



**Breeding and Biotechnology of Tea and its Wild Species.** Tapan Kumar Mondal. Springer (India) Pvt Ltd., New Delhi 110 001, 2014. 167 pp. Price: Rs 12,000. ISBN: 978-81-322-1704-6 Hard Cover.

After water, tea is the most widely consumed beverage in the world. In *Book of Tea*, Kakuzo Okakura, one of the greatest thinkers of the early 20th century extols the virtues of tea. However till date there have been limited number of books describing the interventions of modern technology in plant improvement of this highly priced plantation crop. The book under review is an important contribution towards this area and the author Tapan Kumar Mondal has done a commendable job. Although conventional breeding is well-established and has contributed significantly for varietal improvement of tea and other *Camellia* species with ornamental value, applications of biotechnology are required to address some of the issues where conventional breeding is restricted, particularly for a woody plant like tea. With the vast and rapidly accumulating literature on the genus, the author has made a stellar effort to compile the entire aspect of breeding and biotechnology from a simple introduction to analysing the progress, gaps, future direction across the science of tea.

The book is logically organized into eight chapters. The first chapter gives an overview of tea and its wild form *Camellia* species with history, origin, taxonomy and biotechnological landmarks.

The second chapter describes genetics and breeding dealing with varietal development in tea and *Camellia* species. The author has documented the seed biology, floral biology, genome size of all the species of the genus *Camellia*. Information on cultivars with special characters, region-specific breeding objectives, polyploidy breeding, distant hybridization, etc. is also given in this chapter.

Chapter three to five deal with tissue culture applications ranging from micro-propagation to genetic transformation. Tea is a highly open-pollinated crop and vegetative propagation is extremely important to maintain the eliteness of the genotypes and thus micropropagation has a very important role. A robust table systematically shows all the available micropropagation protocol of tea and its wild species till date. Application of bioreactor, *in vivo* embryogenesis, somaclonal and gamatoclonal variation and various other alternative approaches of *in vitro* culture such as cryo-preservation, haploid culture, organogenesis, anther culture are discussed.

Application of genetic transformation is particularly important for horticultural crops where conventional breeding to develop cultivars is extremely limited. The first protocol for production of transgenic tea was initiated via *Agrobacterium*-mediated transformation in 1999 and has slowly progressed through the years. Even though transgenic technology has tremendous scope for tea, commercial release is quite far into the future.

Chapter six, 'Molecular Markers' describes step-by-step various studies on morphological, biochemical, cytological markers elaborately, along with an atlas of various molecular markers, used in tea and its wild species. An excellent attempt has also been made to tabulate pre-genomic and post-genomic markers along with their advantages and disadvantages and various genomic resources. Application of artificial neural network as markers and metallic markers to classify the tea genotypes and its wild species is explained. The author has emphasized on prioritizing massive characterization of tea germplasm across the world through a common 'Tea germplasm

characterization consortium' using molecular breeding approaches.

Tea plants encounter various abiotic and biotic stresses; however, a few of them are unique to these plants. Chapter seven, 'Stress Physiology', elaborates various abiotic stresses such as moisture, temperature UV, low light intensity and elemental stress. Biotic stresses such as autotoxin, stress effect of plant growth regulators and the positive effect of stress to elevate the quality of made tea, vide concentration of theanine and total free amino acids are also explained.

In the last chapter on functional genomics, various studies on molecular cloning and characterization, differential gene expression, high-throughput sequencing, bioinformatics, etc. applied and incorporated till date in tea have been documented.

In most of the chapters, the author has provided exclusive tables that include the summary of the studies pertaining to the area, which will allow the reader to have a bird's eye view of the progress and milestones in the particular topic.

In a nutshell, the book compiles the studies that have already been done, identifies the problems, analyses the gaps in the area of breeding and biotechnology as well as its wild species, and discusses the future scope. The book will serve as an excellent reference resource for any beginner, as well as researchers and faculty on modern tree breeding. However, one limitation could be the high price of the book, which may deter individual buyer.

Douglas Adams in *Hitchhiker's Guide to the Galaxy* says, 'A cup of tea would restore my normality'. Applications of modern technology has become indispensable in tea genetic improvement today and in the coming years, for continued cheer in the quality of the morning cuppa enjoyed by millions every day.

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