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Controlling Invertebrate Pests in Agriculture

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PAGE, J. AND HOME, P. 2012. Controlling Invertebrate Pests in Agriculture. CSIRO Publishing, Collingwood, VIC, Australia. 128 pp. ISBN 9780643103351, paperback, Australian $49.95.

Straightforward and based on actual experiences, this small and informative book shares a successful approach to adopting integrated pest management (IPM) from the perspective of the authors, highly successful crop advisors. They perceived the need for growers, other crop advisors, and possibly researchers to have IPM concepts explained without unnecessary technical details and supporting documentation. The experience communicated in this book was gained mainly in southern Australia and New Zealand but the general IPM principles can be applied wherever the crops are grown. Several compatible themes are reinforced repeatedly throughout the book: minimize the indiscriminate use of pesticides, especially broad spectrum products; understand the agricultural ecosystem and adopt commensurate IPM practices; and sustain partnerships between farmers and crop advisors to design site-specific, dynamic IPM systems for individual crops. The emphasis on minimizing detail enabled the book to be condensed: the first chapter on agricultural ecosystems being limited to just eight pages, including sections on farming practices before modern pesticides and fertilizers, microorganisms and invertebrates that live in a crop, predator-prey population cycles, and sustainable pest management. In only 17 pages, Chapter 2 covered insecticide resistance, cross-resistance, residues on produce, non-target impacts, disruption of biological control and associated primary and secondary pest outbreaks, timing of pesticide applications, selective insecticides, sub-lethal effects of pesticides, pesticide impacts based on pest and natural enemy status, insecticide resistance management, zero tolerance to pest presence, and pheromones for mating disruption and attract-and-kill. The conclusion to this chapter is essentially one of the original definitions of IPM (Stern et al. 1959), "The best that can be done is to minimize pesticide use and select options that are considered least disruptive to biological control." The remaining chapters were similarly abbreviated: Chapter 3 (Pest Species, 8 pages), Chapter 4 (Beneficial Species, 7 pages), Chapter 5 (Cultural Controls, 11 pages), Chapter 6 (Integrating Control Measures to Maximise Degree of Control, 13 pages), Chapter 7 (Changes in Scientific Assessment, 5 pages), and Chapter 8 (Examples of Changing Pest Management: Specific Crops, 32 pages).

It is reassuring to read that many established IPM principles and practices (Flint and Gouveia 2001; Norris et al. 2003), were validated and refined by working with growers in the field. For example, IPM options are increased appreciably by developing pre-planting crop production and protection strategies based on sound cultural practices. This preventative approach is based on indispensable knowledge of crop phenology, biology of pest and beneficial organisms, scouting and accurate identification of pests and beneficials, action thresholds, and effectiveness of pesticides and commercial natural enemies. Multiple practices are preferred over the single chemical option, with an emphasis on changing pesticides, improving formulations and developing new application methods. The vertical integration of arthropod pests and horizontal integration of other pest types were described in the book, although not in technical terms. Among other factors considered were farm safety, food quality, crop marketing, IPM certified crops, overall economics, and the years it can take to fully implement IPM on a farm. The most important determinants of success were crop monitoring and continuous communication between the grower and crop advisor to make adjustments in the IPM plan. The authors stated, "The key factors in the success of our work in adoption of IPM have been the collaborative and participatory approach to working with individual or small groups of farmers and providing expert, site-specific advice when required." IPM manuals and guides, typical contributions from Extension, are helpful but must be accompanied by sound advice in the field.

The case studies in the final section, Chapter 8, comprise about 25% of the book. Examples of adopting IPM for specific crops include avocado, broccoli, hydroponic capsicums, vegetables (leeks, lettuce, celery, endive, kohl-rabi, wombok, radicchio, parsnips, onions, asparagus, and potato), macadamia nuts, strawberry, wine grapes, organic onions, ornamental plants, hydroponic roses, and broad-acre cropping (wheat, barley, canola, and field peas). The annual cost of the IPM program for a 1500-hectare broad-acre farm was one-fifth of the previous annual cost of applying insecticides, and crop damage was reduced. The case studies are essentially testimonials written in a form appropriate for trade journals, interesting and useful but often lacking details such as pest species and status, economic thresholds, amounts and timing of pesticide applications, natural enemy species and release rates, cultural practices, and crop yields. Near the end of the chapter, there is a useful survey on "Changing to using IPM" that contains 11 questions with answers given by a single grower. Appendices include a glossary (13 entries), common and scientific names of species (48 entries), species listed by common name (36 entries), references (8 entries), and a 4-page index.

In addition to providing a general description of IPM and its adoption in a wide range of crops, the book is highly motivational. The reader is

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encouraged to try IPM at least on part of a crop and rely on technical support from crop advisors. According to the authors, the advantages of adopting IPM include reduced dependence on pesticides, increased safety to farm workers and others, slower development of resistance to pesticides, reduced food and environmental contamination, and improved crop biodiversity. Never has there been a better time to adopt IPM because expertise is available to develop site-specific IPM plans, manuals and guides have been produced, technical support can be accessed in person and online, and IPM has proven to be cost effective. The book ends with a reconfirming declaration, "It works!!!"

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