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Editorial

Health and Bioactive Compounds of Fermented Foods and By-Products

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Some microorganisms can increase the levels of vitamins, antioxidant compounds, peptides, exopolysaccharides, organic acids, and other bioactive molecules in foods after fermentation. This encompasses several health benefits and preservative properties, such as antioxidant and antimicrobial activities. Fermented foods contain living organisms with the capability to modulate gut microbiota, physiology, and cellular redox homeostasis, meanwhile booting the host diet with new bioactive compounds. Other recent advances in fermentation are focused on food by-products, especially as a potential source of bioactive compounds and food-derived biopolymers that, after fermentation, could be combined with other concepts for use in several applications in foods, nutrition, medicine, bioprocessing, and biotechnology. Understanding the health benefits of bioactive molecules of food fermentation and their by-products is a growing field of research. This Special Edition entitled "Health and Bioactive Compounds of Fermented Foods and By-Products" aimed to present new research investigations and insights conducted in this field, evaluating the effect of the bioactive compounds of fermented foods and their by-products for the improvement or maintenance of human health.

This Edition featured seven publications (four original research papers and three reviews) covering diverse fermented foods and fermented food by-products as sources of nutrients, health benefits, medicine, and potential biotechnological applications. A special mention should be given to papers focusing on fermentable foods providing nutritional improvements [1–3] and multi-health functional activities [3–5].

Studies related to bioactive compounds and the health of fermented foods included the fermentation of *Momordica charantia* (MC), an edible fruit commonly known as bitter melon:

Kim et al. [3] reported that MC fermented with *Leuconostoc mesenteroides* is a non-dairy probiotic plant extract used to achieve beneficial multi-health functional activities, such as anti-diabetic, anti-dementia, and antioxidant activities. Such fermented MC produced lactic acids, mannitol, dextran, and oligosaccharides that are probably responsible for the increased inhibition of butyrylcholinesterase, complete inhibition of α-glucosidase (99.91%), and a relatively high inhibition of acetylcholinesterase (55.24%). In a pre-clinical investigation with male C57BL/6 mice, Moon et al. [4] showed that MC fermented with *Leuconostoc mesenteroides* MKSR enhanced the beneficial effects of MC, preventing metabolic complications associated with a high-fat diet by assessing white adipose tissue weight, insulin resistance, serum alanine aminotransferase activity, and high glucose, hepatic triglyceride, and total hepatic cholesterol levels. Moreover, these authors also reported that fermented MC acted in the up-regulatory expression of the adipogenic transcription factors.

Nonetheless, other studies investigating this topic bring novel insights into fermented food by-products that are directly and indirectly related to health for use in healthier

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additives and detoxification fields, expanding the edition concern to a broad thematic approach regarding by-products of high added-value or waste valorization:

Lvova et al. [2] used secondary raw materials, such as corn steep liquor (CSL), as a unique source of nutrients for producing biosurfactants, a healthier alternative to synthetic ones. The authors applied a controlled fermentation process and *Aneurinibacillus aneurinilyticus*, isolated from CSL, for producing extracellular and cell-bound biosurfactants in a controlled fermentation procedure. Biosurfactants have high commercial significance, evidenced by the high number of their utilization and a large variety of their applications, ranging from food and beverage, agriculture, public health, healthcare, medical drugs, textiles, and bioremediation.

Moebus et al. [6] explored the decontamination of some of the most common mycotoxins—produced by the secondary metabolism of fungi—in agricultural products (Aflatoxin B1 (AFB1) and Zearalenone (ZEN)) using *S. cerevisiae* strains isolated from bovine forage, with adsorption and biotransformation capacities. It is crucial to mention that AFB1, comprising a liver carcinogen and ZEN, can cause reproductive dysfunctions. Thus, the detoxification of mycotoxin is a recurring foodstuff challenge due to its high occurrence during the harvest, storage, processing, or feeding stages. Mycotoxins can be toxic to both humans and animals through inhalation, contact, and ingestion [6]. Such a challenge may find solutions in the biodetoxification provided by other bioactive compounds found in fermented foods and fermented food by-products, as reviewed in this Edition by Deveci et al. [7] and Faria et al. [5], respectively.

Finally, another three reviews must also be highlighted due to their valuable perspectives in this field:

Kaur et al. [1] discussed solid-state fermentation (SSF) as a strong tool for the modulation of cereal biochemistry by reviewing fermented-cereal-based products using SSF with a health-benefiting nature and a hidden industrial potential due to their dietary and bioactive components.

Deveci et al. [7] emphasized the bioactive chemicals (organic acids, bioactive peptides, conjugated linoleic acids, biogenic amines, isoflavones, phytoestrogens, and nattokinases) generated during fermentation and the microorganisms (*Lactobacillus*, *Bifidobacterium*, *Streptococcus*, and *Bacillus* spp.) involved during the fermentation of certain fermented foods and their anti-fungal and antioxidant properties; the modulation of intestinal microbiota; anti-inflammatory, anti-diabetic, anti-obesity, anticancer/antihypertension properties; and the protection of cognitive functions.

Once significant amounts of fermented food waste are generated worldwide, promoting an abundance of residual biomass that can be used as a raw material for the extraction of bioactive compounds, Faria et al. [5] presented opportunities for synthesizing bioproducts and recovering bioactive compounds (bioactive peptides, fermentable sugars, polyphenols, and valuable compounds) from fermented food waste and by-products (from vegetables, bread wastes, dairy products, brewing, and winery sources), with several biological properties to support their consumption as dietary supplements that can benefit human health.

Beyond several health benefits related to bioactive compounds and microorganisms of fermented foods and by-products collected in this Special Issue, there is currently a tendency to use fermented wastes to boost bioeconomic policies and support a circular bioeconomy approach that is also focused on biodetoxification, biorefinery, and biotechnology concepts. Although submissions for this Special Issue are closed, more in-depth research into the health benefits of bioactive compounds from food fermentation and their by-products continues to address the challenges of food waste valorization and identifying novel bioactive molecules for preventive nutrition, novel therapeutic approaches for medicine, and the synthesis of bioproducts. Furthermore, there is still relevance in including nanotechnology techniques for the creation of fermented cereals [8], encapsulating bioactive substances derived from fermented sources for nutraceutical products [9], functional foods [10], and other delivery applications in health [11].

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