Biomass-Based Green Technology for Circular Economy

Edited by
Riti Thapar Kapoor and Mika Sillanpää

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This book provides up-to-date information on advanced technologies and future directions for management of waste biomass for carbon neutrality and development of circular economy. It addresses critical environmental issues and challenges related to agro-waste management. It provides practical solutions to the readers on how to meet these challenges.
Features:

- Summarizes the application of waste biomass for development of value-added products for sustainable development using green technologies.
- Provides detailed work on biomass-based green technology.
- Highlights biofuel production with wastewater remediation simultaneously with microbial fuel cell.
- Offers a substantial contribution for solving the problem of biomass waste which can be used as a feedstock for valuable biofuel and fine chemicals production.
- Explores different aspects of biological methods and use of nanomaterials for removal of contaminants, recycling, and reusing.

The book is aimed to provide wide information to researchers and professionals on state-of-art of biotechnology, circular economy, and waste treatment.

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5 *Parthenium hysterophorus*: From Weed to Eco-Friendly Solution for Biogas and Wastewater Treatment

Shazia Qamar, Syed Khalida Izhar, and Uzma Afaq

ABSTRACT

Parthenium hysterophorus L. (Asteraceae), also known as carrot grass or congress grass, is one of the most prolific invasive weeds, endangering agricultural landscapes and natural ecosystems. This notorious plant has recently been shown to have a wide range of innovative uses, such as the elimination of aquatic weeds and the removal of dye and heavy metals from contaminated water. P. hysterophorus has been used for nano-catalytic gasification, which uses Co and Ni as nanocatalysts to produce biofuels (biogas, biodiesel, and charcoal). These weeds contain minimum nutritional values but can be used effectively in production of biofuels. It is also added to cattle dung as an additive to produce biogas, with the prevalence of this weed and the vast number of cattle in India, P. hysterophorus should be given careful consideration as a substrate for anaerobic digestion-based biogas production. Heavy metal pollution of the environment is becoming a worldwide problem. Wastewater contaminated by heavy metals such as chromium, nickel and cadmium need to be treated using affordable alternative technologies or absorbents, particularly in developing countries like India. *P. hysterophorus* is found to be an effective adsorbent of Cr, Ni and Cd. It is used to generate activated carbon, which is a very effective adsorbent material produced through chemical activation using concentrated H_2SO_4. The concerns with industrial wastewater contamination have led to an increase in the use of activated carbon made from *P. hysterophorus* for wastewater treatment.

5.1 Introduction

Parthenium hysterophorus Linnaeus is a ubiquitous weed belonging to the Asteraceae family. It is commonly known as carrot grass, white top, bitter weed, star weed, wild feverfew, and congress grass (Saini et al. (2014). P. hysterophorus is a widely distributed annual herbaceous weed but has