

Book review

C. C. BASKIN & J. M. BASKIN: Seeds. Ecology, biogeography, and evolution of dormancy and germination.

Academic Press, San Diego etc., 2000 (paperback version), 666 pp. (ISBN 0-12-080263-5.). Price: \$ 59.95. More information: <http://www.academicpress.com>

Understanding of the biology of seed dormancy and germination in various taxonomic groups of vascular plants is not only the aim of the presented book, but also one of the first steps in many ecological or taxonomical studies. The success of many plants in particular environmental conditions and plant communities often depends on their "seed strategy", starting from maturation, through propagation and ending in germination.

The married couple of BASKIN was writing the present book for a very long time (about 10 years), which is reflected in the content and number of cited articles – altogether probably several thousands of references are given [!]. The book is divided into the following chapters: Ecologically meaningful germination studies; Types of seed dormancy; Germination ecology of seeds with nondeep physiological, morphophysiological and physiological dormancy; Germination of within-species variation in seed dormancy and germination characteristics; A geographical perspective on germination ecology: tropical and subtropical zones, temperate and arctic zones; Germination ecology of plants with specialized life cycles and/or habitats; Biogeographical and evolutionary aspects of seed dormancy. The above-mentioned chapter titles can give the reader an appreciation of the extensive approach of the authors. The chapters are followed by a subject index and a taxonomic index. The last one contains almost 40 pages and a biologist interested in this topic can very quickly and easily find particular taxa studied for seed ecology.

The book is even now an important reference source and may be recommended to anyone interested in any aspect of seed biology.

P. MRÁZ

Book reviews

Y. SAVIDAN, J. G. CARMAN & T. DRESSELHAUS [eds.]: The flowering of apomixis: from mechanisms to genetic engineering.

CIMMYT, IRD, European Commission DG VI (FAIR), Mexico, D. F., 2001, 243 pp. (paperback) (ISBN: 970-648-074-9). Price (including of shipping and handling): 25 USD (for developed countries), 10 USD (for developing countries). More info: CIMMYT, Int., Apdo. #370, PO Box, 60326 Houston, TX 77205, USA, Fax: +52(55) 5804 7558/59; or on http://www.cimmyt.org/ABC/map/about/Apomixis/APOMIXISpublications/htm/Flower_Apomixis.htm

Apomixis is an asexual formation of seeds without recombination of genomes. Although serious research of apomixis started at the end of the 19th and beginning of the 20th centuries, the consequences of apomictic reproduction has been known for plant taxonomists much earlier, since the Linné's epoch. Thousands of apomictic taxa have been described within some genera such as *Taraxacum*, *Rubus*, *Hieracium* (including *Pilosella*) etc. Allopolyploidization in the past connected with apomixis gave rise to an immense reticulate morphological and genetic variability. Thus apomixis has played a substantial role in the evolution in many agamic complexes belonging especially to three families *Asteraceae*, *Rosaceae* and *Poaceae*. Contemporary study of apomixis represents an exciting research field attracting geneticists, embryologists, systematists and evolutionary biologists. It is also of practical interest to breeders as a means of transfer of apomixis into crops in which heterosis has been well documented (e.g. maize, wheat, pearl millet, rice).

The presented book of renowned editors not only follows the previous monographs of GUSTAFFSON (1946-47), ASKER & JERLING (1992) or MOGIE (1992), but without doubt brings and summarises new knowledge, ideas or hypotheses published (or not) during the last decade. Two complementary approaches used in the study of apomixis are included in the book: one path essentially seeks to transfer apomictic genes into the agriculturally important plants, and the second one rigorously explores the apomictic mechanism to better understanding of the overall apomixis process.

The first chapter deals with a potential use of apomixis in crops, with the final goal of increasing food production and decreasing seed costs for farmers. However, the transfer of apomictic gene(s) into the crops could have a negative influence on diversity of wild ancestors and landraces that grow near fields planted with apomicts ("apomictic risk"). Two genetic models (one gene versus several) of apomixis are discussed with regard to the impact on the environment (second chapter). The main types of gametophytic apomixis and the developmental mechanism which leads to the specific type of apomictic embryo sac are revised by CRANE in the third chapter. As an appendix, the same author added not only the overview of rapid methods of clearing angiosperm ovules, but also the recipes. The omitted feature of apomictic development is ultrastructure, which is referred by NAUMOVA & VEILLE-CALZADA. Generally, the knowledge

on the ultrastructural events that distinguish apomictic initiation from the sexual one (megasporogenesis) is far from complete. For example, only two species (from the genus *Poa*), representatives of diplosporic apomixis, have been included in the ultrastructural analysis of apomictic development so far. The next two chapters are devoted to the genetics of apomixis (by SCHERWOOD) and applications of molecular genetics to apomixis research (by GRIMANELLI & al.). They concentrate on general methods and methodological problems countering the analysis of genetics of agamospermy (selection of model plant, chromosome counting, progeny testing, embryology, molecular markers etc.), inheritance of apomixis (models for taxa testified up to the present day are summarised) and biological aspects of apomixis worth studying by molecular markers.

CARMAN in the next chapter presents his own "Hybridization-derived floral asynchrony theory" (HFA), which is discussed in the light of new data. According to this theory, "required genes are not apomixis genes *per se*, but consist of multiple normal genes with multiple ecotype-specific alleles, which when found in specific combinations confer temporally-divergent schedules of sexual female development to natural ecotypes." CARMAN stresses that apomictic lines have arisen in the Pleistocene period in the process of interspecific crossing between different ecotypes that are distinctly divergent in respect to their start times and rates of floral initiation, megaspore mother cell formation, meiosis, embryo sac formation and embryogenesis. Such "genome collisions" of asynchronously-expressed genes cause diplosporic and aposporic apomixis in hybrid polyploid plants having two genomes divergent in the temporal expression of female developmental schedule. HFA theory considers the photoperiod (plants of long day versus short day ones) as the main factor, which has influenced the timing of developmental events in the hypothetical parents. CARMAN postulates there are many genes at heterozygotic stage included in apomictic phenotype, although they encode such "normal" traits as flower induction, ovule development, meiosis etc. This theory is in strict contradiction with two other "classical" theories of NOGLER (1984) and MOGIE (1992), which consider one or a small number of genes responsible for apomixis induced by mutation. CARMAN'S theory seems to be attractive, and will no doubt provoke intensive experimental study in the near future.

The following chapters deal with model plants suitable for the analysis of apomixis (by BICKNELL) and with screening procedures of identification and quantification of apomixis (by LEBLANC & MAZZUCATO). The last chapters are devoted to the research path necessary to produce apomictic crops by transferring of agamospermy from wild apomictic relatives into crops, or by mutagenization of sexual genes into apomictic ones directly in the crop plant itself.

This book, which by the way has a very nice book cover (originally from OSTENFELD'S publication of 1910), certainly belongs to the best ones that have ever been written on this topic.

References

- ASKER S. E. & JERLING L. (1992): Apomixis in plants. – CRC Press, Boca Raton etc.
GUSTAFSSON Å. (1946-1947): Apomixis in higher plants. I-III. – Lunds Univ. Årskr. 42: 1–67, 43: 69–179, 183–370.
MOGIE M. (1992): The evolution of asexual reproduction in plants. – Chapman & Hall, London etc.
NOGLER G. A. (1984): Gametophytic apomixis. Pp. 475–518. – In: JOHRI B. M. (Ed.), Embryology of angiosperms, Springer, Berlin etc.

P. MRÁZ

G. N. AGRIOS: Plant Pathology

Harcourt/Academic Press, A Harcourt Science and Technology Company 200 Wheeler Road, Burlington, Massachusetts 01803 USA; 4th edition, hard cover printing 1997, XVI + 635 pp., 16 tables with 51 cl photos, nearly 700 black-white photos and about 250 illustrations, schemes and graphs.

Plant pathology is a science dealing with microorganisms and environmental factors that cause disease in plants. This science tries to study harmful factors of plants to avoid or control them. It is necessary to deal with negative changes in plants to reach required amount and quality of food, other plant material and ornamental plants. This comprehensive book gives us very good review of plant pathology problems. Autor tries to explain principles of solving potential pathological situations in plants generally and individually.

This book is divided into two parts: 1. General aspects and 2. Specific Plant Diseases.

Part one consists of nine chapters. Autor deals with general problems of plant pathology, concepts, methods and history of development of this science. Relations between pathogen and plant are discussed at various levels: molecular, cellular, individual and ecosystem level. There are described possible ways of attacking plants by pathogens and ways of plant defence. One chapter is devoted to genetics of plant disease – genetics of plants (resistance) and genetics of pathogens (virulence). Influence of environmental factors on the development of infectious plant diseases is also discussed. Various methods of controlling of plant diseases are in chapter nine.

Part two is divided into seven chapters - each chapter refers one group of factors that cause plant diseases: environmental factors, fungi, prokaryotes (bacteria and mollicutes), parasitic higher plants, viruses, nematodes and flagellate protozoa. There are reviewed most serious diseases of plants including information on life cycles of biological invoking agents, development of diseases, symptoms and possible control.

Examples of disease manifestations are mostly from agriculture, but some of them are from the natural ecosystems too. Individual diseases are illustrated by many photos of visible symptoms, light and electron microscope photos and drawings. Relations between various factors are expressed by a number of graphs and diagrams. Some maps show epidemiological situation concerning important diseases. Each chapter ends with review of literature concerning problems in respective chapter. This 4th edition of Plant Pathology involves the newest information in this area and can be recommended to all interested in problems of plant diseases.

M. SUVÁK

D. W. LAWLOR: Photosynthesis. Third edition.

BIOS Scientific Publishers Ltd, Oxford OX4 1RE, UK, ISBN 1 85996 157 6

Photosynthesis is the most important biological process and therefore the knowledge about it continually expands and precises. New edition of this book written by DAVID W. LAWLOR, excellent specialist in photosynthesis research, witnesses about permanent necessity to publish actual textbooks concerning key biological topics. The third edition is actualized and cites many new references.

In the introductory chapter the essence, occurrence and evolution of photosynthetic processes are described. Second chapter is devoted to light. It deals briefly with physical characteristics of light, electronic states of matter, excitation and dissipation of energy. Next chapter introduces the role of chlorophylls and carotenoids in light harvesting and energy capture in photosynthesis. Fourth chapter is the survey of the architecture of photosynthetic apparatus namely about structure of chloroplast, chlorophyll and protein complexes. Electron and proton transport (chapter 5) is described in photosynthetic bacteria and oxygen-producing organisms. The components of light-harvesting and electron transport complexes are depicted in detail. The formation of reactive form of oxygen and some other phenomena of photosynthesis, e. g. chlorophyll fluorescence and photoinhibition are included there. Separate chapter is devoted to photophosphorylation. The next three chapters deal with carbon photosynthetic metabolisms in detail. Special chapter "Molecular biology of the photosynthetic system" was included in the book. Ecophysiology of photosynthesis is treated in the last three chapters "Carbon dioxide supply for photosynthesis", "Photosynthesis by leaves" and "Photosynthesis, plant production and environment".

The excellent textbook contains many suitable figures, schemes and tables. It is a valuable accession to the libraries of plant biologists and other specialists interested in photosynthesis.

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