GreenNutriFood 2025

April 7th - 9th

BOOK OF ABSTRACTS

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Dubrovnik riviera, Croatia

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1st International Congress on Sustainable Food, Green Chemistry and Human Nutrition

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TRENDS AND OPPORTUNITIES OF SHELLS WASTE VALORISATION

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Abstract

The disposal of mollusc and crustacean shells presents a significant environmental challenge, particularly in regions with high seafood consumption and aquaculture activities. These shells, primarily composed of calcium carbonate (CaCO3) and chitin, hold substantial industrial and environmental potential. However, most of this shell waste remains underutilized, often ending up in landfills or being discarded in marine environments, contributing to their pollution.

This study highlights the need for innovative, multidisciplinary approaches to unlock the full potential of shell waste within circular economy models. By implementing waste valorisation practices across various industrial sectors, significant strides can be made towards achieving sustainable resource management, zero-waste goals, and minimizing environmental impact.

The valorisation of shell waste and its potential application is crucial for alleviating the burden of waste disposal. Several key sectors can benefit from the diverse applications of shell-derived materials. These include environmentally friendly applications such as water purification, bio-filtration, heavy metal adsorption, soil amendment, acid mine drainage (AMD) treatment, and ocean deacidification. Additionally, shells can be utilized in the production of food and feed additives, providing valuable sources of calcium and protein. Shell-derived bioactive molecules, including antioxidants, antimicrobials, and compounds with potential benefits for cholesterol and blood pressure reduction, also lead to potential application in pharmacology and medicine. Biopolymers derived from waste shells can be used to produce eco-friendly bioplastics, bioceramics, and biocomposites, for industrial and household applications. Moreover, the shells can be integrated into biomedical biomaterials for bone tissue regeneration and wound-dressing materials.

This research emphasizes the importance of advancing shell waste valorisation within circular economy frameworks. By unlocking the diverse applications of shell-derived materials, it is possible to reduce environmental pollution, support sustainable practices, and contribute to the development of innovative, eco-friendly solutions. Further research and cross-industry collaboration are essential to realize the full potential of shell waste, ultimately promoting a zero-waste future.

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Keywords: Shell waste, circular economy, chitin, calcium carbonate, sustainable materials, invasive species utilization, zero waste