

## Pesticide Resistance

### Acaricide Susceptibility and Resistance Management of Spider Mites on Pear

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*Keywords:* McDaniel spider mite, avermectin, AgriMek, hexythiazox, fenbutatin oxide, pear

Studies conducted in the Mid-Columbia region in 1987 and 1989 showed that organotin resistance had developed in McDaniel mite. Because of the resistance to organotins and the lack of an effective acaricide, a specific exemption from registration was requested for avermectin (AgriMek) in 1987. For the last seven years probably 95% or more of the pear acreage has been treated annually with avermectin under Section 18 registrations. Essentially no other acaricides have been used during that time.

This study has the following objectives:

- 1) Assess the status of avermectin susceptibility in local McDaniel mite populations on pear which have been treated annually with this product since 1987.
- 2) Evaluate the status of fenbutatin oxide susceptibility in McDaniel mite populations which tested resistant in 1987/88 and which have been treated since then with avermectin.
- 3) Evaluate the status of hexythiazox susceptibility which is now available for mite control on pear.
- 4) Determine cross resistance patterns between avermectin, fenbutatin oxide and hexythiazox.

#### **Avermectin**

The dose mortality responses of the four McDaniel mite populations tested in 1994 showed little variation.  $LC_{50}$ s ranged from 0.10 to 0.12 mg (AI)/l exceeding by a factor of 10 the recommended discriminating concentration for detecting resistance (Knight et al. 1990). No baseline susceptibility data from the Hood River Valley are available. For purposes of comparison, baseline data for Washington McDaniel mite populations are used here to give an indication of the susceptibility changes which may have occurred in local populations over the last seven years of intensive avermectin use. Using the average  $LC_{50}$  for Washington McDaniel mite populations from 1989 as a reference value, our bioassay results suggest that susceptibility in local populations may have decreased about 80 fold. Although these data indicate a major shift in susceptibility, we have not observed actual control failures in the field. The reason why avermectin still appears to be effective is that the field rate is still about 40 fold higher than the  $LC_{90}$  of local populations.

#### **Hexythiazox**

The  $LC_{50}$ s for the four McDaniel mite populations tested in 1994 ranged from 0.05 to

0.48 mg (AI)/l. The recommended discriminating concentration for monitoring resistance to hexythiazox in this species is 5.0 mg (AI)/l (Knight et al. 1990). The data suggest that in spite of considerable variation in susceptibility to hexythiazox among populations, this ovicide appears to be as effective as it was when avermectin use began seven years ago.

#### **Fenbutatin Oxide**

Tests in 1987/88 revealed that McDaniel mite on pear in the Hood River Valley had become resistant to organotin acaricides. However, resistance levels varied considerably from orchard to orchard. A residual leaf disk bioassay was used in those studies. In 1994, we used a topical leaf disk bioassay similar to the one described by Knight et al. (1990) so that our bioassay results could be compared more directly with data from Washington. The LC<sub>50</sub> values ranged from 0.03 to 0.490 g (AI)/l which indicates about a 15-fold difference between the least and most susceptible population. In the Washington study from 1989, LC<sub>50</sub> values for McDaniel mite on pear ranged from 0.144 to 0.366 g(AI)/l similar to present susceptibility levels in northern Oregon.