TOWARD A STANDARDIZED TREATMENT PROTOCOL TO ELIMINATE GLASSY-WINGED SHARPSHOOTER EGG MASSES IN COMMERCIAL NURSERY STOCK

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ABSTRACT

Carbaryl, fenpropathrin, deltamethrin and acetamiprid were evaluated for their ability to kill glassy-wing sharpshooter nymphs emerging from the egg mass under standard commercial nursery operations (including transportation). Carbaryl provided the best overall results resulting in near absolute control (>98%) of emerging nymphs on all plant types (trees, shrubs, bedding plants). Fenpropathrin also achieved very good control. Control of emerging sharpshooters was poorest on bedding plants; this is largely due to the tremendous number of densely packed leaves within a small plant canopy and the resultant difficulty in achieving adequate coverage of the insecticides.

INTRODUCTION

Glassy-winged sharpshooter (*Homalodisca coagulata* (Say), Homoptera: Cicadellidae) has become a serious pest of California's commercial nursery production. This is in large part due to the intra-state quarantine measures restricting movement of nursery products from the southern portions of the state, in which sharpshooter populations have become established, to the northern and central portions of the state that currently do not have established populations of this insect. Currently, movement of nursery products from areas with established sharpshooter populations to areas without established populations requires labor-intensive pesticide applications and visual inspections for viable stages of the insect at both points of origin and destination. Currently, there are no state-approved standardized disinfestation protocols for the prevention and elimination of glassy-winged sharpshooters within nursery crops. The objective of the research presented here is to evaluate a standard set of pesticide treatment protocols to prevent the commercial shipment of viable egg masses of glassy-winged sharpshooters on representative nursery products.

OBJECTIVES

The objective of the research presented here is to evaluate a standard set of pesticide treatment protocols to prevent the commercial shipment of viable egg masses of glassy-winged sharpshooters on representative nursery products. Trials were conducted simultaneously on trees, crape myrtle (*Lagerstroemia indica*, L. 'Zuni"), shrubs, photinia (*Photinia fraseri* Lindl.), and bedding plants, periwinkle (*Vinca minor* L. 'Bowls'). Compounds evaluated for quarantine use include carbaryl, fenpropathrin, deltamethrin and acetamiprid.

RESULTS

Treatment Effects (See Figures 1 and 2).

Lagerstroemia: Carbary (Sevin) provided absolute control for both viable egg masses and emerging nymphs. Applications of carbaryl resulted in 0% viable egg masses and consequently 0% emergence of eggs. There was no successful emergence of a sharpshooter from carbaryl treated plants. Fenpropathrin (Tame) also showed excellent activity with only 1.25% of the egg masses showing any viability with 0.37% of the eggs successfully hatching. Acetamiprid (Tristar) allowed 30.2% of the egg masses to remain viable. This resulted in 8.5% of the eggs on a plant hatching. For acetamiprid, although one-third of the egg masses showed viability, within an egg mass, very few eggs successfully emerged. Deltamethrin showed relatively poor control for preventing successful egg hatch.

Photinia: Carbaryl again provided the best overall control resulting in 1.3% of the egg masses deposited displaying viability. Only 0.8% of the eggs deposited successful emerged on the carbaryl treated plants. Fenpropathrin showed good control with 6.1% of the egg masses showing viability yielding 1.6% of the total eggs successfully emerging. Similar to the results for *Lagerstroemia*, acetamiprid was somewhat intermediate in eliminating viable egg masses (12.2% of the egg masses remained viable) and preventing successful emergence (5.9% of the eggs successfully emerged). Deltamethrin was not significantly different from the control in eliminating viable egg masses or reducing successful emergence.

Vinca: Leaves on the *Vinca* were damaged easily, became necrotic, and fell off prior to the final assessment. Therefore, many of the masses found in the initial count had been damaged and had fallen off the plant. None-the less, as with the above species, carbaryl provided the best control resulting in 1.8% of the egg masses remaining viable and 1.6% of the eggs successfully emerging. Fenpropathrin allowed 25% of the egg mass to remain viable resulting in 32.3% of the eggs to successfully emerge. Acetamiprid allowed 18.2% of the egg masses to remain viable and 16.6% of the eggs to emerge. Deltamethrin was not successful in eliminating viable egg masses or preventing emergence; the deltamethrin treatment was not significantly different from the control treatment in preventing successful emergence from the eggs.

In all cases control treated plants displayed greater than 90% successful emergence of nymphs from eggs and greater than 95% of the egg masses remaining viable.

CONCLUSIONS

Carbaryl provided the best overall results resulting in near absolute control (>98%) of emerging nymphs on all plant types. Fenpropathrin also achieved very good control. Control of emerging sharpshooters was poorest on *Vinca.* This is largely due to the tremendous number of densely packed leaves within a small plant canopy. Adequate coverage of insecticidal materials is very difficult is such plant types and will be problematic. The likelihood of egg masses moving through a quarantine and treatment program on small canopy, densely foliated plants, we suspect will be much greater and consequently may deserve special considerations.

Surprisingly, deltamethrin did not prevent significant emergence from egg. This is in contradiction to our earlier lab/field trial showing deltamethrin caused significant mortality immediately after emergence. In the latter case, leaves containing experimental egg masses were returned to the lab and observed for emergence from the egg. As nymphs emerged from the chorion, they died. In the experiment presented here, the experimental conditions of this trial (handling and caging) prevented us from observing what happened to the nymphs upon emergence. The actual mortality (as opposed to emergence) was most likely higher as large numbers of dead nymphs were observed in the bags below the caged leaves, and many dead nymphs were observed on the leaves that fell off as they were being removed for assessment. Although the number of viable egg masses that resulted in successful egg emergence was high for the deltamethrin trials, we suspect that the overall mortality induced by this compound was extremely high (based on previous lab trials); but the experimental conditions utilized here prevented us from observing this phenomena. We will adjust our methodology for the winter experiment such that we will try and assess the direct, post-emergence mortality of all treatments.

Counting egg masses and/or eggs was determined four times throughout this experiment: July 14 (initial assessment), July 15 (a double check reassessment), July 17 (after treatment) and July 28-30 (final counts). Initially undetected, egg masses were found on each occasion following the initial July 14 assessment. The occurrence of these additional egg masses may be explained in two ways. First, undetected adults may have been present throughout the trial. This explanation requires that adults survive and remain undetected throughout the trial after 2 disinfestation periods (July 14 and 15), and pesticide applications (July 18). This is unlikely in the extreme as each plant and leaf were examined for adults and nymphs during both July 14 and 15 counts. If either adults or nymphs were found at this point, they were immediately removed. Second, it is highly unlikely that adults or late instar nymphs survived treatment applications or were able to cross sleeve cages to access experimental plants. A much more likely explanation is that the additional egg masses were undetected during the first three counts and were only discovered as each leaf on each plant was examined under a microscope at the end of the trial. At this time, masses are more easily seen because the edge of the egg mass had turned necrotic, a dark outline of the open end of the egg mass. In total, an additional 113 egg masses were detected during the fourth observation period. This accounts for approximately 12-14% of the total number of egg masses observed. The fact that a field crew of 13 professional entomologists and CDFA personnel all highly trained to detect sharpshooter egg masses missed 12-14% of the egg masses present on 300 plants is worrisome and draws into question the utility of the statewide inspection programs. The implications for current egg mass monitoring programs are significant; they may be missing a tremendous number of egg masses (~10% of the total). If this is the case, simply prophylactically treating nursery stock prior to shipment will be more effective in limiting the spread of sharpshooters in the egg stage than inspections.

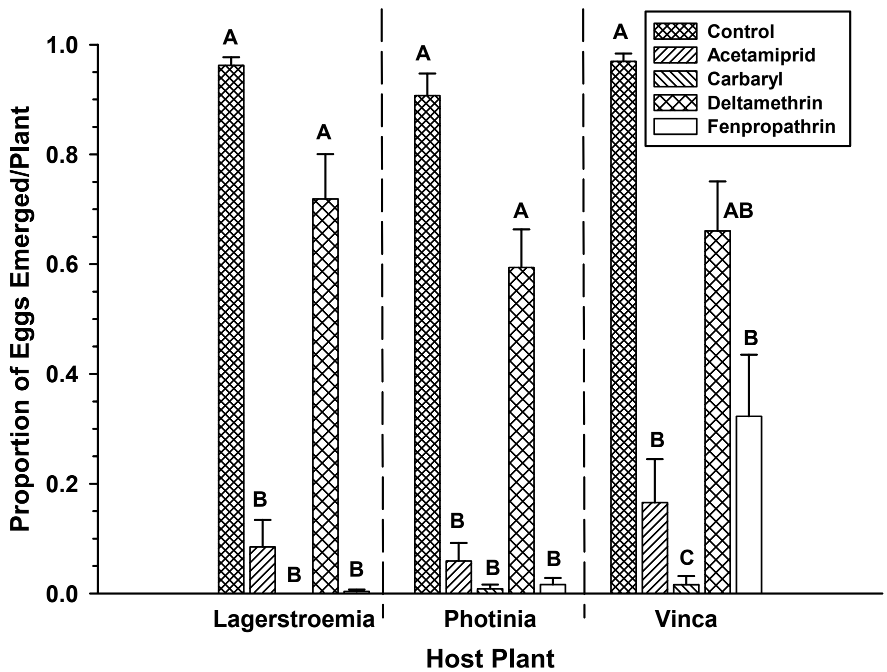

Figure 1. Effect of insecticide application on the proportion of glassy-winged sharpshooter eggs successfully hatching from an egg mass. Different letters over bars, within a species, indicate significant differences among treatments (Kruskal-Wallis test, followed by Nemenyi multiple range test, $P<0.05$)

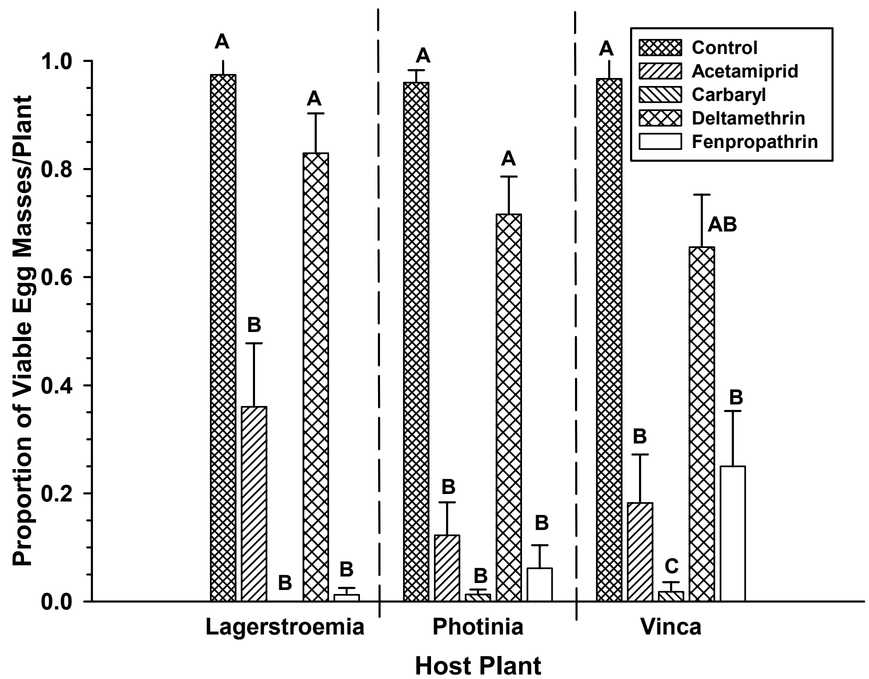

Figure 2. Effect of insecticide application on the proportion of viable glassy-winged sharpshooter egg masses. Different letters over bars, within a species, indicate significant differences among treatments (Kruskal-Wallis test, followed by Nemenyi multiple range test, $P< 0.05$)

FUNDING AGENCIES
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