Huang, B. (ed.): **Plant-Environment Interactions.** – CRC Press, Taylor & Francis Group, LLC, Boca Raton – London – New York 2006. 3rd Ed. ISBN 0-8493-3727-5. 387 pp., USD 129.95, GBP 74.99.

The ability of plants to avoid, postpone, or tolerate adverse environmental conditions is the key factor of their growth, evolutionary success, and geographical distribution. A better understanding of plant adaptation to environmental stress is an important prerequisite for coping successively with global challenges of the near future: elimination of the foot shortage and protection of biodiversity under global climate change. The book offers an insight into complexity of metabolic, signalling, and physiological pathways and their modifications in response to adverse environment. It also gives prospects and current breeding and genomic approaches in improvement of plant tolerance to environmental stress.

Chapter (Ch.) 1 reviews recent advances in the research on membrane structural and functional changes evolved by heat, cold, drought, and salinity stress. Alterations in lipid composition during adaptation and acclimation process are discussed. Role of desaturases, inferred from gene silencing or overexpression, phospholipases and other key enzymes in lipid synthesis and degradation are mentioned as well as involvement of phospholipases in drought stress sensing and signalling. Chs. 2–5 are devoted to cellular and molecular aspects of heat, cold, drought, and variable light stress in details. The factors were predominantly imposed and investigated on shoots. Role of the late embryogenesis abundant (LEA) proteins, dehydrins, and heat shock proteins in seed germination and seedling heat tolerance is treated separately from heat tolerance during vegetative and reproductive ontogeny. Cold-responsive genes and their activators, osmolytes, cold signal transduction, membrane structure, and involvement of phospholipase D in plant response to freezing are highlighted in the cold and freezing stress section. Plant hormones, mainly abscisic acid (ABA) and cytokinins, and their receptors play an important role in drought sensing and responding. Recent advances in understanding of root hydrotropism, ABA signalling, and mechanism of ABA-mediated stomatal closure and ABA-induced gene expression are reviewed in Ch. 5. Light environment, with fluctuations from fractions of second to diurnal and seasonal cycles, may trigger full spectrum of plant responses from shade adaptations to photodamage protection. Chloroplast-level mechanisms of photoaclimation to short- and long-term changes in light environment are reviewed in Ch. 4. Chloroplast to nucleus signal transduction is also included.

Ch. 6 deals with molecular markers of salinity tolerance pointing out the changes in gene expression and protein response to salinity stress. The present knowledge of physiological effects, damage, and repair on level of an individual cell and salt-induced oxidative stress is presented. Perception of lowered oxygen supply, the molecular and cellular mechanisms of tolerance to waterlogging, and genetic manipulations in improving the anoxia tolerance are the topics of Ch. 7. Rich variety of adaptive traits of roots to low phosphorus availability is excellently treated in Ch. 8. Regulation of root growth, turnover and soil exploration, phosphorus mobilization by cluster roots, microbial symbioses and phenology are only several of the traits included in more details. The next Chapter considers availability and physiological effects of deficiency or surplus of twelve heavy metals: essential trace elements (copper, iron, manganese, molybdenum, zinc, cobalt, nickel, and vanadium) and toxic elements (cadmium, chromium, lead, and mercury). A separate chapter summarizes morphological, physiological, and cellular responses of roots to soil abiotic stresses, mainly excess and shortage of water, compaction, and salinity. Mechanisms of osmotic adjustment, reactive oxygen species formation, and scavenging and nutrient ion uptake was treated in more details.

Most of the environmental stress factors considered in the Chs. 2–9 produce adverse effects which can be monitored and evaluated by more or less specific indicators. Ch. 11 represents a comprehensive review on physiological and biochemical indicators of stress impact and/or tolerance such as chlorophyll fluorescence, gas exchange parameters, plant water status and content, osmotic adjustment, stability and peroxidation status of membranes, heat shock and late embryogenesis abundant proteins, or ABA content. Similarly to the last chapter, short methodological guide is provided here. Practice and prospects in improving abiotic stress tolerance close the book. The chapter summarizes breeding and genomic methods currently used.

Each chapter was written by specialists as a review and includes rich list of references; the book is supplemented by an index of basic terms and objects. The book updates and summarizes recent progress in understanding of cellular and molecular mechanisms of plant tolerance to most important environmental abiotic stresses. There is no doubt that it becomes a useful tool for broad community of plant scientists.

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