EMULSION STABILITY OF B-GLUCANS ISOLATED FROM WINE LEES IN OIL-BASED SYSTEMS

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Background: β-Glucans are natural polysaccharides widely distributed in various biological sources, including cereals, fungi, yeast, bacteria, and algae, each source providing β-glucans with distinct structural and functional characteristics. Their physiological properties depend strongly on origin, molecular structure, molecular weight, degree of branching, and solubility, which influence their biological activity and functional performance. Cereal β-glucans are typically characterized by linear β-(1→3)(1→4) linkages associated with cholesterol-lowering and glycemic control effects, whereas yeast and fungal β-glucans mainly contain β-(1→3)(1→6) linkages responsible for immunomodulatory activity. Additionally, extraction methods and processing conditions significantly affect the molecular conformation, hydration behavior, viscosity, gel-forming capacity, and interactions with lipid phases, determining their suitability for applications in food, pharmaceutical, and cosmetic systems.
The aim of this study was to evaluate the ability of β-glucans isolated from wine lees to stabilize oil-in-water emulsions prepared with two lipid phases: avocado oil and the bio-based ester diisopropyl adipate (DIPA).
Materials and methods: Aqueous suspensions were prepared and subsequently homogenized with the oil phases by ultrasonic treatment to obtain the emulsified systems. The prepared emulsions were stored for 14 days, and their stability was assessed at 0, 7, and 14 days through macroscopic and microscopic observations.
Results: The results showed that all emulsions exhibited phase separation during storage, leading to the formation of two distinct layers. The lower phase was more transparent and contained a lower concentration of suspended material, whereas the upper phase was enriched in oil, β-glucans, and microstructural aggregates of different sizes. Differences in the stability profile were observed depending on the oil type and on the characteristics of the β-glucans used. Microscopic evaluation indicated changes in droplet distribution and particle aggregation over time, confirming the progressive destabilization of the systems during storage. Despite the observed separation phenomena, the studied β-glucans demonstrated their capacity to participate in emulsion formation and to influence the structural organization of the dispersed systems.
Conclusions: These findings support the potential valorization of β-glucans derived from wine lees obtained from indigenous wine varieties remaining after wine production, highlighting the significant availability of such by-product in the Republic of Moldova and their potential use as sustainable functional ingredients for emulsion-based applications in the food, cosmetic, and pharmaceutical sectors.

Keywords: wine yeast by-products, emulsifying properties, natural emulsifiers

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