

PREFACE

In the rapidly emerging domain of biotechnology, plant tissue culture, from a modest start, has now attained a unique and respectable status, more so in the last decade. Since plant cells or organs are amenable, in most cases, to *in vitro* culture resulting in the regeneration of entire plants, tissue culture techniques have been extensively used not only in the rapid clonal multiplication and eradication of systemic pathogens, notably viruses, but also in addressing problems related to physiology, genetics, developmental biology, and biochemistry. Recently, it was also recognized that by an interdisciplinary approach involving tissue culture and cryobiology, it should be feasible to preserve plant organs and cell lines for extended periods of time for the purpose of long-term preservation of germplasm of crop species or experimental material in a genetically unaltered state. Although this area of research (cryopreservation of plant cells, tissues, and organs) is still in its infancy as compared to the developments made with mammalian systems, remarkable progress has been made during the last 5 years. The purpose of this volume, therefore, is to provide the reader with an in-depth look at the subject matter area, analyze various critical components involved in the methodology, and present the progress made so far in the cryopreservation of various kinds of plant material.

Since plant cells, tissues, or organs form the basic experimental material in the cryopreservation study, the book opens with a chapter on plant cell culture in order for the reader to gain an overall appreciation of this field of research. In my opinion, a clear understanding of the various events a cell is subjected to during freezing and thawing is imperative before cryopreservation is attempted. The following three chapters provide basic information concerning the principles, nature, and mechanism of freezing injury to plant cells at various levels and attempt to suggest various ways and means of overcoming them for devising successful cryopreservation protocols. In subsequent chapters the role of cryoprotectants in the viable freezing of plant cells and the cryopreservation studies carried out with several types of plant material are examined in detail.

The authors of various chapters are internationally known scientists in the area of their expertise. I am extremely grateful to the contributors without whose cooperation and help this assignment could not have been completed. If the information presented in this book generates added interest and research activity among people considering cryopreservation of plant cells, tissues, and organs, the very purpose of the book, in my opinion, is served.

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