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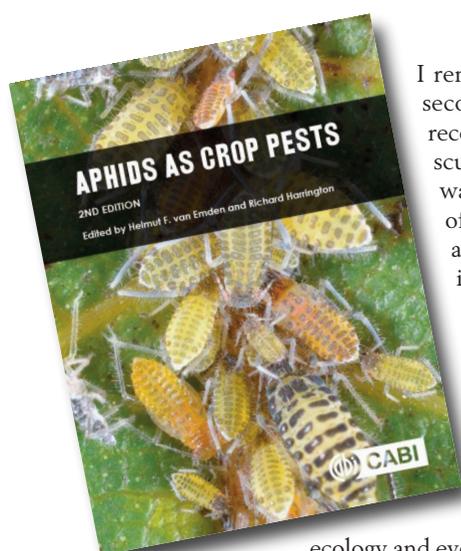
Aphids as Crop Pests (2nd edition)

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I remember, with great fondness, the moment that set me on to entomology. During my second-year undergraduate studies, in the module 'Parasitism and other life strategies', I received a lecture on aphid life cycles. From that moment, aphids had me hooked. I still recall scurrying off to the library to see what books might be to hand to learn more. One of these was the first edition of *Aphids as Crop Pests*, and I pored over this volume over the course of several weeks. The second edition does not disappoint. It revisits the applied aspects of aphidology reviewed in the first edition, with new chapters added to reflect developments in the field and more familiar chapters revised to differing extents.

As before, the book starts with a series of topics set the scene. The first chapter provides an introduction to aphid taxonomy, and details the challenges raised by morphological variation within aphid species. It highlights the role molecular tools can play in this, arguing that such techniques should be used to complement, rather than replace, morphotaxonomic approaches. It also includes examples of taxonomic challenges raised by fifteen economically important species. The second chapter is a new addition and forms an introduction to the molecular and genomic tools that have been developed since the first edition, and which have contributed to our understanding of aphid biology, ecology and evolution. Although this area is one which moves at an impressive pace, the chapter provides context for the third chapter, which addresses how advances in aphid population genetics, molecular markers and other genomic tools are informing studies of aphid identification, host-plant adaptation, life cycle and population dynamics, and clonality, among other subjects. The fourth chapter describes different life cycles and polyphenism, and the roles these play in aphid pest status. The following chapter outlines the growth and development of aphids, how these can be evaluated, the challenges associated therein due to both biotic and abiotic factors, and the importance of considering these when selecting methods for studying aphid performance. This relates well to the next chapter, which addresses aphid nutrition and the role of microbial symbiosis, which in turn leads into a chapter on the influences of stressors, including temperature and drought, on aphids. This chapter also explores adaptations to stress, physiological responses and how these influence aphid nutrition. As in other chapters, the burgeoning potential of molecular toolkits in studies of this area of aphidology is mentioned. The eighth chapter provides an overview of the current understanding of aphid chemical ecology, describing how pheromones regulate interactions with conspecifics, how semiochemicals influence interactions with plants and how both these aspects can affect interactions with natural enemies. The selection of host plants and the mechanics of feeding are reviewed in the ninth chapter, breaking these down into a series of phases and addressing plant resistance and host preference changes. The tenth chapter provides a comprehensive overview of aphid movement at different spatial scales, outlining the roles of different life stages, triggers and stimuli. It also explains some of the consequences of aphid movement on pest status and the implications of this in pest management strategies.

The 'chapter theme' at this point shifts towards more population-level influences. The eleventh chapter introduces aphid predators and parasitoids, addressing the biology and foraging behaviours of common species, and factors that limit the impact of these guilds on aphid densities, including mutualistic interactions of aphids with ants. Aphid pathogens are also described in terms of biology and factors influencing pathogenicity and spread. The twelfth and thirteenth chapters provide an overview of population dynamics. The former provides a general background, addressing patterns, cycles, and what regulates them. It also provides important context to the following chapter, which is a modelling-based case study using a cereal aphid as an example, though overviews of general components and variables that determine dynamics are always considered on a broad level and related to the case study, rather than the other way around.

The chapters in the next section of the book centre around the theme of crop damage and means to mitigate this. The different kinds of feeding injury are summarised in the fourteenth chapter, with common symptoms, modes of injury and the physiological bases for these described. An important aspect of aphids as crop pests is their role as virus vectors, addressed in the fifteenth chapter. The chapter provides an overview of the mechanisms that enable this, discussing what makes aphids effective vectors, and the modes of transmission, the interactions inherent in these relationships, epidemiology and disease management strategies. Management themes continue, with the following chapters addressing different strategies and approaches. The sixteenth chapter discusses the monitoring and forecasting of aphid populations to inform crop management

strategies, describing different monitoring methods and providing a broad overview of forecasting models. The next chapter outlines the merits and biological limitations of decision support systems, typically associated with and built on monitoring and forecasting models. The use of monitoring, forecasting and decision support systems is essential to optimising control strategies. Chemical control remains a frequently used tool, and background on the subject is provided in the eighteenth chapter. Chemical insecticide availability, and chemistry, change rapidly on the back of developments and regulation, which must surely have made this a tricky chapter to write. A brief synopsis of different aphicides and their modes of action is given, with sections on application methods, thresholds and efficacy in different crop types. The following chapter focuses on insecticide resistance, outlining the diagnosis of resistance and the biological and molecular mechanisms forming the basis of resistance. The factors affecting the dynamics of insecticide resistance in the field are also reviewed. The next three chapters address non-chemical means of control. The chapter on biological control provides overviews of various natural enemies, including predators, parasitoids and entomopathogenic fungi, addressing for each, aspects of use in glasshouse, field and orchard crop settings, focusing on direct interventions and their impact, in contrast to Chapter 11, which focuses more broadly on biology and behaviour and provides useful background here. The twenty-first chapter summarises the role of cultural methods in controlling in-field aphid populations, through means such as mulches, plant husbandry and crop management, intercropping and trap planting, and provision of other resources for natural enemies, such as refugia or alternative food resources. The important role of host-plant resistance is also reviewed, with the twenty-second chapter including sections outlining the different types and mechanisms of such resistance. The potential negative implications, for example on yield, of natural enemies or of viral transmission are also discussed.

As with the first edition, the second edition finishes with a series of Integrated Pest Management (IPM) case studies. This section starts with a general introduction in Chapter 23, which sets context and background for the following ten case studies. Each case study focuses on a crop or crop group (grain, sorghum, leafy salads, brassicas, cucurbits, seed potato, cotton, berries, deciduous fruit trees, and tropical and subtropical fruit trees) and jointly they clearly highlight the breadth of challenges experienced in different crop systems. They also illustrate the different concerns in different crops (for example, resistance or virus transmission may be more important in one or another crop). The different key aphid pest species and management strategies employed in each system are described, and each case study chapter benefits from an executive summary which, as in the first edition, provides a unifying element across the different studies. This updated collection of case studies continues to provide a comprehensive outline of aphid management challenges and strategies, giving the in-field examples that put the preceding background chapters into the bigger picture.

The second edition includes colour images throughout the various chapters, rather than black and white images with a series of colour plates as in the first edition. Broadly speaking, the quality of these is very good and they are a welcome change. The taxonomic glossary preceding the index is comprehensive, containing genus, species, taxonomic authority, common name, and page numbers (with inclusions in figures or tables also noted). The overall order of chapters feels more coherent, perhaps, than the first edition, and each is individually referenced, providing an impressive basis for literature review. The main barrier to accessibility is a rather hefty price tag, which may limit the range of individuals who can acquire a copy personally, though I am certain that, as with the first edition, this revised volume will be an important addition to institutional library collections.

Aphids as Crop Pests remains an eminently readable, comprehensive review of applied aspects of aphidology, valuable to a broad range of readers. I enjoyed it just as much this time around, and I am certainly thrilled to be able to add it to my reference library.

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