

Reviving Arid Lands: The Transformative Potential of Biochar in Arab Countries' Agriculture

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Abstract : This review explores the application of biochar as a strategy for enhancing soil fertility in arid regions, with a focus on Arab countries. Biochar, derived from the carbonization of biomass under low-oxygen conditions, has shown promise in improving the physical and chemical properties of soil, such as increasing water retention and nutrient availability. Despite the challenging conditions of arid and semi-arid regions, characterized by poor soil fertility and severe land degradation, biochar application has emerged as a viable method to enhance agricultural productivity and mitigate environmental issues. This paper examines various aspects of biochar, including production methods, such as pyrolysis and gasification, and the effects of biochar on soil fertility. It discusses different application techniques and presents case studies from Arab countries like Egypt, the United Arab Emirates, Saudi Arabia, Qatar, Oman, and Kuwait, highlighting the successes and challenges faced in implementing biochar technology. The review also addresses the limitations of biochar use in arid regions and suggests future research directions to optimize its effectiveness. Overall, this study underscores the potential of biochar to contribute significantly to sustainable agriculture and ecological restoration in arid environments, advocating for integrated strategies that combine biochar application with other innovative agricultural practices.

Keywords : biochar, soil fertility, arid region, Arab countries, challenges and limitations

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