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The valorization of some lipid fractions from oleaginous fruit kernels and oilseeds – review

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Abstract: The review analyzes in depth the remarkable potential of the valorization of lipid fractions extracted from the oil seeds of different fruits, opening a fascinating horizon for obtaining oils with unique properties. The study explores innovative extraction and refining methods, highlighting their impact on the fatty acid composition, the content of bioactive compounds and, consequently, on the final quality of the oils.

Particular emphasis is placed on the detailed characterization of the lipid profiles specific to each type of kernel, highlighting the impressive diversity of saturated, monounsaturated and polyunsaturated fatty acids, as well as the presence of valuable compounds such as tocopherols, sterols and carotenoids. The review analyzes in detail the potential applications of these oils, from the food and nutraceutical industries to cosmetics and pharmaceuticals, highlighting their nutritional, antioxidant and functional benefits.

In addition, the study addresses the challenges and opportunities related to the sustainability of valorization processes, including waste management issues and environmental impacts. The conclusions of the review underline the importance of continued research to optimize extraction and refining methods in order to obtain high quality oils with significant added value from often underestimated natural resources.

• Introduction

Global horticultural production generates significant amounts of waste and by-products, the non-valorization of which has a considerable economic and environmental impact. In the context of the circular bio-economy, transforming these by-products into valuable resources, such as vegetable oils, becomes a priority. The sources of horticultural by-products with oleaginous potential are diverse, including fruit pits (apricot, plum, peach), vegetable seeds (pumpkin, apple, watermelon, melon), peels (citrus) and pressed fruit cakes (apple, grape).

Currently, the generation of food waste is a critical difficulty, and its exploitation as food components for the elaboration of novel functional foods is necessary since customers' demand for foods that include ingredients with improved nutritional characteristics has increased (Fatima Brahmi, 2023). The food waste utilization to conceive and elaborate novel foods with supplemented benefits is very critical for sustainability, considering this as a resolution to diminish food loss and ecological impact (Silva et al., 2020). Apricot kernels (*Prunus armeniaca L*.) are an important waste generated after consumption and processing. Melon (*Cucumis melo* L) and watermelon (Citrullus lanatus L) from the Cucurbitaceae family are famous fruits, consumed worldwide, that comprise considerable quantities of seeds (Fatima Brahmi, 2023). The by-products of the selected fruits are an excellent source of oils with interesting compositions and biological properties. Previous studies carried out on some of these oils confirmed the interest in using them as a possible functional ingredient (Silva et al., 2022). Apricot seeds possess a considerable oil yield, and this oil is rich in unsaturated fatty acids, sterols, tocochromanols, and squalene (Ramadan, 2019). Additionally, ASO contains phenolic substances that play a favorable role regarding the oxidative stability of the oil and the antioxidant capacity and health-benefiting activities such as protection against cardiovascular diseases, cancer, tumors, and ulcers (Ramadan, 2019; Al-Juhaimi et al., 2021). With regard to MSO, it has an appreciable quantity of sterols, tocopherols, and phospholipids, which reinforces its relevance concerning its advantageous impact on the population where it assists in diminishing the hazard of cardiovascular pathologies by inhibiting the oxidation of polyunsaturated fatty acids (PUFA) (Fatima Brahmi, 2023).



Conclusions

Obtaining vegetable oils from by-products of horticultural processing is a sustainable strategy with significant potential. Future research should focus on optimization of extraction and refining methods, detailed characterization of bioactive compounds and exploration of new innovative applications. Overcoming the current challenges and fostering interdisciplinary collaboration are paramount to transform these by-products into valuable resources and contribute to a sustainable bioeconomy.