

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 and Danitol in 2010. Envidor was registered for use against persea mite in 2011 and Zeal will be soon. We are concerned about the heavy reliance on abamectin over the past 12 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; (2) monitor for possible resistance of avocado thrips and persea mite to current products 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 spirotetramat (Movento), cyazapyr, NNI-0101, NAI-2303, and a product whose identity cannot be disclosed at present (secrecy agreement).

Field Studies with Movento

Movento is in a relatively new class of chemistry (but the same as Envidor that was recently registered for perseia mite control) that shows promise against a number of pests. This material was recently registered for use against citrus thrips, California red scale, and mites on citrus in California and has looked strong in recent trials against a variety of other pests including psyllids and leafminers. It is quite close to registration on avocados but we are still trying to learn how to use it effectively as plant systemic uptake does not appear to occur as easily on avocado as it does on citrus.

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.

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). 2009 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. Similar trials were run at two field sites in spring 2010 and fruit scarring data are shown in Table 1 below.

Table 1. Percent of fruit with economic or sub-economic (any) avocado thrips scarring at 2010 field trial sites.

Location	Treatment	# of fruit evaluated	% sub-economic thrips scarring	% economic thrips scarring
Escondido	Control	600	33.3	4.0
	Agri-Mek	600	2.8	0.0
	Danitol	600	5.7	0.7
	Delegate	600	4.0	0.5
Somis	Control	181	95.0	68.5
	Agri-Mek	300	8.0	0.0
	Danitol	300	0.0	0.0
	Delegate	300	7.0	0.0

What did we learn from the 2009 and 2010 field trials? First, each of these 3 materials (Agri-Mek/generic abamectins, Delegate, and Danitol) are quite effective in controlling avocado thrips, even when applied under the challenging circumstances of helicopter application (Escondido; ground application was used at Somis). Each material has its strengths and weaknesses and we encourage PCAs and growers to try both Delegate and Danitol as possible alternatives to abamectin so as to lessen the pressure for resistance evolving to this class of chemistry. Ideally, growers should rotate between different classes of chemistry so that ALL of these products will remain effective.

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 in 2010, Zeal registration is expected late 2011, and FujiMite registration expected in 2012). These 3 materials all are different chemistries and each is different from Agri-Mek, making the likelihood of cross-resistance low.

Fall 2010 PCA Cooperator Persea Mite Trials

Two persea mite field trials were applied by PCA cooperators in fall 2010. Unfortunately (from the perspective of the field trials), a major heat event occurred late September and drastically reduced persea mite levels at both sites. At one of the sites in Saticoy, we obtained useful data showing that control via abamectin versus Envidor was similar (Table 2 below). Both products were effectively reducing persea mite levels until the >105°F temperatures on 27 September also contributed to population decline (thus, evaluation during the latter portions of the trial was compromised somewhat).

Table 2. Results of a fall 2010 persea mite trial in Saticoy (100 gpa application of both products on 12 September 2010; Epi-Mek 0.15 EC applied at 15 fl oz/a + 3% NR-415 oil; Envidor 240 SC at 20 fl oz/a without oil)

Date of count	9-8	9-20	9-28	10-7	10-22	11-5
Days pre or post-treatment	-4	+8	+16	+25	+40	+51
<u>Mean number of motile persea mite per leaf (half-vein method)</u>						
Untreated control	38.2	69.1	35.7	17.9	26.3	3.6
Epi-Mek + oil	57.2	22.4	8.2	2.1	0.4	0.0
Envidor	49.0	26.7	2.3	0.6	0.0	0.0

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