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Thresholds/ Monitoring

Consperse Stink Bug Management Using Multiple Techniques in Bartlett Pears

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Abstract: Consperse stink bug (CSB) infestation in a 55 ha Bartlett pear orchard in the Upper Sacramento Valley of California was followed weekly on orchard interior and perimeter cut fruit clusters at 58-9 days before harvest (DBH) in 2000-2013. Aggregation pheromone traps (AlphaScents™) were utilized for monitoring and mass trapping perimeter locations. These monitoring techniques suggested that the use of contact herbicide treatments to the orchard centers once in the early spring in 2007-2013 (compared with no use of these treatments 2000-2006) may have resulted in lower resident CSB in the orchard interior. Whereas total orchard CSB treatments were required in 2000 and 2002-2007, the monitoring knowledge resulted in use of only perimeter spot treatments for CSB at 20-30 days before harvest in 2008-2010 and no treatments at all needed in 2011-2013. This cut fruit technique, which is also used to monitor codling moth and oriental fruit moth oviposition in mating disrupted pear orchards, had been earlier reported to be helpful in monitoring levels of consperse stink bug (CSB), as well (OPDMC Proceedings 2004).

Introduction

Consperse stink bug, *Euchistus conspersus* (CSB) can cause significant phantom injury to Bartlett pears in the 4-6 weeks prior to harvest in the Upper Sacramento Valley. Although this injury becomes more visible during harvest, the necessity for treatment often needs determination at least a month before harvest in order to avoid objectionable damage visible later and to accommodate the preharvest interval of the chemical control materials. Often these treatments can be disruptive to predators of other pests such as pear psylla (*Psylla piricola*) and two spotted mites (*Tetranychus urticae*). A cut fruit technique used to monitor codling moth (*Cydia pomonella*) oviposition in mating disrupted orchards has been found to increase presence of CSB 4-5 times compared with presence on nearby uncut fruit and to therefore be also helpful in monitoring CSB presence (1, 2). A CSB mass-trapping technique using aggregation pheromone and another avoidance technique using solid center herbicide treatments were utilized to perhaps lower CSB presence as determined by comparing annual frequency on cut fruit samples (2000-2013) and in the traps, themselves (2005-2013).

Methods

The 55 ha Bartlett pear observation orchard located in the Upper Sacramento Valley had a history of CSB presence requiring chemical treatment most years. The same cut fruit clusters installed weekly to monitor codling moth (CM) oviposition in the pear orchard, which was practicing CM mating disruption, were inspected for CSB presence or injury at 58-9 days before harvest during 2000-2013. The orchard was nearly surrounded by orchards of an alternate host (Engish walnut, *Juglans regia*) of CM, or by riparian areas (Figure 1). The neighboring walnut orchards' natural cover crops tended to be dominated by wild oats (*Avena sativa*), and mowing the cover crops in the spring led to peripheral movement of CSB into the nearby pears. Movement from the riparian areas also occurred.

A cut fruit was one fruit cut weekly in a cluster of at least two fruit, one week prior to examination. The area of the cut surface increased weekly with the size of the fruit. Effort was made to maintain the area at a constant 10-20% of the total fruit surface. All cut fruit were at eye level on the east sides of trees. Clusters were inspected on separate trees usually 5 trees distant from other cut fruit clusters.

Cut fruit clusters were inspected weekly. Samples were 20 fruit in 2-3 interior transects totaling 830 meters and ten-twelve 5-30 fruit samples in 2700 meters of perimeter locations. These locations initially were chosen to monitor areas thought to have vulnerability to CM because of wind movement of mating disrupting pheromones or the perimeter presence of walnuts not practicing CM mating disruption. Later in the study (beginning 2010) the neighboring walnuts also adopted CM mating disruption and CM became less an issue while CSB monitoring became a relatively more important one. Cut fruit sample sizes each year thus varied according to the numbers outlined in Figure 2. CSB presence and/or injury presence was determined visually and by examining 5 new cuts on the original cut fruit.

CSB perimeter traps utilized aggregation pheromone lures (AlphaScents™). The traps were of two types, 8 yellow pyramid traps (AlphaScents) and 12 plastic 4 liter jar traps (R. Elkins, University of California Cooperative Extension). These latter traps had 1 cm entrance holes at the tips two inverted cone mesh screens, which covered 10 cm diameter lateral cut outs. Except in the first year of use (2005), the traps were placed at least 7 meters outside the edge of the pear orchards. Approximately 3500 meters of orchard perimeter were monitored by the traps. The trap interval thus averaged 175 meters, but this in fact varied according to perceived risk. Another 1500 meters of perimeter (primarily adjacent paved roads) thought to be less vulnerable were not monitored at all.

Solid centers weedsprays were glyphosate (0.55 kg/ha active ingredient), sometimes with 2,4 dichloro phenoxy acetic acid added (1.1 kg/ha active ingredient). Use of these treatments began in 2007. They were applied once per season in February, prior to pear green tip stage. These were also applied to the first two rows of neighboring walnuts in 1/2 of the walnut borders. In 2011-2013 the riparian levee areas (1/4 of the trap monitored perimeter area) were grazed by sheep in the late spring instead of the use of annual burning for weed management as in the past by the irrigation district.

Chemical treatments for CSB when indicated in the Results were applied about 5 weeks prior to harvest. They included dimethoate (0.8 kg/ha active ingredient) earlier in the study 2000-2005 and fenpropathrin (0.4 kg/ha active ingredient) midway in the study 2006-2009.

Results and Discussion

A statistical reduction in CSB on cut fruit was logged in the course of the monitoring 2000-2013 (Figure 4). CSB reduction chiefly seemed to follow changing to management practices of perimeter trapping (with the traps placed outside the orchard) and centers weed sprays early in the season (Figure 5). The highest monitored CSB experienced inside the orchard during the study was in 2005 when edge traps were first used and placed ***inside*** the perimeters of the pear orchards. After the traps were moved to at least 7 meters ***outside*** the orchard perimeters, the populations have declined, and no more CSB or injury were found on interior samples beginning in 2010 (Figure 6). CSB encountered both in perimeter traps and on perimeter cut fruit have both declined, also (Figure 7). Use of sheep in grazing of the ¼ of monitored perimeters that are riparian levees may be aiding this (2011-2013). In using the monitoring techniques of cut fruit and trapping, the resulting number of necessary treatments has diminished from whole orchard treatment needed most prior years, to edge treatments only applied 2007-2010, and to no treatments at all needed 2011-2013 (Figures 5-7).

While it is tempting to credit the management changes for CSB reduction, this study was observational only and the treatments not randomly installed. Real scientific conclusions are thus not possible from these simple field observations, which are nevertheless encouraging.

References Cited

1. Zoller, B.G. and Zoller, A.M. 2002. Seasonal comparison of monitoring techniques for codling moth in mating disrupted pear orchards. Proceedings, 76th Western Orchard Pest and Disease Management Conference. Portland, Oregon, January 9-11.

2. Zoller, B.G. 2004. Biased sampling for consperse stink bug using a cut fruit technique in Bartlett pears. Proceedings, 78th Western Orchard Pest and Disease Management Conference, Portland, Oregon, January 7-9.

Figure 1. Observation pear orchards are outlined in red;
riparian areas are at north and south;
all other adjacent parcels in green are English walnut orchards.

Figure 2. Total cut fruit sampled by season and week

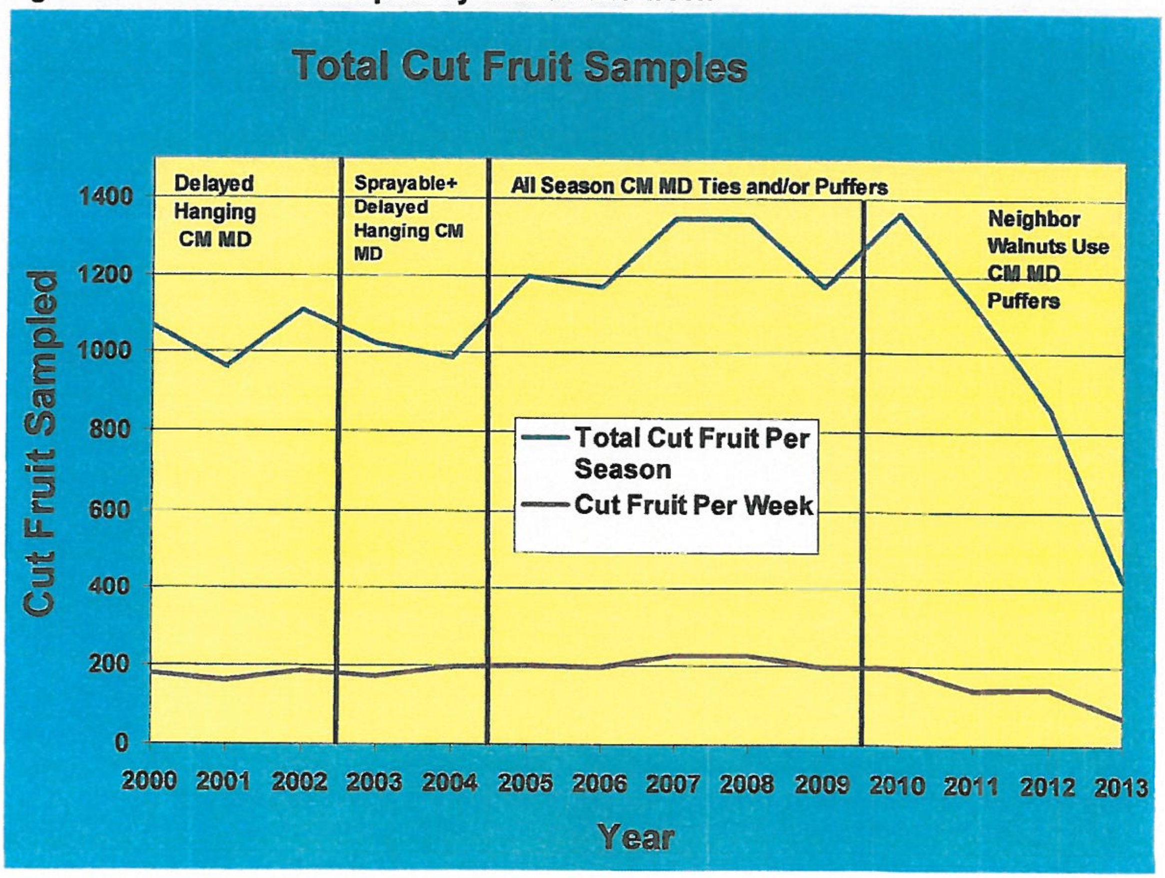

Figure 3. Cut fruit samples, % interior and exterior.

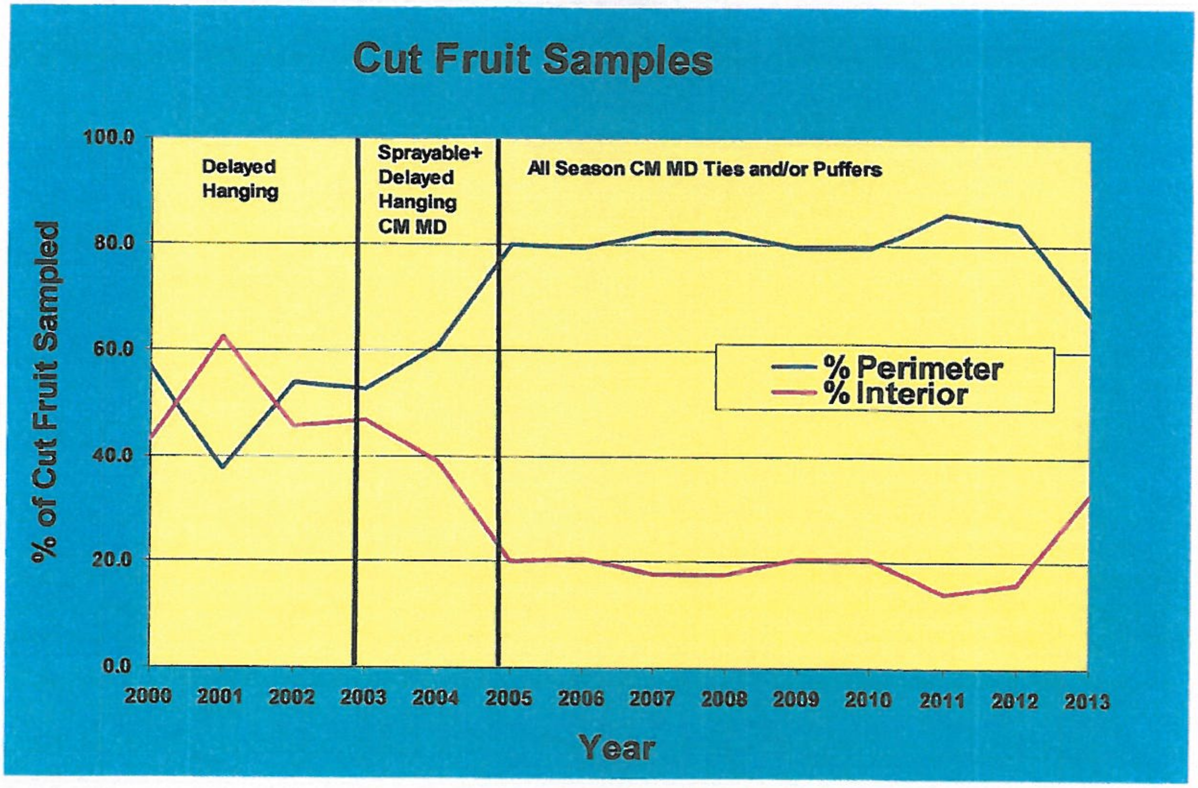

Figure 4. Stink bugs and injury on cut fruit by season.

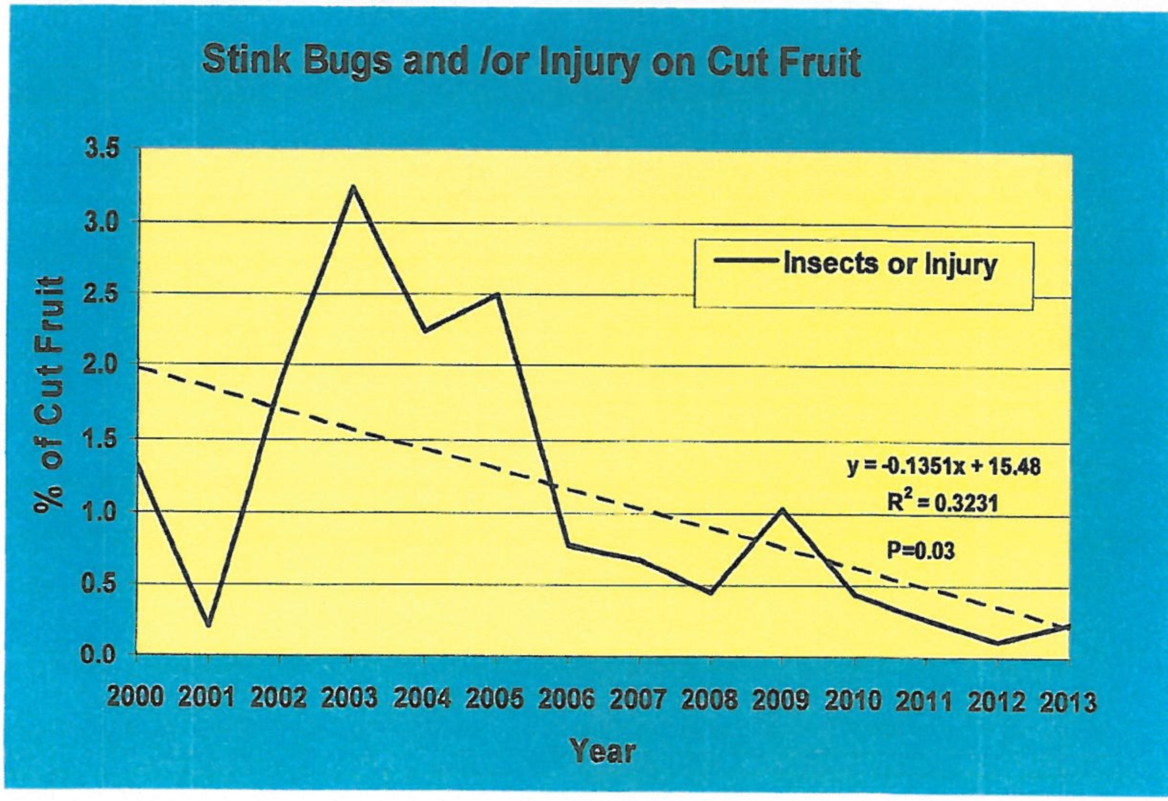

Figure 5. Stink bugs and injury on cut fruit; use of perimeter mass-trapping and centers herbicide treatments is indicated by the vertical lines.

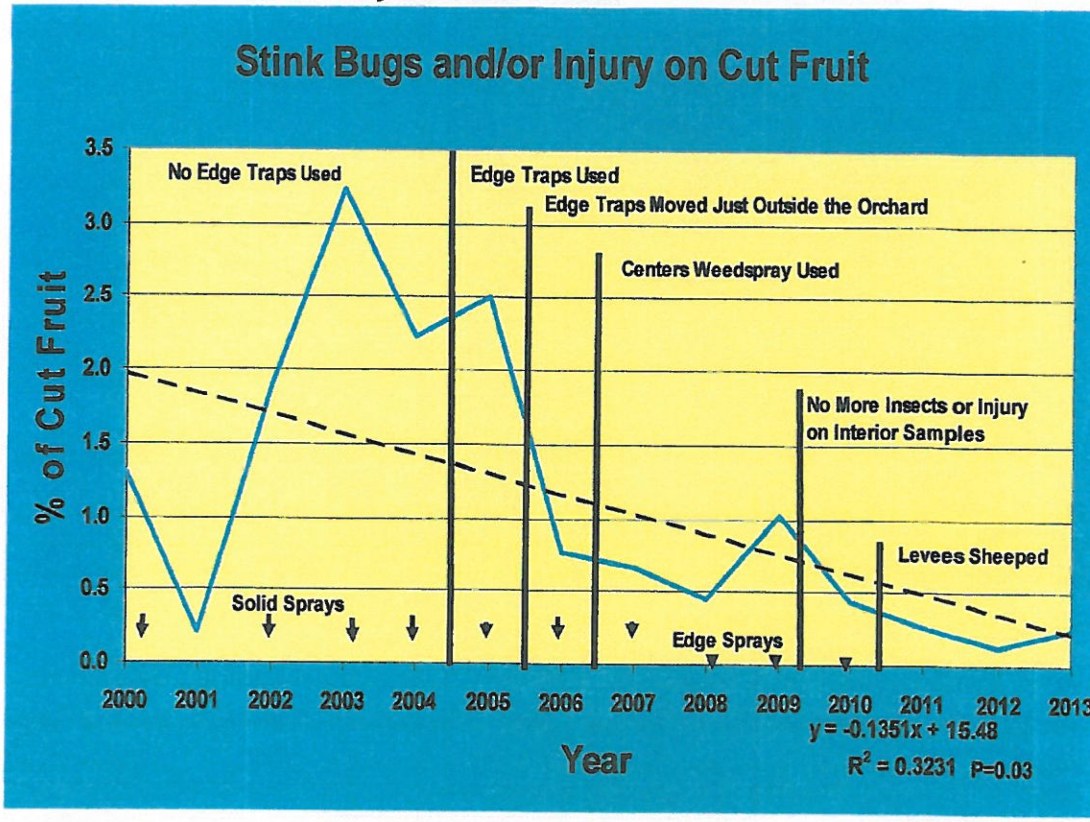

Figure 6. Stink bugs and injury on perimeter and interior cut fruit samples; use of perimeter mass-trapping and centers herbicide treatments is indicated by the vertical lines.

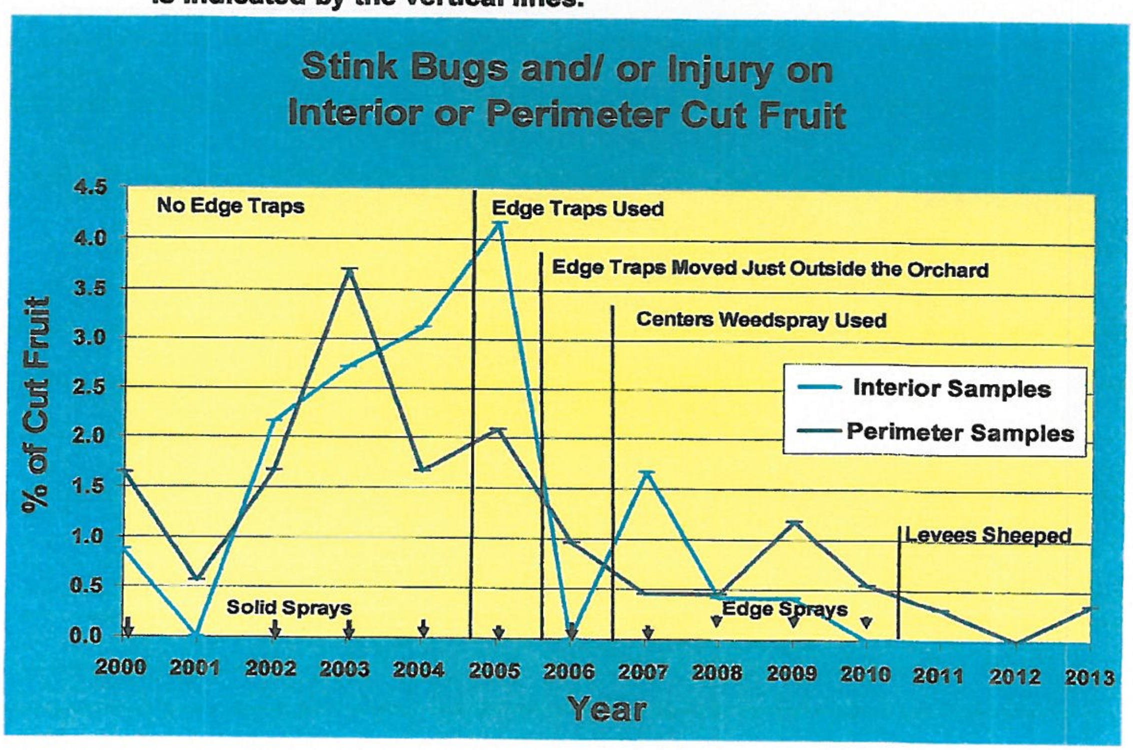

Figure 7. CSB trapping and perimeter cut fruit sampling data.