

PREFACE

Plant physiology especially pertinent to stress physiology has made enormous progress at an astonishing speed in the recent few years. Due to pollution, heavy metals stress, temperature variability, climate change, drought, salt, water logging, anaerobes have aroused great public interest in different aspects of stress physiology of plants. In fact there has been blizzard of new information pouring in extending from molecular to morphological aspects. This discipline has direct bearing on agriculture and accordingly attempts are consistently being made to evolve plants which are resistant to various stresses. Increasing attention is being given to molecular biology of compatible solutes as stress protestants in crop plants. There is considerable scope to exploit such information for increased crop productivity especially in arid and semi arid regions.

All the abiotic stresses have profound impact on ecological and agricultural system. Water stress is the predominant stress among all the abiotic stresses which causes enormous loss in production of crops, more so because water stress is usually accompanied by other stresses like salinity, high temperature and nutrient deficiencies. Conventional breeding approaches yielded limited results so far mainly because of the lack of understanding on the traits that are required for abiotic stress tolerance. Plant breeding aims to ensure that abiotic stresses are managed efficiently by increasing the tolerance mechanism of crops requires the identification of key traits and their incorporation into high yielding varieties using conventional or biotechnological tools. Conventional plant breeding in tropical regions so far only increased the yield of crops grown under several abiotic stresses at about half the rate achieved for crops grown in temperate regions.

The possibilities for increasing tolerance to abiotic stresses by molecular approaches are enormous, although the actual production of transgenic plants with improved abiotic stress tolerance has been slow. The reaction of plants to abiotic stresses differ significantly at various organizational levels depending intensity and duration of the stresses, the plant species and its stage of development. Identification of differentially expressed genes in

various cells or under different conditions is one of the main areas which will decisively pave way for release of new crop varieties which are adapted not only to dryland conditions but are also cross adapted to other stresses in drylands. With specific reference to tolerance to abiotic stress and more specifically to incorporate a common stress counteracting mechanism in plants which can elicit a response that can tolerate more than one stress simultaneously, understanding of plant responses to abiotic stresses that disturb the homeostatic equilibrium at cellular and molecular level is the need of the hour. Biotechnology and genomics help in identifying pathways, metabolites and the genes controlling these tolerance responses to stresses and in breeding or engineering more efficient and adapted crop cultivars. To achieve such a goal, an interdisciplinary and inter institutional approach would be needed with well defined targets on crops and problems prioritized at the national level.

Eleven contributions assembled in this volume comprise a unique collection of topics and review papers spanning from abiotic stress induced proteins, to physiological and antioxidant induced changes by magnetic field, phenological responses of plants pertinent to climate change, salt tolerance- physiological and molecular perspectives, genetic transformation for abiotic stress, molecular breeding for water logging tolerance, role of Brassinosteroids in causing tolerance to temperature stress, physiological basis for coping mechanisms in crop plants under drought environments, RNA silencing-a novel tool for crop protection against biotic and abiotic stresses.

The contributors are experts in their respective fields and comprehend latest information on plant stresses relevant to crop productivity. The authors and co-authors have taken special pains to highlight recent advances taking place in their areas of research. We are indebted to all the distinguished authors and coauthors to help us in completing this volume. They responded with generosity on our invitation and helped in completing this volume. I have tried to honour their ideas in original shape. However, the onus of technical content rests with the contributors.

This book is a must for all science libraries catering to undergraduate and Postgraduate and doctoral students.

Finally, I would like to thank Dr Bhavneet Kaur (USA), for highlighting the academic and personal glimpses from the life of Prof. C.P. Malik FNA I, elaborating his continued enthusiasm and love for plant sciences. I am sure the contributions and personality of CPM will motivate young and upcoming plant biologists.

On the happy occasion of the eightieth birthday of Prof. C.P. Malik, ideal researcher, and an accomplished educationist of all time, we offer our sincere greetings and good wishes for his long, healthy and continued academic life.

I am thankful to Vipin Jain and staff members of Pointer Publishers, Jaipur for their genuine competence in the perfect publishing of this book.