

## Safety and Microbiological Quality

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Editorial

# Safety and Microbiological Quality

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Food fermentation aims, primarily, to increase the shelf life of perishable foodstuffs. It is characterized by an extremely large diversity of raw materials, and an even wider range of fermented products, differing in their form, taste, color, or recipe [1]. The success of shelf life increase relies on acidification or ethanol production. Detoxification of endogenous compounds and increase in digestibility are other health-related benefits of fermentation. Additionally, in many parts of the world, as in Asia, fermented foods have a traditional role in overcoming food and nutritional insecurity [2].

Safety concerns cover the control of growth and persistence of foodborne pathogens, and the presence of toxic compounds, formed over fermentation or present in raw materials. For instance, in Italy, alcoholic fermentation during winemaking was affected by upstream plant treatments, i.e., pesticides used to fight *Plasmopara viticola*, the causal oomycete agent of grapevine downy mildew [3]. Active compounds used in commercial pesticide preparation, and possibly compounds used as excipients, negatively affect both *Saccharomyces* and non-*Saccharomyces* yeast growth. A careful examination of the effect on pro-technological microorganisms of pesticides is recommended.

Foodborne pathogen infections and diarrhea can be prevented with the use of probiotic cultures [4,5]. *Bifidobacterium* spp. is one of the most frequently used probiotic bacteria. Probiotic effect requires that the bacteria can survive and grow in the food matrix used for probiotic delivery. Hence, examination of *Bifidobacterium* strain viability in media is a key component for probiotic development [6]. Similarly, *Enterococcus faecium* and *Enterococcus faecalis* are frequently isolated from fermented foods, for instance table olives [7]. In addition, they produce bile salt hydrolases and are resistant to low pH, and are therefore able to stay alive until they reach the intestinal tract. However, these two Gram-positive lactic acid bacteria have been implicated in infectious diseases and a careful examination of antibiotic susceptibility, virulence, and absence of hemolysis and cytotoxicity is required before their use as starters and possibly probiotics [8–10].

The use of fruit juice to deliver probiotics is an advantage regarding lactose intolerant people and, for economic reasons, in developing countries. An innovative strategy for the prevention of shigellosis, which persists endemically and causes epidemics in tropical countries, is to enhance the capacity of probiotics to suppress the growth of different species of *Shigella*. This approach was applied with different fruit matrix, and the impact of processing and the storage of the juice on the efficacy of probiotics was examined [11].

Microbiological quality of fermented foods includes fermentation process reliability, which impacts sensory quality and shelf life. Process reliability depends on starter fitness and its growth properties in the food matrix. Predictive growth models can be used to determine the optimal conditions on use of single or mixed lactic acid bacterium cultures [12]. In addition, microbiological quality of fermented foods and beverages is closely connected to nutritional quality. For instance, the fungus *Mucor circinelloides* is a promising oil cell factory, producing medium-chain fatty acids (MCFA). Adjustment of cultivation conditions can improve biomass, total fatty acid, and MCFA contents [13].

The development of new lactic fermented beverages from non-dairy sources is of increasing interest because of the combined advantages of plant nutritional properties and benefits from lactic fermentation [14,15]. Tiger nut tubers, *Cyperus esculentus*, are of particular interest because of their richness in lipid and dietary fiber, close to those of nuts, a high content of starch, like in other tubers, and high levels of phosphorus, calcium, and phenolic compounds [16]. The development of fermented or probiotic beverages from tiger nuts must carefully select a tailored bacterial cocktail able to dominate undesirable endogenous flora (either foodborne pathogens or spoilage microorganisms), preserve bioactive compounds, and result in a well-accepted beverage. The nutritional properties of fermented papaya have been extensively studied over the last decade. At present, a corpus of studies shows the cellular protective effects of fermented papaya and its ability to reduce oxidative stress, and thinking of the use of that product for disease prevention and management through a holistic approach has been reviewed [17,18].

All together, the articles of this special issue provide a broad view of the safety and microbiological quality determining factors in fermented foods. The interconnection of starter properties and probiotic effect expectations are focused on. A common point of the articles published in this special issue is their involvement towards better resource management and increasing food and nutritional security, especially in developing countries.

**Conflicts of Interest:** The authors declare no conflict of interest.

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