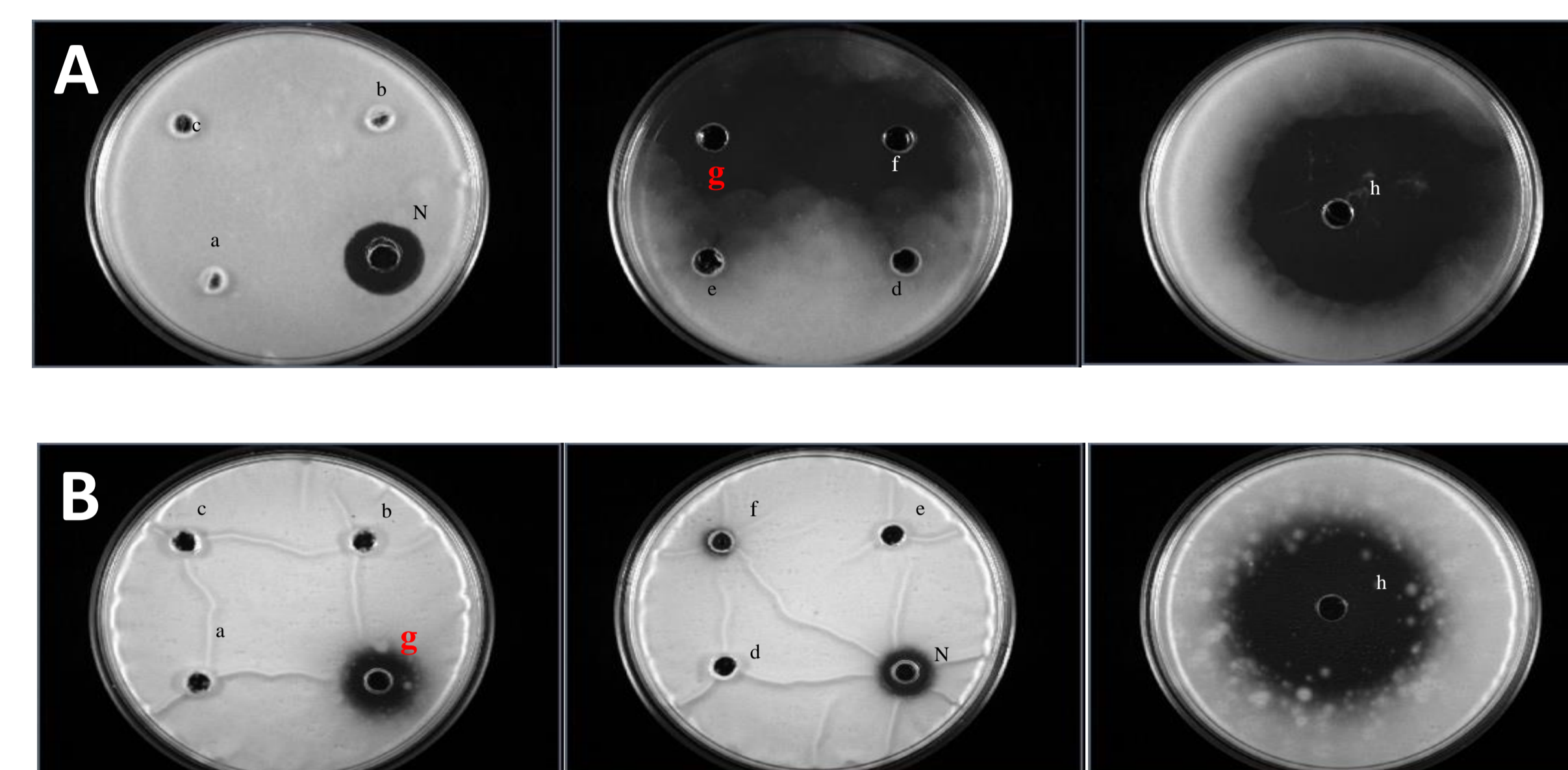


Figure 2 : Modified soft agar diffusion method showing inhibition activity of reuterin at different concentrations against *Mucor racemosus* (A) and *Penicillium chrysogenum* (B)

a: 0,014 mM, b: 0,7 mM (b), c: 1,4 mM, d: 7,0mM, e: 13,8 mM, f: 70,0 mM, g: 140 mM and h 1382 mM. N: nystatine.

Activity	96 h of growing	48 h of growing	48 h of growing
	Aspergillus versicolor	Penicillium chrysogenum	Mucor racemosus
Concentration (mM)	Average inhibition diameters (mm)		
1382 (10X)	41	42	50
138 (5x)	21	15	20
70 (1x)	11	8	20
13,8 (0,1x)	7,5	0	0
7,0 (0,05x)	0	0	0
1,4 (0,01x)	0	0	0
0,7 (0,005x)	0	0	0
0,014 (0,001x)	0	0	0

Table 1: Inhibition diameters (in mm) obtained by different reuterin concentrations against *Aspergillus versicolor*, *Penicillium chrysogenum* and *Mucor racemosus*.

Results in the brewed yogurt showed a complete inhibition of *M. racemosus* and *P. chrysogenum* during the 21 days of the experiment by reuterin at a concentrations of 6.9 mM and more. The addition of 1.38 mM reuterin in the samples shows a 3 days delay in the grow of the mold.

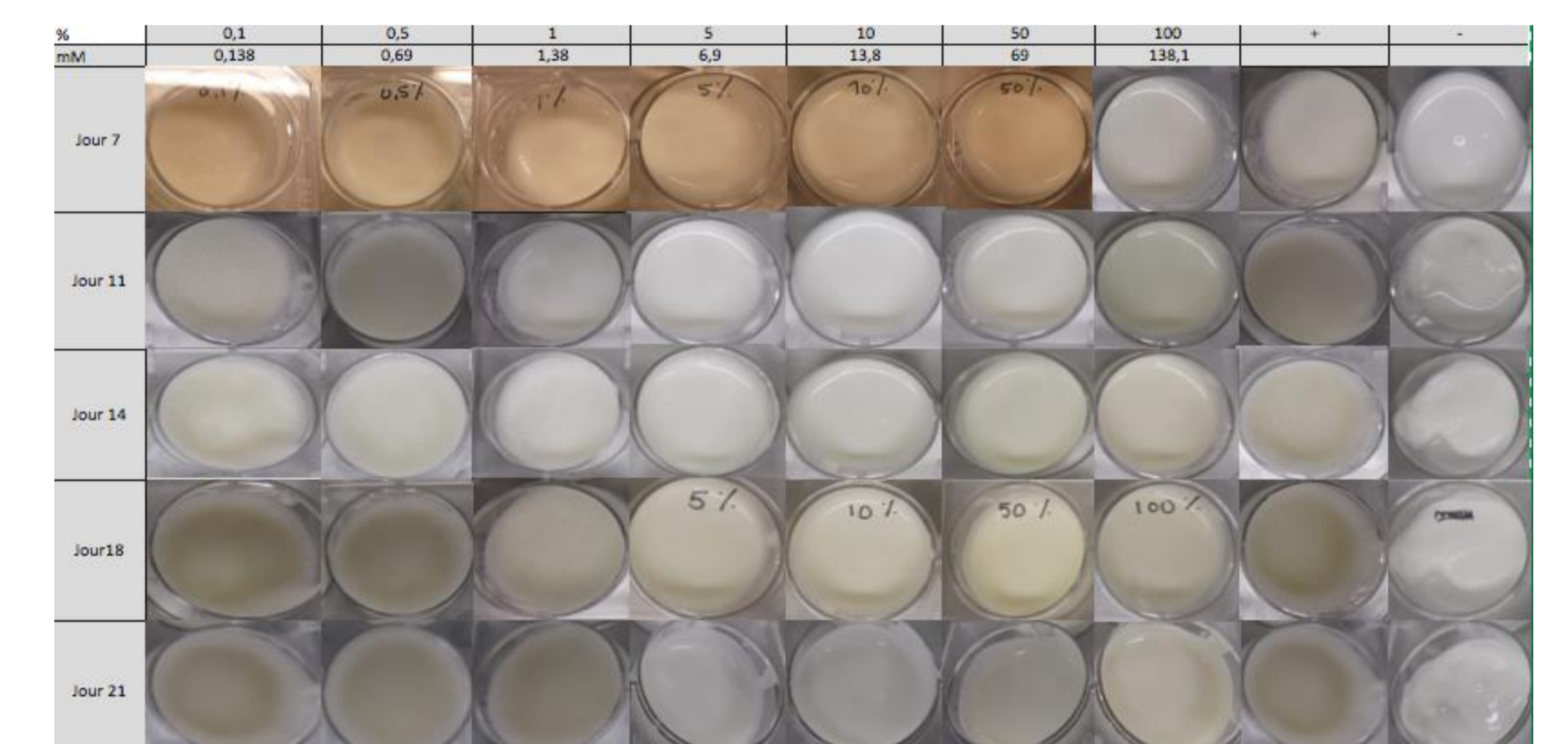


Figure 3: Effet of different reuterin concentrations on *M. racemosus* grow in brewed 1% fat and plain yogurt stored for 21 days at 4 °C.

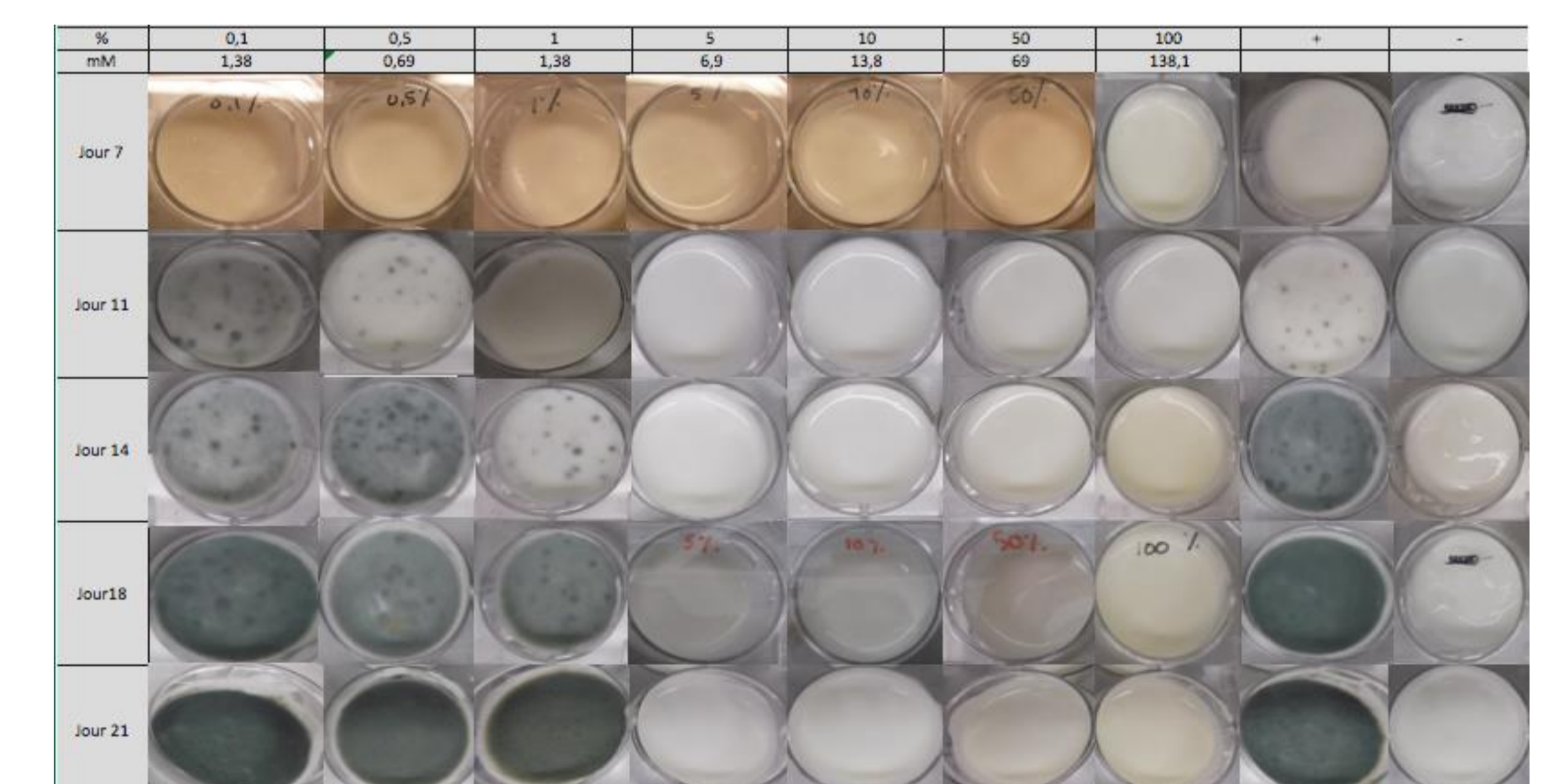


Figure 4: Effet of different reuterin concentrations on *P. chrysogenum* grow in brewed 1% fat and plain yogurt stored for 21 days at 4 °C.

Conclusion

- This study showed that reuterin produced had a strong antifungal activity.
- Reuterin concentration of 6.9 mM and above inhibited fungal grow in yogurt for 21 days at 4 °C
- Reuterin concentration of 1.38 mM delayed the grow of the mold by 3 days.
- These results show the high potential of reuterin as a natural antifungal alternative for use in dairy products..