Progress in Management of Avocado Lace Bug

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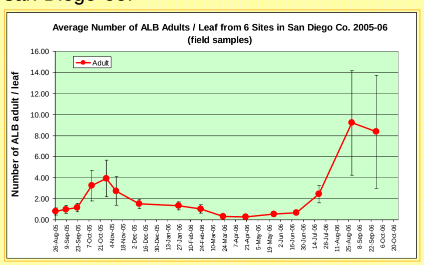
INTRODUCTION: The avocado lace bug (ALB), *Pseudacysta perseae* (Heidemann), was discovered in September 2004 feeding on backyard avocado trees in San Diego County. Several ALB surveys were conducted by the County of San Diego Department of Agriculture, Weights & Measures (AWM) and the California Department of Food and Agriculture (CDFA) during 2004-05 (Fig. 1) and 2006 (spring and fall). So far, it hasn't been found in commercial avocado groves in San Diego County and prior to 2006, it was not found north of the Interstate 8 freeway. During the ALB fall 2006 survey, two new sites were detected near La Jolla (coastal region) and they are approximately 10 miles above the northernmost previous ALB site (Fig. 2).

1. ALB Population Monitoring:

ALB sampling sites were selected based upon high levels of ALB, avocado tree size, and to achieve a diversity in sample locations. Infested ALB sites were not found further inland, therefore the six sample sites are located along the coastal region of San Diego Co.

Results:
After a year of ALB sampling, the highest densities of adult ALB in San Diego Co. were reached between the months of August – December with the peak occurring in October.



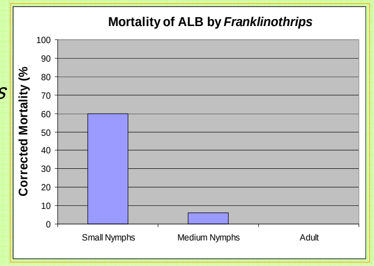
2. Genotyping ALB:

Among the 14 ALB populations studied, there are three different genotypes detected for the CO1 genetic marker. Except for the population from Veracruz (Mexico), all other populations are monotypic at the mitochondrial region, suggesting that the populations that have settled in the U. S. have different origins (i.e. FL vs. TX and CA). Five out of 24 microsatellite markers showed variation between CA, Weslaco, and Veracruz populations. There was population variation within the CA individuals. On the other hand, there was no variation detected within Weslaco and Veracruz populations. Therefore the CA population may have originated from an area we have not yet sampled.

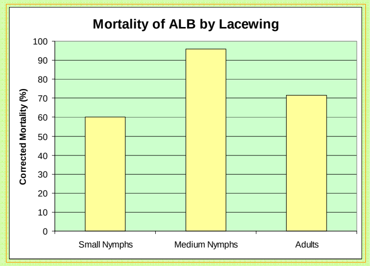
3.Natural Enemy Studies: Testing natural enemies as potential augmentative control agents for ALB

General Protocol:
Predators were starved 24h prior to the bioassay. Predation on different ALB stages, i.e. nymphs (small, medium and large size) and adults was evaluated using Munger cells to confine the bugs in the presence of the predator. The prey/pest ratio used in each cell was one predator per 5-15 ALB stages per cell. ALB mortality was assessed 24 hours after the prey were exposed to the predator.

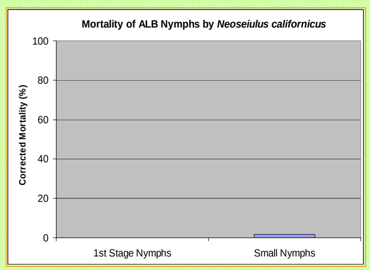
3.1. *Adult female Franklinothrips orizabensis (predatory thrips)*



3.2. *Second instar larva of Chrysoperla rufilabris (green lacewing)*



3.3. *Adult female Neoseiulus californicus (predaceous mite)*

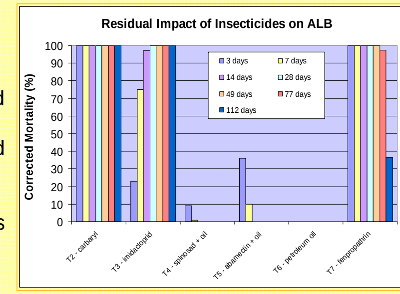


Results:
Adult female *Franklinothrips orizabensis* preyed mostly on small nymphs (60% mortality) compared with only 6% and 0% mortality on medium-sized nymphs and adult ALB, respectively. These results are not promising. Similar negative results were obtained with adult female *Neoseiulus californicus* -- they did not effectively feed on small ALB stages. On the other hand, studies with second instar larvae of *Chrysoperla rufilabris* showed they efficiently preyed on all ALB stages tested. The highest mortality was on the ALB medium size nymphs (96%) followed by adults (71%), and small size nymphs (60%).

4. Pesticide Trial:

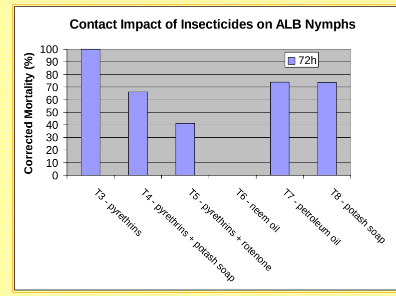
4.1. Residual impact of insecticides on ALB:

Results: The insecticides carbaryl, imidacloprid, and fenpropathrin were the best insecticides of those evaluated to control ALB nymphs at 112 days post-treatment. Spinosad and abamectin plus oil were not effective against ALB, despite past recommendations for their use against ALB.



4.2. Contact impact of insecticides on ALB:

Results: Contact insecticides were evaluated 72 h post-treatment. Pyrethrin was the best contact treatment of those evaluated to control ALB. The two other pyrethrin treatments (i.e. pyrethrins mixed with potash soap or rotenone) were not as effective as using pyrethrin alone. Petroleum oil and potash soap tied as the second most effective treatments. Petroleum oil had no residual impact, but was effective as a contact insecticide. Neem oil had little impact on ALB nymphs.



4.3. Susceptibility of Chrysoperla rufilabris to imidacloprid:

Results: Data indicate that avocado trees treated with imidacloprid (Admire Pro®) can cause lacewing mortality due to food chain impacts (i.e. by lacewing larvae being exposed to imidacloprid via feeding on poisoned ALB).