

# ECOLOGY OF ANTHOCORID (HEMIPT.: ANTHOCORIDAE) PREDATORS OF THE PEAR PSYLLA (HOMOPT.: PSYLLIDAE) IN THE OKANAGAN VALLEY, BRITISH COLUMBIA

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## ABSTRACT

The supposition is not valid that the disappearance of the native *Anthocoris melanocerus* from pear orchards late in the summer is because of competitive displacement by the introduced *A. nemoralis*. It is because *A. melanocerus* migrates to where prey are most abundant whereas *A. nemoralis* remains on pear. *A. melanocerus* is concentrated on willows in the spring, moves to pear when *Psylla pyricola* becomes abundant, and moves to cottonwood when aphids on it become abundant and the numbers of *P. pyricola* on pear have become low.

## INTRODUCTION

Three species of predacious anthocorids attack the eggs and nymphs of *Psylla pyricola* Forster, the pear psylla, in the Summerland area of the Okanagan Valley, British Columbia (McMullen and Jong, 1967). Two, *Anthocoris melanocerus* Reuter and *A. antevolens* White, are natives. The third, *A. nemoralis* (F.), had been introduced into that district from Switzerland in 1963 in a biological control attempt against *P. pyricola* (McMullen, 1971). It became established and subsequently became the most common of the three species in some orchards. *A. melanocerus* also is common but *A. antevolens* is relatively scarce.

Local orchard entomologists noticed that *A. melanocerus* disappears late in the summer from orchards where *A. nemoralis* is common, whereas *A. nemoralis* remains there until it moves to hibernation sites. Possible causes of this disappearance were investigated in 1969, notably to see whether or not it was because of competitive displacement (as defined by DeBach and Sundby, 1963, and DeBach, 1966) of *melanocerus* by *nemoralis* as was suggested by McMullen (1971). The existence of competitive displacement would tend to support the view of Turnbull and Chant (1961) that species being considered for introduction for biological control purposes should be screened to ensure that they will not interact detrimentally with others that attack the same target species.

Populations of anthocorids and of psyllids were sampled regularly in four pear orchards that contained *A. nemoralis* and in two that had not yet been colonized by it, in hibernation sites, and on 31 species of plants growing in

and near the orchards. *A. antevolens* was found only relatively rarely in these surveys, perhaps because there was heavy mortality of the hibernating population during the winter of 1968-69 which was exceptionally cold (-20 to -30 F). Consequently meaningful figures were obtained only for *A. nemoralis* and *A. melanocerus*. Six species of plants other than pear had substantial populations of *Anthocoris* spp.: willows (*Salix* spp.), cottonwood (*Populus trichocarpa*), ash (*Fraxinus* spp.), birches (*Betula* spp.), nettle (*Urtica lyallii*), and thistle (*Cirsium edulii*).

*Psylla pyricola* populations on pear were measured by counting the numbers of eggs and nymphs on 50 leaves picked at random from five trees in each orchard on each sampling date. Anthocorid populations were measured by sampling regularly, for adults and nymphs, ten pear trees in each orchard, and willows and cottonwoods nearby, with a beating-tray technique.

## RESULTS AND CONCLUSIONS

The population surveys on pear showed that:

(a) *P. pyricola* reached a peak in numbers in June when there was an average of 5 to 10 individuals per leaf. It then decreased to about one per leaf by the beginning of August and remained at or near that level until the end of the season.

(b) *A. nemoralis* appeared first late in April, increased to a peak late in July and early in August, and then declined to the end of October.

(c) *A. melanocerus* appeared first early in June, reached a peak about mid-July, and had disappeared by early August.

The early disappearance of *A. melanocerus* was not because it went into hibernation early,

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because surveys by means of artificial hibernation sites consisting of bands on tree trunks showed that all three species of *Anthocoris* sought hibernation sites at about the same time in any one locality.

(d) *A. melanocerus* disappeared from pear orchards early in August whether or not they were inhabited by *A. nemoralis*. Moreover, chi-square analyses of the numbers of *A. melanocerus* found on pear on each sampling date showed that the populations were statistically equal in orchards with and without *A. nemoralis*.

Thus, the indications were that *A. nemoralis* had no direct or significant influence in causing the disappearance of *A. melanocerus*, and therefore that there was no competitive displacement of the native species by the introduced *A. nemoralis*.

The surveys for *Anthocoris* spp. on willow and cottonwood showed that:

(a) *A. nemoralis* occurred on willows during the second half of May, but otherwise this species was apparently virtually specific to pear.

(b) *A. melanocerus* occurred on willows from late in April until early in June and, in large initial numbers, on cottonwood from late in July until at least mid-September (the last survey date).

Two species of psyllids, a *Trioza* sp. and *Psyllasp.* (not *pyricola*), that were common on willows in the spring and an unidentified aphid that was abundant on cottonwood in the late summer were the main prey of *A. melanocerus* on those plants.

Where *A. melanocerus* occurred commonly at different times during the season evidently

depended on where suitable prey insects were most abundant. It seems reasonable to conclude that its disappearance from pear during the second half of July was because food supplies in the form of *P. pyricola* had become scarce on pear or, in the form of aphids, abundant on cottonwood, or both, and that this caused *A. melanocerus* to migrate from pear to cottonwood.

Scanty data obtained on *A. antevolens* indicates that it may have similar habits to *A. melanocerus*.

It is possible that *A. nemoralis* could have had some indirect influence in causing *A. melanocerus* to leave pear late in July by contributing to lowering the population of *P. pyricola* to the level that may have induced *A. melanocerus* to move to more abundant prey on other plants.

The existence of willows near pear orchards evidently contributes to the natural control of *P. pyricola* because they have large populations of prey psyllids in the spring on which populations of *A. melanocerus* build up and then move to the pear trees. Whether or not the willows influence in the same manner the populations of *A. nemoralis* on pear is not known. If they do, the influence probably is minor because larger populations of *A. nemoralis* developed in the spring on pear than on willows.

#### Acknowledgements

The authors wish to thank Dr. R. D. McMullen, Research Station, Canada Department of Agriculture, Summerland, for much advice and assistance during this investigation, which was financed by an Operating Research Grant to B. P. Beirne from the National Research Council of Canada.

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