

Holistic valorization of rice bran towards high-added value products for industrial applications

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Rice bran, one of the main by-products of the rice milling industry, constitutes a rich source of fibers, proteins, lipids (~15-20% oil), minerals, vitamins, as well as phytochemicals, namely γ -oryzanol, tocopherols, tocotrienols and phenols. Even though rice bran has been reported to present several health-promoting properties (e.g. antioxidant, antitumor, cholesterol-lowering properties), it is usually under-utilized as animal feed, fertilizer or fuel.

In the frame of the present study, a holistic approach for the valorization of rice bran towards valuable products for various industrial applications is proposed. In particular, rice bran samples were received from Greek industries. Following their initially characterization in terms of particle size, color parameters, water activity and their proximate composition (moisture, ash, lipids, proteins, carbohydrates), rice bran samples were thermally treated (100 °C, 1h), in order to deactivate lipases and lipoxygenases. Then, the stabilized rice bran samples were subjected to microwave- or ultrasound-assisted extraction as well as Soxhlet extraction in order to recover the rice bran oil. In all cases, the obtained oil was examined for its total phenol content and *in vitro* antioxidant activity as well as for its fatty acid profile using GC-FID. Moreover, the defatted stabilized rice bran samples were then examined as a source of free and bound polar phenolic antioxidants. Free phenolic compounds were recovered using a 60% (v/v) aqueous ethanolic solution, whereas for the recovery of bound phenolic compounds alkaline or acidic hydrolysis was carried out. In all cases, extraction was carried out with the aid of ultrasounds. The obtained extracts were examined for their total phenolic content and also for their reducing and radical scavenging activity with various *in vitro* colorimetric assays (i.e. CUPRAC, DPPH, ABTS). The profile and levels of the major individual phenolic compounds (i.e. *p*-coumaric acid and ferulic acid) in the obtained rice bran extracts were analyzed using RP-HPLC-DAD.

The results of the present study are expected to be of use to the local food industries in terms of by-product utilization for added-value applications.



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