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Volume 119, Issue 7, July 2017, Article number 1600160**Nutritional composition, extraction, and utilization of wheat germ oil: A review** (Review)Ghafoor, K.^a, Özcan, M.M.^b, Al-Juhaimi, F.^a, Babiker, E.E.^a, Sarker, Z.I.^c, Ahmed, I.A.M.^a, Ahmed, M.A.^a^aDepartment of Food Science and Nutrition, College of Food and Agricultural Sciences, King Saud University, Riyadh, Saudi Arabia^bDepartment of Food Engineering, Faculty of Agriculture, Selcuk University, Konya, Turkey^cFaculty of Pharmacy, Kuantan Campus, International Islamic University Malaysia (IIUM), Kuantan, Pahang, Malaysia

Abstract

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Wheat germ is a by-product of wheat milling from which wheat germ oil (WGO) can be obtained using different techniques. For a better quality WGO, techniques such as supercritical fluid fractionation, molecular distillation, and other innovative methods can be adopted. WGO is composed of nonpolar lipids, glycolipids, phospholipids, alcohols, esters, alkene, aldehydes, tocopherols, n-alkanols, sterols, 4-methyl sterols, triterpenols, hydrocarbons, pigments, and volatile components. The most abundant WGO fatty acid is linoleic acid which composes 42–59% of total triglycerides followed by palmitic (16:0) and oleic acids (18:1). The stearic acid, a saturated fatty acid, is usually less than 2%. WGO is rich in tocopherols particularly vitamin E. It contains α -tocopherol and β -tocopherol which gives various health benefits to it. It is being used in medicine, cosmetic, agricultural, and food industry. Some of its applications include production of vitamins and food supplements, animal feed and biological insect control and for treating circulatory/cardiac disorders and weaknesses. More studies are required for producing better quality WGO such as application of more innovative and optimized techniques that can increase its health benefits and hence utilization. More mechanistic approaches for extraction, evaluation, and utilization of WGO can help in making this by-product of wheat processing more valuable. Practical application: Wheat is a major food crop around the globe and produced and processed in large quantities. Its by-products such as wheat germ can be used to obtain value added products. Oil obtained from wheat germ is found to be a good source of various nutritionally beneficial constituents and carry important health benefits and functional properties. The review will help researchers to carry out further

research to improve processing and the quality of oil besides emphasizing on its beneficial aspects. It will also assist in better utilization of this wheat by-product to develop value added products and nutraceuticals after carrying out further studies. Wheat germ oil is a valuable by-product from wheat grain which is a good source of important nutraceuticals such as α - and β -tocopherol. Extraction of this oil from wheat germ is important for the effective utilization of its various potential nutraceuticals that have reported health benefits. This review also explains detailed chemical composition, processing, functional activities, and potential utilization of wheat germ oil. © 2017 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

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