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Editorial

Research Progress of the Functional Properties of Fruit and Vegetables and Their Preserves

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Fruits, vegetables, and their products are prized for their sensory values and play a very important role in our diet. They provide nutrients and sources of bioactivity and serve a number of pro-health and dietary functions, while forming the basis of daily nutrition for vegetarians and vegans. A significant portion of fruits and vegetables, especially those included among the so-called "super foods", can also be classified as functional foods, because, in addition to providing nutrients, they have health-promoting effects. The high level of biologically active compounds present in fruits and vegetables and their products can protect the human body against free radicals, eliminating the effects of oxidative stress, as well as fighting non-infected chronic diseases such as cancer, cardiovascular diseases, type II diabetes, and obesity [1].

A significant proportion of fruits, vegetables, and their products are characterized by high water activity, which results in a short shelf life and requires the use of a number of preservation methods, which show different effects on their technological properties, nutritional value, contents of bioactive compounds, and sensory features. The use of modern preservation methods enables the shelf life of fruits and vegetables to be extended while maintaining a high level of freshness and bioactive compounds, which are of increasing interest among both food producers and consumers [2]. An important issue today (inspired by the "zero waste" concept) is the management of the by-products of the fruit and vegetable industry, which are often the source of a number of important bioactive components and can be used not only for feed and biogas production but also for food. Taking all of the above into account, five research manuscripts on the functional properties of fruits and vegetables and their preparation have been published in this *Agriculture* Special Issue: "Research Progress of the Functional Properties of Fruits and Vegetables and Their Preserves" [3–7].

The aim of the authors of the first two published manuscripts was to explore the application of different pretreatments to bitter gourd (*Momordica charantia* L.) and determine their effects on its physicochemical properties and the optimisation of its drying process. The choice of bitter gourd (*Momordica charantia* L.) for this type of study is greatly justified by its valuable nutritional qualities, as well as the limited amount of existing research into its preservation potential to ensure a high level of retention of bioactive components. In the first study, bitter gourd (*Momordica charantia* L.) samples were subjected to osmotic dehydration in sugar and malesa grape solutions of different concentrations and then subjected to air-drying. It was observed that all pretreatments increased the total colour change; the greatest changes were observed with the use of grape molasse solution. Considering the content of bioactive compounds, osmotic pretreatment with grape molasses resulted in an increase in antioxidant properties, while sugar treatment resulted in samples with high carotenoid contents. This study also proved that mathematical modelling can facilitate the selection of drying and pretreatment parameters in order to obtain products with the most favourable properties. In the second study, bitter gourd (*Momordica charantia* L.) was

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blanched and then dried in a hot air dryer at different temperatures. The highest levels of phenolic compounds and the highest antioxidant properties were found with lower drying temperatures and longer blanching times, regardless of the drying temperature decreasing. It was found that the total colour change and vitamin C levels decreased with increasing drying temperatures. The optimal drying conditions to maximize the contents of phenolic compounds, vitamin C, and antioxidant properties and minimize the drying time and colour change included a temperature of 60 °C, a slice thickness of 10 mm, and there being no blanching process [3,4].

A further two publications assessed the physicochemical and bioactive properties and potential use of the by-products that are generated in large quantities during the processing of sugar beet (sugar beet pulp) and avocado fruit (avocado seeds). The high level of sugar production in EU countries generates many by-products, especially sugar beet pulp, which is primarily utilized as animal feed. It is important to investigate the physicochemical and bioactive properties of this by-product, considering its possible use in food production. A study on the evaluation of beet pulp showed that, after drying, it is a valuable source of polyphenols, especially phenolic acids, as well as dietary fibres (cellulose, hemicellulose, pectin). Among the sugars that build polysaccharides, glucose, arabinose, rhamnose, and galacturonic acid are the most abundant, making beet pulp an interesting raw material for further processing in food technology. The authors suggest that beet pulp could be an ingredient for health-promoting functional foods. Furthermore, the use of isolated arabinans from beet pulp as a carrier in the encapsulation process has the potential to create value-added microcapsules. Avocado seeds constitute 13–18% of the weight of the whole fruit and usually remain unused, which is why more and more research is being focused on the valuable properties of avocado seeds and the possibilities for their further use. Studies have shown that freeze-dried avocado seed powder is a source of nutrients and dietary fibres, characterised by a high content of insoluble fractions. It has high antioxidant activity and can be used in the production of functional foods as a source of fibre and other bioactive compounds. This study investigated the potential use of avocado seeds in the production of cereal snacks at different levels of addition (6%, 12%, and 18%). The snacks with the lowest and highest additions of avocado seed powder were characterised by appropriate technological properties (ease of moulding, appropriate dough consistency). The addition of the powder significantly increased the contents of polyphenolic compounds and antioxidant activity, as well as the dietary fibre content, which allowed the snacks to be labelled with the nutritional claims of "source of fibre" and "high fibre content" [5,6,8].

The fifth publication concerns the comparison of the antioxidant potential and varietal functional properties of apple peel and flesh from two new apple varieties, i.e., the green-skinned "Chopin" and "Granny Smith" apples and the red-skinned "Gala Schniga" apple variety. The aim of this study was to elucidate whether the ratio of bioactive compounds in the skin to those in the flesh could shape the antioxidant potential of apples and the functional properties of the cultivar and help explain some aspects of resistance to environmental stresses. The compounds tested (total ascorbate and total phenolic concentrations, as well as individual phenolic compounds (+)-catechin, (−)-epicatechin, chlorogenic acid, phlorizin, and rutin) were highly dependent on the tissue type and cultivar. The peel of all the tested apple varieties had significantly higher antioxidant properties compared to the flesh, confirming its health value and leading to it being recommended for consumption. The results obtained can be used for further selections of stress-resistant genotypes characterised by a high content of biologically active compounds, not only in the peel but in the whole apple fruit [7].

In conclusion, it can be stated that the research results presented in the Special Issue, "Research Progress of the Functional Properties of Fruit and Vegetables and Their Preserves" on the evaluation of the physicochemical and bioactive properties of bitter gourd fruit, beet pulp, avocado seeds, and the peel and pulp of different apple varieties represent a valuable contribution to the knowledge on optimising the preservation of raw materials with a high content of bioactive components using osmotic and drying methods. These contributions also explore the possibility of using by-products that have not been sufficiently studied, such as beet pulp and avocado seeds, in food technology. The study of bioactive properties in fruits, vegetables, and their preparations and by-products is very important and will certainly be reflected in further research in this field.

Conflicts of Interest: The authors declare no conflicts of interest.

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