

Sustainable Environmental Waste Management Strategies

Veer Singh · Ashish Kumar ·
Nidhi Singh · Vishal Mishra ·
Sachchida Nand Rai *Editors*



Bioenergy and Value Added Byproducts from Biomass Waste

 Springer

Editors

Veer Singh
Department of Biosciences
Manipal University Jaipur
Jaipur, Rajasthan, India

Nidhi Singh
Centre of Bioinformatics
University of Allahabad
Prayagraj, Uttar Pradesh, India

Sachchida Nand Rai
University Centre for Research
and Development (UCRD)
Chandigarh University
Mohali, Punjab, India

Ashish Kumar
Department of Biochemistry
Rajendra Memorial Research Institute
of Medical Sciences
Patna, Bihar, India

Vishal Mishra
School of Biochemical Engineering
Indian Institute of Technology (BHU)
Varanasi, Uttar Pradesh, India

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Contents

1	Novel Approaches for Characterization and Its Conversion into Value-Added Products	1
	Ananda Chettupalli, Jai Vardhan, Shikha Yadav, Abdul Althaf Shaik, and Sarad Pawar Naik Bukke	
2	Biofuel Production from Agro-waste Materials	33
	Chandrabhan Prajapati, Supriya, Sachchida Nand Rai, and Santosh Kumar Singh	
3	Selection, Characterization and Biomass Conversion Approaches for Biofuel Production	63
	Fouziya Parveen, Nafisa Shaheen, Ayush Saxena, and Mohammad Ashfaque	
4	Microbial-Based Bioenergy Production: Sustainable Biofuels from Organic Waste and Biomass	87
	Akhtar Hussain, Irum, Gyanendra Tripathi, Ayush Saxena, Madhvi Singh, Alvina Farooqui, and Mohammad Ashfaque	
5	Recent Updates on Biofuel Production from Food Waste	119
	Lipsa Dehal and Gurinder Kaur Walia	
6	Biofuel Production from Organic Waste Materials: A Sustainable Waste Management Approach	141
	Manish Pant, Nisha Singh, Divya Bisen, and Jabrinder Singh	
7	Green Synthesized Nanomaterials and Its Role in the Biofuel Production	157
	Ayush Saxena, Akhtar Hussain, Fouziya Parveen, Nafisa Shaheen, Zeeshan Quraishi, Mariyam, and Mohammad Ashfaque	
8	Emerging Significance of Life Cycle Analysis in Biofuels Towards Paving the Road to Sustainability	189
	Radhika Jaithaliya, Ayushi Soni, and Kakoli Dutt	

9	Byproducts in the Biofuel Production Process and Their Environmental Application	211
	Sakshi Jaiswal	
10	Global Bioenergy Production and Its Role in Sustainable Development Goals (SDGs)	223
	Priyanka Yadav, Diksha Singh, Shivani Mishra, and Kusum Yadav	
11	Advances in Catalysis for Biomass Conversion to Biofuels	243
	Abhishek Anand, Shyam Sunder Rao, Anamika Maurya, Parmanand Maurya, and Rahul Ranjan	
12	Waste to Bioenergy: Biofuel Production from Seafood Waste	295
	Ulaganathan Arisekar, K. Udhayakumaar, Rajendran Shalini, P. Padmavathy, and Balasubramanian Sivaraman	
13	A Recent Update on Biofuel Production from Microalgae	309
	Aman Kumar, Mansi Rani, and Shubhankar Kumar Singh	
14	Environmental Sustainability of Second-Generation Biofuels for Climate Mitigation and Achieving Circular Economy Objectives	337
	Tarun Sharma and Bharat Bhushan Nagar	

Chapter 3

Selection, Characterization and Biomass Conversion Approaches for Biofuel Production



Fouziya Parveen, Nafisa Shaheen, Ayush Saxena, and Mohammad Ashfaq

Abstract The mounting problem due to global warming and the increase in the price of conventional fuel have alarmed researchers towards the production of biofuel to meet the future energy demand and reduce the environmental impact. Biofuel is considered as an alternative source of energy. Lignocellulose Biomass, Algal Biomass, Starch Crops, and Oil Crops/Waste Oils are the potential feedstock sources for biofuel production. Biomass to biofuel conversion requires two processes viz, thermochemical conversions such as combustion, gasification, pyrolysis, and hydrothermal liquefaction, and biochemical conversions such as anaerobic digestion, fermentation, and transesterification. The efficiency of biofuel conversion depends on the type of biomass; hence it is vital to understand the biomass composition and its properties. This chapter offers a comprehensive overview of biofuels, focusing on biomass characterization and its conversion approach. Additionally, the chapter examines diverse biofuel production methodologies that elucidate the process of converting biomass into biofuel.

Keywords Lignocellulose · Biofuels · Pyrolysis · Fermentation · Green energy

3.1 Introduction

The growing price of fossil fuel and its harmful environmental impact has influenced researchers towards the production of green energy. The variety of human activities, including transportation, the disposal of waste, and the burning of fossil fuels release CO₂ and deforestation, limiting CO₂ absorption (Dimitriou et al., 2018). On Earth, biomass is one of the most abundant and easily accessible carbon sources. Biomass

F. Parveen · A. Saxena · M. Ashfaq (✉)
Department of Biosciences, Integral University, Lucknow, India
e-mail: mohdashfaqekhan@rediffmail.com; mdashfaq@iul.ac.in

N. Shaheen
Department of Environmental Science, Integral University, Lucknow, India