Waisel, Y., Eshel, A., Kafkafi, U. (ed.): **Plant Roots. The Hidden Half.** - Marcel Dekker, New York - Basel 2002. 1120 pp. USD 250.00. ISBN 0-8247-0631-5.

Evolution of roots was a fundamental development that enabled plants to migrate from aquatic to terrestrial habitats. In spite of great importance of roots and long history of root research, there remains much to be learned about root development and function.

The book written by 99 contributors contains 59 chapters arranged into 10 parts. The first part forms introduction to the book offering the reader an overview of root evolution in the first chapter and the general characteristics and functions of root system in the second one.

The second part is devoted to structure and development of root system. The individual chapters (3 to 13) present information about root cap structure and function, cellular patterning in root meristems, root hairs, primary and secondary growth of roots, initiation of lateral roots, functional diversity of a single root system, biomechanics of root anchorage, root-shoot relations, and root life span.

The third part "Root Genetics" is the new one, added in the third edition. Root-specific genes were recently identified and their role in the control of root structure and function in maize, wheat, banana, tobacco and *Arabidopsis* is discussed in chapters 14 to 17.

The part "Research Techniques for Root Studies" is introduced by chapter 18 giving general survey of the most important methods used in root research. The next chapters are more specialized; chapter 19 is devoted to aeroponics, 20 to microsensors for studying ion uptake, 21 to rooting of micropropagated plants and 22 to mathematical modelling of root systems.

The fifth part "The Regulation of Root Growth" belongs to the largest ones. Five chapters elucidate the roles of phytohormones: chapter 23 - auxins, 24 - gibberellins, 25 - cytokinins, 26 - abscisic acid, and 27 - ethylene. The nature and significance of root signalling is elucidated in chapter 28. The last three chapters (29 - 31) are devoted to environmental sensing and directional growth of plant roots and especially to gravitropism.

The further large part is the sixth one "Physiological Aspects of Root System". The chapter 32 deals with different pathways of root respiration and affection of respiration rate by different endogenous and exogenous factors. The chapter 33 is focused on regulation of root pH. The following chapters (34 - 37) are devoted to uptake of nutrients. Areas covered include regulation of ion uptake to match plant demand, dynamics of ion movement at the soil-root interface, root-induced changes in the availability of nutrients, and mathematical models of ion uptake. Water uptake and transport through the root system are the main topics of the chapter 38. This chapter is linked with the following one (39) concerning ecological aspects of root water permeability. The last chapter (40) describes utilization of inorganic carbon.

"Root Growth under Stress" is the name of the seventh part. It contains chapters devoted to plant responses to temperature stress (chapter 41), oxygen deficiency (42), essential, beneficial and toxic trace metals (43), salinity stress (44), mechanical impedance (45), and aluminium (46).

The eight part "Root-Rhizosphere Interactions" includes symbiotic N_2-fixation (chapter 47), growth promotion with rhizosphere bacteria (48), fungal root endophytes (49), mycorrhizae (50), root-nematode interactions (51), and effects of soilborne pathogens (52).

Very specialized are chapters of part nine "Roots of Various Ecological Groups". They deal with eco-physiology of roots of desert plants, especially agaves and cacti roots (chapter 53) and in contrast roots of aquatic plants (chapter 56), and with the functioning of contractile roots (54) and of roots of *Banksia* spp. (55).

The last part "Roots of Economic Value" is concentrated on roots as a source of food (chapter 57), and production of secondary metabolites and their medicinal and industrial applications (58 and 59).

The book is a major source of information for botanists, plant physiologists, microbiologists and soil scientists. The third edition covers not only the numerous subjects of the previous editions but also the additional fields of genetics, molecular biology, growth regulators, biotechnology, and biomechanics. The book also tackles ecological problems and interactions between roots and other soil organisms.

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