Efficacy of Mitecide-Insecticides TetraCURB™ Concentrate and TetraCURB™ Organic on Lygus Bug in California Strawberry

INTRODUCTION

Western tarnished plant bug (Lygus hesperus), also referred to as lygus bug, is a significant and severe pest that affects strawberries grown in the Central Coast area of California, with an annual loss in the California strawberry industry estimated at $200 million¹. Lygus bugs infestation results in irregularly shaped and deformation of the fruit known as cat-facing. They can also damage the fruits by puncturing individual seeds leading to suppressed development of the berry. To successfully manage the pest, it is key to scout and monitor for the nymph and adult pests on both weed hosts and strawberry in Winter and Spring. But spraying insecticides is also highly recommended to kill the earliest instars of lygus bug nymphs before they cause significant damage. Unfortunately, growers experience multiple challenges in fighting against Lygus infestation. Registered insecticides seem to not be as effective as they used to on the adults and many products have been rendered as ineffective through resistance². Therefore, there is a need for improved control actions for lygus bug in strawberries in growing areas of the California Central Coast. Botanical oil-based TetraCURB Concentrate and TetraCURB Organic are miticide-insecticides registered for use against lygus in California. They are already known to be effective in killing spider mites and other soft-bodied insects in strawberries.

The goal of this field trial was to demonstrate the performance of TetraCURB Concentrate and TetraCURB Organic in controlling Lygus bug infestation in California strawberries and to recommend the optimal application rate and how to include the product into an IPM program.

MATERIALS AND METHODS

Experiment: The trial was conducted in Ventura County, California on commercially grown strawberries variety Fragaria vesca cv. Portola. The trial was set up as a random complete block design with six replicate blocks, 5 ft wide by 25 ft long of strawberry row, for each treatment. The economic threshold for lygus was defined following the UCANR guidelines in which one nymph found per 20 plants meets the threshold.

Treatments and application rates: Three different treatments were evaluated. Each treatment was applied four separate times (A, B, C and D) with each spray being 5 to 7 days apart. The spray treatments were applied at water volumes of 100-125 gallon per acre to ensure complete coverage of the plant surfaces (leaf top, underside of leaf, stems, etc.) until runoff.

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>RATES</th>
<th>SPRAY APPLICATIONS*</th>
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<tbody>
<tr>
<td>Untreated control</td>
<td>-</td>
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<tr>
<td>TetraCURB Concentrate</td>
<td>64 fl oz/100 gal</td>
<td>A, B, C, D</td>
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<tr>
<td>TetraCURB Organic</td>
<td>64 fl oz/100 gal</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>+ organic adjuvant</td>
<td>8 fl oz/100 gal</td>
<td>A, B, C, D</td>
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Trial dates: November 6, 2019 – December 2, 2019

Data collection: 1) Infestation and product performance: The adult and nymph lygus population were counted before the first application and 1-2 days after each application. Counts were taken from at least 10 plants samples per replicate via plant beat, collect, and count method. The average number of nymph (Fig. 1) and total lygus (Fig. 2) were collected over the course of the trial. 2) Phytotoxicity: The phytotoxicity and overall impact of the sprays were evaluated by taking multiple representative images of the fields and berries before and during the trial showing the respective treatment block(s) for each treatment. 3) Marketability of the collected berries from the field: Ten plants per replicate were harvested of all ripe fruit, with fruit weights and counts documented. Fruit was scored for unmarketability reasons such as lygus damage, disease, or other. All data rated as significant was done so utilizing the New Duncan’s Multiple Test Range at 95% confidence level.

Keywords: Lygus bug, western tarnished plant bug, Lygus hesperus, strawberry, field trial, TetraCURB Concentrate, TetraCURB Organic, Holden Research and Consulting.
RESULTS - ADULT AND NYMPH LYGUS POPULATION COUNTS

- The overall nymph count and total counts were significantly reduced by TetraCURB™ Concentrate and TetraCURB™ Organic treatments compared to the untreated control.
- The lygus nymph population was reduced by 80% and the total population including adults and nymphs was reduced by 83% for both treatment TetraCURB Concentrate and TetraCURB Organic over the untreated control.
- Note: During the data collection, the adult count was challenging to accurately collect due to the high flight of the pest. That's why we observe less separation between the treatment time points and adult counts even though the average counts were higher for the untreated control.

AVERAGE NUMBER OF LYGUS (NYMPH COUNT)

Figure 1. Average ± standard error of lygus nymph population counts on strawberries. *Significant difference observed between the treatment and the untreated control. DA= day after application (A, B, C, D)

TOTAL NUMBER OF LYGUS (ADULT AND NYMPH POPULATION COUNT)

Figure 2. Average ± standard error of total lygus population counts on strawberries. *Significant difference observed between the treatment and the untreated control. DA= day after application (A, B, C, D)
UNMARKETABLE STRAWBERRY DUE TO LYGUS INFESTATION

- Fruit deformity due to lygus bug damage lead to unmarketable produce, affecting the grower yield. The trial collected the total unmarketable fruit weight and number from the plots at 15 and 20 days after application (114 and 119 days after planting) and 10 days after the last application (125 days after planting) to determine the benefit of TetraCURB treatments in the field.
- The trial demonstrates that TetraCURB Concentrate treatments on strawberries infested by lygus bug was able to significantly reduce the fruit loss two weeks after the first application and ten days after the last applications over the untreated plots.

**CONCLUSION**

Successful lygus management not only requires a meticulous pest monitoring for the first appearance of the nymphs within the strawberry fields and the surrounding host plants, but it also requires a control with registered insecticides. Insecticide treatments are usually more effective against younger nymphs than adult tarnished plant bugs. Today, growers have just a few modes of action in available products such as the malathion organophosphates, pyrethroids (bifenthrin and fenpropatrin), but these have been used for decades resulting in many populations that are resistant to these chemical classes.

The purpose of the trial was to demonstrate the efficacy of our botanical oil-based TetraCURB Concentrate and TetraCURB Organic as alternative insecticide control methods to manage nymph and adult lygus populations in strawberry grown in California over an untreated control plot. Overall, the application of both insecticide on the strawberry field was able to significantly reduce the lygus bug nymph population by 80% over the untreated control after 4 treatments as well as reducing significantly the fruit loss for the grower at various times of the growing season.

TetraCURB and TetraCURB Organic are effective pesticides growers can use in strawberry IPM programs to control lygus bug as well as other small soft-bodied insects such as aphids, whiteflies, or spider mites. We recommend using TetraCURB Concentrate and Organic as foliar spray at 64 fl. oz per 100 gallon of water and spray twice a week to control the nymph populations.

Also, phytotoxicity is a concern that grower may have when using botanical oil-based pesticides. We carefully monitored for burn symptoms during the trial and there was no observable phytotoxicity over the course of the study with any of the treatments.

**Sources:**


**Acknowledgments**

Holden Research

Always read and follow the entire label direction before use.

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