Attraction of males by virgin females of the green capsid bug *Lygocoris pabulinus* (Heteroptera: Miridae)

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Abstract: Males of the green capsid bug *Lygocoris pabulinus* (Linnaeus) were caught on delta traps containing caged virgin females. Captures in traps with a single female were highly variable, but in average as high as on pure white sticky traps. Traps with three females were more effective. Flight curves established with female traps and white traps were similar, and apparently equally influenced by weather.

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Introduction

Young nymphs of the green capsid *Lygocoris pabulinus* (Linnaeus) may cause considerable damage to the fruit in apple and pear orchards. A tapping sample shortly after the hatching of the winter eggs in late April or early May, is currently recommended to establish the presence of this irregularly occurring pest and the necessity of its control (Van Frankenhuyzen & Gruys, 1984). A patchy distribution, together with a high damage : density relation makes this sampling method rather unreliable (Bus *et al.*, 1985). Therefore, we decided to try other means to determine the presence of this species. This paper describes a successful attempt to trap males with virgin females.

Material and methods

The experiments were conducted in an experimental orchard with commercially high densities of *L. pabulinus*.

Half- to full-grown nymphs were collected in the field and reared individually on either apple or potato shoot tips in cotton stoppered glass tubes to provide virgin females for the traps.

Three kinds of traps were used. A delta trap (17×20 cm^2, h 15 cm) made of clear plastic with a large inner chamber between two vertical sheets of gauze (fig. 1) was the most commonly used. The tips of one or two growing shoots were inserted through a hole into the chamber.

In 1985, this trap was compared with two others, with potato shoots as feeding source. The second trap was also a delta design, but with a small cage of PVC-tubing (diam. 3, length 5 cm) hanging from the roof. This cage was closed at both sides with gauze and had a small hole for inserting a shoot tip that was fixed with a wetted cotton wick at the outside. The third trap (fig. 2) consisted of a vertical tube (diam. 3 cm) of metal gauze closed at both ends, and fixed between 2 yellowish plastic plates (diam. 20 cm). A piece of sprouting potato, partly wrapped in plastic foil to delay desiccation, was used in both traps 1 and 3.

The traps were hung at a height of approximately 150 cm in 20 year-old apple trees during 1985 and 1986, and at about 100 cm in 4-year old trees in 1987. Tangletrap™ was used to retain bugs that entered the traps.

Traps with and without bait were compared in 1984 and 1985. A comparison between captures in type-1 traps, three with one and one with three females, and four sticky white traps (type Rebell; Remund & Boller, 1978) was made in 1987. They were deployed in four adjacent 0.4 ha plots and inspected almost daily. The four female traps were arranged in a square with 12 m sides, and the sticky traps were 9 m from the nearest female trap. Dead

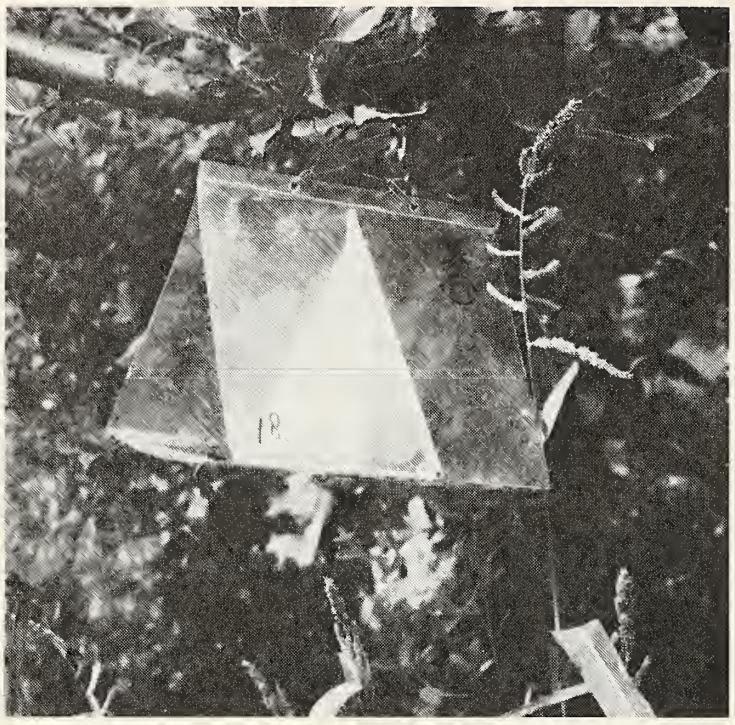

Figure 1. Type-1 delta trap.

females in the traps were replaced at every, almost daily, inspection, and all females were changed on 22 and 29 June. Tapping samples (Van Frankenhuyzen & Gruys, 1984) of 100 branches were taken in each plot on 11, 19 and 22 May, in order to estimate the population densities (of nymphs) previous to the experiment.

Results

In a first experiment in the summer of 1984, four males were found in three female-baited type-1 traps after four days, whereas no males were trapped in eight control traps and in another five female-baited traps, in four of

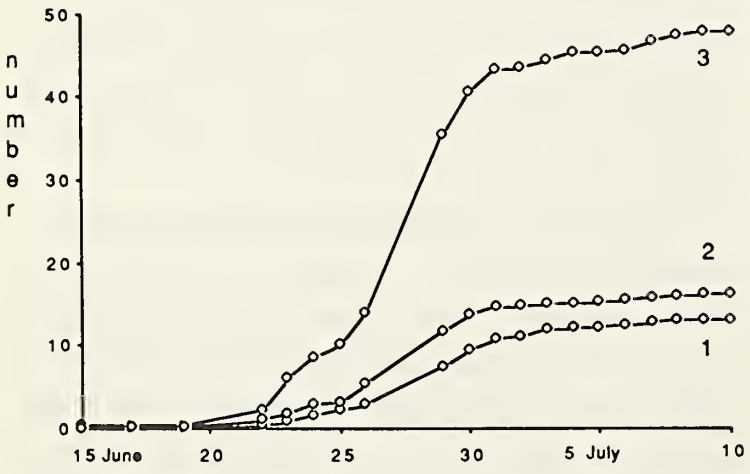

Figure 3. Cumulative average numbers of male *L. pabulinus* captured on traps containing (1) one or (3) three virgin females, and on (2) white sticky traps in four plots in 1987. Start 11 June.

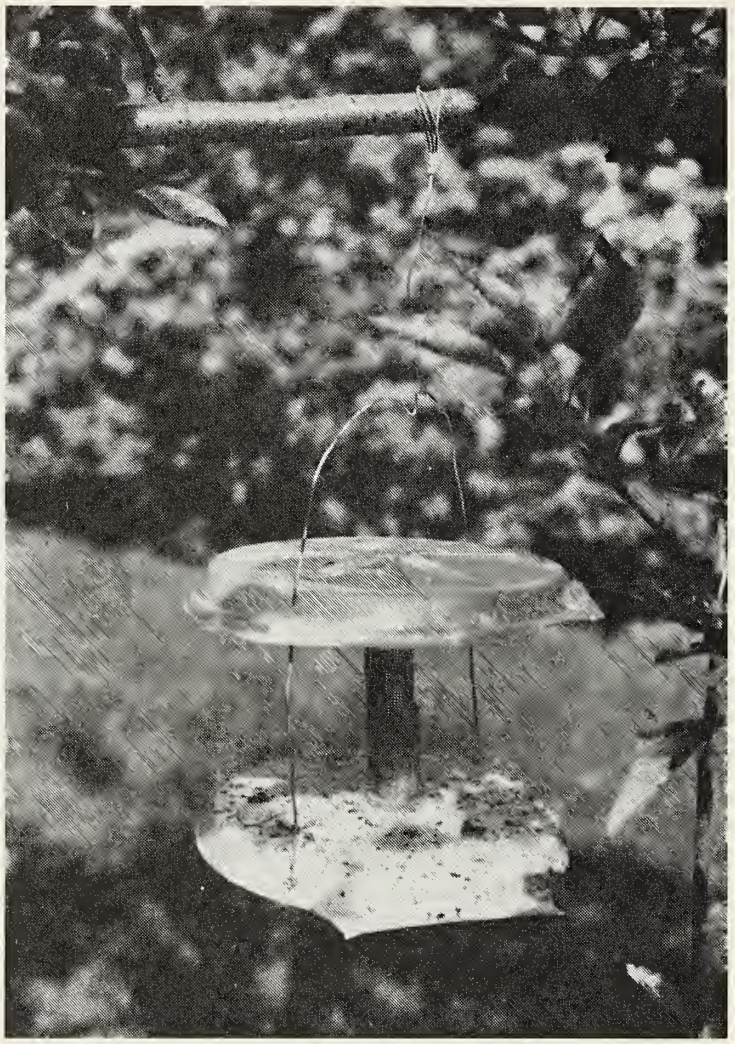

Figure 2. Type-3 trap.

which the female had died. Seven days after replacing these dead females, six males were observed in one of these traps, but none in the seven others, in two of which the female was dead, or in the control traps.

In a second series of experiments, 14 males were caught in two of four baited traps, in which all females lived longer than 13 days. One female was caught in an unbaited trap. Single male bugs caged in three additional traps were dead after six days without attracting any bug.

Seventeen males and one female were found in eight baited type-1 traps between 6 June and 7 July 1985, during which time dead bait females were replaced. Ten males were caught in one trap, 0-2 in the others. The first male was caught on 22 June, 16 days after the start of the experiment and 13 days after the first adult was sighted in the field.

The three trap types were compared between 13 September and 7 October 1985 (tables 1 and 2). Female-baited traps caught ca. 18 × more males than unbaited traps. Few

Table 1. Total numbers of *L. pabulinus* adults caught in three types of female-baited trap, 13 Sept.-7 Oct. 1985 (N = number of traps).

trap type		numbers caught ♀♀	♂♂	N	
	with ♀				
1		0	66	4	
2		0	21	5	
3		1	40	10	
all traps		1	127	19	average: 6.68
	without♀				
1		0	2	4	
2		1	4	5	
3		0	1	10	
all traps		1	7	19	average: 0.37

females were trapped. Most bugs were caught in the type-1 traps; an average of about 16 per trap, as compared with an average of only four in the other two. The same difference in efficacy, although less pronounced, was true for the three plots where the traps were in the same row of trees.

Table 3 shows total trap captures per plot in type-1 delta traps baited with either one or three females and in sticky white traps in early summer 1987. Average capture per trap differed little between the 1-female traps and sticky traps, except that the latter included about 10% females. The traps with three females captured about three times as many males. The captures in 1-female traps were highly variable, ranging from 0 to 20 in plot 21 and from 9 to 30 in both plots 23 and 26. The corresponding captures on single white traps were varying between 5-20, 6-17 and 19-38, respectively. Only three females were found in the female traps.

Table 2. Total numbers of *L. pabulinus* males caught in three types of female-baited trap, one of each in three plots, 13 Sept.-7 Oct. 1985. (N = number of traps).

trap type	1	2	3
plot A	14	6	3
plot B	21	2	6
plot C	9	7	4
average	14.6	5.0	4.3

The flight curves were similar with all traps (fig. 3). None of the traps captured more than a few males during the first ten days, although the first adults were observed in the field on 9 June. Whereas the maximum temperature reached between 18 and 20 °C on 11 and 12 June, it dropped to 14 to 16 °C between 15 and 20 June. Captures reached a peak between 26 and 29 June with maximum temperatures between 20 and 24 °C. Although temperatures above 22° and even as high as 29 °C continued for another ten days, daily captures decreased to almost zero within a few days. The last male was caught on 12 July.

The differences in numbers of nymphs in the tapping samples between plots were more than 7-fold, much more than found with the various traps (table 4).

In addition to these traps, two traps with males were deployed from 12-29 June and caught seven and one male, respectively. The 16 1-female traps captured on average 7.6 males during the same period. After replacing the two caged males with a fertilized female on 29 June, these traps did not capture a single bug, whereas the female traps continued to attract males until 9 July.

Discussion and conclusions

The experiments show that unmated female *L. pabulinus* attracts males over some distance, most probably by means of pheromone. Similar attractancy of virgin females has been observed in related mirid species, such as *Lygus lineolaris* (Beauvois) (Scales, 1968), *L. hesperus* Knight (Strong *et al.*, 1970) and *Lygocoris communis* (Knight) (Boivin & Stewart, 1982).

In most of these species, females start to call a few days after attaining adulthood, apparently after some maturation. Interfering spells of cold weather, as well as some difficulties in keeping the females on apple shoots, prevented us from estimating this period in *L. pabulinus*. As the captures on sticky traps and female traps show a similar curve (fig. 3), it seems likely that climate was a major factor in this case, and that more elevated temperatures are

Table 3. Total numbers of *L. pabulinus* males caught in delta traps with three or one caged virgin female, and of both sexes on sticky white traps, per plot, 1 June-16 July 1987.

Plot	1 trap with 3 ♀♀	3 traps with 1 ♀	4 sticky white traps ♂♂	♀♀
21	56	23	45	4
22	41	18	64	10
23	36	58	47	6
26	56	59	104	9
Sum	189	158	260	29
Average per trap	47.3	13.2	16.3	1.8

needed before these bugs start to move and can be captured.

The captures on single-female traps were more variable, than those on sticky traps in 1987. As the population density was very high, it must be assumed that females which attracted none or a few males were not calling properly. Young females do not readily feed on apple shoots and several died within one or two days after caging. This may explain also the threefold numbers captured in the 3-female traps. Apparently, the calling activities of three females were added in time, and not, or hardly, in space (*i.e.* attracting males from a greater distance).

When compared to previous tapping samples, the trap catches showed less variation among plots in 1987. It may be assumed that this decrease in variation was due to dispersal of the highly mobile adults.

One observation suggests that male *L. pabulinus* may also attract males. However, it should be noted that males are attracted also by white or yellow coloration (Bus *et al.*, 1986), while the delta traps used are of a light coloration. This could explain also why a few males were captured in empty traps, and a few females in traps with or without a female.

When they are loaded with more than one female, the pheromone traps are more effective than the white traps. Moreover, the female-baited traps become far less polluted with other insects. Slaymaker & Tugwell (1984) describe another simple female-baited trapping device.

The use of synthetic sex pheromone to monitor pests has been developed mainly for Lepidoptera (Minks, 1984). The availability of such an attractant for *L. pabulinus* may provide and improve means to monitor the presence, and perhaps the density, of this unpredictable pest.

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References

BOIVIN, G. & R. K. STEWART, 1982. Attraction of male green apple bugs, Lygocoris communis (Hemiptera: Miridae), to caged females. – *Can. Ent.* 114: 765-66.

BUS, V. G. M., P. J. M. MOLS & L. H.M. BLOMMERS, 1985. Monitoring of the green capsid bug Lygocoris pabulinus (L.) (Hemiptera: Miridae) in apple orchards. – *Med. Fac. Landbouww. Rijksuniv. Gent* 52: 505-10.

Table 4. Numbers of *L. pabulinus* nymphs per 100 branches beaten, compared with the total numbers of males found in the various traps, as in Table 3.

Plot	11 May	19 May	22 May	average	♂♂ in traps
21	4	4	6	4.7	104
22	12	12	13	12.3	123
23	12	11	12	11.7	141
26	6	41	54	33.7	218

FRANKENHUYZEN, A. VAN, & P. GRUYS, 1984. *Verantwoorde bestrijding van ziekten en plagen op appel en peer,* 4th ed.: 1-128. Plantenziektenkundige Dienst, Wageningen.

MINKS, A., 1984. Attractants and pheromones of noxious insects. – *Bull. OILB/SROP* 7/1: 1-176.

REMUND, U. & E. BOLLER, 1978. Kirschenfliegenfallen für Prognosewesen und biotechnische Bekämpfung im Vormarsch. – *Schweiz. Z. Obst- und Weinb.* 114: 229-232.

SCALES, A. L., 1968. Female tarnished plant bugs attract males. – *J. econ. Ent.* 61: 1466-67.

SLAYMAKER, P. H. & N. P. TUGWELL, 1984. Inexpensive female-baited trap for the tarnished plant bug (Hemiptera: Miridae). – *J. econ. Ent.* 77: 1062-63.

STRONG, F. E., J. A. SHELDAHL, P. R. HUGHES & E. M. K. HUSSEIN, 1970. Reproductive biology of Lygus hesperus Knight. – *Hilgardia* 40: 105-47.

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