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Editorial

Siginficance and Applicability of Bioactive Compounds from Plants for Innovative Technologies and Processes

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The field of bioactive compounds from plants has witnessed remarkable progress in recent years, driven by a growing recognition of the potential health benefits and therapeutic applications of these natural substances [1]. This Special Issue, "Bioactive Compounds from Plants", has brought together a collection of pioneering research that not only highlights recent advancements but also addresses critical gaps in our understanding. The contributions in this volume reflect the diversity and complexity of plant-derived compounds, shedding light on their biochemical properties [2], mechanisms of action, and potential applications and extractions in medicine, agriculture, and industry [3].

Recent developments in the field have underscored the importance of bioactive compounds in promoting health and preventing disease [4,5]. Studies have increasingly focused on elucidating the mechanisms through which these compounds exert their effects, ranging from antioxidant and anti-inflammatory activities to anticancer and antimicrobial properties [5]. However, despite significant progress, several gaps in knowledge remain. One major challenge has been the identification and characterization of bioactive compounds from lesser-known plants, which hold untapped potential for new therapeutic agents.

This Special Issue has made substantial contributions to filling these gaps. Through rigorous experimental research and comprehensive reviews, the articles included have expanded our understanding of the diverse roles of bioactive compounds. Notable findings include the discovery of novel compounds with potent bioactivities, innovative methods for their extraction and purification, and insights into their molecular interactions and pathways. These studies have not only enriched our knowledge but have also paved the way for future applications in various fields.

For example, Chaiwaree et al. developed oral care products based on natural plant extracts from the Thai highlands. These products, available as an oral ulcer gel and oral spray, can be applied in the pharmaceutical and cosmetic industries for their antimicrobial properties. Avilés-Betanzos et al. [6] devised a new, innovative method for the extraction of secondary compounds from *Habanero* pepper, optimizing the spray drying method to prevent compound degradation. Bastías-Montes et al. explored the cryoconcentration process by centrifugation–filtration as a method to enhance the content of thermosensitive bioactive compounds in *Maqui* (*Aristotelia chilensis*), a Chilean berry rich in antioxidants.

Dabbour et al. examined the influence of freeze and convection drying on the physical, functional, and rheological attributes of sunflower protein and its hydrolysate. Their study found that freeze-dried samples exhibited better solubility and foaming characteristics compared to convectively dried samples, though with lower emulsion properties. Antonescu (Mintaș) et al. demonstrated the healing effects of a combined extract of *Ocimum basilicum* and *Trifolium pratense* on dermal pathologies, highlighting the potential of plants as safe, effective, and economical medicinal sources.

Dao et al. investigated the optimization of parameters in the extraction of pomelo peel-derived essential oils, aiming to improve large-scale production efficiency. Havelt et al.

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conducted feasibility studies on using bioactive components for the stabilization of packaging materials, incorporating plant extracts into poly-lactic acid films to evaluate bio-based alternatives to petrol-based stabilizers. Lastly, Preusche et al. [7] reviewed conventional and advanced cultivation regimes for plants that accumulate economically important sweet-tasting or taste-modulating secondary metabolites, such as mogrosides, phyllodulcin, glycyrrhizin, steviol glycosides, and rubusoside.

As we reflect on the progress that has been made, it is crucial to identify key areas for future research that will further advance the field. One promising direction is the integration of advanced omics technologies, such as genomics, proteomics, and metabolomics, to uncover the complex networks and interactions underlying the biosynthesis and activity of plant bioactive compounds. These approaches can provide a holistic view of plant metabolism and facilitate the identification of new bioactive molecules.

Additionally, the development of sustainable and efficient methods for the large-scale production of bioactive compounds remains a priority. This includes optimizing cultivation practices, exploring biotechnological approaches such as metabolic engineering and synthetic biology, and improving extraction and purification techniques. Addressing these challenges will be crucial for translating laboratory findings into practical applications.

Another critical area for future research is the investigation of the synergistic effects of bioactive compounds. Many plant compounds work in concert, and understanding these interactions can enhance their efficacy and lead to the development of more effective multi-targeted therapies. Furthermore, clinical studies are needed to validate the health benefits of bioactive compounds and establish their safety and efficacy in humans.

In conclusion, this Special Issue has provided valuable insights into the field of bioactive compounds from plants, addressing key gaps in knowledge and opening new avenues for research. The collective efforts of researchers have laid a strong foundation for future studies, which will undoubtedly continue to uncover the vast potential of plant-derived bioactive compounds.

Conclusion: This Special Issue has significantly advanced our understanding of plant-derived bioactive compounds, showcasing their diverse roles in health and industry. By addressing critical gaps, the collected research highlights novel bioactive substances, innovative extraction methods, and important molecular interactions. These insights not only pave the way for future scientific inquiry but also lay the groundwork for practical applications in medicine, agriculture, and sustainable technologies.

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

List of Contributions

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