



PROBIOTIC FERMENTATION OF MIXED FRUIT AND VEGETABLE JUICES

Aruzhan Otegenova^{1*}, Aulia Putri Srie Wardani¹, Waminee Niramit¹, Balázs P. Szabó¹, Judit Krisch¹

¹ Department of Food Engineering, Faculty of Engineering, University of Szeged, Szeged, Hungary

*corresponding author; e-mail: aruzhan.otegenova@alumni.nu.edu.kz

INTRODUCTION

In the rise of a growing trend towards vegan origin product consumption and certain diet limitations in consumers, fruit- or vegetable-based non-dairy probiotic beverages become quite an appealing substitute. In addition, previous studies show that antioxidant activity of plant – based food products enhances post fermentation due to their liberation or new formation of antioxidant compounds. Such qualities allow the fermented fruit and vegetable juice to have promising future and attract beverage industries' attention.

AIMS

To investigate the probiotic cell count viability in 72h fermented with *Levilactobacillus brevis* juice mix made of beetroot, apple and carrot, and conclude on most suitable environment for probiotic shelf life.

MATERIALS AND METHODS

Mixed apple-beetroot and apple-carrot juices in 1:1 ratio were prepared. The hetero-fermentative probiotic strain *Levilactobacillus brevis* was used to ferment the juices under anaerobic conditions at 37°C for 72 h. Fermented juices were stored in the refrigerator for 14 weeks. Different media such as MRS agar, TGE agar and Malt agar were used to conduct microbiological assessment of mixed juices. The free radical scavenging activity (%) of the samples were measured by the DPPH method. Sensorial evaluation was conducted from the fresh, fermented and non-fermented juices just after the fermentation and at the end of the storage period considering odor, taste, and appearance.

RESULTS

Results of the antioxidant activity evaluation in fermented and control juices are illustrated in Table 1. Numbers indicate that the highest radical scavenging activity in both juices are observed in a freshly state with zero treatment with values 18,7% for apple-carrot juice and 45,8% for apple-beetroot juice. While comparing fermented and non-fermented samples at different time periods, antioxidant activity has increased significantly with time, especially for the apple-carrot combination. However, the difference between fermented and control samples seems to be minor with the latter being insignificantly lower in both type of juice combination. Microbiological assay indicated (Fig.1) that inoculated *Levilactobacillus brevis* has a survival time period of 28 days in mixed juices followed by a gradual decline at a longer storage of 14 weeks. Sensory evaluation shows that consumers prefer fresh juice over a fermented state, and the longer storage negatively affects the perception of consumers.

Table 1. Radical scavenging activity (%) in fresh, fermented and non-fermented mixed juices.

	Apple-Carrot		Apple-Beetroot	
	Fermented	Non-fermented	Fermented	Non-fermented
AFTER 72 HOURS FERMENTATION	2,6	2,5	27,8	27,0
4 MONTHS STORAGE at 4°C	8,2	7,1	32,3	31,7
FRESH	18,7		45,8	

MICROBIOLOGICAL ASSAY OF FERMENTED JUICES

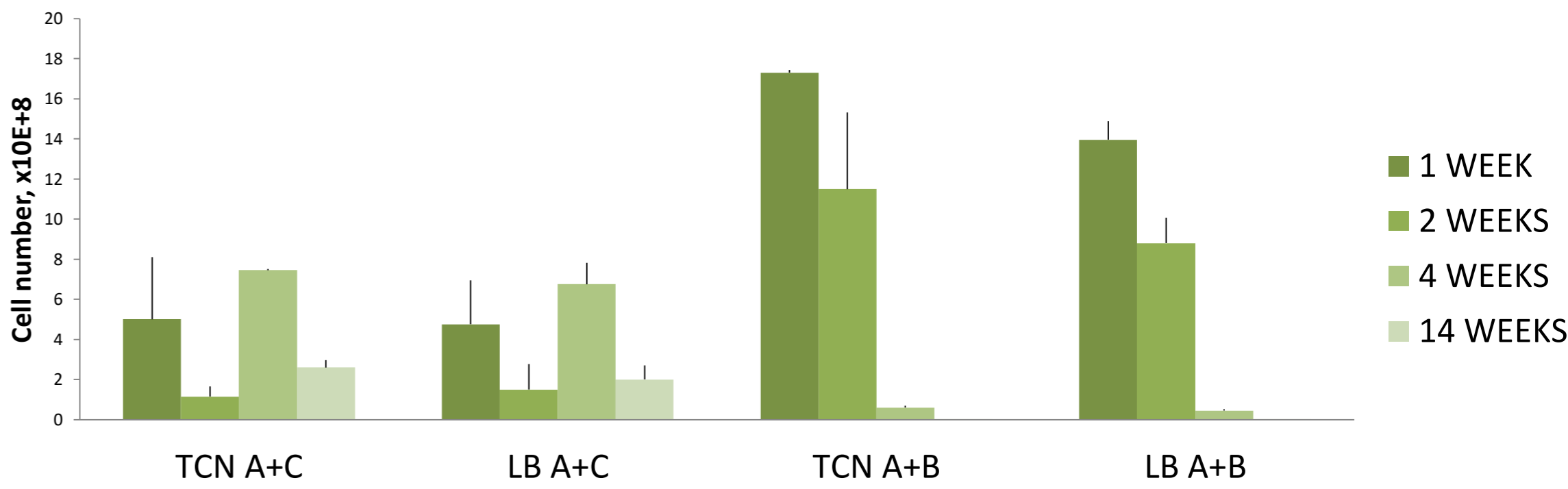


Figure 1. Microbiological assay: total cell number count (TCN) and count of *Levilactobacillus brevis* (LB) in fermented mixed juices. A: apple; B: beetroot; C: carrot.

CONCLUSIONS

Fermentation in juices caused a minor increase in the antioxidant activity. Probiotic strain *Levilactobacillus brevis* was found to be viable at weeks 1 and 2 after fermentation. Fresh juice is perceived better compared to the fermented state.

REFERENCES

Patel, A. R. (2017). Probiotic fruit and vegetable juices-recent advances and future perspective. International Food Research Journal, 24(5).
Ranadheera, C. S., Vidanarachchi, J. K., Rocha, R. S., Cruz, A. G., & Ajlouni, S. (2017). Probiotic delivery through fermentation: Dairy vs. non-dairy beverages. Fermentation, 3(4), 67.
Shori, A. B. (2016). Influence of food matrix on the viability of probiotic bacteria: A review based on dairy and non-dairy beverages. Food bioscience, 13, 1-8.

	Fresh	Apple-Carrot	Apple-Beetroot
		3,59±0,92	3,67±0,91
72h	Non-fermented	3,04±1,12	3,34±1,08
	Fermented	2,86±0,99	3,34±1,21
3 months	Non-fermented	3,04±0,97	3,40±0,86
	Fermented	2,51±0,97	2,81±0,83

Table 2. Sensory analysis of fresh, fermented and non-fermented mixed juices considering odor, taste, and appearance. 1- strongly dislikes; 2- dislike; 3- neither dislike nor like; 4- like; 5- excellent.