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ABSTRACT BOOK



MICROALGAE AS FUNCTIONAL INGREDIENTS FOR BAKERY PRODUCTS, PASTA, AND FERMENTED BEVERAGES

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ABSTRACT

This overview focuses on the influence of the integration of microalgae in bakery products, gluten-free pasta, and fermented beverages, especially in terms of antioxidant potential and phenolic supplementation.

Sourdough was used as leavening and fermentation agent for “crostini”[1]. Three integration percentages with *Arthrospira platensis* F&M-C256 (Ap) were tested: 2%, typically used in algal-based products, 6% and 10%. Six and ten percent Ap “crostini” presented significantly higher total phenolic content (TPC) (2.9 and 3.4 mgGAE/g) and radical scavenging activity (RSA) (61% on average) vs control (56%). For crackers[2] and cookies[3], integration with 2% and 6% Ap, *Chlorella vulgaris* Allma (CvA), *Tetraselmis suecica* F&M-M33 (Ts), or *Phaeodactylum tricornutum* F&M-M40 (Pt) biomass were tested. The highest RSAs (24.4-24.6%) were found in Ap and Pt crackers at 6% incorporation. Microalgae cookies showed significantly higher antioxidant capacity (AC) vs control (from +45% to +307%), with 6% Ts cookies presenting the highest AC (25 mmolTEAC/kg). TPC in microalgae crackers ranged from 1.1 to 2.4 mgGAE/g, with the highest value for 6% Ts. All microalgae-based cookies showed significantly higher TPC compared to the control. Pt cookies exhibited the highest TPC (0.31 and 0.62 mgGAE/g for 2 and 6% incorporation, respectively). Ap at 3% provided a significant supplementation of phenolic compounds, chlorophylls, and carotenoids to gluten-free pasta[4], which resulted in significantly higher RSA (+146%) when compared to wheat pasta. Ap (92 g dw/L) was also used as substrate for lactic acid fermentation by *Lactiplantibacillus plantarum* ATCC8014 in water (W)[5] or in a vegetal soybean drink (SD)[6]. The RSA and TPC increased significantly after fermentation for both W (+79% and +320%) and SD (+31% and +30%). Moreover, the intracellular oxidation in *Saccharomyces cerevisiae* was strongly reduced in SD (-63%).

Keywords: Microalgae, functional foods and beverages, bioactivity, total phenolic content, antioxidants

References:

1. Niccolai A et al. (2019) *Scientific Reports* 9:1-12;
2. Batista AP et al. (2019) *Foods* 8:611;
3. Batista AP et al. (2017) *Algal Research* 26:161-171;
4. Fradinho P et al. (2020) *Algal Research* 45:101743;
5. Niccolai A et al. (2019) *Journal of Applied Phycology* 31:1077-1083;
6. Niccolai A et al. (2020) *Frontiers in Microbiology* 11:1-18.

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