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BOOK REVIEW

Crop Stress and Its Management: Perspectives and Strategies

Edited by B. Venkateswarlu, A.K. Shanker, C. Shanker, and M. Maheswari. Springer, 11 West 42nd St., New York, NY 10036. 2011. Hardcover, 628 pp. $196.34. ISBN 978-94-007-2219-4.

In plants, biotic and abiotic stresses can limit crop growth and development and consequently the yield. An intricate plant response to different types of stresses hampers notable progress in improving stress tolerance. The book *Crop Stress and Its Management: Perspectives and Strategies* is an excellent attempt to provide a better understanding of stress management in plants. The book is comprised of 19 chapters, highlighting physiological, anatomical, and biochemical changes due to a particular stress and its management.

The opening chapter provides an excellent overview regarding stress in terms of its mechanism, plant response to different stress types (biotic and abiotic stresses), and conventional and molecular techniques to improve the tolerance level. The authors comprehensively describe the operational strategy steps as: transcript profiling, proteome analysis, studying the metabolism, and analyzing the entire data in bioinformatics techniques to recuperate the stress tolerance. Chapter 2 highlights the importance of dryland agriculture from the food security perspective because a substantial portion of cereal crops are being cultivated on rainfed land. The authors sketch out the dryland geographic zones on the face of the earth and portray climate changes in the area through the course of time. Production challenges and strategies to mitigate these challenges are briefly described to enhance the crop resilience against the climate change.

A comprehensive description of adaptation mechanisms in plantation crops is presented in Chapter 3. Mechanisms and types of abiotic e.g. drought (anatomical, physiological, biochemical), temperature, radiation, nutrition and pollution; and biotic adaptations e.g. constitutive and inducible defense against pathogenesis, allelopathy, and defense against herbivory, are illustrated in detail. Stress management strategies are explained as: genetic improvement and selection, as well as molecular breeding; better crop management with improved agronomic practices; and biological control. Cell physiology to sense and signal a particular stress is described in Chapter 4. The functional mechanisms to avoid, escape, and/or tolerate drought stress; role of sucrose non-fermenting 1-related protein kinases (SnRK); and stress response of quantitative trait loci to high and low temperatures have been mentioned. Machine learning (ML) algorithms, the idea of making intelligent data based decisions for mapping QTLs for complex traits, assigning the inbred lines in different heterotic groups, and/or genomewide selection is introduced in Chapter 5. The author advocates that high generalization capabilities and distribution of free properties of ML provide better estimation compared to contemporary computational approaches. Chapter 6 features heat stress mechanisms in rice by elaborating physiological, anatomical, and biochemical changes in the phenology and its adaptive response to cope with stress. A combination of conventional and nonconventional techniques (marker-assisted breeding, transcriptome analysis, transgenic rice cultivars with heat shock proteins) along with enhanced fertigation is advocated for higher yields under stress.

In Chapter 7 the authors describe the complexity related to drought phenotyping, timing of drought episodes in relation to plant growth stage, high intra-site variability, and strong genotype environment interactions. Hence, authors suggest the use of molecular-assisted genetic improvements and induction of phenotype-associated markers for a rapid and ensuing improvement for

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