

*IPFP Satellite Project***EVALUATION OF INSECTICIDES AT DIFFERENT TIMINGS AND RATES FOR APHID CONTROL – 2003-04**

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**BACKGROUND**

Aphids are the key pest in prune production, but no effective, reduced risk pesticide(s) are labeled for their control. Spraying for aphids after petal fall, using broad-spectrum insecticides such as diazinon or Asana®, can harm beneficial insect and/or mite populations, resulting in mite “flare-ups” and costly miticide applications. [Horticultural oil sprays can control aphid populations during or after bloom, but are expensive (multiple sprays are often needed), and are not compatible with some important fungicides.]

The IPFP project has shown that, on dried plum, aphids are the only “routine” pest that needs to be controlled with dormant sprays since scale and peach twig borer are rarely a problem and aphids are usually a reoccurring problem. However, dormant insecticide sprays have been shown to pollute surface waterways when rainfall exceeds soil infiltration rate and storm runoff occurs. January and February, the timing “window” for the traditional dormant spray, is the periods of highest rainfall in the Sacramento Valley and thus the period of greatest risk for surface water pollution from sprays intended to control prune aphid.

Since no reliable monitoring method has been discovered to predict aphid outbreaks, dormant sprays to control aphids are generally recommended except in the few cases where long term orchard history indicates that aphids do not frequent a particular orchard.

**OBJECTIVES**

Growers need additional options (application timings and pesticide rates) for aphid control that effectively control aphids while reducing potential for surface water pollution, pesticide residue on fruit, and/or negative impact(s) on mite predators.

The objective of this project is to determine if low label or below label insecticide rates, applied in the fall, late winter, or spring, can control aphids. If this strategy controls aphids and was implemented by dried plum growers it would mitigate the concern that dormant sprays applied by dried plum growers pollute surface waterways.

**PROCEDURE**

**Experiment 1.** In a Butte County California orchard an 11 acre replicated trial was established in a randomized complete block design consisting of five replicates of five treatments. Each replicate consisted of 25 trees (5 x 5). Treatments were applied at 100 GPA to every tree row on November 14<sup>th</sup>, 2003 by an orchard air blast sprayer traveling at 1.5 MPH to determine if any of the treatments would control Leaf Curl Plum Aphid (LCPA) *Brachycaudus helichrysi*, and/or Mealy Plum Aphid (MPA) *Hyalopterus pruni*.

Treatments and rates of product were:

1. Imidan @ 2.12 lbs/A\* + 2 pints of RNA Buffer/A
2. Imidan @ 4.25 lbs. + 2 pints of RNA Buffer/A
3. Asana @ 3 oz./A\*\*
4. Diazinon 4EC 16 oz/A\*
5. Untreated

\* = lowest label rate

\*\* = below label rate (lowest label rate of Asana is 4.8 oz/A)

The RNA Buffer was added to the spray water before adding the Imidan to lower the pH of the spray water from 7.0 to 5.8.

The presence or absence of LCPA and/or MPA was determined on May 7<sup>th</sup>, 2004 by evaluating the nine center trees in each plot. If 10 % or more of the tree canopy was occupied by aphids it was scored as a "significant" aphid population.

**Experiment 2.** A range of materials and rates at two different timings were tested for aphid control in a Sutter county dried plum orchard. All treatments were handgun applications at dilute spray volumes, and the experiment used a randomized complete block design with six blocks. There was one treated tree per treatment per block. One guard tree on each side within the tree row separated the treatment trees. Zinc sulfate was included in some treatments to test if early season defoliation affected aphid control.

October 30, 2003.

Treatments and rates of product were:

1. 20# Zinc sulfate + 2 pints diazinon/A
2. 20# Zinc sulfate + 2 oz Asana®/A
3. 20# Zinc sulfate + 4.25# Imidan® 70W/A\*
4. 4 gallons of oil + 2 pints diazinon/A
5. 4 gallons of oil + 2 oz Asana®/A\*\*
6. 4 gallons of oil + 4.25# Imidan® 70W/A\*
7. 4 gallons of oil + 2.12# Imidan® 70W/A\*
8. 4 gallons of oil/A
9. Untreated control

A further seven treatments were applied on March 9, 2004.

1. 4 gallons of oil + 2 pints diazinon/A
2. 4 gallons of oil + 2 oz Asana®/A \*\*
3. 4 gallons of oil + 4.25# Imidan® 70W/A \*
4. 4 gallons of oil + 2.12# Imidan® 70W/A \*
5. 2 oz Asana®/A \*\*
6. 4 gallons of oil/A
7. Untreated control

\*All Imidan® treatments included 2 pints Trifol®/100 gallons of spray water to drop the pH of the spray solution below pH=5.

\*\* = below label rate (lowest label rate of Asana is 4.8 oz/A)

Trees were visually evaluated for relative levels of LCPA and/or MPA present on April 12 and May 2, 2004. Only MPA were present by the May 2 evaluation date. The following scale was used: 0 = no aphids visible, 0.5 = some aphids present with careful monitoring, 1.0 = some aphids easily visible, 2.0 = significant aphid population easily visible, and 3.0 = high aphid population present. It was assumed that aphid levels above 0.5 would be the spray threshold for many growers.

**Experiment 3.** Trees used in Experiment 2 were visually rated on May 19, 2004, and trees with high aphid populations (all rated 3.0 on the aphid infestation scale described above) were selected for use in a completely randomized design experiment to evaluate in-season aphid control using reduced rates of labeled insecticides. Treatments were as follows:

1. 1 pint diazinon/A\*\*
2. 4 pints diazinon/A
3. 12.8 oz Asana®/A
4. 4 oz Asana®/A\*\*
5. 4 oz Asana®\*\* + 4 oz Sylgard 309 organosilicone surfactant.
6. 6 gallons of horticultural oil/A
7. Untreated control

\*\* = below label rate (lowest label rates of Asana® and diazinon are 4.8 oz/A and 2 pints per acre, respectively)

Trees were visually evaluated for relative levels of MPA present on June 2, 2004, using the same rating scale described for Experiment 2.

## RESULTS:

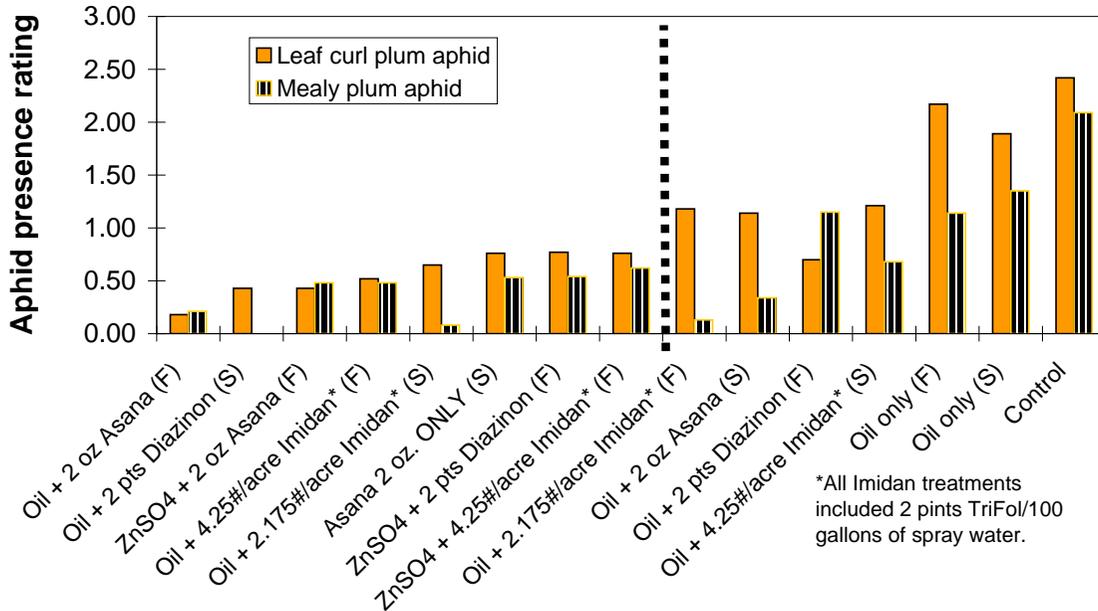
### Experiment 1.

Treatment	% Trees with Aphids (5/7/04)		% Trees with Significant* Aphids	
	LCPA	MPA	LCPA	MPA
1. Imidan 2.12 #/A	0	0	0	0
2. Imidan 4.25 #/A	0	0	0	0
3. Asana 3 oz./A	0	0	0	0
4. Diazinon 4 EC 16 oz/A	0	0	0	0
5. Untreated check	14.4	48.8	0	41.6

\* Significant is defined as 10 % or more of the tree canopy occupied by aphids.

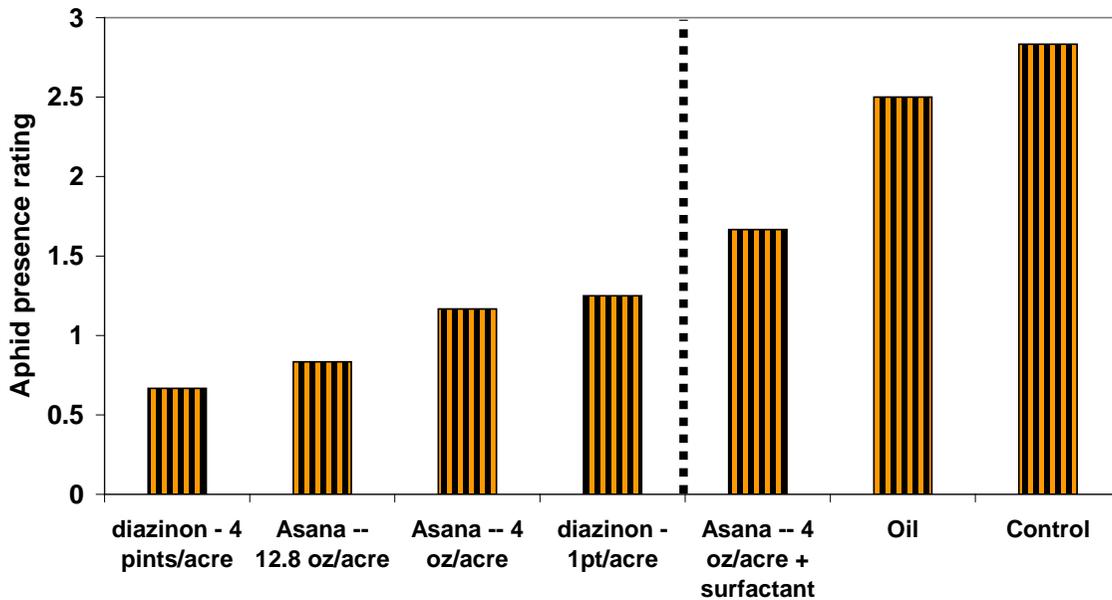
**Experiment 2:**

Aphid Control Trial Results, Sutter County. 2003-2004. Sprays applied on Oct. 30, 2003 are labeled (F) and those on March 9, 2004 are marked (S). All treatments were evaluated on April 12 and May 2, 2004 using an aphid presence scale (0=no aphids, 3=high aphid population) described in the text. All treatments to the left of the dotted line are not significantly different at the 5% level.



**Experiment 3:**

In-season control of mealy plum aphid using different rates of labeled insecticides. Aphid presence rating scale (0=no aphids, 3=high population) was used to evaluate results. Treatments were applied on May 21, and control was evaluated on June 2, 2004. Treatments to the left of the vertical dotted line are not significantly different at the 5% level.



## CONCLUSIONS

Early to mid-November is a good time to apply the “dormant” spray for aphid control even though many leaves are still on the tree and the tree is not entirely dormant. This timing apparently controls aphids returning to the prune trees and any aphid eggs that have already been laid. Low label rates of Imidan® and diazinon and below label rates of Asana® were effective in controlling aphids at this early timing. Including oil or zinc sulfate with insecticides at this time is not necessary for effective aphid control.

Most dried plum growers do not need to control peach twig borer or San Jose scale every year with dormant sprays. However, aphids are a routine pest that needs to be controlled in nearly every orchard nearly every year. This early timing, before winter rains saturate the soil, and the use of low label rates of Imidan® or diazinon or the below label rate of Asana® for aphid control would mitigate concerns of pesticide runoff into waterways. Furthermore Imidan® should breakdown rapidly when in contact with neutral or basic water or soil and should not be a toxic concern in waterways.

Early March, just before trees bloom, can also be an effective timing for prune aphid control, although care must be taken to avoid harming bees at this timing. Depending on the year, this timing may also help reduce the risk of pesticide runoff, as average rainfall in March is less than in January or February.

Finally, no significant differences between low and high rates of diazinon or Asana® for mealy plum aphid control were observed following in-season treatment of heavily infested trees. The level of aphid control in-season was less than with prebloom treatments (October/November or March). Use of low pesticide rates for in-season control may reduce the impact of these sprays on mite predators and pesticide residue on the fruit at harvest, as well as pesticide losses from the orchard due to irrigation runoff.