Vegetable matrix for functional food products development

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ABSTRACT

The aim of our project is to study the vegetable matrices as probiotic support. As an example, pumpkin (*Cucurbita moschata* Duchesne ex Poiret) was used in the present work to support a *Lactobacillus Casei* (LC) strain. Different drying technologies: dry impregnation, forced air convection or vacuum dehydration and dry impregnation followed by vacuum dehydration were applied to stabilize the final product. Edible coating technology was also used. According to the results, the application of edible coating extended the shelf-life product till 14 days. The dehydration processes also contributed to prolong the storage time. The vacuum dried product reached 28 days. All products were storage at 18-20°C. The LC viability depended on dehydration process applied, reaching a level of microbial load ≈10^6-10^7 CFU/g product throughout the storage period (vacuum dried). This level is appropriate for a functional food containing the beneficial microorganism. The presence of the LC did not alter the color changes of the pumpkin, nevertheless the stabilization process applied to matrix enriched with LC, significantly affected the color of the final product.

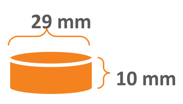
OBJECTIVE

- To study a vegetable matrix as support of LC and to stabilize final product applying different drying technologies and using edible coating.
- To evaluate the effect of the LC presence and the process applied on the color of the final product.

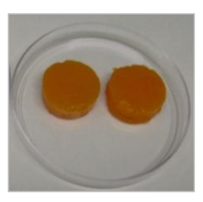
SAMPLES PREPARATION

Pumpkin preparation

Washing
↓
Cutting



↓
Blached with water vapor
↓
Cooled



Pumpkin impregnation

Lactobacillus casei
(ATCC 393, Microbiologics ®)
↓
Biomass generation in MRS broth
↓
Washing (physiological solution)
↓
Impregnation solution

Application of different treatments

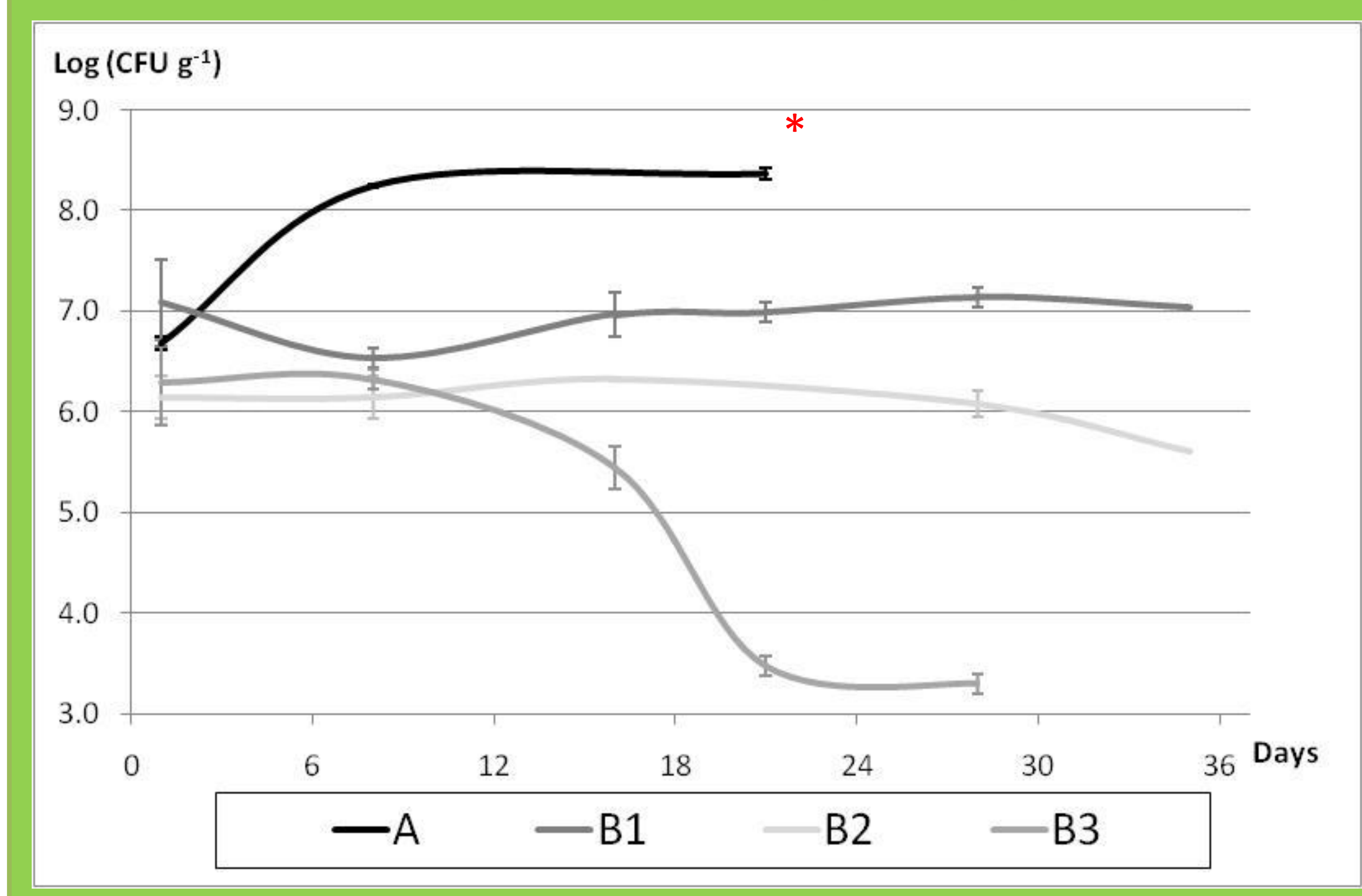
Systems	Treatment
Agar agar coating (2% p.p.)	**A:** coating with reduction of pH plus forced air convection drying (40°C 3h)
Drying	**B1:** vacuum dehydration
	B2: Osmotic drying
	B3: Osmotic drying + vacuum dehydration

DETERMINATIONS

- ✓ **Viable count of LC**: MRS agar
- ✓ **Microbiology stability**: coliform, and fungi and yeasts counts
- ✓ **Water activity and pH**
- ✓ **Microscopic analysis:** Optic and ESEM.

RESULTS

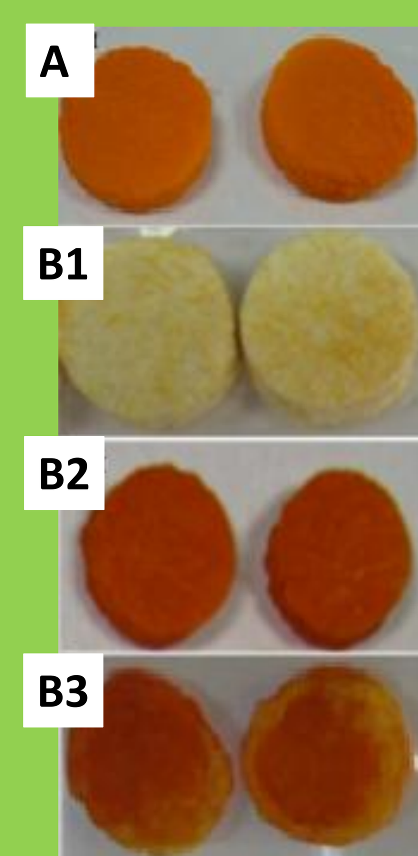
LC viability during storage



* End of microbiological stability.

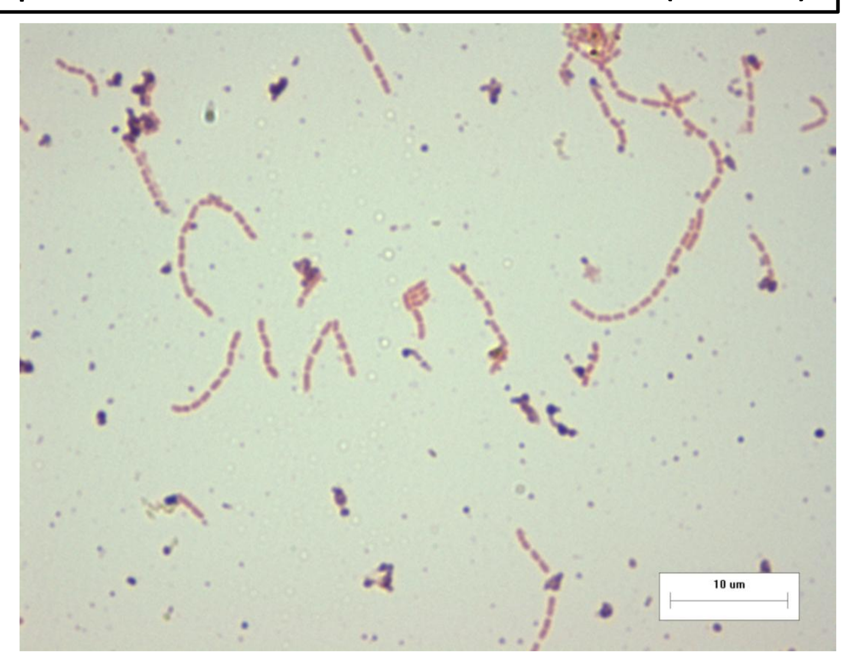
Colour parameters during storage

System	Day	L*	a*	b*
A	1	56±4	27±3	79±1
	7	54±1	28±2	77±1
B1	1	72±1	30±1	58±1 *
	28	72±1	28±2	65±3 **
B2	1	54±3	32±1 *	48±1 *
	28	51±1	21±1 **	42±1 **
B3	1	46±4 *	23±3	70±4 *
	28	36±2 **	25±2	60±2 **

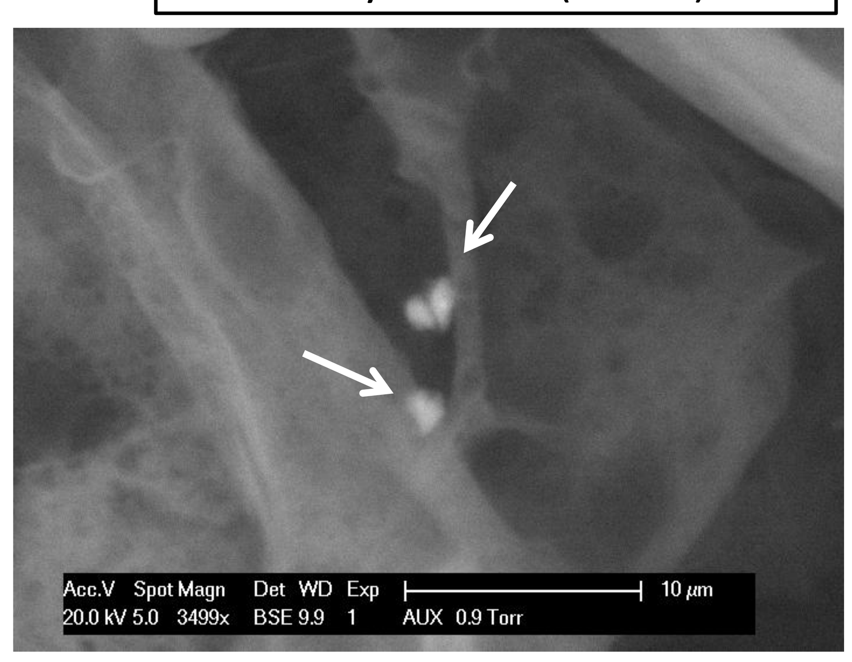


* Significant differences (p≤0.05) between initial and final storage day.

Optic microscopic of free LC cells in MRS broth (1000x)



ESEM of system B3 (3499x)



CONCLUSIONS

- ➢ **The LC was succesfully supported in pumpkin matrix showing high viability of the probiotic during the shelf-life.**
- ➢ **Application of osmotic dehydration and vacuum drying increase the food stability, however LC viability decreased.**
- ➢ **The food colour was affected by the process stabilization but not by the presence of LC.**

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