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Sequential valorization of bioactive polymers from mushroom farming by-products

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PURPOSE OF THE ABSTRACT

Each year, around 90 million tonnes of food waste are produced in Europe, 38% of which is directly produced by the food-manufacturing sector. If we focus on the mushroom farming industry alone, each week more than 60,000 tons of mushroom disregarded outputs are generated. These are basically treated as an unwanted by-product and used for low value applications. However, this fungal by-product contains valuable bioactive polysaccharides such as alfa- and beta-glucans and proteins. Finding high-added value applications for such mushroom farming by-products constitutes therefore a very attractive possibility from an economic and environmental perspective. In this context, our work in the framework of the Bio-Based Industries (BBI) and Horizon 2020 project "FungusChain" aims to develop sustainable value chains using fungal biomass by-products to obtain high-value bioactive molecules (glucans, proteins) and materials (biopolyesters).

In particular, our proposed biorefinery approach for the valorization of the biopolymers in *Agaricus bisporus* by-products combines three sequential processes, including pretreatments of the fungal biomass, extraction methods for soluble polysaccharides, and deconstruction of the insoluble residues into fermentable sugars to obtain the desirable fractions. The use of green solvents (subcritical water), enzymatic treatments and microbial fermentation increases the economic and environmental sustainability compared with traditional harsh chemical methods for the extraction of biomolecules from biomass.

The valuable fractions obtained through the process have great potential for food, pharmaceutical, cosmetic or biomedical applications. Indeed, these fractionated polysaccharides have reported bioactive, prebiotic and immunomodulatory properties of great benefits for human health, which open new perspectives for market claims.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

mushroom by-products | polysaccharides | bioactive compound | biorefinery

BIBLIOGRAPHY