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Editorial

Novel Beverages and Novel Technologies for Their Production

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Beverages have been part of human nutrition for millennia. Several beverages are imprinted on the minds of consumers around the world. The production of such beverages has been optimized over hundreds of years, since their invention, as they have spread around the world. Beverages can be separated into four general categories: fermented, not fermented, alcoholic, and non-alcoholic. Today, there are plenty of novel beverages appearing on the market, and many more are described in the literature. This trend reflects the increasing demand of the consumer for beverages with new and improved flavors, enhanced nutritional value, and functional properties that often need to satisfy diverse dietary lifestyles. As a result, scientists and technologists turn towards new and sometimes exotic raw materials to be employed in both traditional and new schemes to produce beverages. The application of new technologies is also essential for achieving the desired product. In this editorial, we present an overview of five original research papers published in this Special Issue of Beverages: "Novel Beverages and Novel Technologies for Their Production".

In the first study, Syrokou and colleagues present a detailed picture of the microbial populations present in kefir grains used to ferment apple juice, cherry juice and sugary water enriched with plums [1]. Sugary kefirs have demonstrated higher populations of yeast than bacteria. Isolates were typed with RAPD-PCR. For bacteria, two species were mainly present, i.e., *Bacillus amyloliquefaciens* and *Lactobacillus rhamnosus* (*Lacticaseibacillus rhamnosus*). Interestingly, two yeast species also dominated the ecosystems, i.e., *Saccharomyces cerevisiae* and *Kluyveromyces marxianus*. The acidification capacity, the proteolytic and lipolytic activities and the antimicrobial potential of the strains were among the technological properties tested. Different strains presented different aptitudes concerning these properties, but none produced antimicrobial compounds against *Listeria monocytogenes*, *Escherichia coli* O157:H7 and *Salmonella* sp. Some of the strains characterized could be employed for carrying out milk and sugary kefir fermentations.

High potency sweeteners (HPSs) such as steviol glycosides are used to replace sugar in many beverages. In the second study, Pierce-Feldmeyer and colleagues wanted to test a single-attribute time-intensity (TI) assessment in order to examine the ability of certain taste modulation compounds (TMCs) to decrease the bitterness associated with steviol glycosides [2]. The TI evaluation essentially records in a dynamic manner the sensory perception after a single exposure to the sensory stimulus over a certain period of time [3]. In this particular case, the authors tested three TMCs for their ability to decrease the bitterness of a Rebaudioside A bitterness control solution for a period of 2 min. Interestingly, it was reported that different statistical analysis methods could lead to contradictory conclusions about the decrease in the perceived bitterness of the HPS employed in the study through the action of the particular TMCs tested. These findings indicate that more research is needed to improve our understanding of the effects of TMCs.

In the third article of the issue, Zerva and colleagues investigated the cellulose degrading potential of bacteria isolated from the waste of an orange juice factory in order to

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explore their applications in the orange peeling procedure, as well as in the clarification of the juice [4]. The authors isolated seven cellulose-degrading strains all belonging to the genus *Paenibacillus*, exhibiting endo-1,4-β-D-glucanase, exo-1,4-β-D-glucanase, and β-1,4-D-glucosidase activities. Thus, orange juice processing waste was proposed for consideration as a valuable source of cellulose-degrading microbiota, with potential uses not only in the beverage industry, but also in solid state fermentations and energy production.

In the context of consumers' demands for beverages with enhanced functional properties, Raikos and colleagues studied the use of dried berry fruit aqueous extract for the fortification of yogurt beverages with phenolic compounds [5]. The authors assessed both antioxidant properties and their stability in the new products. The fortification of yogurt beverages with extracts from salal (*Gaultheria shallon*) berry or from blackcurrant (*Ribes nigrum*) pomace enhanced the total phenolic and anthocyanin content of the product, as well as its antioxidant activity. Cold storage of the new yogurt-based drinks affected the stability of the anthocyanins, but did not affect their total phenol content. The antioxidant capacity remained more or less unaffected during storage, suggesting that the extracts tested in this study could be used to improve the health-promoting properties of yogurt-based products.

The storage stability of two novel, potentially functional beverages produced from a by-product of the dairy industry, i.e., Ricotta cheese whey (RCW) mixed with fruit juices (apple or apple and blueberry mix), was studied by Cortellino and Rizzolo [6]. RCW is generally considered to be a high pollutant waste. However, it contains a high lactose content, an interesting mineral profile, and a low protein content. This composition, in combination with the nutraceutical compounds of the fruit in a fruit-juice-type beverage, could lead to beverages with improved functional properties. The storage stability of the two beverage products mentioned above at ambient temperatures on an open shelf was investigated. Both total polyphenol compounds (TPC) and monomeric anthocyanins (MAP) were found to decrease during storage, but the antioxidant capacity was preserved. The sourness intensity in the apple-based drink increased significantly, while the rest of the sensory parameters examined were not negatively influenced. A first consideration regarding the commercialization of these novel beverages was suggested.

We are pleased to present these five papers concerning potentially novel beverages and/or novel technologies in this Special Issue, and we hope that the readers will find them interesting and important.

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