

Preface

Plant biotechnology applies to three major areas of plants and their uses: (1) control of plant growth and development; (2) protection of plants against biotic and abiotic stresses; and (3) expansion of ways by which specialty foods, biochemicals, and pharmaceuticals are produced. The topic of *recent advances in plant biotechnology* is ripe for consideration because of the rapid developments in this field that have revolutionized our concepts of sustainable food production, cost-effective alternative energy strategies, environmental bioremediation, and production of plant-derived medicines through plant cell biotechnology. Many of the more traditional approaches to plant biotechnology are woefully out of date and even obsolete. Fresh approaches are therefore required. To this end, we have brought together a group of contributors who address the most recent advances in plant biotechnology and what they mean for human progress, and hopefully, a more sustainable future.

Achievements today in plant biotechnology have already surpassed all previous expectations. These are based on promising accomplishments in the last several decades and the fact that plant biotechnology has emerged as an exciting area of research by creating unprecedented opportunities for the manipulation of biological systems. In connection with its recent advances, plant biotechnology now allows for the transfer of a greater variety of genetic information in a more precise, controlled manner. The potential for improving plant productivity and its proper use in agriculture relies largely on newly developed DNA biotechnology and molecular markers. A number of methods have been developed and validated in association with the use of genetically transferred cultures in order to understand the genetics of specific plant traits. Such relevant methods can be used to determine the markers that are retained in genetically manipulated organisms and to determine the elimination of marker genes. As a result, a number of transgenic plants have been developed with beneficial characteristics and significant long-term potential to contribute both to biotechnology and to fundamental studies. These techniques enable the selection of successful genotypes, better isolation and cloning of favorable traits, and the creation of transgenic organisms of importance to agriculture and industry.

We start the book by tracing the roots of plant biotechnology from the basic sciences to current applications in the biological and agricultural sciences, industry, and medicine. These widespread applications signal the fact that plant biotechnology is increasingly gaining in importance. This is because it impinges on so

many facets of our lives, particularly in connection with global warming, alternative energy initiatives, food production, and medicine. Our book would not be complete unless we also addressed the fact that some aspects of plant biotechnology may have some risks. These are covered in the last section.

The individual chapters of the book are organized according to the following format: chapter title and contributors, abstract, introduction to the chapter, chapter topics and text, and references cited for further reading. This format is designed in order to help the reader to grasp and understand the inherent complexity of plant biotechnology better.

The topics covered in this book will be of interest to plant biologists, biochemists, molecular biologists, pharmacologists, and pharmacists; agronomists, plant breeders, and geneticists; ethnobotanists, ecologists, and conservationists; medical practitioners and nutritionists; and research investigators in industry, federal labs, and universities.

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