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Received August 4, 1994; accepted November 4, 1994

Eur. J. Entomol. **93**: 613–614, 1996
ISSN 1210–5759

BOOK REVIEW

WAJNBERG E. & HASSAN S.A. (eds): BIOLOGICAL CONTROL WITH EGG PARASITOIDS. CAB International, Wallingford, 1994, XIV + 286 pp. ISBN 0-85198-896-2. Price GBP 45.–.

The importance of biological control agents in combating pests in agricultural science has been acknowledged for many years. These agents, including many species of ooparasitoids, have been used widely to exert effective control on many pest species within agriculture and silviculture.

Within the Hymenoptera, ooparasitism of insects and spiders is known from more than a dozen families of both Parasitica and Aculeata. Of those used in biological control, three [Trichogrammatidae, Mymaridae (both Chalcidoidea) and Scelionidae (of Scelionoidea)] are composed entirely of egg parasitoids and a further five [(Encyrtidae, Eulophidae, Eupelmidae, Tetracampidae (all Chalcidoidea) and Platygastridae (of Scelionoidea)] contain non-monophyletic assemblages of egg parasitoids and predators.

Ooparasitoids are cosmopolitan in distribution, indicating their potential for application in biocontrol programmes as natural enemies of pest species. For example, more than one hundred species of *Trichogramma* occur on a wide variety of crops in diverse agroecosystems. The principal advantage of the use of ooparasitoids, in preference to larval parasitoids, in biological control is that they prevent the hatching of the pest species' larvae, early instars of which, usually, cause the most agricultural damage.

The editors [members of the Working Gruup "*Trichogramma* and other egg parasitoids" of the International Organization for Biological Control (IOBC)] intend this publication for a wide audience requiring a practical knowledge of biological control, including students, research entomologists and operators in biological control programmes. Thus, the core of the book is the family Trichogrammatidae, with the remaining aforementioned families providing diverse examples of ooparasitoid habit and application in biocontrol programmes.

Eleven of the twelve chapters may be grouped into three broad areas: (1) trichogrammatid systematics and surveys of the use of ooparasitoids in biological control; (2) selection, production and release of egg parasitoids and (3) ooparasitoid strategies. A twelfth chapter develops several aspects included within areas (2) and (3).

Pinto and Stouthamer (chapter 1) review and present a critique of historical and current aspects of trichogrammatid systematics, emphasising *Trichogramma*. In recommending a global approach, the authors dismiss typology (Symphytologists, take note!) in favour of a complementary, character-assessment based, combination of morphology, allozymes and reproductive characters.

The surveys of the use of egg parasitoids in biocontrol provide stark contrasts. That of Li (chapter 2) discusses, at length, the historical, contemporary and cosmopolitan use of *Trichogramma* with respect to utilisation, release and estimation of effectiveness. The terse nature of Bin's (chapter 7) examination of the use of non-trichogrammatid ooparasitoids (sub-dividing biocontrol into the classic compartments of conservation, augmentation and importation) serves to emphasise the need for greater investigation into the potential use of groups such as scelionids and mymarids.

The selection, production and release of egg parasitoids (chapters 3–6) is dominated by examples from *Trichogramma*, although Grenier (chapter 4) discusses the in vitro rearing of species of Scelionidae, Encyrtidae, Eulophidae and Eupelmidae. The introductory and theoretical sections of Bigler's (chapter 5) examination of quality control in *Trichogramma* production are followed by a succinct and illustrated case study, using *T. brassicae*. Smith (chapter 6) details the plethora of factors that affect the methods and timing of release of ooparasitoids.

Chemical stimuli exert a strong control upon habitat location by *Trichogramma* (Nordlund, chapter 8), whilst many physical and chemical cues are involved in host recognition and acceptance, clutch size and sex ratio adjustment (Schmidt, chapter 9). The ways egg parasitoids have evolved to combat the challenges of the egg as a finite food resource, the brief period of its availability for oviposition and its diminishing quality, over time, as a resource are summarised by Vinson (chapter 10). Overwintering strategies of egg parasitoids are elaborated by Boivin (chapter 11) who concludes that an ability to overwinter successfully is an important criterion in the selection of ooparasitoids forelaborated by Boivin (chapter 11), who concludes that an ability to overwinter successfully is an important criterion in the selection of ooparasitoids for introduction in biocontrol programmes.

At first glance, Wajnberg's (chapter 12) analysis of intra-population levels of genetic variability, as a means improving wasp efficiency through artificial selection programmes, appears to sit rather uneasily within the books' composition by appearing related only distantly to the preceding sections. However, although presumably not intended as either summary or coda, by analysis of three aspects of genetic variation in *T. brassicae* (detection and attack of hosts, distribution of progeny upon hosts and modes of determination of optimal sex ratio, as mentioned by several preceding authors) Wajnberg gathers and investigates seemingly disparate processes under a single theme and, effectively, closes the book.

Aside from the traditional complaint about the book's cost (The r.r.p. is far beyond the reach of many of its target audience and, doubtless, would consume a large slice of the literature-purchase budget in many agronomic institutions in the developing world), a revised edition might include the following: (1) a brief analysis of systematic and taxonomic problems associated with non-trichogrammatid ooparasitoids to complement that of Pinto and Stouthamer on trichogrammatids; (2) a paragraph upon the potential of Aphelinidae as egg parasitoids and (3) an appendix of orders, families and colloquial names of hosts of ooparasitoids. This last is essential for non-specialists who will find the vast array of host taxa an impediment to the understanding that the majority of trichogrammatids have been used against lepidopteran hosts and that the potential of biocontrol of non-lepidopteran hosts lies within families such as Scelionidae and Mymaridae.

Biological Control with Egg Parasitoids has fulfilled the editors aims and, thus, is recommended highly. Its pleasing layout, format, presentation, content and, to some extent, the individual nature of each chapter ensure that the book may be read from cover to cover or selected from, at will. It is rumoured that CAB may extend the notion of a "flip-book" of drawings to future publications on Orussidae, Stephanidae, Pelecinidae, etc.

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