

LEVERAGING EMERGING TECHNOLOGIES FOR EXTRACTING FRUIT BY-PRODUCTS AS INGREDIENTS IN THE FOOD INDUSTRY

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Tropical fruits such as durian, jackfruit, banana, and cacao generate substantial amounts of peel waste, with more than half of this biomass often discarded. Improper disposal of such waste poses environmental and health risks. However, these by-products can serve as valuable resources for producing food additives. In particular, fruit peels present a promising alternative for commercial pectin production, a compound in high demand globally due to its health benefits and functional properties. Increasing interest in natural plant-based ingredients drives research into utilizing fruit waste, supported by emerging technologies that enhance extraction methods. These technological advancements reduce energy consumption, promote renewable resources and alternative solvents, and ensure the production of high-quality, safe extracts and products. In addition to improving the efficiency of biomass recovery, such technologies align with environmental and health objectives. Fruit by-products can be extracted to provide ingredients rich in phenolic compounds, which offer various bioactive properties, including antioxidants, antimicrobial, anticancer, and antidiabetic effects. Moreover, they hold potential for applications in food packaging, thereby contributing to food safety and quality. The valorization of fruit by-products into functional ingredients offers a sustainable solution to waste management and can improve nutrition, food quality, and food safety. This approach also aligns with efforts to enhance the sustainability and efficiency of the agricultural industry, emphasizing the broader impact of utilizing waste from tropical fruit processing through innovative extraction technologies.

Keywords: Fruit By-Products, Emerging, Extraction, Functional Ingredient, Food Applications