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BOOK REVIEW

HALLMAN G.J. & DENLINGER D.L. (EDS): TEMPERATURE SENSITIVITY IN INSECTS AND APPLICATION IN INTEGRATED PEST MANAGEMENT. Westview Press, Boulder, Colorado and Oxford, UK, 1998, 311 pp. ISBN 0-8133-8990-9. Price GBP 48.50.

This extremely useful book represents what is very often lacking in many scientific fields. It surveys the recent achievements of basic research in cryobiology and high temperature studies, and helps to make them applicable to the field of Integrated Pest Management. In the preface the editors give a good definition of the IPM goal: "to combine all practical pest mitigation techniques in a harmonious manner that strives to optimize economic costs and minimize environmental degradation". The exploitation of extremely high and low temperatures has been missing from IPM volumes, although both heat and cold were treated under the category of physical controls in Metcalf's classic text, Destructive and Useful Insects (1962). One of the reasons for increased interest in pest control by heat and cold is the expected cessation of fumigation by methylbromide, which is considered to be an important depleter of stratospheric ozone.

A short but interesting introductory chapter, containing some surprising recent findings, is followed by chapters 2 and 3 dealing with the physiology of heat and cold sensitivity, authored by D. Denlinger, G. Yocum and R.E. Lee Jr. Both chapters are representative updated surveys of the results of basic research in both fields. Next, chapter 4 deals with a modern cryobiological branch, studying the effect of some microbes that reduce cold hardiness. This sphere of research was started by the discoveries in early nineties by the authors of this chapter, R.E. Lee Jr. and M.R. Lee.

The next seven chapters concentrate on various aspects of the application of the known effects of temperature. The general chapter 5 (Temperature Synergism in IPM by D.J. Horn) discusses the effects of temperature on the use of insecticides, biological control agents and pheromones, and also on host plant resistance. Chapters 6, 7 and 8 provide a survey of the methods used in IPM of stored product pests, pests in buildings (such as flats and museums) and quarantine pests on imported commodities. Both freezing and heating strategies have been used with much higher frequency since fumigants were either banned, or their ban is impending. In many situations the use of insecticides is precluded. The continuing pressure to develop safe control strategies and the refinement of technologies is likely to make the use of freezing and heating even more widespread. Chapter 9 by R.A. Leopold gives an overview of the cold storage of biological control agents and their hosts/prey. Mass rearing can thus be made much more economical. Low temperature is also a valuable tool for the safe delivery of biocontrol agents to the release site.

The last two chapters return to the use of temperature extremes against pests in agricultural production. In open fields (C.W. Hoy), insects can be killed by low winter temperatures when insulation from the ambient air temperature is removed. This is particularly efficient if the removal precedes the expected rapid drop in temperatures; cold-hardening is thus prevented. High temperature effects can be produced by flooding with hot water or by using burning devices. R.K. Lindquist states that the manipulation of temperature in greenhouses has been underestimated, although it could be an efficient tool. Only steam treatment or solarization of soil are currently used in such situations.

The book is a valuable compendium of useful advice, which could help widen the use of temperature in IPM. We can only hope that the promotion of this mostly ecologically safe type of pest control will be helped by readers of this book.

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