

MANNOPROTEINS – SOURCE OF BIOACTIVE SUBSTANCES WITH ANTIOXIDANT ACTIVITY

Ludmila BALAN[✉], Nina BOGDAN-GOLUBI[✉], Ana ROZLOVAN[✉], Evelina TIBIRNAC[✉],
Natalia CHISELITA[✉]

Technical University of Moldova, the Republic of Moldova

Corresponding author: Ludmila Balan, e-mail: ludmila.batir@imb.utm.md

Introduction. The production of beer and wine generates large amounts of sediment, which is often discarded as waste and poses an environmental concern. This sediment, however, is rich in yeast that contains a wide variety of biologically active compounds, such as polysaccharides, pigments, proteins, and amino acids. Among these, mannoproteins are highly water-soluble bioactive compounds. As important components in the winemaking process, they possess beneficial properties with applications in food processing and medicine. Mannoproteins play a multifunctional role, exhibiting immunostimulatory and antioxidant effects, and they present promising prospects for future research in various fields.

Purpose of the study. This study aimed to obtain mannoprotein preparations from the waste biomass of beer and wine production. These preparations were investigated as a source of biologically active substances for regenerating and reactivating pigmented yeast strains after prolonged storage.

Material and methods. The mannoprotein preparations (MP) were obtained from *Saccharomyces* yeast biomass waste after Lager beer production (provided by the Kellers brewery) (MPB) and after Merlot red wine production (from the Cricova winery) (MPW), by sedimentation with 96% ethyl alcohol, in a 1:2 v/v ratio, and then purified. In this research, an aqueous solution of MP at a concentration of 25 mg/mL (S.U) was used. Among the bioactive components, the total carbohydrate and protein content, the enzymatic activity of catalase (CAT), and the antioxidant activity using the ABTS method were determined.

Results. The carbohydrate and protein content of MPs are key parameters for assessing their quality and nutritional value. Thus, the results showed that MPB and MPW had carbohydrate contents of approximately 9.0 and 7.6 mg/mL, and protein contents of 1.4 and 8.4 mg/mL, respectively. The higher protein content in the MPW preparation was associated with a decrease in catalase enzymatic activity, which reached 31.6 mmol/min/mg protein, compared to 285.1 mmol/min/mg protein in the MPB preparation. Furthermore, MPW diluted 50-fold revealed a greater capacity to eliminate the ABTS radical, with approximately 75% inhibition, whereas MPB diluted 10-fold achieved an antioxidant activity of approximately 40% inhibition.

Conclusions. Two mannoprotein preparations were obtained from beer and wine production waste. These preparations had a high content of bioactive substances, including carbohydrates and proteins, and exhibited strong antioxidant activity. They will be tested as media for regenerating and reactivating pigmented yeast strains from the genus *Rhodotorula* following prolonged storage.

Keywords: mannoproteins, antioxidant activity, bioactive substances.

Acknowledgments: This study was supported by the research project 25.80012.7007.16TC „Viability and productive potential of pigmented yeasts of the genus *Rhodotorula* – carotenoid producers, after long-term preservation”, funded by National Agency for Research and Development.