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Advances in fruit crop phytochemicals: Nutraceutical and therapeutic perspectives

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Abstract

Fruits are a good source of phytochemicals which play a critical role in promoting human health as well as preventive measures to chronic diseases. These biomolecules, such as phenolics, flavonoids, carotenoids, terpenoids and vitamins, have powerful nutraceutical and medicinal advantages, antioxidant, anti-inflammatory, anticancer and cardioprotective. The recent advancements in the analysis techniques and molecular biology have enhanced the detection, characterization and quantification of these compounds in various fruits. The synthesis and control of phytochemicals are complicated through metabolic pathways and that they are altered by genetic, environmental and development factors. Additionally, new technologies such as the metabolic engineering, the editing of genomes and the omics-based approaches have offered new possibilities to increase the phytochemical content and quality of fruits. Although, they have great potentials, low bioavailability, instability during processing and storage and non standardization are some of the challenges that hinder their effective use in nutraceutical and pharmaceutical industries. New strategies are being considered to address these constraints, including nanoencapsulation, creation of functional foods and sustainable processes of extracting. As well, there is an interest in the economic and environmental benefits of fruit waste valorization as a source of valuable phytochemicals. This review presents the latest evolution of research in the topic of fruit crop phytochemicals, their biosynthesis, health and therapeutic applications, along with the existing limitations and future opportunities of their useful applications in human health and well-being.

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