Can Watersprout Pruning Reduce Pear Psylla Abundance?

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First found in Connecticut in 1882, pear psylla is an invasive pest insect that primarily affects European pear trees throughout the United States. The damage caused by pear psylla is due to the sticky honeydew left behind after feeding. Honeydew-related damage promotes diseases like sooty mold and causes russeting, reducing the fruit aesthetics and sale price. Additionally, toxins in pear psylla saliva injected during feeding can cause psylla shock, resulting in tree wilt.

Watersprout removal can represent an IPM strategy for pear psylla. These vigorous upright shoots that develop on pear in late spring and early summer provide ideal feeding and breeding sites for psylla. While stripping these shoots is said to reduce damage by removing this in-host pest reservoir potential, growers are hesitant to implement this strategy stating they do not have time to accomplish the practice. With little research-based evidence to be found to the contrary, growers often believe it is more economical and effective to make material insecticidal applications for psylla management than it would be to remove watersprouts.

In this study, we assessed the efficacy and practicality of watersprout removal as a cost effective IPM strategy to reduce pear psylla population levels at two Massachusetts orchards.

Materials & Methods

The studies were conducted at the University of Massachusetts Cold Spring Orchard (CSO, and at Bashista Orchards in Southampton MA. Data were collected from mid-May until late August. To assess the removal of watersprouts as viable means to control pear psylla populations, one of four treatments including a control were assigned to each tree. The tree treatments were one fourth, one third, three fourths, and no watersprouts removed (control). Treatments were assigned in a random order. At CSO, the study was conducted on four rows of pear trees, with each row containing fourteen trees. Trees at CSO were Bosc and Bartlett varieties. At Bashista's there were four rows of treatment trees, one with seven trees, one with ten trees and two with twelve trees. Trees at Bashista's were Bosc, Bartlett, Clapp Favorite, and D'anjou varieties.

Watersprout removal treatments involved counting the total number of large branches for each tree and multiplying them by the fraction of the assigned treatment, then rounding to the nearest

whole number (e.g. a tree with 13 branches and ¼ treatment had 3 branches stripped of all watersprouts). Branches were then marked, selecting branches that were evenly distributed throughout the tree, and then stripped of all watersprouts. Watersprout removal took place in late May and early June. Attention was made to only prune in weather below 80 F and below 70% humidity on a sunny day to prevent the spread of fireblight. To assess the viability of pruning considering labor costs, additional data was collected; namely the number of workers pruning, the number of hours it took to prune during each session, and the relative size of the tree.

Immediately after pruning was completed, a single, clear, unbaited sticky trap (30cm x 30cm) was hung at head height from each treatment tree in order to monitor adult pear psylla. Starting on June 10th for CSO and June 24th for Bashista, sticky cards were inspected in the field to count adult pear psylla numbers. During the same visits, five shoots and five spurs from each treatment tree were inspected to monitor pear psylla egg, nymph, and adult numbers. This survey was repeated every two weeks, alternating between the two data collection sites, for a total of four sampling dates at each orchard. Including the control trees, we surveyed a total of 52 trees across all blocks of both orchards.

Results

Cold Spring Orchard (CSO). Figure 1 shows the overall results for all data categories for each of the two sampling dates. For the first sampling date, the instances with significant results in favor of pruning as a way to reduce pear psylla were "Eggs on Shoots", "Nymphs on Spurs", and "Nymphs on Shoots".

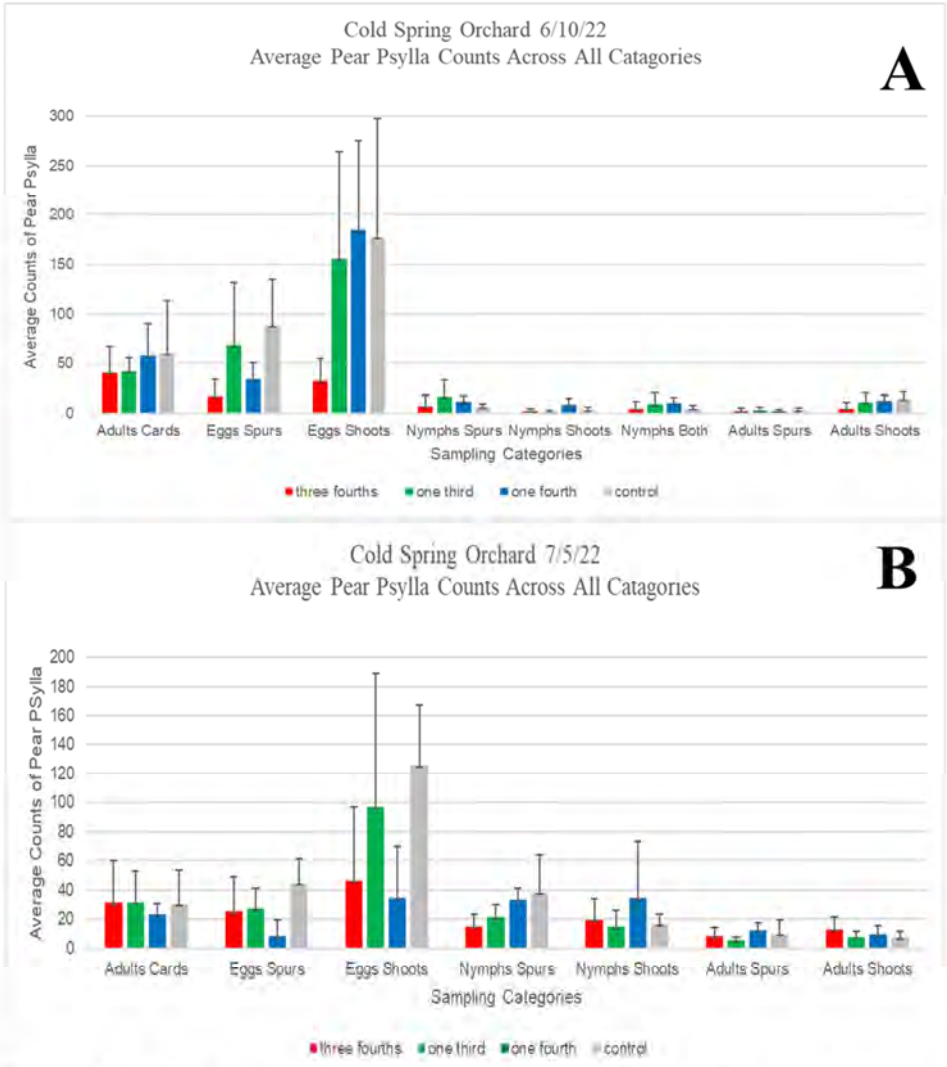

Figure 1. For the various sampling categories, mean pear psylla population counts from two sampling dates (A) June 10th, (B) July 5th at the UMass Amherst Cold Spring Orchard.

Figure 2 shows that the mean number of eggs laid by pear psylla females on shoots was significantly lower in branches that had three-fourths of the watersprouts removed compared to any other treatment.

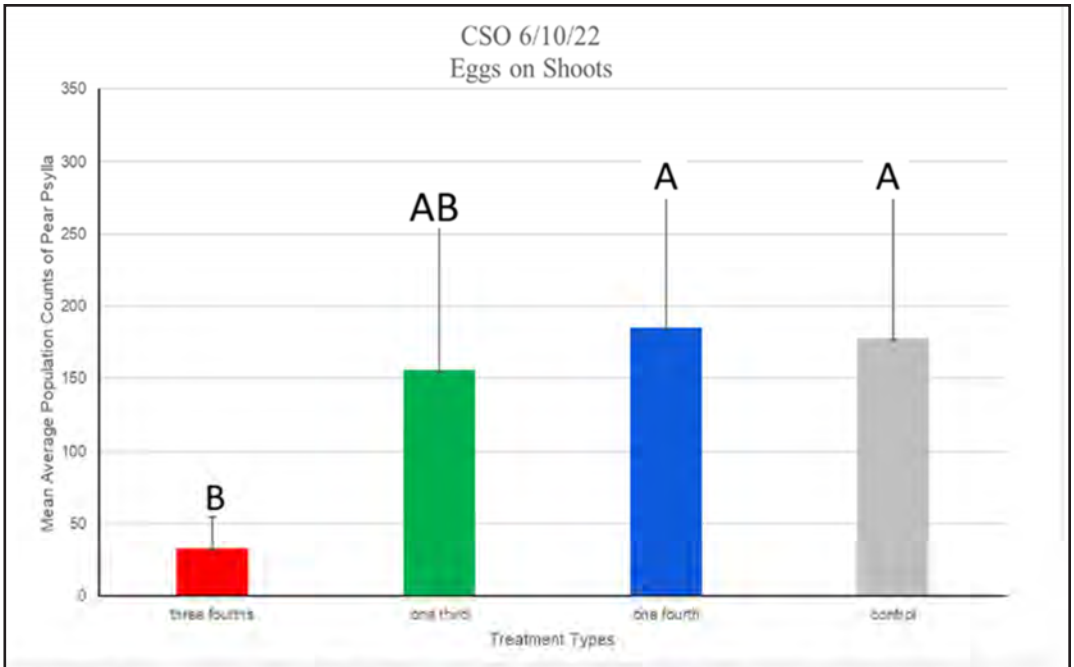

Figure 2. Average number of pear psylla eggs recorded from pear shoots at the UMass Cold Spring Orchard on June 10th. Bars superscribed by the same letter are not significantly different at odds 19:1.

For the second sampling date, egg-laying on spurs was significantly lower on branches with one-fourth of the watersprouts removed when compared to the control (no removal). The other two treatments showed intermediate effects due to high variability among the samples (Fig. 3).

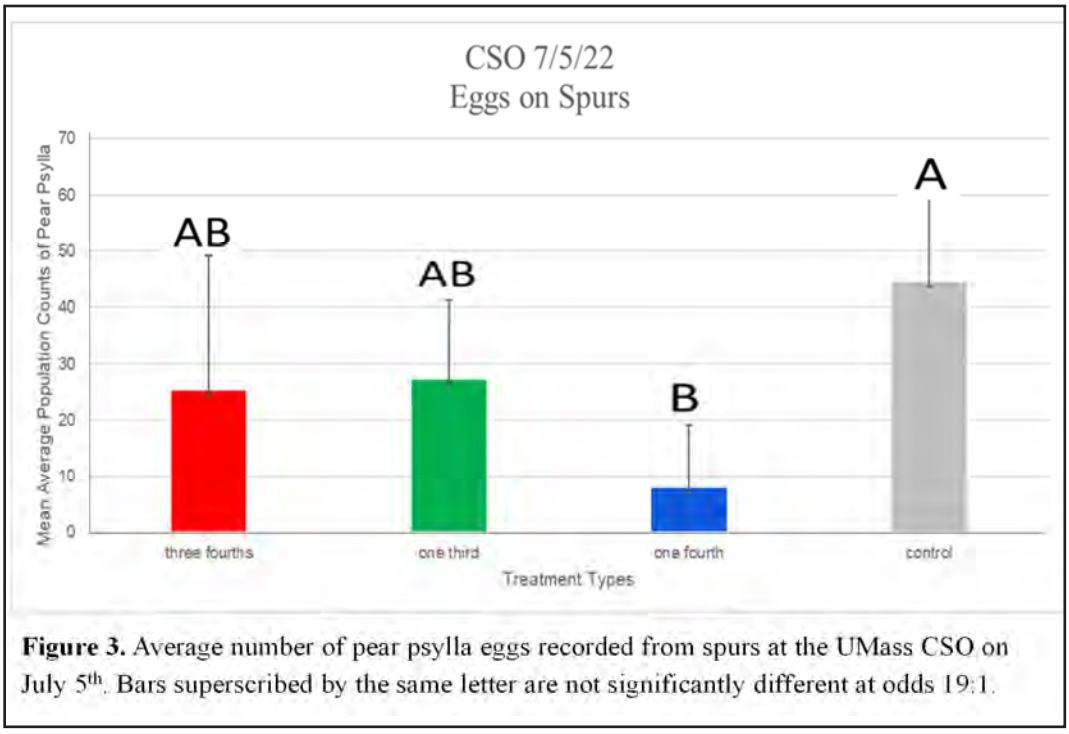

Figure 3. Average number of pear psylla eggs recorded from spurs at the UMass CSO on July 5th. Bars superscribed by the same letter are not significantly different at odds 19:1.

Bashista Orchards. At Bashista's, pear psylla populations were lower than those recorded at CSO. The overall results for all data categories for each of the two sampling dates are shown in Figure 4.

The only category to show significant differences between treatments was adults found on sticky cards during the second sampling date. The mean number of pear psylla adults trapped was

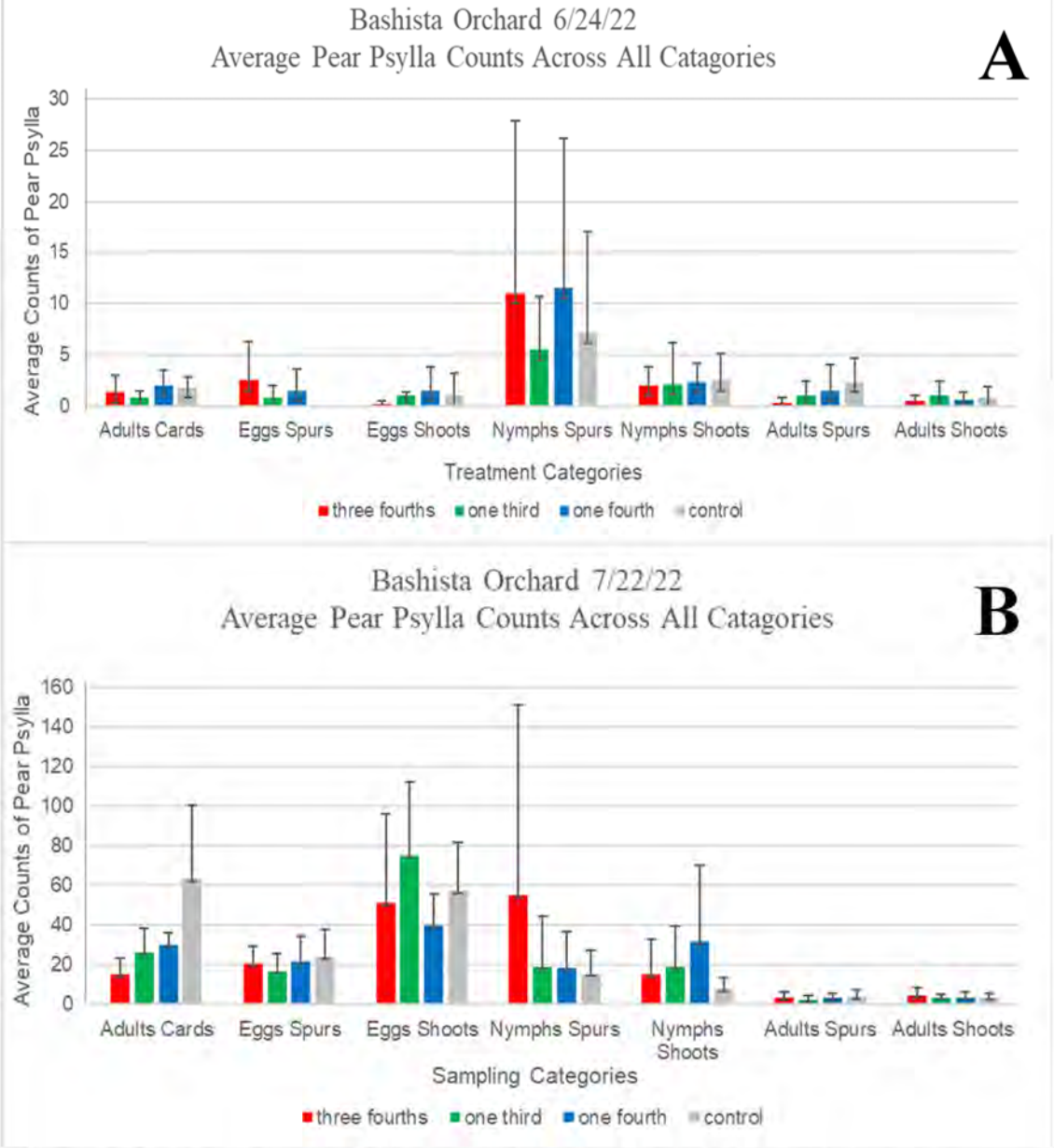

Figure 4. For the various sampling categories, mean pear psylla population counts from two sampling dates (A) June 24th, (B) July 22th at Bashista Orchards.

significantly reduced on branches with the highest amount of watersprout removed (3/4) compared to the no removal treatment. The other two removal treatments showed intermediate results (Fig. 5).

Fireblight incidence. This project also sought to monitor potential fireblight development associated with the practice of pear watersprout removal. Under the conditions of this study, no incidence of fireblight was recorded in both orchards.

Labor Costs. We found that for three workers, the average time to prune one medium standard tree of its watersprouts is 9 minutes. The median number of trees per row in this study was 12, so to complete one row of pruning on standard trees it would take 1.8 hours. Minimum wage in Massachusetts is $14.25, therefore, the minimum cost of pruning

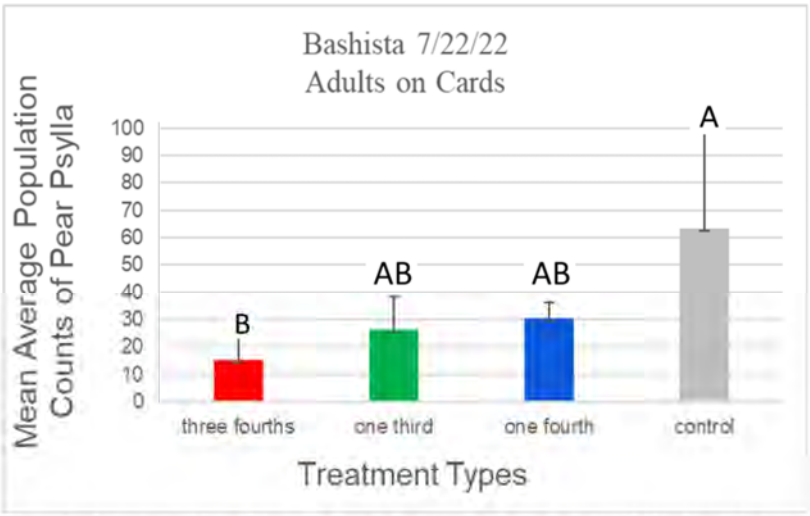

Figure 5. Average number of pear psylla adults recorded from sticky cards Bashista Orchard on July 22th. Bars superscribed by the same letter are not significantly different at odds 19:1.

one row of trees (rounded to two hours) would be $85.50, for three workers. This information applies to the large trees that were present at the CSO orchard and it does not reflect time involved with smaller-sized trees.

Conclusions

Collectively, we found evidence in support of our the hypothesis that removing watersprouts from pear trees reduces pear psylla populations. Watersprout removal may prove more beneficial in organic systems pesticide options are limited and those production systems where dealing with pests with which resistance development is of special concern.

Acknowledgments

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