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# Somatic Embryogenesis in Ornamentals and Its Applications



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A. Mujib  
Editor

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 Springer

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## Preface

The incidence of somatic embryogenesis (SE) was described over fifty years back, and since then the knowledge on in vitro embryogenesis has been accumulated in a wide range of plants including monocot, dicot, and other groups of plants. This is a unique process by which vegetative or somatic plant cell transforms into an embryo, reconfirming cells' totipotency in culture. This in vitro embryogeny has immense fundamental and practical potential such as in understanding cellular differentiation of plants and in producing transgenic en masse. The entire process of SE has been, however, complex and is seemingly controlled by a variety of external and internal triggers. In this book, an attempt will be made to collect and compile the current development of embryogenic research particularly in ornamentals. Ornamentals are important groups of plants and constitute a good component in floriculture industry. These include bulbous, tuberous, and foliage plants, used mostly as indoor decorative, landscape, and potted plants. The plants are often propagated vegetatively, which is a slow process. Besides propagating raw materials at fast pace, SE may offer advantages in generating new traits/cultivars in ornamentals more quickly. The embryo precursor/mother cells in embryogenic cells are considered to be a good source in raising transgenic in several investigated plants. This book will therefore highlight the importance of embryogenic cultures/tissues in genetic transformation studies especially in ornamentals. The role of genotype, plant growth regulator, environment, and other controlling factors will be described in establishing embryogenic cultures and in developing protocol for obtaining plantlets. The morphology, maturation, and germination ability will also be discussed by investigating somatic embryos by scanning electron microscopy (SEM) and histological preparations. A few chapters will focus on comparative biochemical and physiological differences during the acquisition and development stages of SE. In recent times, several genes are found to be associated with specific embryogenic development; therefore, a few chapters will discuss molecular characterization, expression analysis of gene like somatic embryogenesis receptor kinase (*SERK*) during SE. Currently, proteomic study has been conducted widely at various stages of plant growth and development; here in this book, the importance of plant proteome as a source of somatic embryogenesis marker will also be described very briefly. Recently, there has been a drastic decline in the number of cultivars and loss of genetic diversity of plant germplasm due to various socioeconomic reasons. The erosion of genetic diversity can be prevented by mass multiplication and simultaneous conservation of

germplasm by utilizing *in situ* and *in vitro* methods. Preservation, i.e., storage of living tissues at low temperatures in laboratory conditions, has long been used to conserve plant germplasm for short-, medium-, or long-term basis. In this book, cryopreservation in the protection of genetic resources of ornamentals will be discussed using somatic embryo/embryogenic culture as the tissue of choice. The role of various cryoprotectants during preculture, pretreatment, and freezing will be discussed by monitoring cellular regrowth. The survival of cryopreserved SE tissues and plant regeneration will also be described in detail especially in ornamentals.

Although some of the information are available in websites, the need to accumulate fractured past years' knowledge and to organize embryogenesis research in ornamentals in structured book format is always necessary. This updated information on embryogenesis in ornamentals will be a very useful resource material to a wide range of people especially to researchers, graduate students, teachers, and many others professionals in various disciplines like biotechnology, botany, horticulture, pomology, agriculture, and other related fields.

New Delhi, India

A. Mujib

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