

BOOK REVIEW

The Downy Mildews – Genetics, Molecular Biology and Control

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This book contains chapters presented by keynote speakers at The Second International Downy Mildews Symposium, held in July 2007 at Olomouc, the Czech Republic. Regular oral presentations were published in a separate volume entitled: *Advances in downy mildew research*, Vol. 3. [LEBEDA A., SPENCER-PHILLIPS P.T.N. (eds): Palacký University Olomouc, 2007, 278 pp., ISBN 80-86636-19-4]. The conferences mentioned above reflect the increasing international cooperation in the downy mildew research.

Papers in this volume cover a wide range of topics. I would like to refer especially to the most important problems that appeared in individual papers:

Using molecular data enabled a new insight into genes and morphology of white blister rusts. Ordinal family and generic circumscriptions have been reconsidered and changed during the last years. The definition of the limits of a taxonomic group of organisms and concepts are also changing. These rearrangements also lead to a re-evaluation of traditional morphological characters used for classification.

Hybrids of *Phytophthora alni* either created in the laboratory or evolved in natural environments are discussed in association with evolutionary issues and possible threats they may pose to agriculture, horticulture and forestry. Sustainable control of such hybrids will depend on the better understanding of temporal and spatial aspects of genetic mechanisms and environmental factors that lead to the hybridisation process and thus the genetic diversity in *Phytophthora* populations.

The second group of papers was dealing with host-pathogen relationships. An overview of genetics and molecular analyses of *Bremia lactucae* describes not only what has occurred in the last 25 years but also perspectives of future directions (MICHELMORE R. & WONG J.).

Comprehensive and unique research was done on *B. lactucae*, which is shared between a crop (*L. sativa*) and its close wild relative (*L. serriola*). Conclusions contribute to the broadening and better understanding of gene-for-gene systems. The interaction of *Lactuca* spp. with *Bremia lactucae* displays extreme variability, due to a long co-evolutionary history. The first part of this review summarises recent data on host-parasite specificity, host variability, resistance mechanisms and genetics of lettuce by *Bremia* interactions. The second part focuses on the development infection structures. Phenotypic expression of infection, behaviour of *B. lactucae* on leaf surfaces, process of penetration, and the development of primary infection structures, hyphae and haustoria are discussed in relation to different resistance mechanisms. In the third part, the components of host resistance and the variability of defence responses are analysed (LEBEDA A., SEDLÁŘOVÁ M., PETŘIVALSKÝ J., PROKOPOVÁ J.).

In the review “Comparative epidemiology of zoosporic plant pathogens” (JEGER M. J., PAUTASSO M.) are considered hybridisation events between *Phytophthora* species, long dispersal of oomycetes, sporangia and zoospore survival, direct and indirect infection processes and newly observed sporulation structure. These aspects are all relevant features for the understanding of epidemiology of zoosporic plant pathogens in natural host-pathogen populations and their relationships to crop pathosystems.

The last group of papers concerns the possibilities of chemical control of downy mildews. Classes of fungicides with different properties in their systemicity, specificity, duration of activity and risk of resistance are described.

Four carboxylic acid amide (CAA) fungicides inhibited the *Bremia lactucae* spore germination *in vitro* or on leaf surfaces. Fungicides applied to germinating spores prevented a further extension of germ tubes. When applied to germinating spores on the leaf surface they prevented penetration.

Resistance inducers are promising groups of chemicals controlling fungal diseases. Beta-aminobutyric acid (BABA) is one of the most important. After treatment, the sporulation of *Plasmopara viticola* was strongly inhibited and the accumulation of stilbene increased with the time elapsing since infection. The pretreatment of a susceptible grapevine cultivar with BABA prior to infection primed the accumulation of specific phytoalexins that are undetectable in non BABA-primed plants.

A botanical fungicide prepared as a juice from garlic (*Allium sativum*) containing allicin was effective against *Phytophthora infestans* and downy mildew of cucumber caused by *Pseudoperonospora cubensis*. Allicin in a garlic juice inhibited the germination of sporangia and cysts and subsequent germ growth by *Phytophthora infestans* both *in vitro* and *in vivo* on the leaf surface. In growth room experiments at a concentration from 50–1000 µg/ml the garlic juice reduced the severity of cucumber downy mildew by approximately 50–100%.

Proceedings of the 2nd International Downy Mildew Symposium present the latest information on research in this scientific field. The book is well arranged and contains many new findings on downy mildews. It can be recommended to scientists as well as to advanced students and postgraduates interested in this topic.

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