

7th
International
Conference

WASTES

SOLUTIONS
TREATMENTS
OPPORTUNITIES



BOOK OF PROCEEDINGS

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FROM THE EDITOR

Dear colleagues,

It is with great pleasure that we bring to you this Book of Proceedings developed within the context of the 7th International Conference Wastes: Solutions, Treatments and Opportunities.

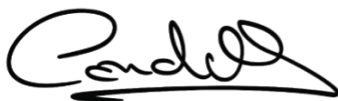
The WASTES Conference, held biennially, serves as a global platform for scientists and industry professionals in the fields of waste management and recycling to share their expertise and experiences. The event fosters thoughtful discussions on achieving a sustainable balance between economic, environmental, and social goals. A core focus is the advancement of innovative techniques, tools, and strategies to transform waste into valuable resources—enhancing environmental performance and deepening our understanding of the industry's environmental impact, while identifying pathways for continuous improvement.

Through this editorial work, we are pleased to extend the reach of the conference by publishing selected scientific contributions derived from the oral presentations and posters. In doing so, we carry the impact of the event beyond its physical boundaries.

This issue features 185 abstracts presented at the 2025 edition. These papers, further refined and developed, represent an important scientific output of the conference. Meanwhile, the full papers submitted were compiled in the book series Springer Proceedings in Earth and Environmental Sciences, which is indexed in Scopus and Web of Science.

The abstracts cover a wide range of themes, including management of waste streams, environmental, economic and social aspects in waste management, marine pollution and bioinvasions, waste-to-energy technologies, life cycle assessment and carbon footprint, biological treatment techniques, sustainable waste valorization technologies, circular economy and industrial symbioses, smart technologies and digital tools in waste management, recycling of wastes and resources recovery, wastes refineries, food waste management and bioeconomy, plastic waste impacts, management strategies and solutions, wastes as critical raw materials resources, the use of wastes as construction materials and as fuels, waste treatment technologies, municipal solid waste (MSW) management, recycling and material recovery, the environmental, economic and social dimensions of waste management, circular economy and waste refinery approaches, life cycle assessment, and topics related to logistics, policies, regulatory frameworks, and market dynamics in waste management.

We hope you find these research contributions insightful and inspiring - and that they motivate you to join us for the 2027 edition of the conference!



Chair of the Organizing Committee

Cândida Vilarinho

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ALMOND AND WALNUT SHELLS AS SUSTAINABLE SOIL AMENDMENTS: PHYSICAL INSIGHTS FOR GEOTECHNICAL APPLICATIONS

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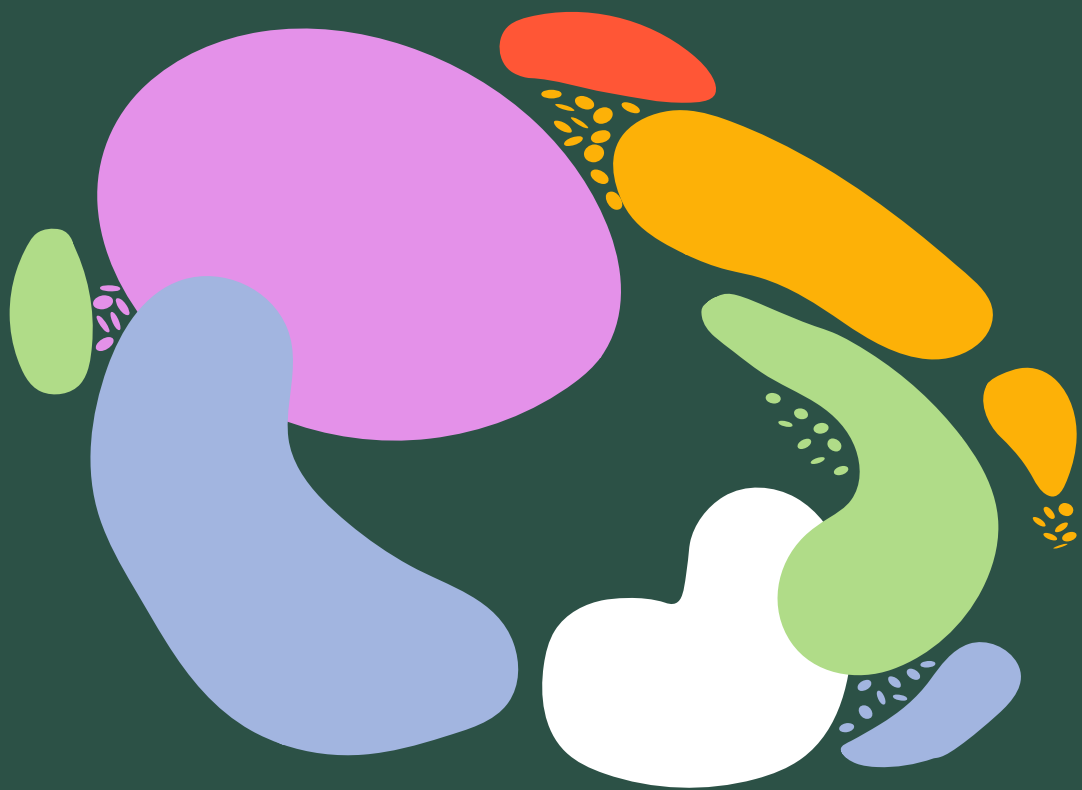
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ABSTRACT

The use of agricultural waste as soil amendments aligns with global efforts to promote sustainable development and circular economy principles. This study investigates the potential of almond and walnut shells as eco-friendly soil amendments, focusing on their physical and mechanical characteristics, including density, plasticity, compaction, and consolidation behavior. By incorporating these biodegradable by-products into soil systems, the research seeks to evaluate their chemical compatibility with natural soils and their suitability for enhancing geotechnical performance. Laboratory analyses were conducted to determine the shells' specific gravity, Atterberg limits, Proctor compaction parameters (optimum moisture content and maximum dry density), and oedometric consolidation properties under various stress conditions. Results indicate that almond and walnut shells exhibit very low density, making them suitable for reducing soil weight in specific applications. Additionally, their favorable compaction and plasticity characteristics contribute to improved soil workability. Consolidation tests reveal that these amendments enhance the compressibility and permeability of treated soils, suggesting potential applications in agricultural and environmental engineering contexts. The findings highlight the dual benefits of reducing agricultural waste disposal and improving soil properties, contributing to the United Nations' Sustainable Development Goals. By showcasing the viability of almond and walnut shells as sustainable soil amendments, this study provides a novel approach to integrating agricultural by-products into geotechnical engineering practices, supporting both environmental protection and infrastructure resilience.

Keywords

Sustainable Development; Waste Recycling; Circular Economy; Geoengineering; Environmental Protection; Agriculture By-products.



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