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Pear psylla, pear

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LABORATORY TESTS TO COMPARE THE PREDATORY VALUE OF FIVE MIRID SPECIES AGAINST PEAR PSYLLA (*CACOPSYLLA PYRICOLA*) EGGS

The functional response of a predator to different prey densities is an accepted methodology to describe predatory behaviors under controlled conditions. For most predaceous insects, the number of prey consumed per predator directly proportional to the number of prey available at low prey densities, but gradually decreases at higher prey densities (type II functional response). Searching efficiency and handling time are two predatory behaviors determining the curvature and upper asymptote of the functional response.

This study compared the functional response characteristics of five species of predaceous mirids attacking eggs of the pear psylla (*Cacopsylla pyricola*). Test subjects included adults of *Campyloneura virgula*, *Diaphnocoris provancheri*, and *Phytocoris fraterculus*, and both the final nymphal instar and adult life stages of *Pilophoris perplexus* and *Deraeocoris brevis*. The experimental arena consisted of five pear leaves on a 'Bartlett' terminal shoot infested with psylla eggs and enclosed in a clear mylar cylinder. Terminals of varying egg density were exposed to a single starved test animal at 75° F and 16:8 L:D photoperiod for 24 hours. Numbers of eggs destroyed were determined by subtracting the number of whole eggs remaining after exposure from the number prior to exposure. The type II equation for each species was determined by non-linear regression. Psylla eggs on control terminals were treated similarly, but were not exposed to predation.

The response of most predators to varying prey density resembled the type II functional response. Fifth instar *D. brevis* subjects, which were offered only a few heavily infested terminals, showed a more linear (Type I) response. Table 1 shows the type II parameters derived for each species. Adult *D. provancheri* were predicted to destroy the most psylla eggs in 24 hours at the experimental conditions (F_{max}), while C. virgula adults were predicted to destroy the least. The low r^2 values may be due to differential distributions of psylla eggs among the five leaves at high densities. Linear regression showed that the number of eggs on control terminals before treatment were not significantly different after treatment than before ($r^2 = .98$, $P = .00001$, $N = 17$). Further analysis of the data may reveal differences in foraging behavior among leaf position and density. Despite differences among species and life stages, all five generalist predators consumed large numbers of psylla eggs under these conditions, demonstrating their potential as biological control agents of the pear psylla.

Table 1. Values of functional response parameters as estimated by non-linear regression. N = number of observatons, a = search constant, T_h = handling time ($days^{-1}$), F_{max} = predicted maximum number of psylla eggs consumed/day.

Species	Life Stage	N	r^2	a	T_h	F_{max}
D. provancheri	Adult	39	.532	0.765	0.0025	399
P. perplexus	Adult	48	.516	1.075	0.0039	258
P. perplexus	5th Instar	26	.493	1.329	0.0050	198
P. fraterculus	Adult	22	.469	0.838	0.0044	228
D. brevis	Adult	33	.555	1.064	0.0041	226
D. brevis	5th Instar	28	.558	0.602	$7*10^{-10}$	---
D. brevis	4th Instar	26	.583	0.943	0.0049	205
C. virgula	Adult	66	.647	0.854	0.0056	179