Food products can be contaminated by a variety of pathogenic and spoilage microbiota, the former causing foodborne diseases and the latter causing significant economic losses for the food industry due to undesirable effects on the food properties. According to the Centers for Disease Control and Prevention (CDC), each year in the United States, 48 million people get sick, 128,000 are hospitalized, and 3,000 die because of foodborne infections. However, although foodborne outbreaks are well recorded, sporadic cases are not because not all patients visit the doctor or enter the hospital and the causative agent is not always identified. A considerable number of foodborne pathogens of great public health importance (e.g., VTEC *E. coli* serotypes, *Campylobacter jejuni*, *Listeria monocytogenes*, and *Yersinia enterocolitica*) have emerged during the recent two decades causing severe illness and foodborne outbreaks worldwide.

Microbial food spoilage is also an area of immense concern for the food industry. It is estimated that as much as 25% of all food produced is lost after harvest due to microbial activity. While the growth of spoilage microbiota in foods is not harmful for the human health, it has negative impact on the shelf-life, textural characteristics, and overall quality of the finished products, affects the consumer choices, and results in significant commercial losses. Thus, prevention or inhibition of microbial growth in foods is of utmost importance for the current globalized food production. Hence, there is still the need for new processing methods, to be used either alone or in combination with the already existing ones, able to reduce or eliminate foodborne pathogens and spoilage bacteria.

Chemical additives have been extensively used to prevent the survival and proliferation of microorganisms, but their safety and impact on human health are under discussion. Since the reduction or elimination of pathogens and spoilage microorganisms in food is the foremost priority, the current trends in food processing are focusing on the use of natural compounds, which are considered as safe alternatives and satisfy the consumer preferences for more “green foods.” Hence the increased awareness on the safety of food additives and preservatives, and the consumer’s trend to avoid foods containing chemicals, which, in the long-term, may have adverse impact on their health, have generated a significant number of studies and publications on the potential use of various natural substances, recognized as GRAS (Generally Recognized as Safe), to be used as food preservatives. Chemical compounds added to foods as antioxidant agents are also of concern, particularly when important protein sources (e.g., burgers, steaks) are involved in the daily diet of westernized consumer living in the developed countries [1, 2]. Synthetic antioxidants such as BHT, TBHQ, and BHA have demonstrated various adverse effects on the human health including allergy, headache, asthma, and dermatitis. Recent studies on the utilization of natural antioxidants (e.g., herbal essential oils and extracts) indicate their capacity and safety [3, 4]. Also, the antimicrobial properties of natural substances such as plant essential oils and extracts have been extensively studied with promising results [5]. The proper recycling and use of fruit-processing plants by-products like fruit seeds or skins discarded and piling up in huge amounts every year, are of great interest for the food industry, particularly their potential to be a useful source of oil and meal [6]. Additionally, the oil from plant seeds can be used by the food industry for manufacturing more “natural” or “green” foods and also can sufficiently extend the shelf-life of the
food product [7]. The oils derived from fruit seeds oils may also have some more useful properties beyond being just "edible." The oil derived from the seed extract of two Mexican varieties of cactus pear (Opuntia albicarpa and Opuntia ficus indica) has been found to have sufficient antioxidant and antimicrobial properties [8]. Furthermore, some biological active compounds produced by microorganisms are widely used in the food industry. As a result, ultrasound extraction and antioxidant and antimicrobial activity were compared with those obtained using both conventional and unconventional methods, such as Soxhlet and maceration, using heat, agitation or long extraction times, microwave, supercritical fluids and ultrasound-assisted extraction in an open and in a closed system. The results have shown that ultrasound exhibited lower oil yield and antioxidant activity but had the potential to achieve comparable results if multiple ultrasound extractions are performed in the time needed by conventional methods. Seed oils showed similar antimicrobial activity despite the extraction method and can be an alternative extraction method of seed oils from fruits such as cactus pear. Lastly, the replacement of chemical additives with natural compounds has been addressed for fish foods as well. Fish-paste products also known as fish cakes or surimi-based products are worldwide favorites. Surimi, a wet protein concentrate of fish muscle, is used as an intermediate raw material to produce surimi seafood. The flavor, texture, taste, shelf-life, and market value of surimi-based products depend on several factors, including the additives used to prepare the surimi. While preparing surimi with chemical additives, several problems have been observed, such as a lack of unique characteristics, inferior acceptability, and poor functionality. In this context, a systematic review of fish-paste products prepared using natural food additives (e.g., animal, seafood and plant source additives, herbs and oriental medicines, grains and roots, and functional food materials) has been performed, which summarizes the existing relevant knowledge in the production of new value-added foodstuffs of interest for the surimi industry.

In conclusion, this special issue offers to the readers the chance to be informed on the recent advancements related to the antimicrobial and antioxidant properties of natural substances that are of interest for the contemporary food industry. Their prospective use in the food production has the potential to lead towards the production of safer and healthier foods, not excluding their contribution to a more efficient preservation of the environment, when chemicals will be replaced with natural substances.

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