

The ecology of key arthropods for the
management of *Epiphyas postvittana* (Walker)
(Lepidoptera: Tortricidae) in Coonawarra
vineyards,
South Australia

Cate Paull

B.NRM – Hons, The University of Adelaide

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Australian Centre for Evolutionary Biology and Biodiversity
School of Earth and Environmental Sciences
The University of Adelaide
Australia

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Abstract

There is currently little knowledge about the dynamics of invertebrates in Australian viticultural ecosystems. This study was conducted in Coonawarra vineyards over three seasons (years) and has focused on identifying natural enemies, their seasonal phenology, multiple species interactions, and potential for the suppression of the pest lepidopteran *Epiphyas postvittana* (Tortricidae). The work presented in this thesis shows that endemic natural enemies have far greater potential to control *E. postvittana* than has been realised.

An initial survey identified a diverse and abundant range of potential natural enemies. Of these, the species most likely to attack *E. postvittana* include a predatory mite *Anystis baccarum* and a number of hymenopteran parasitoids. The most abundant parasitoid in the vineyards was a braconid, *Dolichogenidea tasmanica*.

Understanding the characteristic behaviour of parasitoids in response to host density can help to gauge their potential for pest suppression. The results of large-scale field experiments showed that the response of *D. tasmanica* to the density of *E. postvittana* was inversely density-dependent, and that parasitism was consistently higher in Cabernet Sauvignon compared with Chardonnay varieties.

Despite the fact that interactions among multiple species of natural enemies can increase or decrease pest suppression, particularly when they share a common prey/host, few multi-species interactions have been investigated. Laboratory studies identified a novel interaction between the predatory mite *A. baccarum* an abundant predator in the vine canopy, the parasitoid *D. tasmanica* and host *E. postvittana* larvae. Although *A. baccarum* readily ate *E. postvittana* eggs and free roaming larvae, they could not access larva in their silk leaf rolls. However, the addition of *D. tasmanica* significantly increased predation of *E. postvittana* larvae, by altering the behaviour of host larvae and increasing their vulnerability to the mite.

Experiments conducted at a landscape level in the Coonawarra showed that *D. tasmanica* was also present in habitat other than vineyards including native vegetation. However, it was not present in highly disturbed habitats. Although the exact mechanism for this remains unknown, results indicate that viticultural practices and resources in the surrounding landscape can influence the presence of parasitoids. Together, the findings presented in this thesis make a significant contribution towards developing sustainable pest management in Australian viticulture.

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

Cate Paull

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**For My Dad
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28.3.1925 – 13.11.2004**