

**Predators of the Alfalfa Weevil, *Hypera postica* in
Western Nevada—a Greenhouse Study.
(Coleoptera: Curculionidae)**

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Abstract: Some insect predators of the alfalfa weevil commonly found in the alfalfa fields of Western Nevada were screened for their predatory efficiency against the alfalfa weevil larvae and the pea aphids. By offering each predator species a combination of the alfalfa weevil larvae and pea aphids as diet, their preference for the host insects was determined.

The three lady beetle species, the big eyed bug and the nabid bug preferred to feed upon the pea aphids; whereas, the soft winged flower beetle, *Collops bipunctatus* Say, significantly preferred to feed upon the alfalfa weevil larvae and hence could be of importance in the biological control of the alfalfa weevil.

INTRODUCTION

Biological control of the alfalfa weevil, *Hypera postica* (Gyllenhal), has been given considerable attention but most of the studies in this field have been confined to the weevil parasites. Only a limited number of studies have been done involving insect predators of this pest. In an alfalfa field in Utah, Webster (1912) observed that the darkling ground beetle, *Eleodes sulcipennis* Mann., the soft winged flower beetle, *Collops bipunctatus* (Say), the imperfect tiger beetle, *Cicindela imperfecta* Lec., larvae and adults of *Hippodamia sinuata* var. *spuria* and larvae of *Hippodamia convergens* and *Coccinella nine-notata* fed on the alfalfa weevil larvae. Adults of *H. convergens* were reported by Essig and Michelbacher (1933) to feed upon the larvae of the alfalfa weevil. Kaddou (1960) found that *H. quinquesignata* (Kirby) preyed upon small alfalfa weevil larvae in Utah. Clausen (1962) also reported that *C. bipunctatus* fed on the alfalfa weevil larvae; and Yadava and Shaw (1968) studying predatory behavior of some Coccinellids, found them to prefer pea aphids over the alfalfa weevil larvae. This report includes a greenhouse study of the predatory efficiency of some of the entomophagous insects commonly found in the alfalfa fields of Nevada, against the alfalfa weevil larvae; and if these predators ex-

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hibited any preference for the pea aphids, *Acyrtosiphon pisum* (Harris) or the alfalfa weevil larvae.

METHODS

Six species of entomophagous insects were used in this study. These were three lady beetle species; *Hippodamia convergens* (G-M), *Hippodamia sinuata disjuncta* (Timberlake) and *Coccinella transversoguttata* (Fald.); a soft winged flower beetle, *Collops bipunctatus* (Say); a big eyed bug, *Geocoris pallens pallens* (Stal) and a nabid bug, *Nabis americanoferus* Carayon. The alfalfa weevils and the predators were collected from the alfalfa fields in Gardnerville, Fallon and Lovelock, Nevada. The alfalfa weevil larvae were reared on alfalfa plants in the greenhouse. Adult weevils were allowed to oviposit in the caged alfalfa stems, eggs were removed and incubated at 81 ± 1 F and 70% relative humidity in a temperature controlled cabinet. Larvae hatching out of these eggs were transferred to caged alfalfa plants in the greenhouse and were used for feeding experiments. The pea aphids were reared on potted alfalfa plants in the greenhouse. The feeding experiments were conducted in the greenhouse where the temperature ranged between 50 F at midnight to 85 F at midday, and the relative humidity ranged between 30 and 50%. The feeding behavior of the predators was studied in petri dishes with screened tops.

The predators were starved for a period of 12 hours prior to the feeding study. Each sex of a predator species was individually allowed to feed upon a combination of 40 pea aphids and 40 alfalfa weevil larvae for a period of 8 hours, but an observation was made every two hours. Small sized pea aphids were used in combination with the first instar weevil larvae, medium sized pea aphids with the second instar larvae and large pea aphids with the third instar weevil larvae. Ten replicates were obtained for each experiment and the average so obtained was used to interpret the results. The student "t" test was used to statistically analyse the results at 0.05% level.

RESULTS

The feeding of the predators on the two host species, in terms of number of each host eaten, is shown in the table. When a combination of small pea aphids and the first instar weevil larvae were offered, the three lady beetle species and *C. bipunctatus* showed no significant preference for either of the two hosts and each host was preyed upon at random. The two Hemiptern predators, however, decidedly preferred to feed upon the pea aphids. Similarly, *H. convergens* and *C. transversoguttata* did not show any significant preference for either host when a combination of second instar weevil larvae and medium sized pea aphids were offered as diet. *H. sinuata disjuncta*, *G. pallens pallens* and *N. americanoferus* preferred to feed upon pea aphids, while *C. bipunctatus* significantly preferred to feed upon the weevil larvae. In case when the third

TABLE 1. Average number of host insects eaten by the predator species in a period of 8 hours when a combination of the host species was offered as diet.

Host combination	Predator species											
	<i>H. convergens</i>	<i>C. transversoguttata</i>	<i>H. sinuata disjuncta</i>	<i>C. bipunctatus</i>	<i>G. pallens pallens</i>	<i>N. americanus</i>						
	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male
Small aphids	16.3	21.0	19.5	18.2	9.0	13.3	7.1	5.7	2.9*	6.1*	6.4*	10.3*
1st instar larvae	14.3	17.1	16.1	15.8	7.4	9.7	8.1	7.1	1.3	3.0	3.2	6.3
Medium aphids	4.2	6.3	8.6	8.7	4.9*	5.9*	4.2	4.0	2.0*	2.7*	4.3*	4.4*
2nd instar larvae	3.6	4.4	7.1	7.2	1.7	2.5	6.4*	6.5*	0.9	1.3	1.3	2.0
Large aphids	4.2*	5.2*	3.9*	5.3*	3.1*	3.2*	1.7	0.8	1.8*	1.8*	3.1*	2.7*
3rd instar larvae	1.0	0.9	1.8	1.6	0.3	0.9	1.9	3.1*	0.6	0.8	0.0	0.6

* Significant preference at 0.05% level, using student "t" test.

instar weevil larvae and large pea aphids were presented together, all the predator species except *C. bipunctatus*, preferred to feed upon the pea aphids; whereas the female *C. bipunctatus* preferred to feed upon the weevil larvae and the male did not show preference for either of the two hosts.

Although all the predator species used in this study feed upon the alfalfa weevil larvae in the presence of the pea aphids, a host of great competitive importance to the alfalfa weevil larvae, the *Collops* beetles distinctly prefer the weevil larvae as opposed to the pea aphids and could be of importance in the biological control of the alfalfa weevil. These studies were conducted in the greenhouse conditions and hence may not truly represent the behavior of these predators in the field.

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