Management and Resistance Monitoring of Avocado Thrips and Persea Mite

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Persea mite was discovered attacking avocados in southern California in 1990. Avocado thrips was found in two isolated avocado groves, one in Orange Co. and the other in Ventura Co., in June 1996. Since then, these have become the two major arthropod pests of avocados in California although populations of each can vary in severity a good deal from year to year. Although it was an unusual year, according to Witney (2009), estimates of direct losses from avocado thrips damage to fruit and control costs for this insect combined to exceed $50 million in 2006.

Abamectin (Agri-Mek and several generic formulations) has been the major pesticide used for control of both avocado thrips and persea mite since it was first made available for use on avocados in 1999. Delegate was registered for use against avocado thrips in 2007 but has not been used extensively to date. We are concerned about the heavy reliance on abamectin over the past 11 years because both thrips and mite species are notorious for their ability to develop pesticide resistance.

The objectives of our research are three-fold: (1) Screen new pesticides potentially useful in control of avocado thrips and persea mite so as to find, and help move towards registration, products with chemistries different from the effective products we currently have available, i.e. abamectin (Agri-Mek and generic formulations), the spinosyns (Delegate, Entrust on organic avocados), fenpropathrin (Danitol), and spirodiclofen (Envidor); (2) Monitor for possible resistance of avocado thrips and persea mite to current products such as abamectin, Danitol, and newer materials once they are introduced; and (3) other research as needed to optimally manage these and other pests of avocado.

Brief Summary of Recent Research Results

Screening for New Avocado Thrips Control Materials

We have developed a fairly efficient means of screening new products for potential use against avocado thrips. Many products show limited efficacy against avocado thrips and screening trials rapidly eliminate them from the need for future testing. Products that have shown promise in recent experimental trials and warrant further testing include spinetoram (Movento), cyazypyr, NNI-0101, NAI-2303, and a product whose identity cannot be disclosed at present (secrecy agreement).

Field Studies with Movento

Movento is a new class of chemistry (but the same as Envidor that was recently registered for persea mite control) that shows promise against a number of pests. This material was recently registered for use against citrus thrips and California red scale on citrus in California and has looked strong in recent trials against a variety of pests including thrips, armored scale insects, psyllids, and mites. We had not seen as good results against avocado thrips and suspect the problem may be more difficult leaf uptake on avocado (the material is systemic). We are very encouraged by recent trial data from a study conducted by David Machlitt (Consulting Entomological Services, Moorpark) in which several surfactants added to Movento appeared to result in good control.

Movento is an interesting material in that the formulation that is sprayed on the plant has almost no toxicity but it is taken up into the plant and converted to the toxic enol derivative. Thus, only plant feeding species should be impacted by this pesticide or possibly natural enemies that derive a toxic dose by feeding on poisoned prey or hosts.

Movento is relatively non-toxic to honey bees and for experimental purposes, we applied the material at two times during avocado bloom on campus (at the cauliflower stage and 2 weeks later), testing application with 0.5% NR-415 oil versus 0.25% Dynamic as surfactants that might improve uptake by the plant. After talking to Dr. Carol Lovatt and others, the thinking was that pesticide uptake during bloom might be more efficacious than when the material was applied to a leaf flush. In these studies, we saw moderate avocado thrips activity with Movento – mortality was not as high as we would have liked.

Spring PCA Cooperator Field Trials with Agri-Mek vs. Delegate vs. Danitol

Danitol is a pyrethroid insecticide that was registered in 2010 for use on avocados. Delegate was registered in 2007 but relatively few pest control advisors have used this material to date. We believe Agri-Mek (and generic abamectins) is being overused and because of resistance concerns, wanted to develop comparative data on how Delegate and Danitol might work in control of avocado thrips.

With the assistance of 6 PCAs, we set up 6 field avocado thrips field trials in spring 2009, 3 in the south (Escondido, Valley Center, Irvine) and 3 in the north (2 in Somis, Goleta). Trial data was reported at the spring CAC-CAS meetings in SLO, Ventura, and Temecula in April 2010 and a fruit scarring summary was reported in our June 2010 progress report.

What did we learn from the 2009 trials? First, Agri-Mek appeared to be the most effective pre-bloom treatment at one site but Danitol was at the other site. Danitol applied at two-thirds leaf expansion was extremely effective in reducing thrips scarring but Delegate was also very effective, in several cases it performed better than Agri-Mek. We would have liked to have seen how these materials would have performed under higher avocado thrips pressure and towards that end we repeated the studies at two field sites in 2010. The 2010 Ventura trial also included comparison of Movento + Oil and Movento + Destiny surfactant in small plot trials which included crop destruct (this material it not yet registered for use on avocados). Fruit scarring counts have not been taken as yet but Fig. 1 and 2 below show levels off avocado thrips on leaves treated with the different products over time post-treatment. The bottom line on these studies will be the fruit scarring counts to be taken over the next several months.

Fig. 1. Avocado Thrips Spray Trial 2010, San Diego Co.

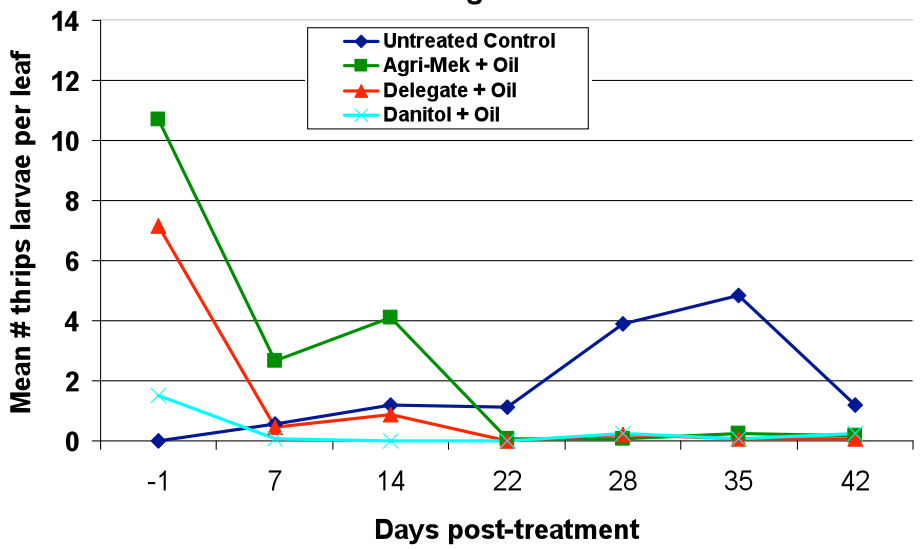
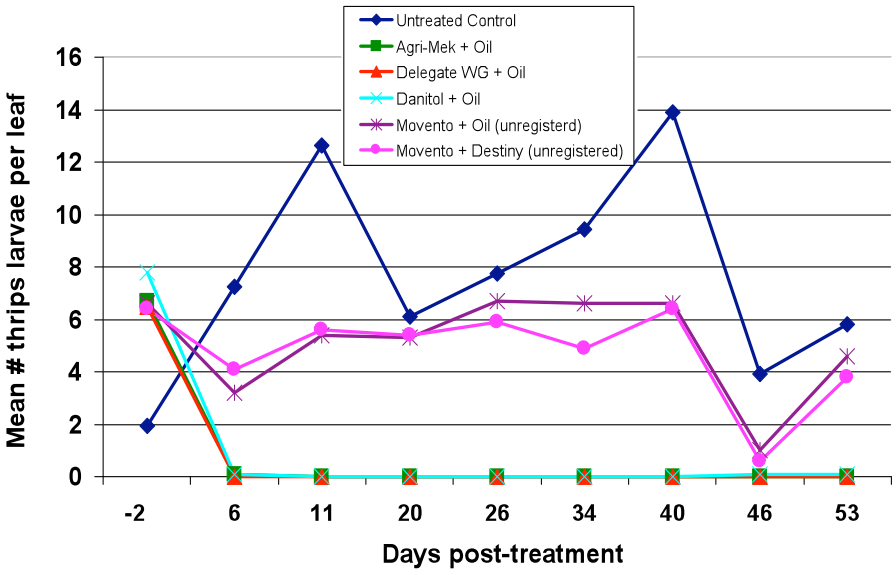


Fig. 2. Avocado Thrips Spray Trial 2010, Ventura Co.



Evaluation of Persea Mite Control Materials

We have also developed a fairly good means of screening new products for efficacy against persea mite and to date, have run 6 field trials. As a result, 3 new and effective materials are moving towards registration on avocado (Envidor [registered recently], Zeal [late 2011], and FujiMite [expected 2012]). These 3 materials all are different chemistries and each is different from Agri-Mek, making the likelihood of cross-resistance low.

Envidor Recently Registered

Envidor was recently registered for use on California avocados and appears to be quite effective against persea mite. Because it is a new class of chemistry, it can take some of the pressure off products such as Agri-Mek.

Zeal Registration Likely late 2011

The Zeal registration package was submitted to U.S. EPA in August 2009. At this point, federal registration is expected during the second quarter of 2011 with California registration some time late in 2011.

Fall 2010 PCA Cooperator Persea Mite Trials

Two persea mite field trials were recently applied by PCA cooperators. Evaluation of persea mite levels post-treatment is currently in progress.

Acknowledgments

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