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BOOK REVIEW

The Mycota. A Comprehensive Treatise on Fungi as Experimental Systems for Basic and Applied Research
Edited by K. Esser. J.W. Bennett.
Volume XI Agricultural Applications. F. Kempken (Volume Editor) 2002.
Springer-Verlag Berlin, Heidelberg, New York. XVIII. 388 pp., 44 figs, 29 tabs.
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In early 1989, encouraged by Dieter Czeschlik from Springer-Verlag, Paul A. Lemke (1937–1995) and Karl Esser began to plan a great publishing enterprise "The Mycota". The first volume "Growth, Differentiation and Sexuality" was released in 1994. This was followed by vol. II "Genetics and Biotechnology" in 1995; vol. III "Biochemistry and Molecular Biology" in 1996; vol. IV "Environmental and Microbial Relationships" in 1997; vol. V part A and part B "Plant Relationships" in 1997; vol. VI "Human and Animal Relationships" in 1996; vol. VII part A and part B "Systematics and Evolution" in 2001; vol. VIII "Biology of the Fungal Cell" in 2001; vol. IX "Fungal Associations" in 2001, vol. X "Industrial Applications" in 2002 and vol. XI "Agricultural Applications" in 2002. Vol. XII, the last of the treatise about "Human Fungal Pathogens" is going to be published in 2004. "The Mycota" in twelve volumes is a great step forward since the four-volume publication "The Fungi. An Advanced Treatise" edited by G.C. Ainsworth, A.S. Sussman and F.K. Sparrow, published in the period 1965–1973. One has to realise that during the years 1994–2002 two editions of the "Dictionary of the Fungi" were published (8th edition in 1995 and 9th edition in 2001).

The editors of the whole treatise, the volume editors and 430 contributors to more than 250 chapters gave reviews of all possible advances in fundamental and applied mycology. The reviewer is aware of the criticism in some circles of mycologists all over the world as well as discussions concerning the idea of presenting such a huge work, of omissions or even mistakes in one or another chapter. Every omission or mistake can be improved or rewritten. This short introduction is meant only as a background for the presentation of the content of the eleventh volume on the agricultural applications of fungi.

The volume is divided into four parts, *i.e.*: food and fodder production, mycotoxins and detoxification, disease control, diagnostics and management, update on host-parasite interactions.

P.A. Horgen and A. Caste provide an interesting review of the application and potential of molecular approaches to edible mushrooms worldwide. In nature there are more than 38 000 kinds of mushrooms, but only a fraction of these types are grown or harvested for commercial purposes. The white button mushroom *Agaricus bisporus* is by far the most successful component of the mushroom industry. One has to be aware that its production in 1999 was over 2 million metric tons with a value in excess of US $ 1 billion. Several methods for the development of an efficient transformation system for *Agaricus bisporus* were tried with little success in the period 1990–2000. Nevertheless, a conviction exists that genetic manipulation in *A. bisporus* will be successful in the twenty-first century.

Straw enrichment for fodder production by fungi is associated with the biological upgrading of this product as food and finding suitable microorganisms for cheap largescale process of delignification. Straw of wheat, barley, oat, rye and rice represents the main agricultural crops. At present, molecular biology approaches are applied to study fungal lignocellulose degradation with the advent of the polymerase chain reaction. Unfortunately, cheap solutions to those problems are still distant. The yearly production of the above mentioned crops amounts to 1400 million tons. All the straw left on the fields or collected in the farms gives the idea of the importance of investigation into the mycology of the delignification of the straw and use as fodder for cattle.

Dutch scientists J. Dijksterhuis and R.A. Samson discuss very shortly the food and crop spoilage on storage. The reader will find on this subject more in the sixth edition of the book by R.A. Samson *et al.* "Introduction to food – and airborne fungi" (2001).

350 species of fungi produce mycotoxins. Vol. XI presents the genetics and biosynthesis of aflatoxins and sterigmatocystin. The reviewer would not hide his admiration for the whole text of Mycota. But in this big publishing project more information is needed regarding the genetics and biosynthesis of citrinin, fusarenon X, ochratoxin A, patulin, trichothecenes and zearalenone.

D. Cullen's review of molecular genetics of lignin – degrading fungi and their application in organopollutant degradation is simply an excellent job. One has to imagine that polychlorinated biphenyls, polycyclic aromatic hydrocarbons and sewage from the pulp and paper industry are of constant danger to the environment. The yearly production of wood pulp and paper amounts to 450 million tons giving enormous volume of sewage including lignins, even if the production in the paper industry is organised in a closed cycle.

The eight chapters on disease control, diagnostics and management give some proof of a significant progress made towards biological and integrated control of plant diseases in various plant pathosystems over the last two decades, since 1980. Among five chapters on host-parasite interactions the reviewer wishes to focus on the investigations important for explaining the role of cell wall degrading enzymes in pathogenesis of fungal plant pathogens. The CWDE (Cell Wall Degrading Enzymes) including hydrolases, lyases, transferases and esterases have been provided by P.M. Continbe and B. Henrissat since 1999 in a website database at <url>http://af mb.cnrs-mrs.fr/-pedro/CAZY/db.html</url>. However, no general conclusion can be drawn. Each plant-fungus interaction and the functions of each individual CWDE in this interaction need to be studied independently.

The year 2004 is going to be very fruitful as the Springer-Verlag announced the publishing of the volume III of Mycota – "Biochemistry and Molecular Biology", this time in two parts. Volume II "Genetics and Biotechnology", edited by Ulrich Kuck, is going to be presented as well in second edition. Medical mycologists look forward to the volume XII of Mycota – entitled "Human Fungal Pathogens".

The list of wishes for further volumes may be long. One would think that a volume on mycotoxins is still a piece of work to be done. The editors: Professor Karl Esser and Professor Joan W. Bennett, as well as the bosses of the Springer-Verlag have to be congratulated for the job done for mycologists worldwide.

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