

Lesser Peachtree Borer:¹
Captures of Male Moths When One, Three, or Five
Females Were Used as Bait in Traps^{2 3}

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Introduction

Since the female lesser peachtree borer, *Synanthedon pictipes* (Grote and Robinson), is highly attractive to the male (Girault 1907, Gossard and King 1918, Boyce 1962), the female moths have been used as bait in traps to monitor populations (Cleveland and Murdock 1964; Wong et al. 1969, 1971) and as a means of suppression of field populations (Wong et al. 1972). Also, the response of marked laboratory-reared males to increased numbers of bait females was evaluated (Wong and Cleveland 1972, Buriff et al. 1974) in release-recapture studies. However, little information has been obtained regarding the response of native male borers to various numbers of bait females in traps within a given trapping area. Therefore, a study was conducted to determine the relative attractiveness of 1, 3 or 5 females/trap in traps in peach orchards near Vincennes, Indiana.

Methods and Materials

Tests were conducted simultaneously during September and October 1973 in 5 commercial peach orchards. Test areas were blocks of trees (7- to 14-years old 'Redskin', 'Redhaven', and 'Cresthaven'), in rectangular plantings that ranged in size from 7 to 15 acres. The native populations of borers within the test areas were derived from existing trees heavily (35-50 larvae/tree) to moderately (15-30 larvae/tree) infested and from adjoining blocks of injured peach trees.

Bait females were laboratory-reared virgin females ranging in age from newly-emerged to 1 day old. These females were randomly collected from the emergence cage if they were in the "calling" position (Cleveland et. al. 1968) and transferred to holding cages for assignment to traps. Also, 1-2 small pieces of moist dental wicking were placed in the holding cages as a water source for the confined moths.

All traps were wing traps (Howell 1972) modified as described by Buriff and Davis (1974) (sold commercially as Pherotrap I®). However, the bottom of the

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traps had an additional coat of Stikem® to ensure the capture of most attracted males. Since all traps (3/block) were arranged in a straight line and were placed on the long side of each rectangular block, the 1st trapping station was centrally located ca. 60.97 m from the front edge of the short side of each test block; the distance from the 1st trapping station to the 2nd and 3rd stations was 121.95 m, respectively; and the final distance from the 3rd station to the opposite short side (back edge) of each block was ca. 60.97 m. The baits (1, 3 or 5 females) were completely randomized by female multiples and placed in traps hanging from branches 1.5 m above ground level. Also, as the traps were hung, they were positioned to allow free air movement and minimum shading, both of which influence female "calling" behavior.

Three times a week (9 AM-12 PM) for 35 days from September 3 through October 8, male moths captured in each trap were removed and counted. Also, all female moths were replaced and traps were repositioned in a clockwise movement. All trap bottoms were replaced weekly throughout the entire study.

Results and Discussion

A total of 4115 native male lesser peachtree borer moths was taken from the 15 traps. The percentage of the total trapped in blocks A, B, C, D, and E were 47.2, 15.1, 17.6, 8.8, and 11.3 (Fig. 1). This variability probably occurred because of differences between blocks in acreage, tree age, alternate hosts, and density of the borer population. Nevertheless, male attraction usually was directly related to the number of female moths per trap. For example, in blocks B, C, and E, catches of adult male moths were quite similar, and the response to increased numbers of bait females was definite. In blocks A and D, catches deviated slightly from the general trend during the 1st 2 weeks of the test period (September 3-17) but were more similar the last 3 weeks (September 18-October 8).

Peak field emergence occurred during the week of September 3, which produced high male activity (that present plus newly emerged) within and around all orchard blocks (test areas + infested adjoining areas). This increased activity was directly visible in higher catches per trap. Percentages of adult male captures from all areas (A-E) for the 1st 2 weeks of the initial (35-day) test period were 79.2, 80.6, 83.4, 84.2, and 79.1. The question therefore is whether the different numbers of bait females could really reflect their true potential in attracting males at a time of such density of the native population.

Field observations (personal communication, J. F. Howell, SEA, USDA, Yakima, WA) in extensive trapping studies of the response (male activity) of the male codling moth, *Laspeyresia pomonella* (L.), to pheromone emissions have tended to show that when attractive females are first introduced into a previously untrapped population, there is an excess of responsive males, and trap catches are higher. Then as the insect population is reduced to replacement status (rather than excess), the traps began to show their true attractancy. Apparently, in our study, conditions were such that there was an excess of responding lesser peachtree borer males during the 1st 2 weeks of the trapping periods. Data for the last 3 weeks then are more accurate and reflect better the response of the males to the different numbers of bait females (Table I).

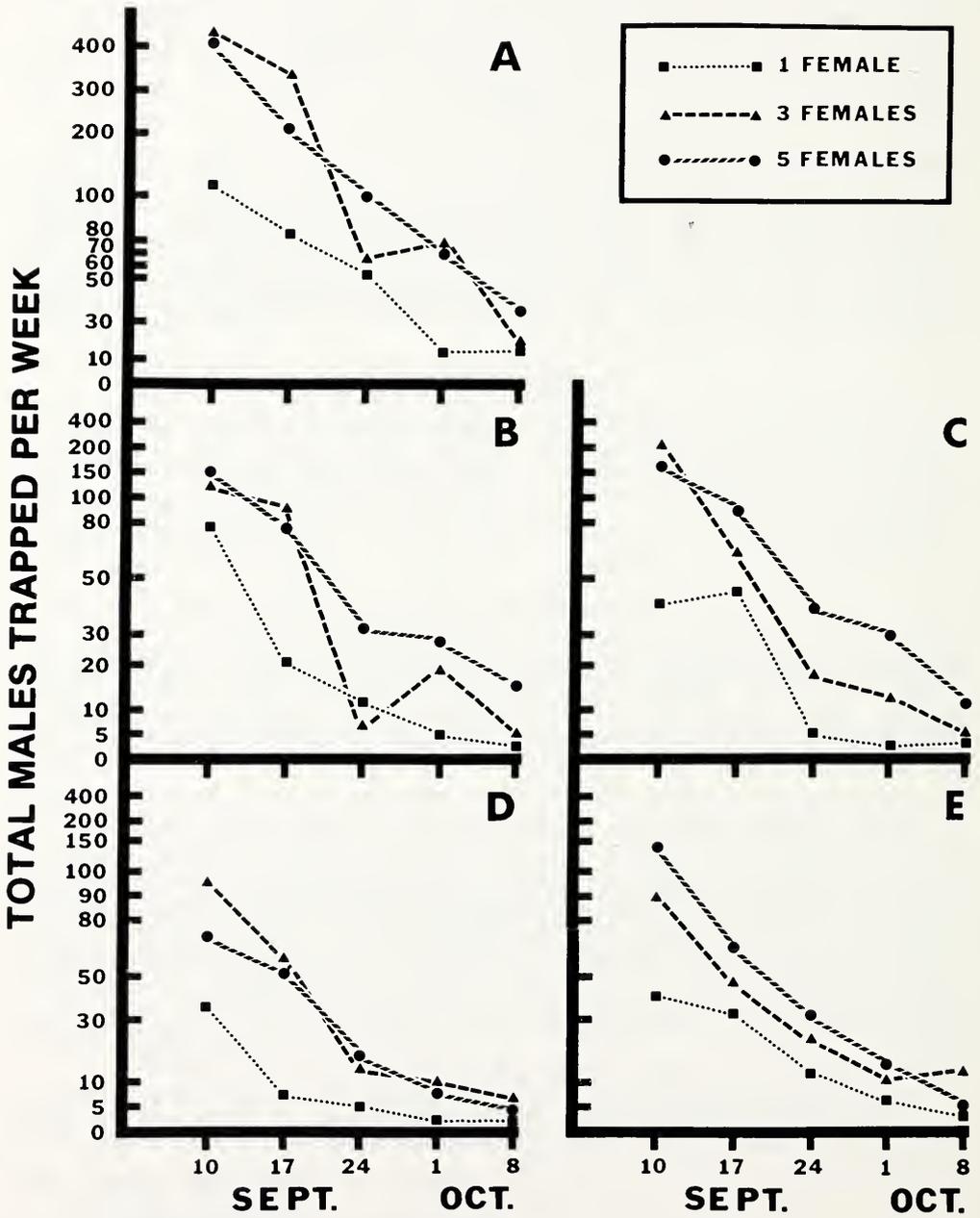


FIGURE 1. Comparative captures of male lesser peachtree borer moths in traps baited with 1, 3 or 5 virgin females in 5 commercial peach orchards, Vincennes, Indiana, 1973.

TABLE I *Captures of lesser peachtree borer males and attraction of females in orchard blocks (September 18-October 8), Vincennes, Indiana, 1973.*

Orchard	No. ♀/trap	Mean no. of ♂ trapped/week/trap		
		September		October
		24	1	8
A	1	16.7	3.7	4.0
	3	19.3	22.0	4.0
	5	32.7	21.0	11.3
B	1	3.3	1.4	1.0
	3	2.0	6.7	2.7
	5	10.0	9.3	4.0
C	1	2.0	0.7	1.0
	3	6.0	4.7	1.0
	5	14.3	7.3	3.0
D	1	1.3	0.0	1.0
	3	3.7	3.0	2.0
	5	4.7	2.3	1.0
E	1	3.3	1.7	1.0
	3	7.0	2.7	2.3
	5	9.0	4.3	1.0

No definite explanations can be provided for the differences in male attraction in blocks A and D during the 1st 2 weeks of the test. However, there are several possibilities: (1) the initial placement of traps with regard to areas of localized infestation ("hot spots" in trapping areas), (2) increased male build up with heavy flight activity (male moths responding to closest pheromone source), (3) intermittent emission from the caged females (variable pheromone concentrations), and (4) trap orientation with regard to wind direction and air circulation (moth flight and orientation to pheromone concentrations). Any one or any combination of these factors would have influenced the results in these 2 test blocks, but all would apply equally to male activity in these blocks and other orchard test areas.

A distance of 121.95 m between trapping stations was selected in hopes of preventing interaction between the females confined in traps within the same orchard. Interaction apparently was prevented since 1 female/trap caught 23.6 male/female (female equivalents based on total catch from all test areas) and 3 and 5 females/trap caught 22.7 and 14.6 male/female respectively. Usually trap catch was somewhat proportionate to the number of females per trap.

(Fig. 1) illustrates the principal difference between using 3 or 5 female multiples per trap, not only was the number of males caught increased but the reliability or consistency of the catch was improved. This probably relates to pheromone emission. Where there were only 3 females there were probably more interruptions in the emission pattern than with the 5 female multiple. We can conclude that for both survey and control purposes, traps baited with 5 females would be more efficient and reliable than traps baited with 3 females.

However, in the area of male response investigation, the optimum number of females per trap is not established. Neither is the number and placement of traps needed to regulate or suppress native populations of this insect.

Literature Cited

1. BOYCE, H. R. 1962. Peachtree borers (Lepidoptera: Aegeriidae) in Ontario. Proc. Entomol. Soc. Ont. 92:45.
2. BURIFF, C. R. and D. G. DAVIS. 1974. A modified wing trap for capturing adult male lesser peachtree borers. Environ. Entomol. 3:191-2.
3. BURIFF, C. R., R. E. DOLPHIN, T. E. MOUZIN and D. F. RALSTON. 1974. Lesser peachtree borers: response of males to wing and carton traps baited with one or five virgin females. Environ. Entomol. 3:73-4.
4. CLEVELAND, M. L., and L. L. MURDOCK. 1964. Natural sex attractant of the lesser peachtree borer. J. Econ. Entomol. 57:761-2.
5. CLEVELAND, M. L., T. T. Y. WONG, and K. W. LAMANSKY. 1968. Rearing methods and biology of the lesser peachtree borer, *Synanthedon pictipes*, in the laboratory. Ann. Entomol. Soc. Am. 61:809-14.
6. GIRAULT, A. A. 1907. The lesser peachtree borer. USDA, Bur. Entomol. Bull. 68 (Part IV):31-48.
7. GOSSARD, H. A., and J. L. KING. 1918. The peachtree borer. Bull. Ohio Agric. Exp. Stn. 329. 55 p.
8. HOWELL, J. F. 1972. An improved sex attractant trap for codling moths. J. Econ. Entomol. 65:609-11.
9. WONG, T. T. Y., and M. L. CLEVELAND. 1972. Recovery of male moths of the lesser peachtree borer in a peach orchard. Environ. Entomol. 1:344-7.
10. WONG, T. T. Y., M. L. CLEVELAND, and D. G. DAVIS. 1969. Sex attraction and mating of lesser peachtree borer moths. J. Econ. Entomol. 62:789-92.
11. WONG, T. T. Y., H. KAMASAKI, R. E. DOLPHIN, M. L. CLEVELAND, D. F. RALSTON, D. G. DAVIS, and T. E. MOUZIN. 1971. Distribution and abundance of the lesser peachtree borer on Washington Island, Wisconsin. Ibid. 64:879-82.
12. WONG, T. T. Y., H. KAMASAKI, R. E. DOLPHIN, D. G. DAVIS, T. E. MOUZIN, D. F. RALSTON, and J. A. BURNSIDE. 1972. Mass trapping of male lesser peachtree borer moths with virgin-female traps on Washington Island, Wisconsin, 1970. Ibid. 65:1034-9.