A TALE OF TWO ENEMIES

Will the introduction of a generalist predator improve or disrupt biological control?

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Paropsis charybdis adults and larvae feed on eucalypt foliage. The key pest of eucalypt plantations in New Zealand.

Enoggera nassaui first introduced to New Zealand in 1987, now well established. Attacks a high proportion of *P. charybdis* eggs in the field.

Cleobora mellyi introduced to New Zealand between 1979 and 1987. Survived only in the Marlborough Sounds. Feeds on eucalypt psyllids and *P. charybdis* eggs.

AIMS

Quantify feeding preferences of the ladybird, *Cleobora mellyi* Mulsant for parasitised and unparasitised eggs of the eucalyptus tortoise beetle *Paropsis charybdis* Stål.

Assess the impact of predation by *C. mellyi* on the egg parasitoid *Enoggera nassaui* (Girault) and their respective roles as biological control agents of *P. charybdis*.

BACKGROUND

Cleobora mellyi needs psyllids to breed successfully.

One eucalypt psyllid species at time of introduction, several psyllids now present.

Lack of suitable prey may have prevented widespread establishment of *C. mellyi*.

A new opportunity to mass rear and release *C. mellyi* around New Zealand.

Will this enhance or reduce suppression of *P. charybdis* by *E. nassaui*?

METHODS

Experimental conditions were 22ºC, 65% rh, 12L:12D. Each ladybird was used only once and a 50:50 sex ratio maintained in each experiment. *P. charybdis* egg batches came from a laboratory colony and were laid directly onto *Eucalyptus nitens* foliage. Fresh eggs were exposed to *E. nassaui* for 24 hours then incubated for 3-4 days until colour changes indicated the eggs had been parasitised. All prey items were presented on their original foliage.

a) 20 ladybirds in individual petri dishes (90 mm diameter) presented with one parasitised and one unparasitised batch of *P. charybdis* eggs of equal size (± 1 egg). Number of eggs eaten in each batch recorded after 24 hours. Ladybirds watched for one hour to record first choice of prey (if any).

b) Same procedure except parasitised *P. charybdis* egg batches were replaced with a minimum of 10 eucalypt psyllids. First prey choice and number of *P. charybdis* eggs eaten were recorded.

c) 10 ladybirds released into a plastic mesh cage (300 x 300 x 300 mm) containing 10 stems of *E. nitens* foliage. Each stem had one parasitised and one unparasitised *P. charybdis* egg batch attached to its leaves. The 20 egg batches were selected to give equal numbers of each egg type. Number of eggs eaten recorded after 24 hours. This test was replicated three times.

RESULTS

Figure 1. Individual ladybirds ate more unparasitised *P. charybdis* eggs than parasitised (paired sample t-test, t = 7.98, P < 0.001) and consumption of unparasitised eggs increased slightly in the presence of psyllids.

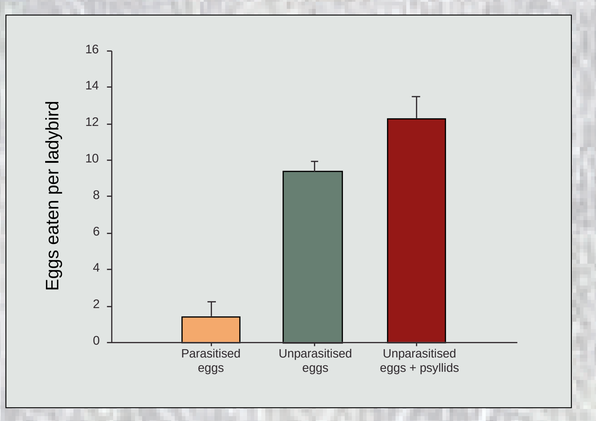


Figure 2. a) Ladybirds more frequently chose unparasitised eggs first than parasitised (chisq = 7.14, P = 0.008).

b) Twice as many ladybirds chose psyllids first over unparasitised eggs although the difference was not significant (chisq = 2.58, P = 0.108).

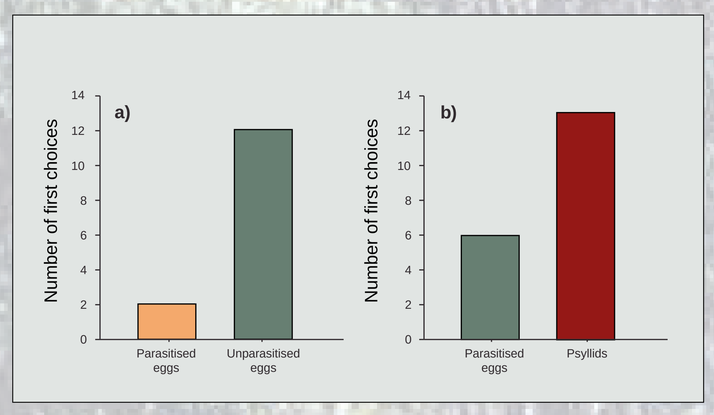
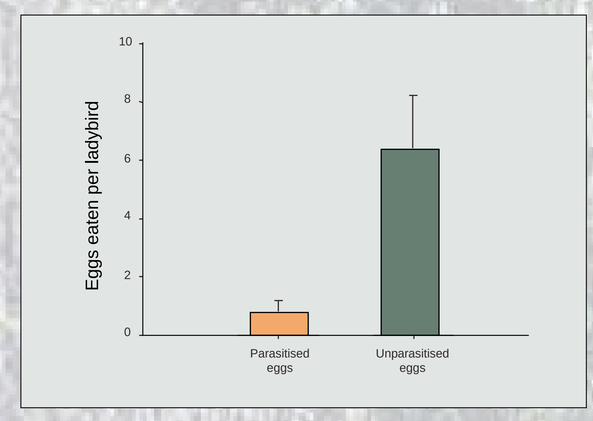


Figure 3. Groups of 10 ladybirds consumed more unparasitised eggs than parasitised however consumption varied between groups and the difference was marginally non-significant (paired sample t = 3.84, P = 0.062).



CONCLUSIONS

Data trends indicate that adult *C. mellyi* prefer psyllids > *P. charybdis* eggs > parasitised eggs.

Wider establishment of *C. mellyi* should not be detrimental to suppression of *P. charybdis* by *E. nassaui*.

Acknowledgements

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