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Editorial

Editorial for the Special Issue, "Research on the Antioxidant, Antibacterial, and Anti-Drug Properties of Plant Ingredients"

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The increased consumer demand for safe foods has led to the development of new preservation techniques (e.g., irradiation, ultrasonic methods, and modified atmosphere packaging) and the use of natural extracts and essential oils (EOs) to reduce or eliminate the addition of synthetic additives to foodstuffs. In recent decades, the antioxidant properties of EOs and their effectiveness against pathogenic microorganisms resistant to antibiotics has been an important research topic in the food and pharmaceutical industries. It has been demonstrated that the use of essential oils protects the sensory attributes of foods, significantly improves their shelf life, and decreases food waste. Moreover, accessing them can reduce oxidative stress at the cellular level, which is characteristic of cardiovascular and neurodegenerative diseases, and in addition treat some types of cancer.

We originally produced a Special Issue of *Applied Sciences*, entitled "Research on the Antioxidant, Antibacterial, and Anti-drug Properties of Plant Ingredients", in the section "Food Science and Technology" (ISSN: 2076-3417; https://www.mdpi.com/journal/applsci, accessed on 8 June 2021). This thematic issue was dedicated to the biological properties of natural extracts and EOs, including their compounds' potential mechanisms of action. The Special Issue, now transformed into a book, comprises ten chapters with distinguished authors' significant contributions to the subject. All told, eight chapters are research papers, while the remaining two are review papers.

Chapter 1 comprises the review entitled "Antioxidant and Antimicrobial Properties of Selected Phytogenics for Sustainable Poultry Production" [1]. It regards phytogenic products as alternatives to in-feed antibiotic growth boosters in poultry production. In addition, the review delivers exhaustive information regarding the integration of phytogenic products into poultry diets in such a way as to improve feed utilization efficiency, decrease feed–food competition, and enhance the contribution of these products to eradicating hunger and food insecurity.

Chapter 2 ("Anti-Breast Cancer Activity of Essential Oil: A Systematic Review") evaluates the application of EOs compounds' applications as an alternative to breast cancer treatment [2]. In this chapter, the authors summarize terpenoids' excellent anti-breast cancer pharmacological effects. They conclude that EOs can be accessed as a primary or adjuvant breast cancer treatment due to their highly effective nature and how rarely they exhibit side effects.

Chapter 3 comprises a research paper titled "Anti-Yeast Synergistic Effects and Mode of Action of Australian Native Plant Essential Oils" [3]. In this chapter, Alderees and colleagues explore the efficacy of three Australian native EOs against weak-acid-resistant yeasts: Tasmanian pepper leaf, lemon myrtle, and anise myrtle. The tested EOs exhibited good anti-yeast and antibacterial activity. Furthermore, damage to the yeast cell membrane, ion leakage, and cell organelles was identified as being the most probable mode of action of Tasmanian pepper leaf and lemon myrtle EOs. Our findings suggest that

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potential applications exist for these products in the beverage and food industry as natural antimicrobials [3].

Chapter 4 addresses "Essential Oil of *Origanum vulgare* var. *aureum* L. from Western Romania: Chemical analysis, in vitro and in silico screening of its antioxidant activity" [4]. This noteworthy chapter was reserved for an *Origanum* genus member that has remained insufficiently explored, *Origanum vulgare* var. *aureum* L. The authors proceeded by assessing its EO chemical composition and antioxidant effects. The results of this investigation reveal that gamma-terpinene (22.96%) and para-cymene (14.72%) are the main compounds of the *Origanum vulgare* var. *aureum* essential oil (OEO) and that they demonstrate strong scavenging effects on the DPPH and ABTS assays and higher relative antioxidant activity in the beta-carotene/linoleic acid bleaching assay. Furthermore, in silico analysis results reveal that their main compounds may be responsible for the oil's antioxidant properties by inhibiting the ROS-producing enzymes known as lipoxygenase (LOX), and xanthin oxidase (XO).

Chapter 5 ("Chemical profile of *Ruta graveolens*, evaluation of the antioxidant and antibacterial potential of its essential oil, and molecular docking simulations") evaluate the antimicrobial and antioxidant effects of the *Ruta graveolens* L. essential oil (RGEO) [5]. The results contained in this chapter demonstrate that RGEO possesses broad-spectrum antifungal and antibacterial effects and moderate antioxidant properties. Moreover, molecular docking analysis shows that the RGEO can exert its antimicrobial activity by inhibiting the D-Alanine-d-alanine ligase and generating an in vitro antioxidant effect via cumulative XO and LOX inhibition. Therefore, the RGEO could comprise a new natural preservatives and antioxidants source with diverse food and pharmaceutical industry applications.

Chapter 6 discusses the paper "Phytochemical profile, antioxidant and wound healing potential of three artemisia species: in vitro and in ovo evaluation" [6]. This chapter proposes using ethanolic extracts of three *Artemisia* species, *Artemisia absinthium* L., *Artemisia dracunculus* L., and *Artemisia annua* L., as new efficient alternatives in injury therapy. The results demonstrates that all three *Artemisia* species can be promising low-cost, polyphenol-rich, antioxidant, and safe choices in injury treatment.

Chapter 7 is entitled "Studies Regarding the Antibacterial Effect of Plant Extracts Obtained from Epilobium parviflorum Schreb" [7]. This chapter evaluates the phytochemical contents of *E. parviflorum* Schreb. extracts (aqueous, hydroalcoholic, and ultrasonicated hydroalcoholic) and their potential antibacterial activity. The chapter records that hydroalcoholic extract have the highest content of polyphenols and flavonoids and possesses strong antibacterial properties. Additionally, the study concludes that the amount of polyphenols and flavonoids in the analyzed extracts directly influences the recorded antibacterial activity (*White Staphylococcus*, *Streptococcus mitis*, *Streptococcus sanguis*, and *Enterococcus faecalis)*.

Chapter 8 concerns the paper "Evaluation of genetic damage and antigenotoxic effect of ascorbic acid in erythrocytes of *Oreochromis niloticus* and *Ambystoma mexicanum* using migration groups as a Parameter", which is marginally related to the topic of the Special Issue [8]. In this chapter, Prof. Alvarez-Moya and his research team investigate the genetic damage in erythrocytes of *Oreochromis niloticus* and *Ambystoma mexicanum* exposed to ethyl methanesulfonate and ultraviolet C radiation. The results reveal that migration groups of cell comets allow the detection of basal and induce genetic damage or damage reduction with roughly the same tail length and tail moment parameters efficiency. These findings suggest the usage of migration groups as a complementary parameter to evaluate DNA integrity in species exposed to mutagens.

Chapter 9 comprises the article "Antibacterial activity of nanoparticles of garlic (*Allium sativum*) extract against different bacteria such as *Streptococcus mutans* and *Poryphormonas gingivalis*" [9]. The increasing mortality rate of infectious diseases confirms the necessity of discovering alternative antibacterial agents to combat this threat to public health. Furthermore, garlic has been used as a medicinal plant with antibacterial properties for centuries. Therefore, ultrasonicated garlic extract is analyzed to evaluate the antibacterial activity against *Escherichia coli*, *Poryphyromonas gingivalis*, and Staphylococcus aureus sub. aureus,

and *Streptococcus mutans* strains. The results demonstrate that the ultrasonicated garlic extract is a potent antibacterial agent and can help in developing novel antibiotics against bacteria that have developed resistance.

Chapter 10 is entitled "Effect of postharvest UV-C radiation on nutritional quality, oxidation and enzymatic browning of stored mature date" [10]. This chapter aims to study the influence of UV-C radiation (1, 3, and 6 kJ m^{-2}) on preservation potential after harvest of Deglet Nour dates during 5 months of storage (10 °C). The results showed that low-UV-C radiation doses contribute to the enrichment of date fruit in terms of total polyphenols, flavonoids, and tannins, increasing the antioxidant activity. The authors conclude that UV-C radiation of Deglet Nour fruits may positively impact human health by increasing the levels of certain bio-compounds, preserving their nutritional quality, and extending their shelf-life.

The chapters of this book address the undeniable importance of using EOs as new sources of bioactive compounds to eliminate the disadvantages generated by synthetic food additives and unlock new opportunities in the treatment of diseases. However, some challenges still need to be addressed, such as how to preserve their biological properties and minimize the influence on the organoleptic properties of the foods they are incorporated by, alongside testing their toxic effects or any harmful impact that may affect consumer safety and health. Nevertheless, the chapters provided by this book signify a valuable resource for researchers, decision makers, stakeholders, and professionals interested in identifying, promoting, and developing new green antioxidants and preservatives for food-related and pharmaceutical industrial applications. Moreover, following the success of this Special Issue, a new issue, entitled "Antioxidant, Antibacterial and Anti-drug Ingredients in Plants", is now open for submissions.

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