

Hippodamia variegata (Goeze) (Coleoptera: Coccinellidae), a predacious ladybird new in Australia

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Abstract The originally Palearctic but now widespread coccinellid *Hippodamia variegata* was recorded for the first time in Australia at Gatton, Queensland, in November 2000. Since then, it has been recorded preying on 12 different aphid species and a psyllid, on a variety of crops, weeds and ornamental plants. Within a year of its discovery, it had been recorded within a distance of 800 km north and south and 500 km west of the original collection point. Collection and observation records are presented.

Key words Aphididae, aphids, biological control, new record, predation.

INTRODUCTION

The ladybird *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae: Coccinellinae) originated in the Palearctic region (Gordon 1987). It is well known as a common predator of aphids in Europe (Hodek 1973) and has also been recorded from South Africa (Aalbersberg *et al.* 1988), Kenya (Ogenga-Latigo 1994), India (Singh *et al.* 1991), China (Fan & Zhao 1988), Canada (Gordon 1987), USA (Wheeler 1993) and Chile (Araya *et al.* 1997). Within a few years of being accidentally introduced into South Africa in 1967, *H. variegata* had spread throughout the country (Aalbersberg *et al.* 1988). It was deliberately introduced into Chile in 1975 (Zuniga *et al.* 1986) and successfully established (Araya *et al.* 1997).

Numerous attempts were made to establish *H. variegata* in the USA from 1957 to 1983 and from 1987 to 1993 (Ellis *et al.* 1999). The first indication of its establishment was its discovery in the north-east of the USA in 1992 (Wheeler & Stoops 1996). Between 1987 and 1993, the United States Department of Agriculture released more than 500 000 individuals in the mid-west and west of the country (D.J. Nelson, USDA, pers. comm., 2001), apparently without achieving establishment there.

This paper records the discovery of *H. variegata* in Australia and provides records of plant hosts and prey. The potential of *H. variegata* to contribute to pest management and biological control is discussed.

COLLECTIONS AND OBSERVATIONS

Hippodamia variegata was first discovered in Australia at Gatton (27°34'S 152°17'E), Queensland, in November 2000, feeding on the aphid *Rhopalosiphum maidis* (Fitch) on sorghum. Since then, numerous collections and observations

have been made and the ladybird has been recorded feeding on 12 different aphid species and a psyllid (Table 1). In the spring of 2001 it was the most commonly encountered predator in the majority of the major field crops (cotton, lucerne, sorghum, sunflowers, triticale) in southern Queensland. Within 1 year of its first sighting, *H. variegata* had been recorded 800 km north at Emerald (23°31'S 148°10'E), 500 km west at St George (28°03'S 148°35'E) and 800 km south at Warren (31°42'S 147°50'E) in New South Wales.

DISCUSSION

Although interactions 'between predators and their prey, within multispecies systems under the influence of rapidly changing biotic and abiotic variables are difficult to predict' (Symondson *et al.* 2002), *H. variegata* might adopt various roles in Australia.

The ladybird may become a significant component of the beneficial complex that facilitates integrated pest management in a number of crops. It may fill a niche during winter and early spring, as breeding populations were found in field crops during winter in southern Queensland, at a time when other common predacious ladybirds were generally inactive.

In Shan Dong Province, China, *H. variegata* is considered to be a very important predator of *Aphis gossypii* Glover on cotton (Fan & Zhao 1988). Conceivably, it could provide significant biological control in cotton in Australia.

It seems likely that *H. variegata* will provide significant additional predation of *R. maidis* on sorghum. Natural enemies have been shown to play a significant role in keeping this aphid under control and preventing panicle infestations (B.A. Franzmann, unpubl. data, 2001).

Although aphids seem to be its preferred prey, this ladybird may also prove to be a useful generalist predator. It has been recorded as a predator of noctuid larvae (Lepidoptera: Noctuidae) (Araya *et al.* 1997) and leafhoppers (Hemiptera: Cicadellidae) (Singh *et al.* 1991), as well as psyllids (Hemiptera: Psyllidae) in this study (Table 1).

Table 1. Collection and observation records for *Hippodamia variegata* during November 2000 to October 2001. Only original plant host and prey records are shown

Locality	Date	Host	Prey	Collector/Observer
Gatton	27 November 2000	Sorghum	<i>Rhopalosiphum maidis</i> (Fitch)	B.A. Franzmann
Warra	12 March 2001	Cotton	<i>Aphis gossypii</i> Glover	M.R. Wade
Toowoomba	19 March 2001	Hibiscus	Aphid	R. May
Toowoomba	22 March 2001	Rose	<i>Macrosiphum rosae</i> (L.)	R. May
Dalby	10 April 2001	Sunflower	NA	J.E. Hopkinson
Gatton†	9 July 2001	Lucerne	<i>Acyrtosiphon pisum</i> (Harris)	M.R. Wade
Brookstead†	28 August 2001	Triticale	<i>Metopolophium dirhodum</i> (Walker)	B.A. Franzmann
Toowoomba	30 August 2001	<i>Datura</i> sp.	<i>Macrosiphum euphorbiae</i> (Thomas)	R. May
Southbrook†	3 September 2001	<i>Sonchus oleraceus</i>	<i>Hyperomyzus lactucae</i> (L.)	B.A. Franzmann
Southbrook†	3 September 2001	<i>Rapistrum rugosum</i>	<i>Lipaphis pseudobrassicae</i> (Davis)	B.A. Franzmann
Imbil	7 September 2001	<i>Gomphocarpus physocarpus</i>	<i>Aphis nerii</i> Boyer de Fonscolombe	R.L. Powell
Acland	11 September 2001	<i>Matthiola incana</i>	NA	R. May
Biloela†	11 September 2001	<i>Sonchus oleraceus</i>	<i>Uroleucon sonchi</i> (L.)	B.A. Franzmann
Crows Nest†	26 September 2001	Lavender	NA	B.C. Scholz
Goondiwindi	28 September 2001	Faba bean	NA	D.A. Murray
Stanthorpe	10 October 2001	<i>Acacia</i> sp.	Psyllid	G.K. Waite
Stanthorpe	10 October 2001	Peach	<i>Brachycaudus persicae</i> (Passerini)	P.R. Nimmo
Grafton	24 October 2001	Soybean	NA	T. Coleman
Mundubbera	28 October 2001	Citrus	<i>Toxoptera citricida</i> (Kirkaldy)	D. Papacek

†Larvae present. NA, not applicable.

The ladybird is the most important predator of the Russian wheat aphid, *Diuraphis noxia* (Mordvilko) in South Africa (Aalbersberg *et al.* 1988). Laboratory studies in the USA showed that it could, on establishment, be an important predator of the greenbug, *Schizaphis graminum* (Rondani) there (Michels & Flanders 1992). If these two major aphid pests entered Australia they could pose a considerable threat to Australian wheat, barley and sorghum crops. Should either of these aphids establish in Australia, *H. variegata* might be expected to play a significant role in their biological control.

Despite these positive predictions about the future of *H. variegata* in Australia, its establishment may equally be a curse, as it may adversely affect native ladybirds as has occurred with other ladybird invasions in other countries (Elliott *et al.* 1996; Wheeler & Stoops 1996).

It is not known how the ladybird arrived in Australia. The location of the first sighting and the chronology of subsequent records suggest the introduction occurred in south-east Queensland. As a minimum of an inseminated female would have had to arrive for successful establishment, it would seem most likely that the introduction was in commerce.

Hippodamia variegata is the only member of its genus in Australia. Other common ladybirds of similar appearance in the habitats now occupied by *H. variegata* are *Coccinella transversalis* Fabricius, *Coelophora inaequalis* (Fabricius), *Harmonia conformis* (Boisduval), *Harmonia octomaculata* (Fabricius) and *Micrapsis frenata* (Erichson). The new ladybird can be distinguished from these by its black pronotum with pale yellow anterior and lateral borders and a spot (or blotch) on each side of the middle. Specimens are deposited in the Department of Primary Industries' collection, Indooroopilly, and the Australian National Insect Collection, Canberra, Australia.

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