



Editorial

# Recent Advances in Applied Microbiology and Food Sciences, Volume II

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The food industry is constantly evolving due to environmental, social, and geopolitical factors. With the development of innovative technologies and the application of novel raw materials, it is crucial that we are in possession of appropriate methods for analyzing the nutritional value, biological activity, and microbiological safety of food products. In light of these changes, there is a growing demand for plant-based products that positively impact our health, contribute to climate protection, and simultaneously provide food for an expanding population.

Due to the interest in and great success of the first edition of “Recent Advances in Applied Microbiology and Food Sciences” [1], the scope of Volume II of this Special Issue is devoted to the latest advances in food design and research, including novel processing and preservation techniques, and the collection of data regarding the microbiological aspects of food quality and safety. In this Special Issue, six original research manuscripts have been compiled and published. The articles included in this collection are briefly described below.

Kidoń et al. [2] evaluate the suitability of 14 apple cultivars for the vacuum impregnation (VI) process by comparing the physicochemical properties of fresh and impregnated tissue. The cube-cut apple was impregnated in an isotonic solution comprising 0.5% ascorbic acid, 0.5% citric acid, and 10% sucrose. The VI process was conducted utilizing a vacuum time of 10 min and an absolute pressure of 15 kPa, then restoring atmospheric pressure. The content of ascorbic acid after the VI process rose by 3 to 25 times, and was in the range of 73.5–130 mg/100 g; meanwhile, the mass gain for the samples ranged from 15% to 34%. On the basis of the Pearson correlation, it was revealed that the mass gain was negatively correlated with the firmness of the fresh apple cubes ( $r = -0.85$ ). The cultivars with favorable features after the VI process in terms of vitamin C content, hardness, and browning index (BI) were Cortland, Champion, and Ligol.

The article by Valková et al. [3] reports on the chemical profile, antioxidant, and antifungal activities of three types of cinnamon essential oils (EOs), namely *Cinnamomum cassia* EO, isolated from bark (CCEO), and two *C. verum* EOs, isolated from plant bark (CVBEO) and leaf (CVLEO), against three *Penicillium* strains. The results revealed that the major compounds of the CCEO, CVBEO, and CVLEO were (E)-cinnamaldehyde (77.1%; 44.1%) and eugenol (70.8%), respectively. The most powerful antioxidant activity was detected in CVLEO, while the strongest in vitro antifungal activities were exhibited by all analyzed EOs in the highest concentration (500 µL/L) when employed against *P. crustosum*. The in situ antifungal efficacies of all EOs examined were revealed to be dose-dependent, with 250 µL/L of CVBEO precipitating the greatest inhibition of mycelium growth against *P. citrinum* ( $95.23 \pm 9.17\%$ ). The obtained findings promote the applicative potential of EOs and evidence their ability to extend the shelf-life of bakery products.



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This next article, published by Shahid et al. [4], investigates the phytochemical composition, biological activities, and in silico molecular docking of the ethanolic extract of *Zaleya pentandra* L. jaffery, a Xero-halophyte plant that grows in the Cholistan desert, Pakistan. The plant is recognized for its high phenolic and flavonoid content. The study revealed that the ethanolic extract of *Z. pentandra* contains a high phenolic content and flavonoid content, which correlates with strong DPPH, FRAP, and enzyme inhibition results. The ethanolic extract of *Z. pentandra* also exhibited dose-dependent antibacterial activity and excellent activity against H9, IBV, and NDV viral strains. In silico molecular docking was performed in order to determine the interaction and binding affinity between the enzymes and compounds identified via GC–MS. The study revealed that the ethanolic extract of *Z. pentandra* L. jaffery contains a variety of bioactive compounds with potential therapeutic benefits. The high phenolic and flavonoid content of the extract correlates with its strong antioxidant and enzyme-inhibiting properties. Additionally, the extract exhibits dose-dependent antibacterial activity and antiviral activity against H9, IBV, and NDV viral strains. In silico molecular docking studies propound that compounds identified via GC–MS possess a strong binding affinity for enzymes such as  $\alpha$ -glucosidase, cholinesterase, and tyrosinase. These findings suggest that *Z. pentandra* L. jaffery boasts anti-diabetic, neuroprotective, and skin-protective applicative potential and warrants further investigation regarding the isolation of its pure bioactive compounds.

The MTT antibacterial assay is a technique employed to evaluate the antibacterial activity of natural compounds. The research of Shi et al. [5] aimed to identify a method via which to reduce background color and bacterial cell interference when employing the MTT assay to study the antibacterial effect of phytochemicals. A silica gel column chromatography method was developed in order to remove background color and bacterial cells before measuring formazan. This technique was discovered to be particularly suitable for MTT-based antibacterial inhibition studies when the tested phytochemical extracts have an interfering color. The study utilized New Zealand ‘Hass’ avocado crude ripe seed extracts as an example and revealed that the combination of column chromatography and the MTT colorimetric method can greatly enhance the accuracy of formazan measurement.

In their article, Kowalczyk et al. [6] consider the behavior of Polish consumers within the honey market and its determinants. The research discovered that honey was consumed by 90% of the people surveyed and that it was most frequently consumed when incorporated into hot drinks, desserts, cakes, sandwiches, and consumed via direct consumption. The primary motivations reported regarding the consumption of honey were personal preferences and habit. When selecting honey, the respondents were found to pay main attention to the type of honey, its texture, production method, and place of sale. The locations most frequently mentioned regarding the honey’s place-of-purchase were apiaries, markets or bazaars, and supermarkets. Among the respondents’ demographic, social, and economic characteristics, honey consumption behavior was differentiated by gender, age, education, and income. The respondents’ level of nutritional knowledge had a moderate effect on the differentiation of their attitudes towards honey. Yet, an analysis of the relationship between their health status and honey consumption indicated that a superior health assessment was associated with a greater level of importance being attached to the nutritional benefits of honey consumption. Meanwhile, an inferior health status was associated with the attachment of greater importance to various other honey consumption determinants, such as the place of sale or attractiveness of the label.

Consumer preferences, this time regarding milk fat products, were also analyzed by a group of researchers led by Chudy [7]. The study aimed to analyze the physicochemical features of milk fat products (60%, 74%, and 82% fat) and to determine consumer preferences regarding these products. The study found that taste, followed by color, was the most crucial attribute of milk fat products. The most desired fat was butter (82% fat), although it was difficult to spread at 4 °C. The best cuttability and spreadability properties were observed in butter containing three-quarters fat (74%); however, it was the product least desired by consumers. Most of the respondents (68%) preferred milk fats to have a yellow

shade rather than a white one. In conclusion, the authors discovered that consumers tended to select milk fats with the highest fat content and preferred a more yellowish milk fat color. The taste was the critical attribute and criterion in the selection of milk fat products, followed by color. Indeed, these results may be valuable to dairies that add healthy food ingredients to dairy products and aim to observe new trends.

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