

O.C. 151_147 | TOWARDS ZERO-WASTE NUTRITION: UNVEILING THE NUTRITIONAL AND BIOACTIVE POTENTIAL OF FREEZE-DRIED BROCCOLI STALK POWDER

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Objective: The shift towards sustainable food systems includes valorising agro-industrial by-products like broccoli stalks, rich in nutrients and bioactive compounds. This study assessed the nutritional profile and bioactive properties—phenolic content, antioxidant capacity and potential prebiotic activity—of freeze-dried broccoli stalk powder.

Methods: Broccoli stalks were cleaned, freeze-dried, milled, and analysed for proximate composition (moisture, ash, fat, protein, carbohydrates, dietary fibre) by AOAC methods, with total phenolics and antioxidant capacity measured via Folin-Ciocalteu and ABTS assays, respectively. Potential prebiotic activity was evaluated by monitoring the growth of three probiotic strains (*L. rhamnosus* GG, *L. rhamnosus* R11, and *L. casei* 01) via viable counts, alongside metabolic activity assessed through pH changes and organic acid profiles determined by HPLC.

Results: Freeze-dried broccoli stalk powder exhibited high dietary fibre (43.9 g/100 g), substantial protein (21.5 g/100 g), low fat (0.7 g/100 g), and significant total phenolic content (1.721 mg GAE/g) alongside antioxidant capacity (17.240 µmol TE/g). Fermentation with 2% broccoli stalk powder supported the growth of the tested strains, with viable cell numbers often matching or surpassing that achieved with the positive control (FOS) (approximately +0.5 log cycles). HPLC results indicated enhanced carbohydrate utilisation, with significantly higher lactic acid production and comparable acetic acid levels from broccoli stalk powder relative to glucose, both at 2%, after 24 hours of fermentation. These metabolic responses coincided with a decrease in pH.

Conclusions: Freeze-dried broccoli stalk powder offers a promising nutritional and functional profile, making it a sustainable and valuable ingredient in functional food development.

O.C. 152_149 | 2'-FUCOSYLLACTOSE AS A FUNCTIONAL MOLECULE: INSIGHTS FROM THE C. ELEGANS MODEL

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Objective: 2'-Fucosyllactose (2'-FL), a human milk oligosaccharide, provides key health benefits beyond infant nutrition. Studies suggest it supports immune function, metabolic health, and healthy aging, making it a promising ingredient in functional foods for all age groups.

Methods: *C. elegans* fat levels were measured using Nile Red staining. 2'-FL was applied to nematode growth media (NGM) plates with Nile Red, using Orlistat as positive control. Worms were incubated until young adult stage and fluorescence was measured. For aging assays worms were grown on NGM supplemented with 2'-FL for 21 days and survival was recorded daily. For anti-infection assays, worms were similarly exposed to 2'-FL and at the young adult stage were transferred to *Salmonella* seeded NGM for the daily monitoring of survival.

Results: 2'-FL was tested at five concentrations for fat reduction. The lower and higher doses resulted in no functional activity, while the intermedium doses significantly reduced fat content. For aging assays, the results obtained indicate a dose-response. A significant increase of median lifespan was determined at dose of 1 mg/ml in 2'-FL group. Finally anti-infection assays revealed a statistically significant increase in worm survival when exposed to 2'-FL compared to controls. The hazard ratio of 1.4 - 1.9 for the *Salmonella* group shows they had up to double the risk of death compared to 2'-FL group, indicating a protective effect.

Conclusions: Overall, 2'-FL elicit a positive effect in fat reduction, aging and protection against *Salmonella* infection.