

Frontiers in Plant Biotechnology

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Preface

Plant biotechnology has emerged as one of the most transformative disciplines in modern agricultural science, providing innovative solutions to address the growing challenges of food security, climate change, environmental sustainability, and nutritional quality. By integrating advances in molecular biology, genetics, genomics, tissue culture, bioinformatics, genome editing, and synthetic biology, the field has significantly accelerated crop improvement while enhancing resilience to biotic and abiotic stresses.

Frontiers in Plant Biotechnology presents a comprehensive and contemporary overview of the principles, technologies, and applications that are shaping the future of plant science. The book explores fundamental concepts alongside recent developments in plant tissue culture, molecular markers, transgenic technologies, CRISPR-based genome editing, omics approaches, functional genomics, plant-microbe interactions, and biotechnology-driven strategies for sustainable agriculture. It also highlights the ethical, biosafety, regulatory, and societal considerations associated with the adoption of advanced biotechnological innovations.

This book has been written for undergraduate and postgraduate students, researchers, educators, and professionals seeking a clear understanding of both the scientific foundations and practical applications of plant biotechnology. Every effort has been made to present complex topics in a logical, accessible, and scientifically rigorous manner while incorporating current research and emerging trends.

The authors sincerely hope that this volume will serve as a valuable academic resource, inspire innovation, and encourage readers to contribute to the responsible development and application of plant biotechnology for sustainable agriculture and global food security.

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Dr. Ramesh Chand Swami
Dr. Manas Mathur
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Dr. Richa Bhardwaj

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