Natural Enemies: An Introduction to Biological Control
Ann Hajek
Press Syndicate of the University of Cambridge, Cambridge, UK, 2004
378 pp., hardback $110.00, paperback $50.00
paperback ISBN 0-521-65385-1

It is difficult studying insects, with millions of species and their associated behaviors, physiology, genetics, and ecological impacts. On top of all of that, if one is interested in managing insect pests with natural enemies, the taxa studied expands to cover almost the entire tree of life. This is no trivial task for instructors needing to describe the animals, fungi, and unicellular organisms that are used within pest management programs that target insects and weeds. Thankfully, Ann Hajek has taken on the entire natural enemy community and summarized it in Natural Enemies: An Introduction to Biological Control. This is a remarkable textbook given that she has left no member of this community out: from vertebrates to pathogens. The text is written in a very accessible language appropriate for students whose primary focus may not be entomology or biological control. For entomology students and students studying pest management, this will be an excellent introduction to the use of natural enemies in agricultural and natural area settings. For this latter group of students, Hajek provides a great service by compiling the details and examples of non-insect natural enemies (nematodes, fungi, and viruses) that are not familiar to entomologists (at least this entomologist).

The book is divided into five sections that starts with a brief introduction to biological control and focuses on the type of pests attacked by natural enemies. The sections pertain to (1) strategies for using natural enemies, (2) biological control of invertebrates and vertebrate pests, (3) biological control of weeds, (4) biological control of plant pathogens and plant parasitic nematodes, and (5) biological control: concerns, changes, and challenges. The theory behind each of the three basic biological control strategies (classical, augmentation, and conservation) is described in the second section. These three strategies provide an applied framework in the subsequent sections when describing the use of each natural enemy taxa. I found this very useful, grounding this textbook within an applied context. However, this is not just a handbook for pest management, because the theoretical basis for biological control is discussed within a single chapter (Chapter 6: Ecological Basis for Use of Predators, Parasitoids, and Pathogens). Also, interspersed throughout the text are references to ecological niches, population regulation, and host feeding preferences. Although these are not comprehensive, they provide a gateway into the primary literature for undergraduate students. As an instructor of an undergraduate course in pest management, I will refer to this textbook often, particularly for the last three sections. General biology with case examples are provided for each natural enemy taxa as it applies to various pests. I am very impressed by the quantity and quality of examples, their global scope, and the accounts of their efficacy and cost effectiveness.

In addition to a readable text, there are components that make this an accessible textbook for new students of pest management and biological control. Throughout the chapters are stand-alone boxes featuring personalities and case studies that highlight selected concepts. The mini-biographies (Rachel Carson, Albert Koebele, Edward Steinhaus, and others) place the biology within a personal and historical context. These boxes have me excited to recommend this text to students of social sciences interested in pest management. The author also does an excellent job of describing the implementation of biological control, with opportunities for students to discover the influential role that government policies have on pest management strategies. As the author points out, conservation biological control is the least studied of the three main strategies of biological control. Not surprisingly, it has the fewest examples in the text. The potential for conservation biological control is described, but this follows a discussion on the lack of “truly efficacious strategies.” It is interesting to note that the author offers three case studies in which government policies have been critical for the adoption of biological control: (1) augmentative biological control in Danish greenhouses (Box 19.3), (2) conservation of natural enemies for rice integrated pest management in Indonesia, and (3) the use of “beetle banks” in Europe as a means of conservation biological control (Box 5.2). Each of these examples is a viable method of pest management that involves conservation that was encouraged with some degree of government intervention. Conserving existing natural enemies may not provide the most efficacious method for controlling a pest, but as pointed out by Hajek in her final chapter, “stand alone” pest management programs may not be sustainable. Conservation methods can have additional benefits for the agroecosystem, which in aggregate may provide greater value than a single “stand alone” pest management program. Therefore, conservation biological control may be more appropriate for constructing such a multi-functional agroecosystem. Granted, this begins a very broad discussion—maybe one beyond the scope of this textbook—but it is one that highlights how governmental policy can influence the application and perception of pest management science.

The fifth and final section includes a chapter (Chapter 18: Safe Biological Control) devoted to nontarget impacts. Case studies include the report of Rhinocyllus conicus, an imported biological control agent for invasive thistles, reducing populations of thistles native to North America. Additional examples are found throughout, especially in the chapters describing biological control programs that import exotic natural enemies. There are detailed passages describing how nontarget studies should be constructed, as well as...