

## BOOK REVIEWS

**Microbial Control of Pest and Plant Diseases 1970–1980.** Ed. by Burges H. D., 949 pp., Academic Press, London, 1981, £41.40 (\$99.00).

Burges, assembling a formidable group of younger leaders of research to review this rapidly expanding field, has overcome one of the chief problems of the symposium form by exercising the editorial hand firmly enough that each of the 43 chapters follows roughly the same format. At the same time, he has not stifled the individual viewpoints of the authors nor discouraged departures from the format where the subject matter demands it.

The book is intended as a sequel to Burges H. D. and Hussey N. W. (Eds) (1971) *Microbial Control of Insects and Mites*, from the same publisher. It stands on its own as a comprehensive practical reference source on the utilization of microorganisms in pest management. The Editor's brief, yet compact, historical review of the progress made in this rapidly expanding area of knowledge reveals an enormous and exponential growth within a period of 10 years. Thus, the Editor and contributors deserve congratulations in compressing all the information within 949 pages.

The sequence of chapters is logical. The first nine chapters on 'identification' begin at the basics and go on to include references to diagnostic techniques and keys. Identification, which is divided into major specialized groups of insect pathogens and each group covered by different internationally known experts, is a remarkable achievement over the 1971 forebear of this book. It should be noted, however, that nematode identification is not covered, presumably because for them we have several texts by Poinar and others.

Chapters 10–22 are devoted to the bacteria. It is a demonstration on how far we have gone in understanding *Bacillus popilliae* and its use in pest control. Next, on *Bacillus thuringiensis*, Dulmage, Fast and Sebesta take on a mixed bag of topics including insecticidal activity, the crystal toxin and  $\beta$ -exotoxin and their potential in pest control. Martin's treatise on genetics and genetic manipulation of *Bacillus thuringiensis* is thorough and rather highly technical, perhaps necessarily so.

The chapters on viruses give a most up-to-date account of the successful examples on usage of viruses in pest management practices, especially the commercialization of the nucleopolyhedrosis virus of *Heliothis* species as a microbial insecticide. The baculovirus group dominate the list of viruses in use, and all the examples cited are from crop pests. Stockdale's coverage on production of insect viruses in tissue culture highlights the basic questions that need surmounting as yet. Thus, *in vitro* production of the viruses remains a technology for the future.

Fungi are accorded their rightful proportion of space in the text (114 pages) undoubtedly because of their potential in pest management, especially in the tropical and subtropical milieu.

Roberts has given the most up-to-date information on the entomopathogenic fungal toxins, with the conclusion that there are no fungal toxins under development at

present for pest control. Hall's coverage on *Verticillium lecanii* is superb and indicates that this fungus is at the threshold of commercial development for aphid control, once storage formulation to improve its shelf-life is achieved. Similar competent and detailed reviews by Ignoffo, Wilding, Ferron and McCoy contain a useful synthesis of current research and development activities on fungi: *Nomuraea rileyi*, *Entomophthora*, *Metarrhizium*, *Beauveria* and *Hirsutella*, respectively. Results show that some of these fungi are already being tested in the field for the control of agricultural pests. Federici points out, however, that with rapid rate of research and technological development in the biological sciences, *Coelomomyces*, *Culicinomyces* and *Lagenidium* will play a significant role in future integrated mosquito control programs.

The three chapters devoted to the protozoa give an in-depth review on the use of *Nosema locustae*, *Vairimorpha necatrix* and *Nosema fumiferanae* in the pest management of locust, lepidopterous pests and the spruce budworm, respectively. Like viruses, *in vitro* production of protozoa still remains a hindrance to their mass production, although major questions involved in their development as microbial control agents have been answered.

The nematode group is assigned only one chapter. Nevertheless, Finney's contribution will make it a most useful chapter for practical pest management using nematodes, since she gives an overview of present usage of nematodes in insect control, prospects, research requirements and exhaustive references.

Two chapters on technological aspects, including formulation, application, assessment, safety, quality control and integration with other agents, is a welcome addition and an improvement over the 1971 forebear of this text. A brief chapter on the insect's defence underlines the paucity of knowledge on the immune systems in insects. A similar reason perhaps may hold for the use of microorganisms to control plant diseases. It is interesting to compare and contrast the pest management approach prevailing in the People's Republic of China with those practised in Western countries. Finally, Burges's concluding chapter summarizes the overall progress, operational principles, socio-economic factors and strategy, giving prospects for the future. The book ends with appendices (76 pages) and a subject index (34 pages).

The clarity of style makes the book valuable both for those who are highly specialized in the area of insect pathology and microbiology as well as for those new to the field or peripherally interested in it. Meanwhile, the researcher will find this an excellent and timely review of a rapidly expanding area, and, in spite of the high cost of the set, I would recommend strongly that it be given top priority in the book budget of insect pathologists, pest management practitioners, plant pathologists, parasitologists, insect scientists and microbiologists.

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