Earth Sustainability & Reinforcing Circular Economy through Plastic & Agro Waste Recycling

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Editorial

At global level plastic waste and Agro-Industrial byproducts are being used in thermal insulation bricks or other innovative applications for sustainability? It is well known that India generates over 3.5 million tonnes of plastic waste annually and India recycles only ~35% of its plastic waste. Also, a very large quantity of rice husk, bagasse, and sawdust from agro-industrial waste in which more than 500 million tonnes of agricultural residues are generated annually. Moreover, a significant fraction of these wastes is either landfilled or openly burned to contribute to severe air pollution, GHG emissions for public health at stake. Hence it poses a big challenge, how to mitigate it?

Sustainable Thermal Insulation in Bricks Using Plastic Waste and Agro-Industrial Byproducts

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Abstract

This study investigates the feasibility of incorporating two agro industrial waste materials—wooden waste ash (WA) and rice husk ash (RHA)—as partial replacements for clay in the production of burnt clay bricks. These waste materials pose significant disposal challenges and contribute to environmental pollution. WA and RHA were sourced locally and added to clay in proportions of 5%, 10%, and 15% by weight. The mechanical properties (compressive strength and modulus of rupture) and durability characteristics (water absorption, porosity, sulphate resistance, and efflorescence) were evaluated. The results indicate that the inclusion of WA and RHA enhances sulphate resistance and reduces efflorescence, although mechanical strength decreases with higher replacement levels. The unit weight of bricks decreases with the addition of waste materials, which contributes to lightweight and economical construction. Overall, the incorporation of WA and RHA up to 15% can be recommended for sustainable and environmentally friendly brick production. Wooden waste ash and rice husk ash were procured from nearby locations in Greater Noida and Bulandshahr, respectively, and utilized as supplementary materials in clay brick production. The ashes were blended with clay at replacement levels of 5%, 10%, and 15% by weight. The manufactured bricks were assessed for mechanical performance, including compressive strength and modulus of rupture, along with durability characteristics such as water absorption, resistance to freeze–thaw cycles, and sulphate attack. The experimental results revealed a noticeable improvement in sulphate resistance and a reduction in efflorescence in bricks containing wooden waste ash and rice husk ash. In contrast, the incorporation of these waste materials did not produce any significant variation in the mechanical strength properties. Additionally, the inclusion of ashes led to a reduction in the unit weight of the bricks, thereby decreasing the dead load of structures and contributing to cost-effective construction. Hence, the use of such waste-derived materials in brick manufacturing offers an effective approach to reducing environmental impact while promoting sustainable and economical building practices.

Keywords: Plastic waste, Thermal insulation, Composite material, Rice husk, Sawdust, Glazed powder, sustainable construction.

Implication of AI in Transforming Human Resource Development

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Abstract

This paper presents a systematic conceptual review of the application of Artificial Intelligence (AI) in Human Resource Management (HRM). Human resources form the backbone of organizations, and the integration of AI technologies is transforming key HR functions such as recruitment, training and development, performance management, compensation, grievance redressal, and retirement planning. This study synthesizes peer-reviewed literature published between 2018 and 2024 drawn from databases such as Scopus, Web of Science, Google Scholar, and major academic publishers. The review identifies how AI enhances efficiency, reduces bias, supports strategic decision-making, and improves employee experience, while emphasizing that human judgment remains essential in ethical and relational domains.

Keywords: Artificial Intelligence recruitment, management, balance scorecard, regulatory

Biodegradation of maneb, a Fungicide by a γ-*proteobacterium Pseudomonas psychrotolerans* Strain SDS18

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Abstract

The present study reports the isolation and identification of a γ-proteobacterium which is capable of degrading maneb and its photolytic product ethylene thiourea. The strain SDS18 was isolated from the surface of the most common weed *Parthenium hysterophorus* growing in agricultural field. Based on molecular systematics the strain SDS18 was identified as *Pseudomonas psychrotolerans*. Our study first time revealed that a single bacterial strain is capable of metabolising the toxic fungicide maneb and its carcinogenic photolytic product ethylenethiourea. We found that the strain SDS18 can tolerate upto 150ppm of maneb and 200 ppm of ethylene thiourea and ethylene urea as sole carbon sources. The optimum conditions for degradation were in the presence of ammonium sulphate as nitrogen source at 30°C at pH 7.0. Interestingly, the strain SDS18 exhibited activities like phosphate solubilisation, production and assimilation of ammonia, ACC deaminase activity, production of indole acetic acid and siderophores which are plant growth promoting activities and antifungal activities for *Alternaria citri* and *Cladosporium cladosporioides* indicating it could be beneficial for plant growth and maturation. The isolated strain can be used for bioremediation of maneb and its photolytic products.

Keywords: Degradation, maneb, ethylenethiourea, plant growth promoting

Memristor Functional Layer Dynamics in Real-Time Data Analysis and Its Applications: A Review

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Abstract

In the age of artificial intelligence, it is crucial to have high-speed capabilities for processing and storing data. Existing CMOS-based technologies encounter a bottleneck in achieving high-speed computing due to the separate storage and processing units, causing communication lag that impedes processing speed. Memristors, with their capacity for parallel data storage and processing, present a promising solution. This advanced capability is harnessed in state-of-the-art real-time data analysis to boost the processing speed. In this review, the utilization of memristors as computing hardware for real-time data analysis has been discussed. This review systematically explores different classes of materials considered for functional layers and delves into their characteristics, accompanied by a discussion on potential applications.