

Evaluation of Temik (aldicarb) For the Control of the Pecan Aphid Complex for Pecans Grown in Arizona

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Abstract

This experiment was conducted to extend the label for Temik use in Arizona pecan orchards for aphid control. Spring application of Temik controlled both yellow and black aphids throughout the season and significantly increased yield.

The pecan aphid complex (yellow, black margined and black pecan aphid) can cause serious damage to pecan trees in Arizona. This aphid complex is the major pecan insect pest group in Arizona and if not controlled can cause significant economic damage by reducing yield and nut quality in any given year. Each aphid species alone can cause significant damage to foliage resulting in reduced photosynthesis or leaf abscission depending on year and climatic conditions.

It is of utmost importance that pecan producers have an arsenal of insecticides available to combat economic populations of these aphids to prevent leaf damage or drop, thus reducing yield and nut quality.

Available insecticides labeled for use in Arizona pecan orchards can be applied foliarly, injected into drip irrigation systems or injected into soil. The compound has successfully controlled aphid populations since its initial registration in Arizona is Temik. This compound is injected into soil on two sides of a tree and has an excellent reputation for effective aphid (the total pecan complex) control. Even though new insecticides continue to be labeled for pecan aphid control, Temik needs to be retained because of its history of excellent performance in controlling pecan aphids. Foliar applied insecticides have been utilized by growers in recent years, however, genetic resistance has developed in the yellow colored aphids with these compounds becoming less effective over time. Since aphids have an ability to develop resistance to any given insecticide it is important that effective chemicals be retained for aphid control.

Temik is one compound which continues to have credibility in the pecan industry in Arizona and other states. In this experiment Temik was evaluated for effective aphid control and yield enhancement in an Arizona pecan orchard. This experiment was conducted at the request of Rhone Poulenc to support label continuation for use in Arizona pecan orchards. It is extremely important that Temik to be available for industry use.

Procedures

Temik was soil applied to a pecan orchard owned by Farmers Investment Company (FICO) located near Green Valley, Arizona. The FICO pecan orchard is the largest in the world in that it contains 4,600 acres of pecan trees of various varieties. Temik was applied in single and split applications according to protocol and according to label. In addition, a foliar insecticide (Provado) was included as a treatment with an untreated control. The Provado was applied based on aphid populations considered to be damaging to leaves and trees as determined by the grower, a field consultant and principal investigator. The treatments and dates of application are represented in Table 1.

Table 1. Treatments, rates and dates of application of Temik and Provado for experiment..

Treatment No.	Description(Product)	Rates	Dates of Application
1	Untreated control	0	
2	Temik 15 G	47 lbs/A	May 28
3	Temik 15 G	33 + 20 lbs/A	May 28 & July 31
4	Temik 15 G	20 lbs/A	July 31
5	Provado (foliar)	8 oz/A	Sept. 15

The experiment was a Randomized Complete Block design with 4 replications. The orchard consisted of rows of trees which were one acre in length. Each row was designated as a single replication. A buffer row was established between each treatment row. Four trees were selected in each treatment row for data collection. Trees were selected for uniformity in size and crop load. A total of eighty trees were sampled and harvested for data collection which included aphid populations, yield and nut quality determinations. Trunk diameters were measured in order to calculate adjusted yields(yield efficiency) to account for tree size.

Temik was applied with a commercial applicator using the lock 'n load method of handling. The applicator was calibrated to release Temik into the soil in amounts required by making 4-8 passes down each side of a treatment row. This allowed for equal distribution of the chemical within the treatment row. Temik was irrigated into the root zone immediately following application. During this growing season rainfall was frequent resulting in difficulty in entering equipment into the orchard in a timely fashion. This was somewhat of a problem with the Provado application as only one application could be made during peak aphid infestation periods. However an application was made based on aphid density and perceived damage potential.

Aphids were counted at weekly intervals beginning July 15 continuing through November. A compound leaf on each of four sides of the plot trees were used for counting aphids.

RESULTS

Aphid populations were slow to build up during the 1999 growing season due to frequent rainfall. As a consequence we began aphid counts on July 15th when populations began to increase and honeydew began to accumulate on leaves. Figures 1 and 2 indicate the seasonal variation of both yellow and black aphids during the course of this experiment as related to treatments.

During the latter part of July and into August and the early part of September, Temik applied in the Spring, Spring/Summer or Summer only (all three application dates) significantly reduced yellow aphid populations when compared to the control. Provado was not applied until September 15th due to physical constraints from rainfall frequency. Therefore all three Temik treatments had lower aphid counts than either Provado or control neither of which had been sprayed. At the September 16th aphid count date the effectiveness of the Spring applied Temik application date began to fade and eventually lost its effectiveness in the fall even though aphid counts continued to be lower than the control or Provado treatments. After spraying Provado, aphid populations declined to a level equal to all Temik treatments. However by September 30th, two weeks later, aphid levels in the Provado treatment had increased to damaging levels and populations were significantly higher than the Temik treatments of Spring/Summer or Summer. Yellow aphid counts from October and November sampling dates indicate that the summer or Spring/summer application dates significantly reduced aphid populations to a non-damaging level when compared to the control or Provado treatments. Black aphid populations were almost non-existent

in all of the Temik plots but showed extreme damage in both the control and Provado treatments. All three Temik application dates (treatments) significantly reduced aphid populations below that of control for the entire growing season.

In addition to determining aphid populations and seasonal distribution, yield and nut quality parameters were measured. These data are reported in Tables 2 and 3.

Table 2. The effect of Temik on yield and yield efficiency of ‘Wichita’ pecan trees grown in Sahuarita, AZ in 1999.

<u>Treatment</u>	<u>Total Yield</u> <u>Kg/Tree</u>	<u>Yield Efficiency</u> <u>Kg/cm² trunk area</u>
Control	84.3 a*	0.45 a
Temik – Spring	115.6 b	0.65 b
Temik – Spr./Su	117.4 b	0.54 a b
Temik – Summer	104.9 b	0.52 a b
Provado	91.3 a b	0.41 a

*Means followed by the same letter in a column are not significantly different at the 5% level of probability.

Table 3. Effect of Temik and Provado on nut quality attributes of “Wichita” Pecan grown in Sahuarita, Arizona in 1999.

<u>Treatments</u>	<u>Nut Size</u> <u>Nuts/lb</u>	<u>%kernel</u>
Control	5.9 a*	60.2 a
Temik – Spring	6.1 a	60.3 a
Temik – Spr/Su	6.0 a	61.0 a
Temik – Summer	5.9 a	61.8 a
Provado	5.6 a	60.6 a

* means followed by the same letter in a column are not significantly different at the 5% level of probability.

Total yield per tree and yield efficiency indicate that applications of Temik increased yield over the control or Provado treatments. In order to equalize yield in relation to tree size yield was adjusted to trunk area(yield efficiency) and reported as Kg/Cm2. Temik applied in the Spring significantly increased yield efficiency when compared to the control. In fact yield efficiency was greater for all three Temik treatments when compared to the control or Provado treatment. This was also true for total yield, %kernel and nut size even though the nut quality parameters did not differ significantly.

CONCLUSIONS

Temik applied in the Spring, Spring/Summer or Summer significantly reduces both yellow and black aphid populations below damaging levels in pecan orchards in Arizona. The black pecan aphid is almost totally eliminated and yellow aphids are significantly reduced to an apparent non economic level of damage. In fact the data collected from this experiment strongly suggest that applications of Temik will increase yield regardless of application date. However yield was significantly increased when applied only in the Spring in this experiment.