



Editorial

Phytochemicals of Natural Products: Analysis and Biological Activities

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The natural products of the plant kingdom, both terrestrial and marine, have been widely explored. Plant-based products have long been used in the prevention and treatment of various ailments. Many natural compounds have been reported to have a variety of interesting and significant biological activities (antioxidant, anti-inflammatory, antibacterial, antifungal, antiparasitic, analgesic, antidiabetic, anti-atherogenic, and antiproliferative). Therefore, researchers have paid special attention to the bioactive compounds synthesized by plants. Opportunities in the fields of functional ingredients and the treatment of non-communicable diseases (oxidative stress, diabetes, obesity, metabolic syndrome, etc.) have been widely explored. However, undeniably, many of the therapeutic properties of plants are yet to be discovered. The current Special Issue, “Phytochemicals of Natural Products: Analysis and Biological Activities”, compiles 11 original research articles and 3 reviews focusing on the chemical profiling of plants, the beneficial properties of their essential oils, and the practical application of plant by-products, with their antimicrobial and antioxidant activities and specific volatile profile.

Phenolic compounds are a group of natural organic substances that are found in different morphological plant parts. They exhibit particularly strong antioxidant properties that protect the body from the damaging effects of free radicals. In the experiment conducted by Afonso et al. [1], it was stated that total phenol levels in hop cones were substantially affected by experimental factors such as plant vigor, foliar treatment, liming, cultivar, plot, and year. Agro-environmental variables make it difficult to recommend strategies to both farmers and researchers without a well-defined target for the further utilization of the product. The paper of Yin et al. [2] confirmed that metabolic differences between the medicinal and non-medicinal parts of plants exist, and they may not possess the same therapeutic effect, which warrants a strict regulation of harvest and market standards. Kolarević et al. [3] revealed the potential of in vitro leaves of blueberry as a source of total phenolics and flavonoids. The aqueous extracts of field-grown and in vitro leaves of blackberry and blueberry were screened, and the results show that they can be a good source of phenolic compounds and exhibit antioxidant properties, whereas callus cultures have potential for the production of specific phenolic compounds. Consumers have a growing interest in foods that offer high nutritional value and provide health benefits. Rehal et al. [4] proposed the utilization of tomato pomace (a by-product) for the preparation of ready-to-cook gluten-free snacks. The newly developed product helped to lower the oil uptake and enhanced the fiber, lycopene content, mineral, and antioxidant activity.

The antioxidant potential of plant sources has been widely studied for a long time. Yet, new knowledge is continually being added to that already published on the subject. Gentsheva et al. [5,6] studied the potential of extracts from *Sempervivum tectorum* L. and *Sambucus nigra* L. blossoms to be used for the preliminary prognosis of pharmaceutical applications due to their phenolic content and antioxidant potential. The abovementioned authors also stated the total element contents (Ca, Mg, Zn, Mn, and Fe) in leaves of *Sempervivum tectorum* L. They focused on the trace element content of freshly squeezed



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S. tectorum leaves as an essential plant characteristic. The established content of toxic elements in plants grown on different soils clearly showed pollution from urban soils and phosphate fertilizers. Furthermore, the authors presented a correlation between the total phenolic contents and the antioxidant activities of *S. tectorum* water–ethanolic extracts [7]. In addition, Bulgarian *S. nigra* samples (blossoms and leaves), collected from different regions, were screened and compared in terms of their phytochemicals and activities [5].

The team of Duong et al. [8] focused on *Curcuma* (turmeric) species, and the essential oils of *Curcuma* rhizomes, which have demonstrated promising pharmacological properties. They also confirmed that wide variation exists in the essential oil compositions from different geographical locations. The volatile profile of plants has always been an object of extensive study. The review of Tangpao et al. [9] provides information about the usefulness of volatile organic compounds from diverse types of basil essential oils and their biological activities, summarizing techniques for enhancing the efficacy of the extraction process. The study presented by Plabon et al. [10] showed that the peel of *Spondias mombin* is distinctive in terms of its volatile composition. The antimicrobial activity of the oil was analyzed by the disk diffusion method. The results in terms of the antifungal activities of the peel oil showed the highest zone of inhibition against *Aspergillus niger* and *Penicillium oxalicum*, pointing toward *S. mombin* as an alternative to synthetic bactericides and fungicides to be used in the agro-industries. Lafraxo et al. [11] promoted the potential of *Juniperus thurifera* essential oil as an alternative solution to antibiotics due to its activity against the fungal strains *C. albicans*, ATCC 10231, and *F. oxysporum*, MTCC 9913. Ismail et al. [12] tested different extracts of pomegranate, sugar apple, and eggplant peels applied as inhibitors of the aflatoxigenic maize fungus *A. flavus*. GC–MS phytochemical analysis of fruit peel extracts suggested that compounds such as α -kaurene, α -fenchene, p-allylphenol, octadecanoic acid, 3,5-dihydroxy phenol, hexestrol, xanthinin, and linoleic acid could be the active substances. Moreover, fruit peel waste extracts have been reported as a potential source of useful compounds.

A review article written by Panda and Duarte-Sierra [13] shows plants as a reservoir of phytochemicals, with several beneficial health properties. Panda and Duarte-Sierra pinpoint the importance of plant polyphenols, their role as antimicrobial agents, the mechanisms of biochemical methods, and the ways these methods may be used in enhancing the antimicrobial potency of plant polyphenols. Finally, Madrigal-Santillán et al. [14] evaluated the available scientific evidence of the beneficial properties of *Opuntia* spp., with reference to its protective effects against atherosclerotic cardiovascular disease, diabetes, and obesity, in addition to hepatoprotection, among other effects, outlining a direction for further investigations (in vitro, in vivo, and clinical) to confirm these properties.

Modern horticulture must turn its attention toward the supply of products with a variety of valuable metabolites and aromas. This has motivated researchers to study these compounds and facilitate the development of horticultural products. All of the above highly encourages both health professionals and researchers to expand their studies on the pharmacological and therapeutic effects of plants.

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

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