

## Book Review

Belanger, R.R., Bushnell, W.R., Dik, A.J., Carver, T.L.W. (eds.). 2002. *The Powdery Mildews – A Comprehensive Treatise*. APS Press – The American Phytopathological Society, St. Paul, Minnesota, USA, 292 pp. ISBN 0-89054-291-0.

The powdery mildew fungi cause important diseases of many crops and wild plants and therefore this book will be of great interest to phytopathologists, plant protection specialists and botanists in many countries. It updates the knowledge on these fungi that has advanced substantially since publication "The Powdery Mildews", edited by D. M. Spencer, in 1978.

The book comprises 18 chapters arranged in five sections: The Fungi, Techniques, Host-Parasite Interactions, Populations, and Control.

Chapter 1 "The role of powdery mildew research in understanding host-parasite interaction: past, present and future" (p. 1–12) by W.R. Bushnell provides an overview of the characteristic of powdery mildew-plant systems. The chapter focuses largely on the much investigated powdery mildews of cereals.

Chapter 2 "The taxonomy of the powdery mildew fungi" (p. 13–55) by U. Braun et al. presents the new nomenclature and classification of species that reflects the phylogeny of the fungi more accurately than the older. The new system of powdery mildew genera is connected with numerous nomenclatural changes which as the authors expect will be... "not very welcomed by non-taxonomists". However, such changes are necessary and are based on scientific progress. This chapter presents most modern taxonomy of *Erysiphales* including key to genera and tribes. In order to facilitate understanding and transition towards general use of the new taxonomy and nomenclature, both the "new" and the "old" names are used throughout the treatise.

Chapter 3 "Comparative genetics of avirulence and fungicide resistance in the powdery mildew fungi" (p. 56–65) by J.K.M. Brown provides a very comprehensive review on phenomenon of avirulence, specifically based on the gene-for-gene relation in cereal mildews *Blumeria graminis* ff. spp. *hordei* and *tritici*. Of special interest is review on genetics of resistance to various groups of fungicides noted in barley mildew (*B. g. f. sp. hordei*) and wheat mildew (*B. g. f. sp. tritici*).

Chapter 4 "Formation and function of infection and feeding structures" (p. 66–82) by J. R. Green et al. describes chronology of germination and the developmental sequence leading to formation of appressorium primary germ tube (PGT), cAMP cycles, and differentiation and development of the haustorial complex and its function.

Chapter 5 "Basic methods for epidemiological studies of powdery mildews: culture and preservation of isolates, production and delivery of inoculum, and diseases assessment" (p. 83–99) by P.C. Nicot et al. contains very useful information on: isolation in pure culture and single-spore culture, culture and preservation of living isolates in collections, inoculum production, inoculation procedure and diseases assessment.

Chapter 6 "DNA-mediated transformation of *Blumeria graminis* f. sp. *hordei*" (p. 100–106) by P. Chaure et al. describes a protocol for the stable transformation of *Blumeria graminis* using transformed plasmids pBt-BAR and pPT-GUS particle bombardment and BASTA (biolophos) resistant transgenic barley.

Chapter 7 "Epidermal cell papillae" (p. 107–125) by R. J. Zeyen et al. describes the *B. graminis* – cereal plant system pointing out the role of papillae into resistance of plants against powdery mildew infection.

Chapter 8 "Localized induction of accessibility and inaccessibility by powdery mildew" (p. 126–133) by H. Kunoh describes infection process caused by *B. graminis* and *Erysiphe pisi* and reaction of barley and pea cells.

Chapter 9 "Genes and molecular mechanisms controlling powdery mildew resistance in barley" (p. 134–145) by N.C. Collins et al. describes the role of *mlo*, *Rar1* and *Sgt1* genes in broad-spectrum and race-specific resistance of barley to *B. graminis*.

Chapter 10 "The nature and role of defense response genes in cereals" (p. 146–160) describes the role of pathogenesis-related proteins, regulatory proteins and structural changes in barley infected by *B. graminis*.

Chapter 11 "Powdery mildew of *Arabidopsis*: a model system for host-parasite interactions" (p. 161–168) describes using *Arabidopsis* plants and infection techniques with *Erysiphe cruciferarum*, *Golovinomyces cichoracearum* and other fungi or their mutants to understand host-pathogen interactions.

Chapter 12 "Epidemiology of powdery mildews in agricultural pathosystems" (p. 169–199) by W. R. Jarvis et al. reviews all factors that play role in epidemics e.g. dispersal of conidia, dispersal of cleistothecia and host phenology. Of special interest is review of models and forecasting of the following diseases: apple powdery mildew, tomato powdery mildew, barley powdery mildew, rose powdery mildew, sugar beet powdery mildew.

Chapter 13 "Population genetics of powdery mildew-natural plant pathosystems" (p. 200–218) by D. D. Clarke and A. Akhkhya describes several examples of powdery mildews affecting plants of no agriculture significance. Of special interest are interactions between *B. graminis* and *Hordeum spontaneum*, and *Golovinomyces cichoracearum* var. *fischeri* and *Senecio vulgaris*.

Chapter 14 "Breeding for powdery mildew resistance in common wheat (*Triticum aestivum* L.)" (p. 219–238) by S.L.K. Hsam and F.J. Zeller provides information on sources, chromosomal location and characteristic of powdery mildew resistance genes (Pm1–Pm30) used in breeding for resistance of wheat varieties.

Chapter 15 "Breeding cucurbit crops for powdery mildew resistance" (p. 239–248) by M. Jahn et al. discusses sources of resistance, genes and techniques of breeding resistant varieties of melon (*Cucurbita melo*), cucumber (*Cucumis sativus*), pumpkin (*Cucurbita pepo*), squash (*C. moschata*) and watermelon (*C. lanatus*). All these plant species are attacked by powdery mildews caused by *Podosphaera xantii* (syn. *Sphaerotheca fuliginea*), *Golovinomyces cucurbitacearum* (syn. *Erysiphe cichoracearum*) and *Golovinomyces orontii* (syn. *Erysiphe cichoracearum*).

Chapter 16 "Controlling powdery mildews with chemistry" (p. 249–255) by D.W. Hollomon and I.E. Wheeler provides a concise review of history of fungicide use against powdery mildews. Special attention was given to mode of action of strobilurins, spiroxamine, cypridinil and quinoxifen and problem of resistance detection and management.

Chapter 17 "Control of powdery mildew without chemicals: prophylactic and biological alternatives for horticultural crops" (p. 256–267) by R.R. Belanger and C. Labbe reviews prophylactic and biological alternatives to chemical control against powdery mildews. Biological control agents are listed and some of them are characterized e.g. *Ampelomyces quisqualis* and *Verticillium lecanii*.

Chapter 18 "Powdery mildew control through transgenic expression of antifungal proteins, resistance genes, and systemic acquired resistance" (p. 268–278) by J. Salmeron et al. describes new possibilities for powdery mildew control using antifungal proteins and compounds, endogenous plant defense mechanisms, systemic acquired resistance, and crop transformation technology. Especially broadly transformation technology is discussed using *Agrobacterium*, protoplast, biolistic and other transformation techniques.

Without question this book in an excellent way presents the current "state of the art" in the knowledge of the powdery mildews and should be present in each agricultural library.

Jerzy J. Lipa  
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