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Integrated technology for a sustainable valorization of bioactive compounds from cereal by-products

Silvia Amalia Nemes, Anca Corina Fărcaș, Sonia Ancuța Socaci and Dan Cristian Vodnar

University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Cluj-Napoca 400372, Romania

Abstract

Cereal is a staple food and the major source of dietary nutrients all across the world. It is grown in huge quantities due to its economic value as a commodity that provides more food and energy than any other crop on the planet. Worldwide is estimated that around 12.9% of all food waste is generated from cereal processing. Wheat bran, wheat germ, rice bran, rice germ, corn germ, corn bran, barley bran, and brewery-spent grain are just a few examples of wastes that may be exploited to recover bioactive compounds, therefore promoting a sustainable approach for the development of novel food products and ingredients. Food industry wastes come out as potential valuable protein sources to be valorized, thus, the cereal wastes are mainly used due to their immense release rates and high protein contents compared to other by-products. High-value compounds like lignans, essential fatty acids, ferulic acid and phenols, tocopherols, anthocyanins, or β-glucans are found in cereal by-products. The most crucial stage in isolating various types of bioactive molecules from cereals is the extraction process. Bioactive compounds have been extracted from cereal waste using both traditional and innovative extraction protocols. Currently, a variety of extraction methods are applied to recover the bioactive compounds from cereal by-products. Solvent composition and polarity, the optimal sample particle size and sample: solvent proportion, as well as pH, pressure, and temperature are key factors for the release and preservation of extracted compounds. This paper aims to provide a critical and comprehensive overview of the current knowledge of the well-known conventional extraction methods and the advanced novel treatments and extraction techniques applied to release the bioactive compounds from cereal waste and by-products.

Keywords: cereal by-products, bioactive compounds, novel extraction, conventional extraction, sustainability

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