

The background of the cover is a composite of several images showing microbial growth. At the top, there are three distinct, bright green, circular colonies on a dark surface. Below these, the background transitions into a dense, textured field of green, resembling a large-scale microbial culture or a forest of microscopic organisms. At the bottom, there are more varied microbial structures, including some that appear to be branching or filamentous, and others that are more granular or crystalline, all set against a dark, almost black background.

Microbial Biotechnology

**Role in Ecological Sustainability
and Research**

Edited by

**Pankaj Chowdhary • Sujata Mani
Preeti Chaturvedi**

WILEY

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This edition first published 2023
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Editorial Office

Boschstr. 12, 69469 Weinheim, Germany

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Library of Congress Cataloging-in-Publication Data

Names: Chowdhary, Pankaj, editor. | Mani, Sujata, editor. | Chaturvedi, Preeti, 1977– editor.

Title: Microbial biotechnology : role in ecological sustainability and research / edited by Pankaj Chowdhary, Sujata Mani, Preeti Chaturvedi.

Other titles: Microbial biotechnology (John Wiley & Sons)

Description: First edition. | Hoboken, NJ, USA : John Wiley & Sons, Inc., 2023. | Includes bibliographical references and index.

Identifiers: LCCN 2022032480 (print) | LCCN 2022032481 (ebook) | ISBN 9781119834458 (Hardback) | ISBN 9781119834465 (adobe pdf) | ISBN 9781119834472 (epub)

Subjects: LCSH: Microbial biotechnology.

Classification: LCC TP248.27.M53 M5158 2023 (print) | LCC TP248.27.M53 (ebook) | DDC 660.6/2–dc23/eng/20220821

LC record available at <https://lcn.loc.gov/2022032480>

LC ebook record available at <https://lcn.loc.gov/2022032481>

Cover Design: Wiley

Cover Image: © Aliaksei Marozau/Shutterstock

Set in 10/12pt TimesNewRomanMTStd by Straive, Pondicherry, India

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PREFACE

The book *Microbial Biotechnology: Role in Ecological Sustainability and Research* discusses the potential role of microbial biotechnology in the betterment of our daily lifestyle. Today, microbial biotechnology is a rapidly growing segment of life sciences/biological sciences. It is well known that rapid industrialization and urbanization have resulted in contamination of all components of the environment, increasing public concern over the environmental brunt of wastewater polluted by anthropogenic sources. To mitigate this, numerous traditional wastewater treatment techniques, both physical and chemical, such as sedimentation or filtration techniques, oil–water separators, adsorption, membranes, coagulation, adsorption, activated sludge, trickling filtration, precipitation, and oxidation processes have been applied effectively. Besides, biological strategies through bacteria, fungi, algae, actinomycetes, etc., have also been used to remove environmental pollutants. But these conventional wastewater treatment methods have some limitations, require a noteworthy amount of energy, and most importantly involve pricey paraphernalia and their upkeep in maintaining microorganisms. From an environmental point of view, these recent and classic treatment technologies should be amplified to formulate them in a more viable and feasible manner. Contaminant mitigation or removal by using microbial technology is an attractive and potential alternative. Recent development in the field of biotechnology, molecular biology, ecology, and microbiology has been applied to develop different novel treatment methods involving novel strains of microorganisms and their desirable properties that could be applicable in the process of bioremediation. Various types of beneficial microbes are present in the ecosystem and they can play key roles in mitigating climate concerns, increasing green production technology, improving agriculture productivity, and providing a means of earning a livelihood.

On the other hand, pathogenic microorganisms are a warranted introduction to emergent therapies and disease prevention, and to gradually increasing agricultural profitability using microbial biocontrol agents and bio-fertilizers. Similarly, various potential microbes play critical roles in regulating the environment via their involvement in the production and intake/consumption of greenhouse gases (GHGs) and other air pollutants from the environment. Environmental pollutants such as industrial and pharmaceutical waste have emerged as a global threat, creating widespread antibiotic resistance and giving rise to drug-resistant strains of pathogens. The book details the environmental problems posed by antibiotics, including the various types of toxic environmental pollutants discharged from both natural and anthropogenic activities and their toxicological effects in environments, humans, animals, and plants. This book also highlights the recent advanced and innovative methods for the useful degradation and bioremediation of organic pollutants, heavy metals, dyes, etc., in wastewater. This book covers a wide range of topics: environmental microbiology, biotechnology, nanotechnology, green chemistry, environmental science, and environmental engineering, among others.

It is our hope that this book will also enhance the knowledge base of students, environmental scientists, environmental biotechnologists, microbiologists, biomedical scientists, and policymakers working in environmental microbiology, biotechnology, environmental sciences, and medical microbiology with both basic and more advanced facts about environmental issues and their challenges. Moreover, readers can also get up-to-date information

and some background learning about existing environmental problems, their effects on human health, and ways to control or contain these effects by employing various effective approaches.

The editors would like to express their sincere thanks to the contributors for submitting their work in a timely and proper manner. The editors are also thankful to national and international reviewers for evaluation and valuable suggestions and comments to improve the book for readers. Dr. Chowdhary acknowledges the support received from their family, especially their father (Mr. Ram Chandra), and mother (Mrs. Malti Devi). Further, the editors also acknowledge the cooperation received from the Wiley team, and for their guidance to finalize this book.

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