



Valorization of xylo-oligosaccharides from brewer's spent grain: antioxidant, antimicrobial and glycemic modulation potential

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Apresentação oral

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COMO CITAR ESSE TRABALHO?

Resumo

Brewer's spent grain (BSG), the main by-product of the brewing industry, is an abundant lignocellulosic material with potential for the production of value-added functional ingredients. The recovery of xylo-oligosaccharides (XOS) from BSG represents a sustainable strategy for by-product valorization, as these compounds are associated with prebiotic and health-promoting properties. In this context, the study aimed to produce, purify, characterize, and evaluate the functional properties of XOS obtained from BSG, including antioxidant, antimicrobial, and glycemic modulation potential. XOS were produced through alkaline extraction followed by enzymatic hydrolysis of the hemicellulosic fraction. After production, the XOS fraction was purified and concentrated, and the oligosaccharide profile was characterized by ion-exchange chromatography. Phenolic compounds content and antioxidant activity were evaluated before and after simulated gastrointestinal digestion using Folin-Ciocalteu and ABTS assays, respectively. Antimicrobial activity was determined by the minimum inhibitory concentration (MIC) method against foodborne pathogens, including Gram-positive (*Staphylococcus aureus*, *Bacillus cereus*, and *Listeria monocytogenes*) and Gram-negative (*Salmonella enterica* and *Escherichia coli*) strains. The potential for glycemic modulation was evaluated *in vivo* using an oral starch tolerance test with purified XOS at 3 g/L. As a result, the XOS profile consisted mainly of low-degree-of-polymerization oligomers, with a predominance of xylobiose (X2), followed by X3-X6 fractions, indicating efficient enzymatic hydrolysis of xylan and the formation of soluble short-chain oligosaccharides with potential functional applications. Digested XOS exhibited enhanced antioxidant responses compared with non-digested samples, suggesting increased availability of bioactive compounds after gastrointestinal processing. Purified XOS showed antimicrobial activity against all tested microorganisms, with a MIC of 2 g/L. In the *in vivo* assay, XOS supplementation reduced postprandial glucose peaks compared with the starch control group. Overall, purified BSG-derived XOS demonstrated multifunctional properties, combining antioxidant capacity, antimicrobial activity, and potential for glycemic modulation. The predominance of short-chain XOS and their biological effects highlights the potential of brewer's spent grain as a sustainable source of functional ingredients for innovative food applications.



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Programação

📅 16:30 até 18:00 em 23/09/2026

📍 Anfiteatro do CDI

(<https://eventos.galao.com.br/cibia-2026/calendar/activity/24310>)

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Eixo Temático

- 1) Engenharia de Alimentos

Palavras-chave

lignocellulosic biomass

biorefinery

enzymatic hydrolysis

bioactive compounds

Agro-industrial by-products

Discussões Científicas de Qualidade

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