AGRICULTURE

in the 21st Century:

Sustainability, Food, Security and Environmental Change

Dr. Sarika Bajpai
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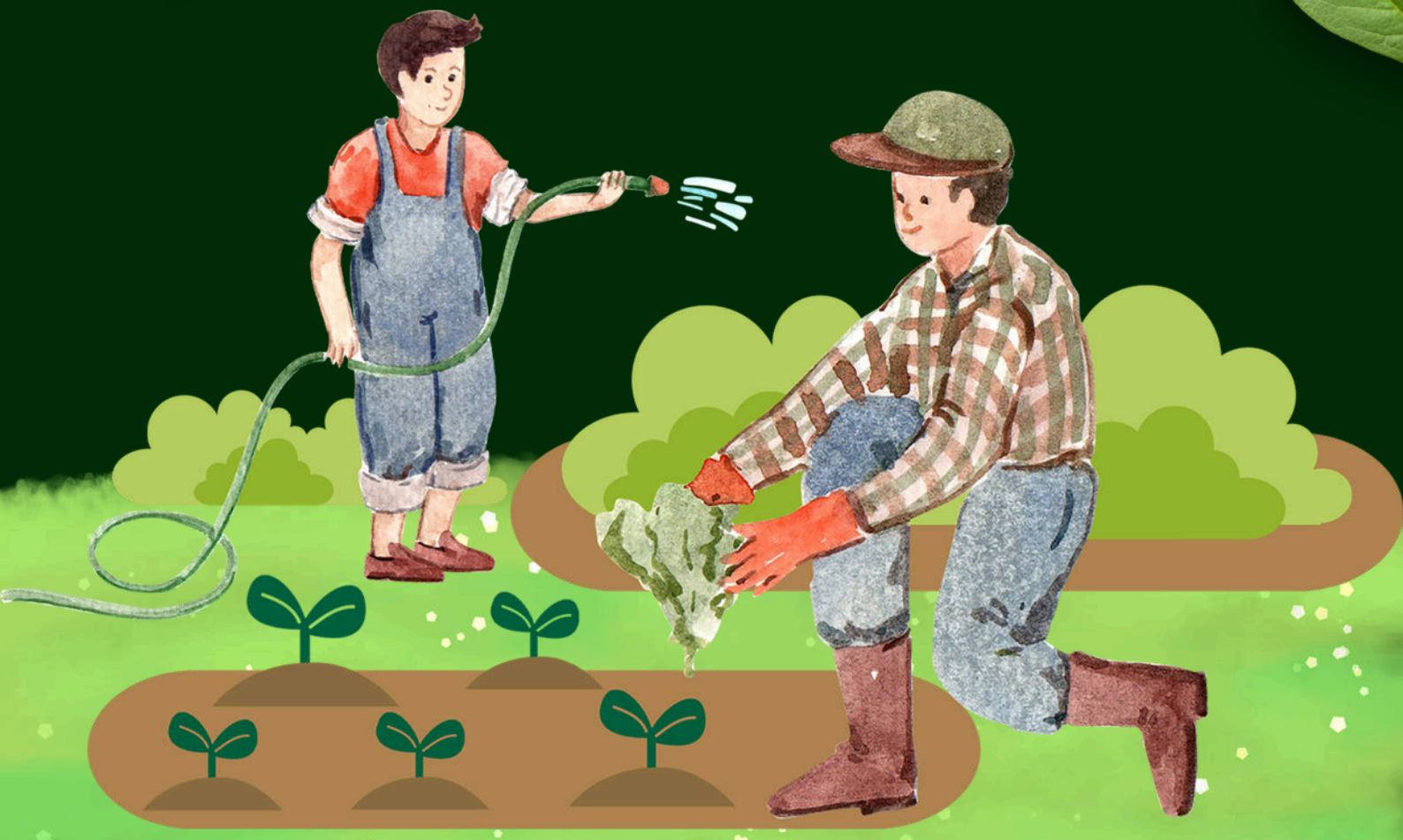

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Agriculture in the 21st Century Sustainability, Food, Security and Environmental Change

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Preface

Agriculture in the 21st century stands at a critical crossroads, shaped by unprecedented challenges and transformative opportunities. As the global population continues to rise, the demand for food, fiber, and fuel intensifies, placing immense pressure on natural resources and agricultural systems. At the same time, climate change, environmental degradation, and socio-economic inequalities threaten the sustainability and resilience of food production worldwide. This book, Agriculture in the 21st Century: Sustainability, Food Security and Environmental Change, seeks to explore these complex dynamics with clarity and depth.

The purpose of this volume is to provide a comprehensive and interdisciplinary understanding of modern agriculture within the broader context of sustainability and environmental change. It examines how traditional farming practices are evolving through technological innovation, policy interventions, and scientific advancements. Topics such as sustainable land management, climate-resilient crops, water conservation, and agroecological approaches are discussed to highlight pathways toward a more resilient agricultural future.

Equally important, this book addresses the socio-economic dimensions of agriculture, including food security, rural livelihoods, and global trade systems. It underscores the need for inclusive and equitable strategies that ensure access to nutritious food while safeguarding the environment for future generations.

Designed for students, researchers, policymakers, and practitioners, this work aims to bridge the gap between theory and practice. By integrating diverse perspectives, it encourages critical thinking and informed decision-making in addressing one of humanity's most pressing concerns—how to sustainably feed the world without compromising the ecological balance of our planet.

Ultimately, this book aspires to contribute to a more sustainable, resilient, and just agricultural future.

Ackowledgement

The completion of Agriculture in the 21st Century: Sustainability, Food Security and Environmental Change has been an intellectually enriching and collaborative journey, made possible through the collective efforts and support of many individuals and institutions.

We express our sincere gratitude to the scholars, researchers, and practitioners whose extensive work in sustainable agriculture, environmental science, and food systems has significantly informed and shaped the perspectives presented in this book. Their contributions continue to guide critical thinking and innovation in addressing the evolving challenges of agriculture in the modern era.

We are deeply thankful to our academic peers and colleagues for their valuable feedback, thoughtful insights, and continuous encouragement throughout the development of this manuscript. Their engagement has helped strengthen the analytical depth and clarity of the work.

We extend our appreciation to the institutions and organizations that actively promote research and dialogue on sustainability and environmental change. Their commitment to knowledge dissemination has provided a strong intellectual foundation for this book.

We also acknowledge the editors and reviewers for their meticulous evaluation and constructive suggestions, which have greatly enhanced the quality, coherence, and academic rigor of this work.

On a personal note, we are grateful to our families and friends for their unwavering support, patience, and encouragement during the writing process. Their understanding and belief in our efforts have been invaluable.

This book represents our collective endeavor to contribute meaningfully to the discourse on building resilient, sustainable, and equitable agricultural systems for the future.

Dr. Sarika Bajpai
Dr. Kumari Deepa Rani
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About the Authors

Dr. Sarika Bajpai is an Associate Professor in the Department of Basic Sciences & Humanities at the Pranveer Singh Institute of Technology in Kanpur, Uttar Pradesh, India. Her areas of interest in teaching and research include soil physico-chemical analysis, polymer composite analysis, industrial chemistry, green chemistry, and geochemistry, pollution, sustainability, and bio-organic and bioinorganic chemistry. She has written textbooks for both education and research and published widely in journals. She connects basic chemistry with ecological issues as an expert in contaminants, waste treatment, chemical dispersion (air, water, and soil), and environmental effects. She takes an active involvement in curriculum enrichment activities, research advice, and academic mentorship. Her work focuses on the use of contemporary scientific technologies and hands-on learning in the higher education system. She aspires to make a significant contribution to academic research and technical education and is dedicated to ongoing professional development.

Dr. Kumari Deepa Rani is incharge of the Department of Women Studies and Assistant Professor in the University Department of Economics at Magadh University, Bodh Gaya. With over a decade of teaching and research experience, she has supervised four Ph.D. scholars and published more than 35 research papers in reputed national and international journals. She has presented her research in over 50 national and international conferences, seminars, and symposia, with a focus on economics and gender studies.

Dr. Rani has also served as Assistant Professor at the University of Delhi and ARSD College before joining

Magadh University. She is actively engaged in academic and administrative committees and is a frequent invited speaker at professional and scholarly forums.

She is the author of two books: Goods and Services Tax (GST): An Analytical Study and Artificial Intelligence and its Emerging Area: Boon or Bane, contributing to contemporary debates in economic policy and technological impacts on society.

Dr. Vipul Ranjan is a dedicated academician and Lecturer in the Department of Humanities and Applied Science at Government Polytechnic Tekari, Gaya. With over three years of experience, he specializes in International Trade and BRICS studies. He has authored over 10 research papers and holds a Ph.D. in Economics from Magadh University, focusing on BRICS trade patterns. A lifetime member of the Indian and Bihar Economic Associations, Dr. Ranjan actively contributes to global economic discourse. He remains committed to fostering analytical thinking and advancing research within the technical education sector.

Table of Contents

ABOUT THE AUTHORS :

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ABOUT THE BOOK :

Agriculture in the 21st Century: Sustainability, Food Security and Environmental Change provides a comprehensive and critical examination of the evolving agricultural landscape in the context of rapid environmental, economic, and social transformations. The book explores the pressing challenges of feeding a growing global population while addressing climate change, resource depletion, biodiversity loss, and socio-economic inequalities. It brings together interdisciplinary perspectives to analyze sustainable farming practices, technological innovations, policy frameworks, and the role of institutions in shaping resilient agricultural systems. Emphasis is placed on the integration of ecological principles with modern agricultural techniques, highlighting approaches such as climate-smart agriculture, agroecology, precision farming, and sustainable supply chain management. The book also examines the dynamics of food security, rural livelihoods, and global trade, offering insights into how agricultural systems can be made more inclusive, efficient, and environmentally responsible. By combining theoretical discussions with practical case studies, it aims to bridge the gap between research and real-world application. Ultimately, this work serves as a valuable resource for students, researchers, policymakers, and practitioners seeking to understand and contribute to the development of sustainable and resilient agriculture in the 21st century.

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