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Lactic acid fermentation of *Arthrospira platensis* for the production of a new lactose-free beverage rich in probiotics

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Abstract:

The first objective of this study was to evaluate the use of lyophilised biomass of the cyanobacterium *Arthrospira platensis* F&M-C256 in a “vegetal soybean drink” (Alce Nero), as substrate for lactic acid fermentation by *Lactobacillus plantarum* ATCC8014 (LAB8014) and to evaluate the fermented products in terms of probiotic bacteria content, biochemical composition, *in vitro* digestibility (IVD), *in vitro* antioxidant activity (IVAA), and total phenolics (TP), which are considered parameters of great importance for the development of probiotic and functional beverages.

The suitability of *A. platensis* biomass as substrate for LAB8014 growth was tested according to Niccolai et al. (2019).

After 72 h of fermentation, the LAB8014 concentration was 10.5 log CFU mL⁻¹ and lactic acid and acetic acid concentration reached 1.2 and 7.7 g L⁻¹, respectively. As expected, after 72 h of fermentation a decrease of pH (-8%) and carbohydrates (-25%) was observed. Lyophilised *A. platensis* biomass was shown to be a suitable substrate for LAB8014 growth.

After fermentation, the lyophilized broth contained 51% of proteins and 23% of lipids. IVD, IVAA and TP increased (+2%, +31%, and +30%, respectively), while phycocyanin content decreased (-23%).

The *in vivo* antioxidant activity of the lyophilized broth (after 72 h fermentation) was also measured using a *Saccharomyces cerevisiae* ZIM2155 model. An aqueous extract prepared from the lyophilized broth was able to strongly reduce intracellular oxidation processes in the yeast cells.

This study highlights the potential of *A. platensis* F&M-C256 biomass as a substrate for the production of lactose-free vegan beverages rich in probiotics.

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Keywords:

Arthrospira platensis, spirulina, lactose-free beverage, bioactivity, probiotics

References:

Niccolai, A., Shannon, E., Abu-Ghannam, N., Biondi, N., Rodolfi, L., & Tredici, M. R. (2019). Lactic acid fermentation of *Arthrospira platensis* (spirulina) biomass for probiotic-based products. *Journal of Applied Phycology*, 31(2), 1077-1083.