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New Host Records and Developmental Notes on the Pear Slug *Caliroa Cerasi* (Hymenoptera: Tenthredinidae), Feeding on *Cotoneaster* and *Chaenomeles* Species.

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NEW HOST RECORDS AND DEVELOPMENTAL NOTES ON THE PEAR SLUG *CALIROA CERASI* (HYMENOPTERA: TENTHREDINIDAE), FEEDING ON *COTONEASTER* AND *CHAENOMELES* SPECIES.

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ABSTRACT

The pear slug, *Caliroa cerasi* was collected and reared to adulthood on flowering quince and three species of *Cotoneaster*. This is the first record of *C. cerasi* attacking any member of the genus *Chaenomeles* and the first confirmation of feeding on *Cotoneaster* in North America. Adult emergence, oviposition, and larval development were evaluated under both laboratory and field conditions. Females lay an average of 48 eggs, with about two-thirds of the oviposition occurring during their first 24 hours. A method for monitoring adult emergence in the field was developed.

The pear slug, *Caliroa cerasi* (L.) is an introduced sawfly pest of Eurasian origin that is most commonly found on Rosaceae (Cook 1914, Britton 1921). Defoliation of ornamental *Prunus* and *Crataegus* is occasionally severe enough to require insecticidal suppression (Carl 1972, 1976). Damage to *Cotoneaster* by larval *Caliroa* spp. may also be significant (Johnson and Lyon 1976), but because no adults have been reared from these specimens and larval keys are inadequate for species confirmation (Smith 1971; pers. commun), the role of *C. cerasi* remains uncertain. The pear slug is not known to attack *Chaenomeles* (Smith 1971).

Severe defoliation of several *Cotoneaster* and *Chaenomeles* species was observed in Madison, WI during July and August, 1986. Our experiments were conducted to determine the identity of the *Caliroa* species, and determine its developmental success on various *Cotoneaster* hosts.

MATERIALS AND METHODS

Larvae were collected from 24 August–4 September, 1986 in Madison, WI on hedge *(Cotoneaster lucidus),* many-flowered *(C. multiflorus),* and cranberry *(C. apiculatus)* cotoneaster, and a quince hybrid *(Chaenomeles speciosa* × *Chaenomeles japonica).* Host plants were confirmed by E. Hasselkaus, Horticulture Department, University of Wisconsin.

Ten larvae from each host were reared in an environmental chamber held at 22°C, 16:8 L:D. The larvae were kept in 22 × 6 cm plastic boxes. Fresh shoots of the appropriate host species were secured in vials of distilled water with cotton plugs. Late instar larvae were provided with 50:50 mixes of soil and sphagnum moss for cocooning. The chambers were observed daily for adult emergence. Adult specimens were submitted to S. Krauth, Dept. of Entomology, Univ. of Wisconsin for identification.

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Adults were transferred to new chambers containing fresh foliage so that oviposition could be observed. Only hedge cotoneaster was available by this time due to autumn senescence. These chambers were examined daily. Oviposition, adult survival, and larval eclosion were recorded.

Three sites at which infestations occurred in 1986 were examined from 1 May to 7 July, 1987. Two plantings consisted of hedge cotoneaster, while the remaining site was a mixture of cranberry cotoneaster, many-flowered cotoneaster and hybrid quince. Wooden boxes (43 cm × 31 cm × 2.5 cm high) were placed on the soil beneath the shrubs. A 2.5 cm o.d. × 5.7 cm glass vial was screwed into a hole at the top of the box. Damp, crumpled paper toweling was provided in the vial. These boxes were examined every one to four days throughout the sampling period. There were 6, 5, and 3 boxes at sites 1, 2, and 3, respectively. Each time the vials were sampled, the hedges were extensively examined for *C. cerasi* adults, eggs, and larvae. Percent defoliation was estimated at these sites, and neighboring sites were examined periodically.

Spatial and temporal distribution of sawflies collected in the traps were analyzed by ANOVA (Steel and Torrie 1960). Curve fitting was performed using the linear regression subprogram of RS1/RPL by BBN.

RESULTS AND DISCUSSION

All adult sawflies were confirmed as *C. cerasi*. The tentative host plant identifications were also confirmed. This is the first record of *C. cerasi* attacking any member of the genus *Chaenomeles* and the first confirmed feeding on *Cotoneaster* in North America. The latter observation is significant because European *C. cerasi* consist of several ecotypes with regard to host plant utilization (Carl 1972) and the source of the American introduction is unknown.

The levels of damage in the field (% leaf skeletonization) were: Hedge cotoneaster- 90%, cranberry cotoneaster- 50%, hybrid quince- 35%, many-flowered cotoneaster- 10%. Since all of these shrubs were within 15 m of each other, this suggests a relative preference for hedge cotoneaster.

Larvae began to spin cocoons on 9 September, and all cocooning was completed by 19 September. Larvae were able to complete development on all four hosts. Dissection of cocoons indicated that adults are fully formed within about 10 days. Adults emerged from 29 September to 15 October. Survival from late instar larvae to adults averaged 26.7 ± 22.5% ($P < 0.05$) with no apparent differences between hosts.

Adults began ovipositing almost immediately. They averaged 48.5 ± 17.8 ($P < 0.05$, $N = 6$) eggs per female, with most of the eggs being deposited during the first day (Figure 1). This corresponds very closely to the fecundities of 50.3 and 47.0 reported on larvae fed *Prunus* by Tadic (1956) and Carl (1972), respectively. However, no eggs were deposited after 4 days, compared to the mean ovipositional period of 7.4 days observed under laboratory conditions by Carl (1972). Two females were observed for the first two hours after being provided with host tissue (14:00), and they laid 7 and 8 eggs respectively during this period. Females were able to produce viable eggs regardless of the host plant on which they developed. Adult longevity averaged 3.0 ± 0.94 ($P < 0.05$, $N = 6$) days. The females are photopositive and undergo reflex immobilization if disturbed. The latter response consists of the insect folding up its legs and rolling downward.

Eggs turn from dark brown to light tan in three to four days. Larval eclosion occurs six to seven days after oviposition and averages 50.1 ± 34.9% ($P < 0.05$) under these conditions. Early larval feeding is indicated by small "shot holes" in the foliage. Cocooning occurred after 14 days, demonstrating complete development on hedge cotoneaster.

The first *C. cerasi* to emerge in the field in 1987 were observed on 10 May. Emergence continued until 17 June, after which no adults were present (Figure 2a). The box traps were effective in capturing *C. cerasi* adults. After completing development, the sawflies emerge from the soil and orient to the light source, thus becoming trapped in the vials.

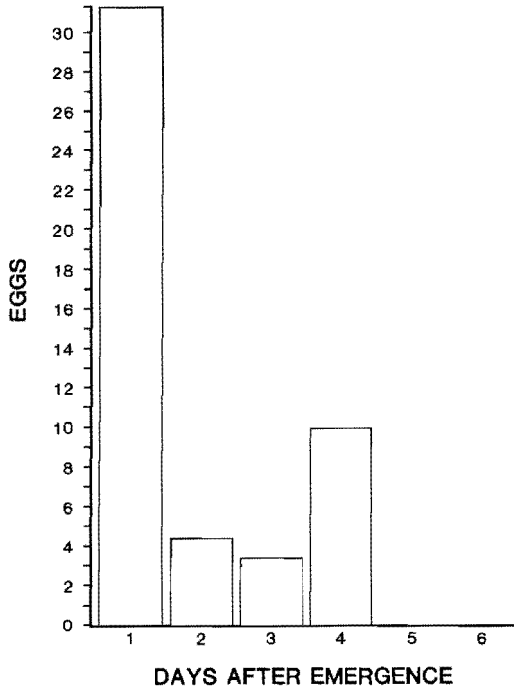

Fig. 1. Oviposition by *C. cerasi* on *C. lucidus* under laboratory conditions.

The folds of moistened paper provide them with sufficient footing and shelter to help prevent their return to the ground. Adults were captured in the traps from 20 May to 8 June (Figure 2b).

Peak adult emergence occurred from 21 May to 4 June, with 90% of the visually located and 82% of the trapped sawflies being found during this period. The clustered temporal distribution was highly significant ($F = 2.32$, $P < 0.003$). Spatial distribution was highly clustered as well. Only Site 2 provided enough trapped sawflies for statistical analysis, and at this location 93% were found in only two of the five boxes ($F = 2.53$, $P < 0.045$).

The trapping method provided a good estimate of total *C. cerasi* adults present. The number of visually located adults (VL) was related to the number of trapped adults (TR) on each day by

$$VL = (12.40 * TR) + 4.41 \qquad r^2 = 0.60,\ F = 28.77,\ P < 0.001.$$

Egg blisters first appeared on 26 May and newly formed blisters were observed as late as 1 July. The first larvae emerged on 4 June, and brood from the first generation were present until late July. Minor pin-hole feeding scars were present on 4 June, but extensive shrub damage was not apparent until mid-June.

Defoliation was most severe on hedge cotoneaster. By 27 June, both hedge cotoneaster sites had undergone at least 85% damage, consisting of about 75% brown skeletonized leaves and approximately 10% leaf drop. Damage at the mixed site was only about 1%. By early July, damage to the hedge cotoneasters was 90–95%, and damage to cranberry

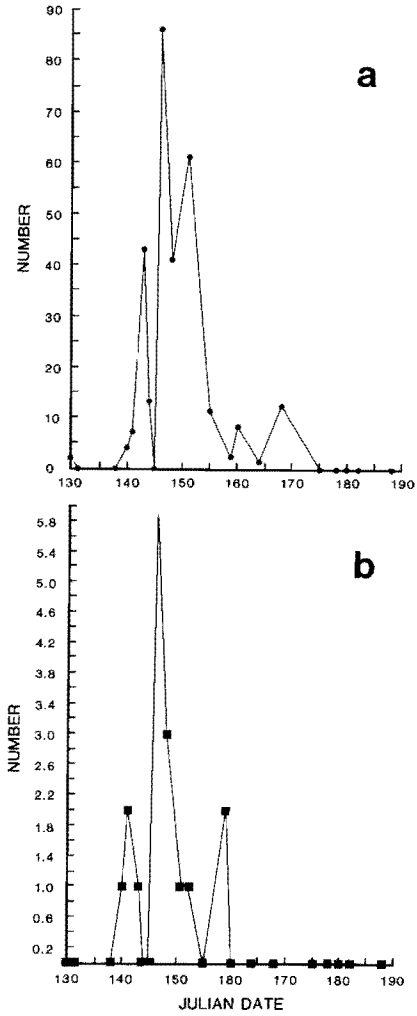

Fig. 2. Emergence of *C. cerasi* in 1987 from *Cotoneaster* sites experiencing defoliation in 1986. a) Sawflies located by direct observation; b) Sawflies collected in box traps.

cotoneaster, hybrid quince, and many-flowered cotoneaster was 20%, 10%, and < 1%, respectively. This corresponds with our 1986 field observations. By mid-July second generation egg blisters were observed. At the same time a group of hedge and many-flowered cotoneasters located near (0.4 km) the two infested hedge cotoneaster sites was undergoing the early stages (<1% damage) of infestation. These plants were probably being attacked by emigrants from the heavily infested sites, as there was no other apparent source of pear slugs. This supports the view of Carl (1972) that outbreaks over

large areas usually originate from very small, localized populations. Some reflushing of new foliage follows severe defoliation.

Our results suggest that where the pear slug requires control tactics on ornamental *Prunus*, neighboring *Cotoneaster* and *Chaenomeles* should be considered as potential reservoirs for population buildup. Conversely, these hedge species are susceptible to pear slug attack. Of these, hedge cotoneaster appears most important. Trapping emergent adults as described may be a useful passive method of monitoring for the pear slug, as our trap catches preceeded egg blisters and noticeable defoliation by about six days and one month, respectively, and related to actual pear slug numbers.

ACKNOWLEDGMENT

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