

Evaluation of Pheromone Disruption in Combination with Insecticide Applications for Control of Peachtree Borers in Peaches

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In New York, there are two species of sesiid (clearwing) moths that attack peaches — the peachtree borer (PTB), *Synanthedon exitiosa*, and the lesser peachtree borer (LPTB), *Synanthedon pictipes*. The adult borers are striking clearwinged moths with yellow and steel-blue body markings (Fig. 1). Adults of these insects have from one to four yellow-orange stripes across the abdomen, depending upon species and sex. The PTB enters the tree near soil level and does not require the presence of wounds or breaks in the bark for entry, but the LPTB nearly always enters the tree at a pruning scar, canker, mechanical injury, or winter-injured area. Both species pass the winter as borers inside the tree. In the spring, they emerge as moths that lay eggs on or in the trunk during the summer. In New York, the LPTB moth emerges first, in late May, and the PTB doesn't show up until mid-June; both stay active (laying eggs) through August. When the borer stages hatch, the

PTB tends to crawl down the tree to soil level and burrow in there, but the LPTB will move to the nearest injured area, which may be on the lower trunk or just as easily up in the scaffold limbs. LPTB completes its development in one year, but some PTB larvae take two years to develop, so any control measure a grower would elect will require repeating for at least two to three years.

Injury is caused by larval feeding on the cambium and inner bark of the trunk close to the soil level (PTB) or on the upper trunk and lower scaffold branches (LPTB). Occasionally, larger roots are also attacked by PTB. Areas attacked often have masses of gum, mixed with frass, exuding from the bark.

All ages of trees are injured. Young trees are at times completely girdled and subsequently die. Older trees are often so severely injured that their vitality is lowered and they are rendered especially susceptible to attack by other insects or by diseases. Although both species may be found in infested trees, younger plantings and those not afflicted by extensive cankers or other bark splits are attacked primarily by PTB. Control is difficult, owing to the concealed habit of the larvae, and most growers must rely on one or more coarse insecticide sprays of the trunks and lower scaffold branches to deter egg laying and kill newly established larvae. Because this is a labor-intensive measure that often fails to completely control these pests, many growers choose not to elect treatment, or else do an incomplete job,

Evidence indicates that pheromone disruption alone provides adequate protection from Peach Tree Borer and Lesser Peach Tree Borer infestations in commercial orchards. Recent labeling of Shin-Etsu Isomate-L ties in New York will give growers an effective non-chemical alternative to trunk sprays for managing this pest complex in their stone fruit plantings

with the intention of getting what they can out of a planting until infestations combine with other peach production factors to warrant tree removal. This approach has been common in the recent past, during which time there has been little demand for New York stone fruits outside of local farm markets. However, with a recent increase in the planting of new peach varieties and short-range distribution to processing markets, there is now more interest in examining currently available pheromone disruption tools for the control of these perennial pests.

This research involved trials testing the efficacy of pheromone disruption with and without directed trunk sprays. Here we report our findings after the second of a two-year trial to establish reliable guidelines for the use of mating disruption against these pests in commercial New York plantings.

Materials and Methods

This was a multi-year trial in commercial orchards having serious annual problems with borers. Because we were targeting both lesser peachtree borer (LPTB) and peachtree borer (PTB), we selected orchards infested with cankers (necessary for LPTB). Trials were conducted at two locations in Wayne Co., Furber (Sodus, NY) and Herman (Williamson, NY). In each location, we

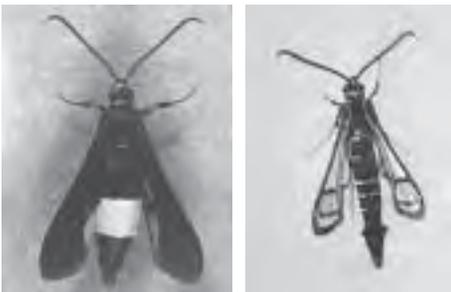


Figure 1. Adult female (left) and male lesser peachtree borer moths.



Figure 2. Twist-tie dispenser for LPTB pheromone.

Figure 3. Fabric screen cages on trunk and branches of peach tree.

compared mating disruption versus no pheromone treatment in two separate orchards, each approximately 2.5 acres in size. We further selected a group of 10 trees in each of these orchards for treatment with insecticide using directed trunk sprays, so the following treatments were evaluated:

1. Pheromone disrupted + trunk spray
2. Pheromone disrupted, no trunk spray
3. Non-disrupted + trunk spray
4. Non-disrupted, no trunk spray

On 31 May (2000) and 22-23 May (2001), Shin-Etsu Isomate-L ties (Fig. 2) containing a 30:70 blend of (Z,Z):(E,Z)-3,13-octadecadienyl acetate were placed in the test blocks at a rate of approximately 200/acre (1/tree). This blend is formulated to be appropriate for disruption of both borers in situations where LPTB is the predominant species, such as we believed to be the case at these sites. On these same dates, three wing-style traps baited with pheromone lures for each species were hung in the interior of each disrupted and non-disrupted block; traps were checked twice per week from early June through August each year. On 22–28 May, 2001, screen cages made out of greenhouse netting (SolarGard 40 percent shade cloth, Tewksbury, MA) were used to enclose two canker/damage sites on the branches and one site on the trunk of each of 10 unsprayed trees in each plot (Fig. 3).

Insecticide treatments consisted of directed trunk sprays of Asana (4.0 oz/100 gal) applied three times during the season. In 2000, 2 June, 6–7 July, and 20 Sept (postharvest); and in 2001, 13 June,

18 July, and 19 Sept (postharvest), using a Nifty Pul-Tank handgun sprayer operating at a pump pressure of 150 psi. Applications of approximately 1.25 gal per tree were made to single-tree plots, and replicated 10 times per block.

In the fall, from 13–27 Oct (2000) and 10–11 Oct (2001), trees were examined for PTB larvae and larval damage. The bases of the trunks on all the sprayed trees, plus an equal number of unsprayed trees in each block, were excavated around their entire circumference to a depth of 3–6 inches. The surface of the trunk circumference was inspected for exudations of gum containing frass, as well as for pupal cases of any PTB larvae evident in the excavation. In 2001, the fabric sleeve cages on each tree were also examined for emerged adults or pupal cases of LPTB.

Results

The pheromone dispensers completely suppressed trap catches of both

PTB and LPTB at both sites for both seasons, compared with relatively heavy flights noted in the non-disrupted comparison blocks (Figs. 4 and 5). Therefore, it may be concluded that this pheromone treatment was highly successful in disrupting the chemical communication of males and females in these two species. The PTB pheromone traps did regularly catch small numbers of a related species, determined to be lilac/ash borer, *Podosesia syringae*, which is not an economic pest of stone fruits.

The tree trunk inspections in 2000 turned up no evidence of any PTB larvae or gum exudations resulting from infestations, in both the treated and untreated trees. In 2001, very low levels of damage were detected that were consistent with PTB entry sites, although no empty pupal cases were found, and no significant differences were seen among any of the treatments (Table 1). These results were not entirely unanticipated, as the previous year's inspection had implied that the incidence of this species

TABLE 1

Block/Treatment	PTB trunk injury sites		LPTB pupal exuviae		
	Sprayed	Unsprayed	Mean avg. no./tree	Proportion on	
				trunk	scaffolds
Furber					
Pheromone	0.1 a	0.3 a	0.1 a	1.0	0.0
No pheromone	0.1 a	0.1 a	0.7 a	1.0	0.0
Herman					
Pheromone	0.0 a	0.2 a	0.2 a	0.5	0.5
No pheromone	0.2 a	0.1 a	2.1 b	0.5	0.5

^a Values in the same column followed by the same letter not significantly different ($P = 0.05$, Fisher's Protected Lsd test).

was relatively low in these blocks, and any damage noted might have been caused by the small number of specimens that could have been in the trunk tissue from infestation during the year before this study began.

Inspection of the sleeve cages enclosing canker and damage sites on the trees revealed numerically higher numbers of LPTB pupal cases in the non-disrupted blocks than in those treated with the pheromones, although the difference was significant only at the Herman site. This is further argument for the effectiveness of the pheromone dispensers in disrupting the sexual behavior of this species to a noticeable degree.

After two seasons of these trials, there is sufficient evidence to determine that pheromone disruption alone is able to provide adequate protection from borer infestations in commercial orchards, and the recent labeling of this product in New York will give growers an effective non-chemical alternative to trunk sprays for managing this pest complex in their stone fruit plantings.

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