

Chemical Control/New Products

Efficacy of Insecticides for Green Apple Aphid

E. Beers and R. Talley

Washington State University Tree Fruit Research and Extension Center, Wenatchee, WA

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Abstract: F1785 (flonicamid) provided slightly slower knockdown of aphids at 2 DAT than the neonicotinyls, but control was equivalent by 7 DAT. Toxicity to natural enemies of aphids by all treatments appeared to be low.

High populations of the green aphid complex (apple aphid, *Aphis pomi* De Geer, and spirea aphid, *Aphis spireacola* Patch) are most often problematic on young trees with vigorous growth. However, they can also cause problems on large, mature trees when honeydew produced by aphid feeding drips on the fruit. Although aphid problems are not as prevalent as they were 10 years ago, newly planted orchards are still at risk.

The objectives of this test were to determine efficacy of F1785 against a midsummer aphid population and compare it to the standard (neonicotinyl) materials.

Materials and Methods

This experiment was conducted in a commercial orchard near Mattawa, WA. The block was newly planted (2004) 'Fuji' apples and was uniformly and heavily infested. The experimental design was a randomized complete block with eight treatments and six replicates. The blocks were based on the pretreatment count of aphids per most infested leaf. Each replicate consisted of a single tree, and counts were taken on a single tagged terminal of that tree. At each evaluation, the number of live aphids on the most infested leaf on the terminal was counted; thus the leaf chosen varied from count to count, although the terminal remained the same. In addition, the natural enemy complex was counted on the entire terminal. These were divided into five groups, viz., parasitized aphids (probably *Lysiphlebus* sp. or *Praon* sp.), (Hymenoptera: Braconidae), *Campylomma verbasci* Meyer-Dür (Heteroptera: Miridae), lady beetles (Coleoptera: Coccinellidae), lacewings (Neuroptera: Chrysopidae), and syrphids (Diptera: Syrphidae). Counts included adults, immatures, and eggs of each group.

The sprays were applied by using a multiple tank handgun sprayer (Parker Mfg., Wenatchee, WA) on 21 July, 2 days after the pretreatment count. Counts continued until 12 August 2004, at which time the trial was stopped due to low aphid populations in all treatments, including the checks.

Data were analyzed using the Statistical Analysis System (SAS 1988). Data were tested prior to analysis for homogeneity of variance using Levene's (1960) test. Variances found to be non-homogeneous were transformed [$\ln(y+0.5)$] before analysis. PROC GLM was used to

conduct an analysis of variance, and treatment means were separated using the Waller-Duncan *k*-ratio *t*-test.

Results and Discussion

Provado provided the fastest knockdown of aphids at the 2-d post-treatment count on 23 July, closely followed by the two rates of Assail and Calypso (Table 1, Fig. 1). The three rates of flonicamid (F1785) had significantly higher population on this date than the other treatments, but were lower than the check. By 7 days post-treatment, differences among the pesticide-treated plots had disappeared, although all were significantly lower than the check. There was a slight resurgence of the aphid population on this date, probably because of new terminal growth which may not have been covered during the application. Populations began to decline again by 4 August and were approaching zero by 12 August. The high August temperatures greatly slowed tree growth, resulting in less favorable conditions for aphids.

Statistical differences among mean populations of aphid natural enemies occurred on only 1 date (23 July) (Table 1, Fig. 2) and generally tended to be highest where aphid populations were highest. The exception was the lowest rate of F1785; however, predator survival at the 2 higher rates indicates inherent toxicity was not likely responsible. The high natural enemy populations in all treatment on 4 August indicate none of the treatments have long residual toxicity to natural enemies.

References Cited

Levene, H. 1960. Robust tests for equality of variances. Chap. 25. *In* Olkin, I., S. G. Ghurye, W. Hoeffding, W. G. Madow and H. B. Mann (Eds.), Contributions to probability and statistics. Stanford University Press, Stanford, CA.

Statistical Analysis Institute. 1988. SAS/Stat User's Guide, Release 6.03 Edition. SAS Institute, Inc., Cary, NC.

Table 1. Apple aphid and associated natural enemy populations before and after treatment with various insecticides, Beverly Thomas Blk. 21, Mattawa, WA, 2004 (Exp. 0415)

| Treatment | Rate form/ acre | Live aphids/most infested leaf | | | | |
|------------------|--------------------|--------------------------------|---------------------|----------|--------------------|--------|
| | | 19-Jul | 23-Jul ^x | 28-Jul | 4-Aug ^x | 12-Aug |
| F1785 50SG | 1.73 oz | 209.17 a | 42.83 b | 20.67 b | 10.67 b | 0.17 a |
| F1785 50SG | 1.41 oz | 211.83 a | 58.50 b | 22.67 b | 3.33 b | 0.50 a |
| F1785 50SG | 1.15 oz | 213.83 a | 62.17 b | 22.50 b | 23.50 b | 0.67 a |
| Provado 1.6F | 4 fl oz | 208.17 a | 0.17 d | 21.17 b | 11.67 b | 1.17 a |
| + Saf-T-Side Oil | [0.25% v/v] | | | | | |
| Assail 70W | 1.1 oz | 205.00 a | 4.33 c | 22.67 b | 26.50 b | 0.67 a |
| Assail 70W | 1.7 oz | 212.33 a | 3.00 c | 22.33 b | 10.83 b | 0.83 a |
| Calypso 4F | 4 fl oz | 206.50 a | 4.33 c | 23.00 b | 4.83 b | 0.83 a |
| Check | ----- | 206.50 a | 282.00 a | 326.67 a | 306.17 a | 0.17 a |

| Treatment acre | Rate form/ acre | Total natural enemies/shoot | | | | |
|------------------|--------------------|-----------------------------|---------|--------|--------|--------|
| | | 19-Jul | 23-Jul | 28-Jul | 4-Aug | 12-Aug |
| F1785 50SG | 1.73 oz | 0.33 a | 0.50 ab | 0.33 a | 0.33 a | 0.00 a |
| F1785 50SG | 1.41 oz | 0.00 a | 0.33 ab | 0.00 a | 0.17 a | 0.00 a |
| F1785 50SG | 1.15 oz | 0.17 a | 0.00 b | 0.00 a | 0.17 a | 0.00 a |
| Provado 1.6F | 4 fl oz | 0.67 a | 0.00 b | 0.00 a | 0.33 a | 0.00 a |
| + Saf-T-Side Oil | [0.25% v/v] | | | | | |
| Assail 70W | 1.1 oz | 0.67 a | 0.17 b | 0.17 a | 0.67 a | 0.00 a |
| Assail 70W | 1.7 oz | 0.17 a | 0.17 b | 0.00 a | 0.00 a | 0.00 a |
| Calypso 4F | 4 fl oz | 0.33 a | 0.17 b | 0.00 a | 0.33 a | 0.17 a |
| Check | ----- | 0.33 a | 0.83 a | 0.17 a | 0.33 a | 0.17 a |

Treatments applied handgun 21 July 2004.

Means within columns not followed by the same letter are significantly different.

^xData transformed log(x+0.5) due to unequal variances.

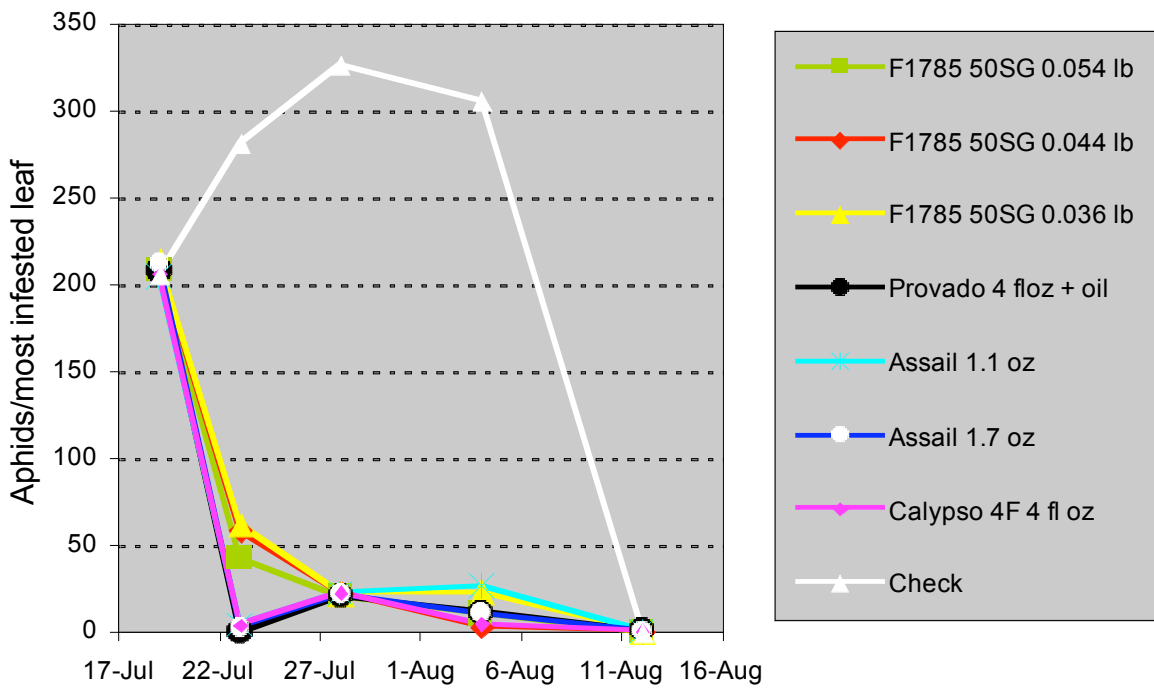


Figure 1. Aphid populations before and after treatment with various insecticides, Mattawa, WA, 2004.

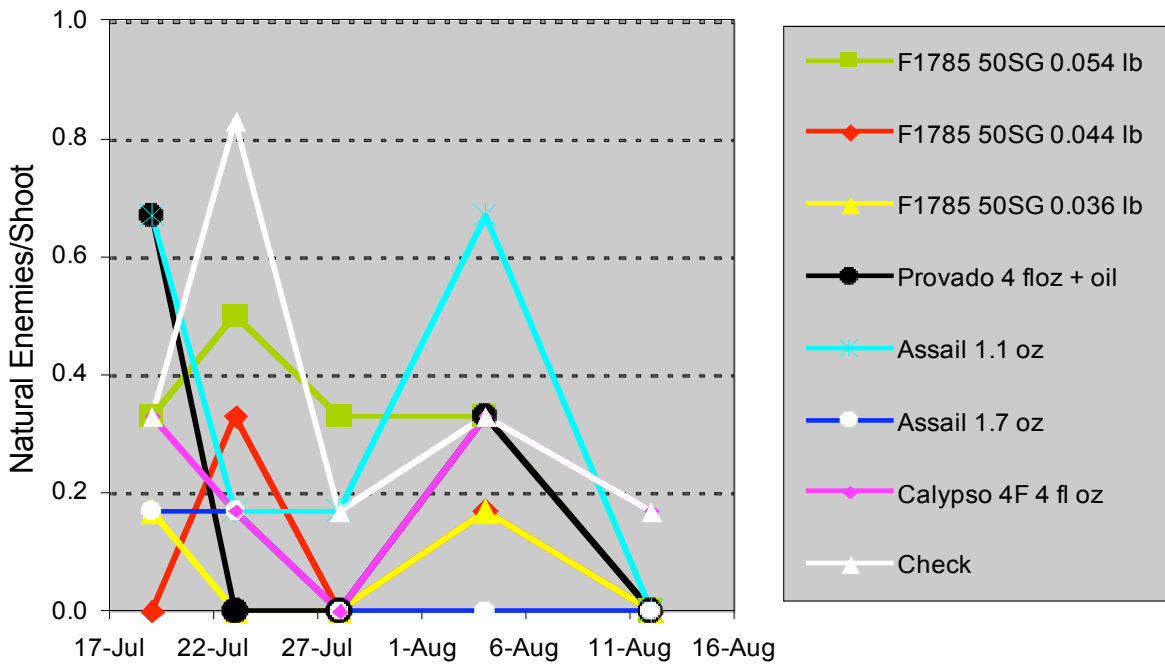


Figure 2. Aphid predator populations before and after treatment with various insecticides, Mattawa, WA, 2004.