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Food Industry Reintegration By-Products

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Abstract

Numerous studies have shown that fruits and vegetables are important sources of bioactive compounds. The antioxidant activity of by-products derived from the food industry is comparable or higher. On the other hand, intensive industrialization produces a large volume of by-products, raising serious environmental concerns. As a result, this situation necessitates the development of new strategies to exploit the generated wastes, ensuring the ability to develop new high-added-value products. The purpose of this review is to summarise the utilisation of fruit wastes, specifically apple and citrus, as well as vegetable by-products derived from tomato, potato, and carrot cultivation.

Keywords: Pharmaceuticals • Feed • Cosmetics • Nutritional

Introduction

Food production has increased significantly around the world, with the UN Food and Agriculture Organization reporting that one-third of developed products destined for human consumption are discarded each year. Furthermore, the human population is expected to increase by 2050, indicating the need for the development of an adequate food supply in order to secure the ability to prepare food in the future. In this context, population growth will contribute to an increase in food waste, exacerbated by environmental issues associated with its proper management and disposal. Food processors face serious economic challenges when it comes to waste disposal. Furthermore, by emitting CO2 and other greenhouse gases, the generated wastes have the potential to increase the environmental footprint.

Since Europe discards 50% of its generated foods, the global production of municipal organic wastes is expected to exceed 1000 million tonnes per year by 2025. Food waste accounts for approximately 30% of global agricultural land area. According to the Food Waste Index Report, the generated by-products in 2019 were estimated at 931 million tonnes, with 61% classified as household wastes, 26% as food service wastes, and the remaining 13% as retail wastes. Food waste production, particularly for those classified as household waste, is linked to consumer purchasing power, depending on the country [1].

Description

Food waste is defined as all discarded parts of food products, including those with enhanced nutritional profiles. These wastes are an appealing and economical source with a diverse nutritional composition that varies depending on their origin. They are made up of carbohydrates, proteins, lipids, and other important components. Their improved nutritional composition converts them to raw materials, which can be used in a variety of industries. Because of the increased market demand for low-cost natural products, food by-products could be valorized by the aroma industry.

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Waste valorization is associated with feasible and sustainable methodologies that facilitate recycling and reusing procedures. Waste valorization strategies aim to increase the value of a product by converting waste into alternative sources for the development of new high-added-value products. Because they adhere to environmental standards, these developed products could be adopted by the global economy, contributing to the reduction of the environmental footprint [2].

The results revealed a higher moisture content in the crust, with the fortified bread by whole pomace displaying a volume reduction. Baking loss was also measured, particularly for the enriched bread containing 5% w/w. Furthermore, whole pomace incorporation resulted in a better phenolic profile, with the fortified bread with whole pomace at 5% w/w being the most consumer-acceptable due to its properties. The addition of 1% w/w apple pomace to French bread could improve its sensory properties. Masoodi and Chauhan investigated the use of apple pomace in wheat bread formulations at 2%, 5%, 8%, and 11% [3,4].

The cookies developed with the addition of black carrot pomace at various levels ranging from 0-15% w/w in the flour exhibited an elevated fibre profile, which may be related to the enriched polyphenolic content and antioxidant capacity. The cookie fortification with 15% w/w pomace was the most effective, as it resulted in the highest levels of polyphenols and antioxidant activity.

According to the studies, the exploitation of food industry by-products has been widely used for the production of brittle bakery products, such as cookies, crackers, and biscuits, and their effects on the prepared products have been evaluated. The generated by-products were incorporated into the formulation of cookies in various proportions. In particular, the inclusion of apple by-products is an intriguing case because the different incorporation rates (0 to 30% w/w) affected different attributes of the prepared products. Furthermore, apple, potato, and carrot inclusions in cookies all had similar effects on the latter. Regardless of incorporation rate, all of the included by-products had an effect on the colour parameters of the cookies, and a similar addition of apple and carrot waste improved their antioxidant profile [5].

Conclusion

The increased pollution of the environment necessitates the development of new, feasible, and sustainable technologies aimed at exploitation of generated by-products in various sectors (livestock, food and pharmaceutical industries, etc.). This review highlights the rich nutritional composition of wastes generated by the food industry, emphasising their potential for the development of new products that reap their nutritional and functional benefits. This review summarised the use of fruit and vegetable by-products as additives in the food industry for the production of new functional foods (dairy, confectionery, meat, pasta, and bakery, among others), as well as their use in livestock, and found very promising results. Furthermore, this study highlighted the potential for

agri-food waste to be used by the pharmaceutical and cosmetic industries, The food and biotechnological industries should investigate the use of agri-food wastes as alternative sources for the production of high-value-added products. Future perspectives include the use of low-cost and appropriate strategies, the optimization of specific methodologies, the development of novel food and pharmaceutical products enriched with bioactive compounds, and the management of consumer awareness, all of which must be addressed in order to assess the efficacy of agri-food by-products as potential sources of bioactive compounds.

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Conflict of Interest

There are no conflicts of interest by author.

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