

## **Recent advancement and applications of biochar technology as a multifunctional component towards sustainable environment**

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### **ABSTRACT**

Biochar is a rich carbon source formed through biomass's thermal decomposition. Biomass-derived biochar is gaining traction in a variety of industries to alleviate the most pressing environmental problems effectively. Biochar development utilizing biomass is generating tremendous attention as a low-cost amendment because of its multiple benefits for urban science, engineering, and the environment and its capability to trap carbon in the soil. Recently, there has been a shortage of specific data connecting biochar applications for environmental development and scientific research in climate change. This article analytically assesses reported studies and examines biochar's role in hydrogel-biochar composite technology, nanotechnology, hazardous pesticide detoxification, and as a nutrient source and a catalyst for various chemical reactions. Biochar's application in modern technological advancements and innovation has a discernible effect on renewable energy and activated carbon production. There is also a discussion of the scientific findings for biochar's capacity to improve agricultural physiology and alleviate salt plant growth and development and its function in promoting animal growth. In summary, biochar has a vast number of possible uses in environmental reduction, and the mechanism by which its performances should be further investigated. Thus, incorporating biochar into the environment appears to be a 'bonus' approach for urban science and engineering technology.

### **KEYWORDS**

Biochar; Biochar applications; Biomass; Energy storage; Environment; Nanotechnology; Renewable energy

**ACKNOWLEDGEMENTS**

We are gratefully acknowledging Universiti Malaysia Pahang's research grant (RDU2203102) for financially supporting this study. This research was also supported by a Postdoctoral Fellowship from Prince of Songkla University, Thailand.