

PREFACE

Natural enemies are organisms that kill or reduce the activity of other organisms and are particularly useful and functionally relevant in agricultural ecosystems due to their contribution to biological control. Every year, arthropod pest outbreaks cause serious losses in agricultural production and to the income of farmers. Sustainable crop protection strategies, through the conservation or enhancement of natural enemies in agroecosystems, can increase production and food quality and security.

The community of natural enemies that inhabits agroecosystems is usually complex because it includes quite diverse taxonomic groups of pathogens, predators and parasitoids, living in structured assemblages that include dominant, accessory and vestigial species. This complexity can be mainly due to multiple trophic interactions established among natural enemies and their prey/hosts. Predators feed on several prey throughout their lifespan and can be more generalists, feeding on a broad range of prey, or specialists, with a demarcated preference for one type of prey, while a parasitoid specimen kills one host during its developmental stages, but it usually is more species-specific than predators. Trophic interactions influence biological control since natural enemies can show preferences for certain food items other than pests. Moreover, the efficiency of natural enemies can depend on their recruitment into the crop and maintenance of their populations at an adequate level. Most of them require non-prey/non-host food resources such as pollen and nectar from flowers and honeydew secreted by phytophagous hemipterans as well as shelters and overwintering places. Several studies demonstrated that spontaneous herbaceous plants occurring as ground cover plants and landscape patches surrounding the arable area can positively influence the abundance of natural enemies in the crop and, consequently, biological control of pests.

When the habitat is disturbed by periodical cuts, tillage or pesticide application, arthropods will be affected and, if they survive, they may need to move to neighboring areas. Pesticides are also deleterious factors for natural enemies and influence behavior, reproduction parameters and, ultimately, survival.

This book includes a broad range of ecological issues about the identification, protection strategies and impacts of agricultural practices on important groups of natural enemies. The core focus includes specific studies on predatory species (e.g., mites, spiders, anthocorids, nabids, carabids, and coccinellids) as well as parasitoid species (hymenopterans). Chapter 1 presents a case study performed in Spanish olive groves with new approaches towards the promotion of biological control mechanisms through the conservation and restoration of natural ecological infrastructures. Chapter 2 focus on the biological control of *Oligonychus perseae* (Tuttle, Baker and Abbatiello), a herbivore mite specific to avocados, performed by predatory mite species (*Euseius stipulatus* (Athias-Henriot), *E. scutalis* (Athias-Henriot), *Neoseiulus californicus* (McGregor), *Galendromus annectens* (De Leon) and *G. helveolus* (Chant)) in a climate change scenario. Chapter 3 provides an overview of the effects of the most common agricultural practices on the biodiversity and life-history parameters of spiders, one of the most abundant and diverse groups of predators in agroecosystems. Chapter 4 shows that crop management can influence the movement of natural enemies that can migrate to surrounding areas. Methods used to determine the movement of natural enemies, their characteristics, as well as advantages and disadvantages of each method are described. Chapter 5 discusses several management strategies required to increase the abundance of the parasitoid species, *Psytalia concolor* (Szépligeti) (Hymenoptera: Braconidae), as potential biological control agent of the key pest of the olive tree, the olive fruit fly *Bactrocera oleae* (Rossi) (Diptera: Tephritidae). Chapter 6 reviews the communities of native parasitoid associated with *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera: Cynipidae), a gall-inducing insect, native to China, that attacks buds of trees from the genus *Castanea* in several invaded countries of Asia, Europe and the USA.

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