

Supplementary Material

Zinc tolerance of special yeasts and lactic acid bacteria for use in the food industry

Samantha Rossi¹ <https://orcid.org/0000-0003-0254-6464>, **Maria Maares**² <https://orcid.org/0000-0002-9140-2448>, **Helena Kieserling**³ <https://orcid.org/0000-0002-8093-6794>, **Sascha Rohn**³ <https://orcid.org/0000-0002-5009-8830>, **Oliver Schlüter**⁴ <https://orcid.org/0000-0001-8958-5815>, **Francesca Patrignani**^{1,5} <https://orcid.org/0000-0002-6688-2638>, **Rosalba Lanciotti**^{1,5} <https://orcid.org/0000-0002-1592-4674>, **Hajo Haase**² <https://orcid.org/0000-0002-1622-8718>, **Claudia Keil**^{2*} <https://orcid.org/0000-0003-0317-0905>

¹ Campus Food Science, Department of Agricultural and Food Sciences, Alma Mater Studiorum, University of Bologna, p.zza Goidanich 60, 47521 Cesena, Italy; samantha.rossi2@unibo.it (S.R.); francesca.patrignani@unibo.it (F.P.); rosalba.lanciotti@unibo.it (R.L.)

² Technische Universität Berlin, Institute of Food Technology and Food Chemistry, Department of Food Chemistry and Toxicology, Straße des 17. Juni 135, 10623 Berlin, Germany; c.keil@tu-berlin.de (C.K.); maares@tu-berlin.de (M.M.); haase@tu-berlin.de (H.H.)

³ Technische Universität Berlin, Institute of Food Technology and Food Chemistry, Department of Food Chemistry and Analysis, Straße des 17. Juni 135I, 10623 Berlin, Germany; helena.schestkowa@tu-berlin.de (H.K.); rohn@tu-berlin.de (S.Ro.)

⁴ Leibniz Institute for Agricultural Engineering and Bioeconomy, Quality and Safety of Food and Feed, Potsdam, Germany; oschlueter@atb-potsdam.de (O.S.)

⁵ Interdepartmental Centre for Agri-Food Industrial Research, University of Bologna, Quinto Bucci 336, 47521 Bologna, Italy

* Correspondence: c.keil@tu-berlin.de (C.K.); Tel.: +49 (0) 30 31472816; Fax: +49 (0) 30 31472823

Table S1: Results of a two-way ANOVA on growth of yeast and lactic acid bacteria during the Zn-enrichment procedure analyzed by OD600 measurement (see Fig. 1)

	<i>Y. lipolytica</i> RO25	<i>K. unispora</i> FM2	<i>K. servazzii</i> KAZ2	<i>F. sanfranciscensis</i> DG1
0 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.59	<0,001	0.03	0.04
start vs end	<0.001	<0.001	<0.001	<0.001
before Zn ²⁺ addition vs. end	<0.001	<0.001	<0.001	<0.001
0.5 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.51	0.01	0.006	n.a.
start vs end	<0.001	<0.001	<0.001	n.a.
before Zn ²⁺ addition vs. end	<0.001	<0.001	<0.001	n.a.
1 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.45	0.02	0.02	n.a.
start vs end	<0.001	<0.001	<0.001	n.a.
before Zn ²⁺ addition vs. end	<0.001	<0.001	<0.001	n.a.
2.5 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.51	0.01	0.01	n.a.
start vs end	<0.001	<0.001	<0.001	n.a.
before Zn ²⁺ addition vs. end	<0.001	<0.001	<0.001	n.a.
5 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.45	0.01	0.007	0.02
start vs end	<0.001	<0.001	<0.001	<0.001
before Zn ²⁺ addition vs. end	<0.001	0.07	0.32	<0.001
10 mM ZnSO₄				
start vs. before Zn ²⁺ addition	0.43	0.009	0.01	0.02
start vs end	<0.001	<0.001	<0.001	<0.001
before Zn ²⁺ addition vs. end	0.007	0.01	0.10	<0.001
20 mM ZnSO₄				
start vs. before Zn ²⁺ addition	n.a.	n.a.	n.a.	0.02
start vs end	n.a.	n.a.	n.a.	<0.001
before Zn ²⁺ addition vs. end	n.a.	n.a.	n.a.	<0.001

A two-way ANOVA was performed to analyze the effect of time and zinc treatment on growth of *Yarrowia lipolytica* RO25, *Kazachstania unispora* FM2, *Kazachstania servazzii* KAZ2 and *Fructilactobacillus sanfranciscensis* DG1. p-values for the statistical significance of the cell enrichment at the respective times of microorganism cultivation are shown (Two-Way ANOVA with Tukey's Multiple Comparison Test) are indicated.; n.a. = not analyzed