

Genetic Frontiers in Modern Plant Breeding

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Preface

Plant breeding has entered a transformative era driven by remarkable advances in genetics, genomics, biotechnology, and computational sciences. The book *Genetic Frontiers in Modern Plant Breeding* is designed to present a comprehensive understanding of these emerging innovations and their applications in crop improvement for global food and nutritional security. Modern agriculture faces unprecedented challenges including climate change, shrinking natural resources, evolving pests and diseases, and the increasing demand for sustainable agricultural production. In such a scenario, genetic advancement has become one of the most powerful tools for developing resilient, high-yielding, and quality crop varieties.

This book highlights the integration of classical breeding approaches with cutting-edge molecular techniques such as marker-assisted selection, genomic selection, genome editing, bioinformatics, and omics technologies. It also explores recent developments in stress tolerance, hybrid breeding, conservation of genetic resources, and precision breeding strategies. Each chapter has been carefully prepared to provide both fundamental concepts and practical insights for students, researchers, academicians, and professionals in agricultural sciences.

The editors sincerely hope that this volume will serve as a valuable academic and research resource, encouraging innovative thinking and scientific exploration in the field of plant breeding and genetics. We express our heartfelt gratitude to all contributors, reviewers, and scholars whose dedication and expertise made this publication possible. It is our belief that this book will contribute meaningfully toward sustainable agricultural development and future genetic innovations in crop science.

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