# VALUE-ADDED UTILIZATION OF OAT PROCESSING RESIDUES VIA *RHIZOMUCOR MIEHEI*-BASED ENZYMATIC TREATMENT

**Tamás Kovács[1], Balázs P. Szabó[1], Judit Krisch[1], Miklós Takó[2]**

[1]*Institute of Food Engineering, Faculty of Engineering, University of Szeged, Mars tér 7, H-6724 Szeged, Hungary*
[2]*Department of Biotechnology and Microbiology, Faculty of Science and Informatics, University of Szeged, Közép fasor 52, H-6726 Szeged, Hungary*
*e-mail: kovacs.tamas@mk.u-szeged.hu*

## Abstract

The utilization of oat grain has shown an increasing trend in recent years, due to its favorable nutritional properties. However, large amounts of hull are generated during the processing, which are not suitable for human consumption. Nevertheless, oat hull contains a wide variety of bioactive compounds, for example vitamins, dietary fibers and phenolic compounds [1-3]. Phenolics can exert antioxidant, antimicrobial and anti-inflammatory properties, however majority of these compounds occur in carbohydrate-ester and carbohydrate-glycoside forms, which decreases their bioavailability [4-5]. Traditional solvent-based extraction methods can be harmful to the environment, therefore the development and testing of eco-friendly approaches have become a key research focus in recent years [6]. Extracellular hydrolases (cellulases, esterases) produced by Mucoromycota fungi [7], for instance, can be well-utilized for such phenolics extraction. In this study an enzyme-assisted extraction approach using the enzyme cocktail with cellulolytic and esterolytic properties from the Mucoromycota *Rhizomucor miehei* was applied to liberate phenolic compounds from the hull of a black-hulled oat cultivar. The enzyme cocktail was produced in a wheat-bran based solid state fermentation system and partially purified by gel filtration prior to treatments. Relevant enzyme activities of the *R. miehei* cocktail were also determined. During enzyme-assisted extraction a mass of 1 g grounded oat hull was treated with 10 mL of enzyme cocktail, and the mixtures were incubated for 7 hours at 50 °C, under constant stirring at 130 rpm. Samples were taken at predefined intervals (0, 1, 3, 5 and 7 hours), then total phenolic content (TPC), total flavonoid content (TFC) and antioxidant activity measurements (e.g., radical scavenging and metal ion reducing capacities) were carried out. Results indicated that the enzyme treatment had a positive effect on both free phenolic and flavonoid yields, moreover the antioxidant activity generally increased in parallel with the TPC and TFC. The highest values were detected in samples collected during the later stages of the treatment, indicating that a longer incubation time is necessary to achieve higher bioactivity. In conclusion, treatment with enzymatic cocktail of *R. miehei* had a positive effect on the liberation of bioactive phenolic compound from pigmented oat hull.

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