EFFICACY OF GRANULAR AND FOLIAR INSECTICIDES AGAINST WESTERN FLOWER THRIPS, *FRANKLINIELLA OCCIDENTALIS*, IN SEEDLING PIMA AND ACALA COTTON IN THE SAN JOAQUIN VALLEY

Treanna Pierce
Shafter Research and Extension Center, University of California
Shafter, CA
Larry D. Godfrey
Dept. of Entomology, University of California
Davis, CA

Abstract

Historically, western flower thrips have not been a major pest of cotton in the SJV. They routinely distort the early-season growth but under favorable growing conditions the plants quickly grow out of this damage. Thrips also feed on spider mite eggs and mites are an important, yield-limiting pest of SJV cotton. However, in recent years especially on Pima cotton, thrips damage has been more severe and control measures have been needed. The efficacy of Temik®15G at planting (5 lbs./A) was evaluated and compared with that of commonly used foliar insecticides; the research was conducted in Acala and Pima cotton. During the 3-year study, Temik generally provided excellent thrips control for 5 to 7 weeks after planting (~4-5 weeks after emergence) [spider mites were also controlled]. In 2007, Temik performance on Pima cotton was poor and much less effective than on Acala. None of the foliar insecticides showed acceptable thrips activity in Acala cotton in 2007 and 2008. Orthene and Radiant were very effective in 2008 on Pima cotton; dimethoate showed moderate activity.

Introduction

Western flower thrips (*Frankliniella occidentalis*) is by far the most common thrips species on cotton in the San Joaquin Valley (SJV) of California and may be found all season. Thrips are tiny, slender insects less than 0.06 inch (1.55 mm) long, light-colored and the adults have clear, slender wings. Historically, thrips infestations in SJV cotton have not been as major of a problem as in many other parts of the cotton belt. Although western flower thrips feed on leaves and buds and may cause seedling leaves to become distorted, their benefit as predators of spider mites is thought to outweigh any damage the thrips may cause. While infested seedlings may appear severely deformed, they typically grow out of the damage rapidly with the onset of hot weather. Spider mites have historically been a severe arthropod pest in SJV cotton. Without the use of effective acaricides and following defined management plans, spider mites can severely impact yields.

In seasons with prolonged cool spring weather, thrips damage to cotton terminals may be problematic. In recent years, thrips have become a more severe problem and this seems to be particularly true on Pima cotton (*Gossypium barbadense*). This cotton type may be more susceptible to thrips damage and the longer growing season required by this cotton species places an added importance on the early-season thrips damage and seedling stunting. Terminal damage and loss of the apical dominance have been commonly seen in untreated Pima cotton in recent years.

Management: Guidelines developed for Acala cotton varieties suggest that treatment is generally not recommended for western flower thrips as young plants will rapidly recover from injury (Godfrey et al. 2008). In addition, the threat from spider mite infestations influences this decision as insecticides applied to control flower thrips may be counterproductive and may tend to promote outbreaks of mites. Only in situations where a prolonged thrips infestation is destroying seedling terminals is treatment justified. The situation on Pima cotton in terms of thrips management may differ as higher populations, more severe damage, and less threat from spider mite infestations suggest more aggressive thrips management. The switch of the California cotton industry from upland cotton to Pima cotton over the last ~10 years has placed added importance on developing arthropod management plans specific for Pima cotton. At present, aldicarb (Temik®) at planting and acephete (Orthene®) seed treatment are used for thrips management in SJV cotton.

Materials and Methods

Field research was conducted at the Univ. of California Shafter Research and Extension Center near Shafter, CA (Kern County). Two approaches were used over the 3-year period. Research was conducted 1.) to evaluate the

efficacy of Temik® 15G (aldicarb) at the 5 lb./acre rate at planting against early-season thrips on Acala and Pima cotton seedlings in 2006 to 2008 and 2.) to evaluate the activity of several foliar treatments against early-season thrips on Acala and Pima cotton seedlings in 2007 and 2008.

Field research was conducted on Pima Phytogen 800 in 2006 to 2008 and Acala Sierra RR in 2006 and 2007 and Phytogen 725RF in 2008. Cotton was planted on 1 May 2006, 16 April 2007, and 14 April 2008. For the Temik studies, sampling was conducted in unreplicated plots of Pima and Acala cotton four rows by 290 ft. long (40 inch row spacing) with Temik applied at planting and similar-sized plots of cotton planted without Temik. In 2007 and 2008, the foliar treatments were evaluated in Pima and Acala plots four rows wide by 25 ft. long with four blocks. The Temik and the foliar insecticide studies were conducted adjacent to each other (four row buffer between the studies) and the Pima and Acala plots were in close proximity on the research station. The foliar treatments were applied with a backpack CO2 sprayer on 7 and 21 May 2007 and on 2 and 16 May 2008. Ten cotton seedlings were sampled from each plot on each sample date starting with the development of the first true leaf stage for the Temik study for 5 weeks thereafter and at 3 days after treatment (DAT) for the foliar insecticides study. Seedlings were inspected in the laboratory and thrips were recovered using a dissecting microscope; numbers of thrips (immatures and adults, totals reported) were tabulated. In addition, in 2007 the heights of 10 seedlings per treatment were recorded on each sampling date. In 2008, the height and wet and dry weights of the above-ground plant and the roots were obtained at first and last sampling date. On the final sampling date, thrips damage was rated on the following thrips injury rating scale: 0=no injury, 1=10% injured leaves, no bud injury, 2=25% injured leaves, no bud injury, 3=75% injured leaves, 0-25% bud injury, 4=90% injured leaves, >25% buds injured, 5=dead plants.

Results

At-PlantingTreatments. 2006. Temik applied at planting effectively controlled thrips 2 to 3 weeks after the development of the first true leaf (~5 weeks after planting and 3 to 4 weeks after first emergence). Efficacy results and population severity were similar on Acala and Pima cotton. Mite control (data not shown) was also excellent with Temik and the residual control was ~1 week longer than with thrips.

2007. Cotton emergence and thrips populations development were delayed by a cool period immediately after planting. On Acala cotton, good control of thrips was seen with Temik at ~5 weeks after planting and even ~50% reduction at 8 weeks. Reductions on Pima cotton were not as high.

Foliar Treatments. 2007. Orthene at the labeled rate provided ~60% thrips control for 7 days following the first application. Results were similar in Acala and Pima cotton and Orthene was not as efficacious as Temik at planting. Following the second application, ~60% thrips control was again seen; by this date the Temik had largely dissipated. The experimental QRD 400 product was ineffective.

2008. On Acala cotton, following the first foliar application, none of the treatments provided significant control of thrips; Temik provided excellent control until the 14 day sample (~4 weeks after planting). For the second application, dimethoate was the only foliar-applied product which provided any level of control. Temik still showed some activity especially for the 11 DAT (second application) when the population increased significantly in the untreated and only slightly in the Temik-treated (88 and 60% control of immatures and adults, respectively). In the Pima cotton plot, the foliar insecticides performed much better with Orthene and Radiant providing ~75% thrips control even at 14 DAT. Dimethoate provided moderate short-term control. These results continued into the second application. Temik activity was similar to that in the Acala; efficacy declined in the 14 day sampling but some activity was still present in the later samples. There were no differences in dry weight biomass among treatments in Acala; in Pima cotton there was a trend for higher root and above-ground biomass values in the Temik-treated compared with the untreated. There were no differences in the injury ratings.

Acknowledgements

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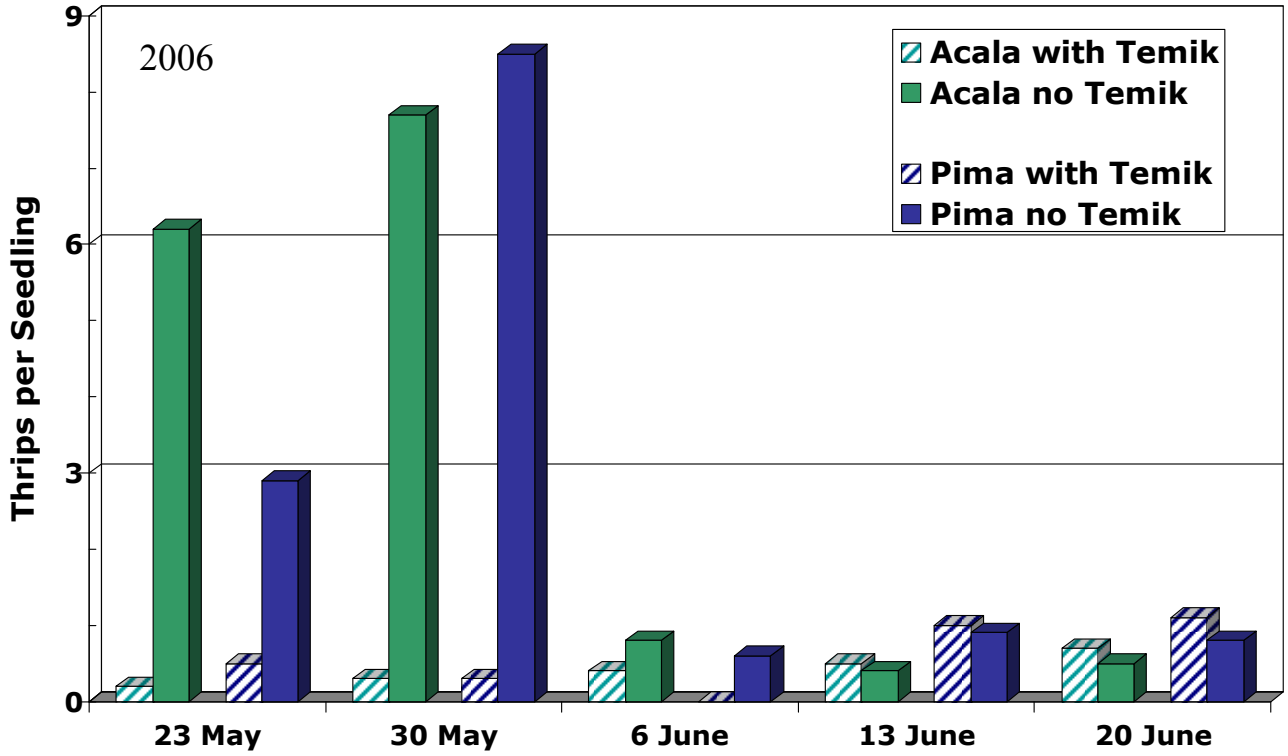
References

Godfrey, L. D., P. B. Goodell, E. T. Natwick, and D. R. Haviland. 2008. UC IPM Pest Management Guidelines: Cotton, UC Statewide Integrated Pest Management Program, University of California Agriculture and Natural Resources Publication 3444, 103 pp.


2006
Acala with Temik
Acala no Temik
Pima with Temik
Pima no Temik
Thrips per Seedling
9
6
3
0
23 May
30 May
6 June
13 June
20 June

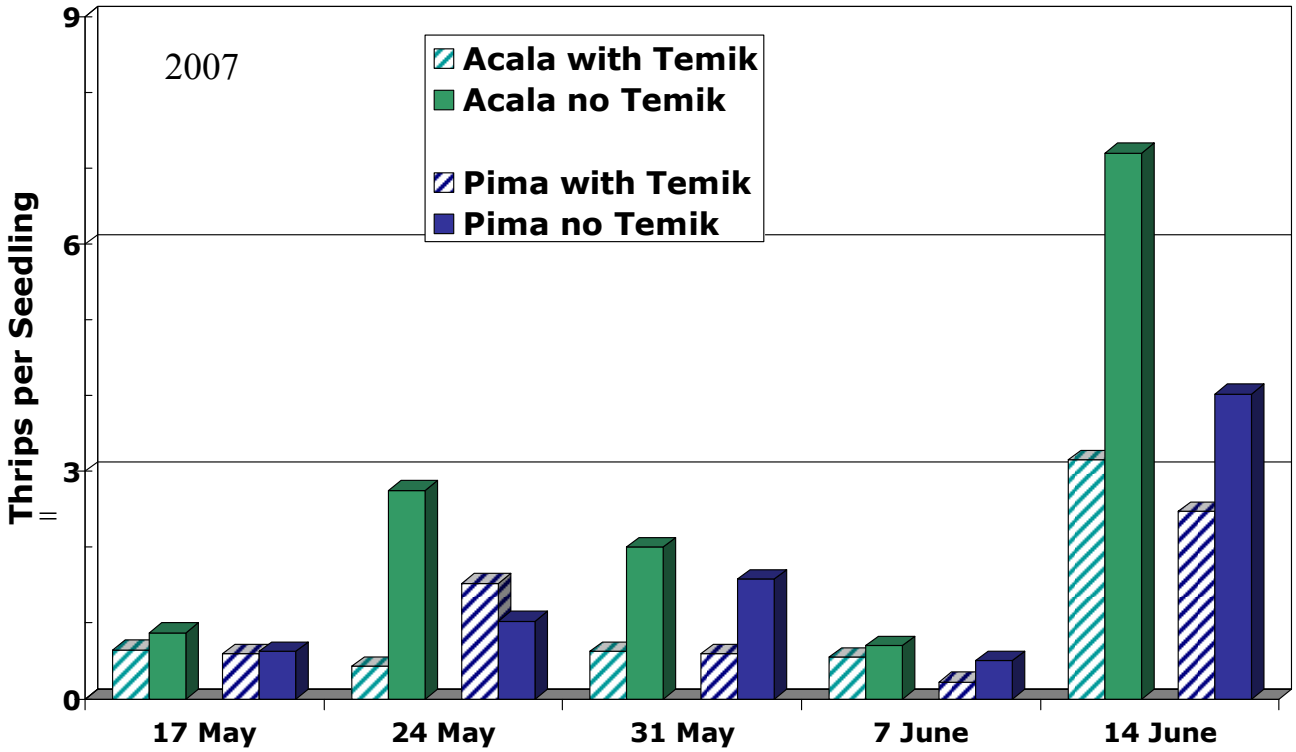
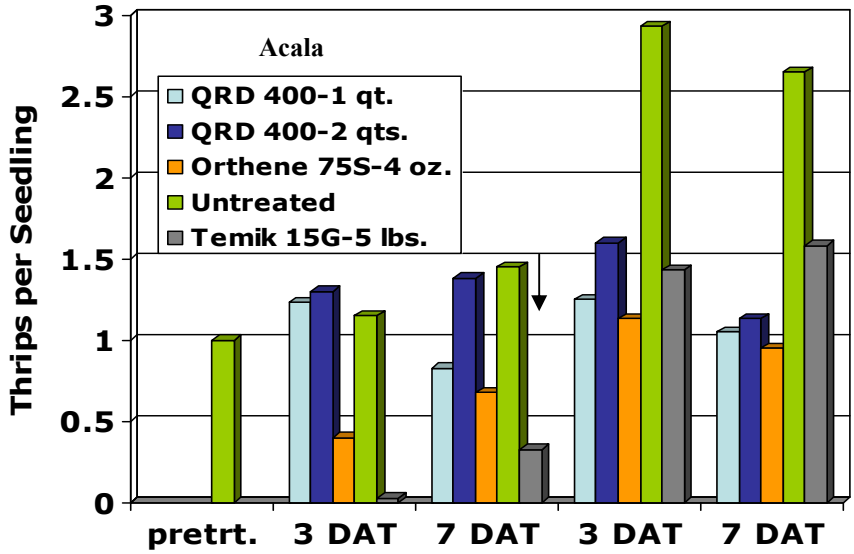

2007
Acala with Temik
Acala no Temik
Pima with Temik
Pima no Temik
Thrips per Seedling
9
6
3
0
17 May
24 May
31 May
7 June
14 June

Figure 1. Influence of Temik applied at-planting on populations of western flower thrips in Pima and Acala cotton in 2006 and 2007.



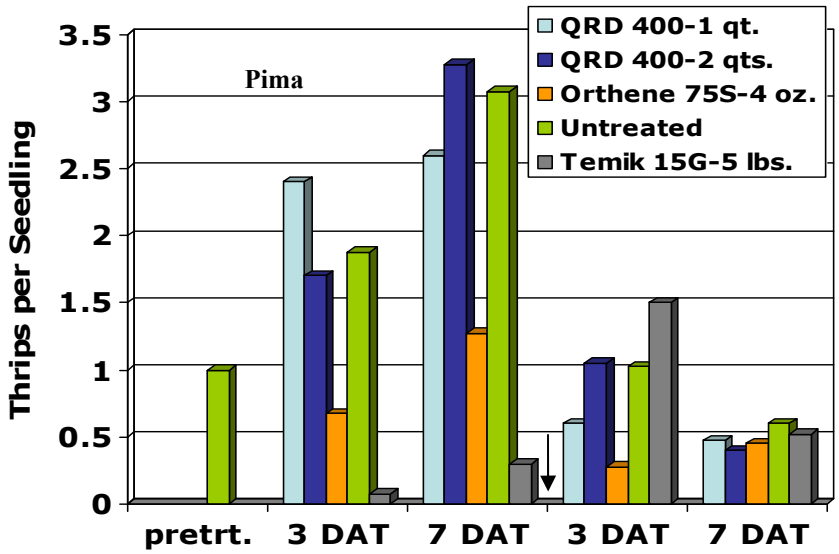


Figure 2. Influence of foliar insecticide treatments compared with at-planting Temik on populations of western flower thrips in Acala and Pima cotton in 2007 (DAT=days after treatment). Arrows indicate timing of second foliar application.

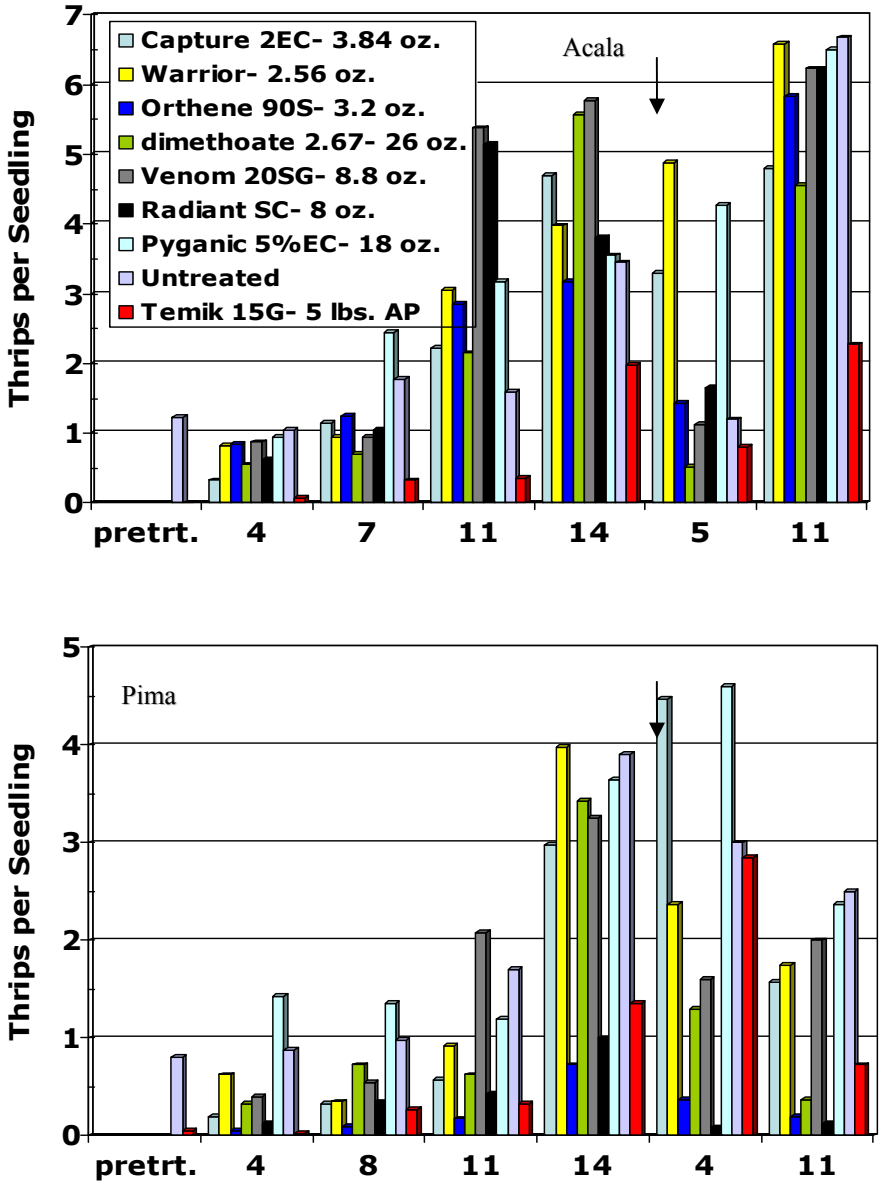
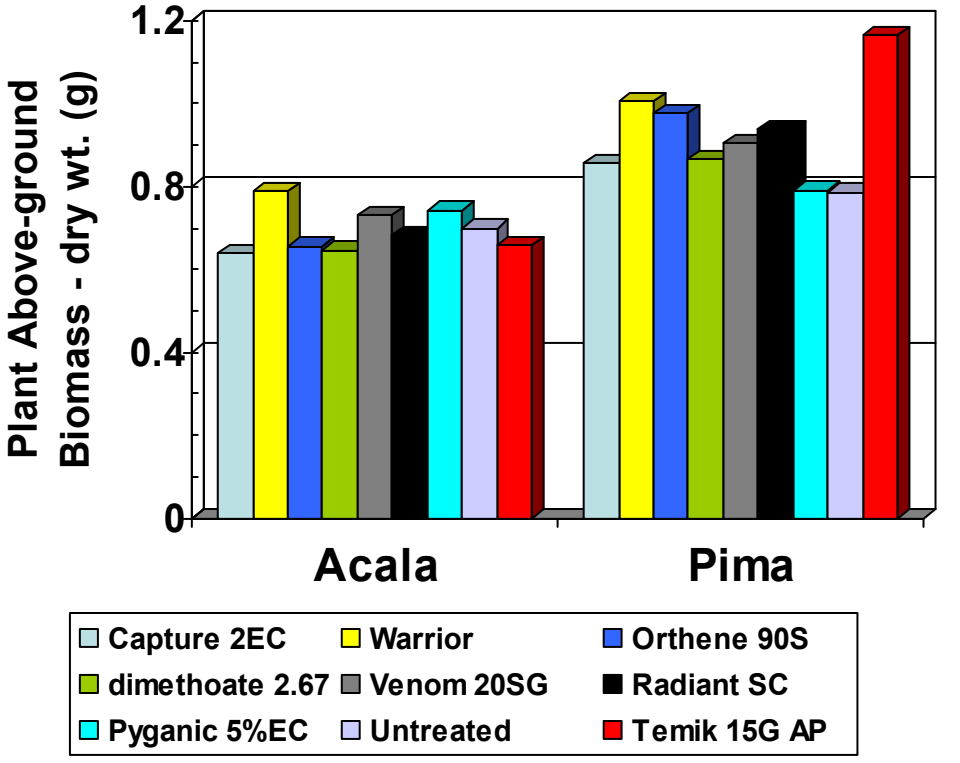


Figure 3. Efficacy of foliar insecticide treatments and Temik applied at-planting on populations of western flower thrips in Acala and Pima cotton in 2008 at various days after treatment. Arrows indicate timing of second foliar application following the 14 days after treatment sample.



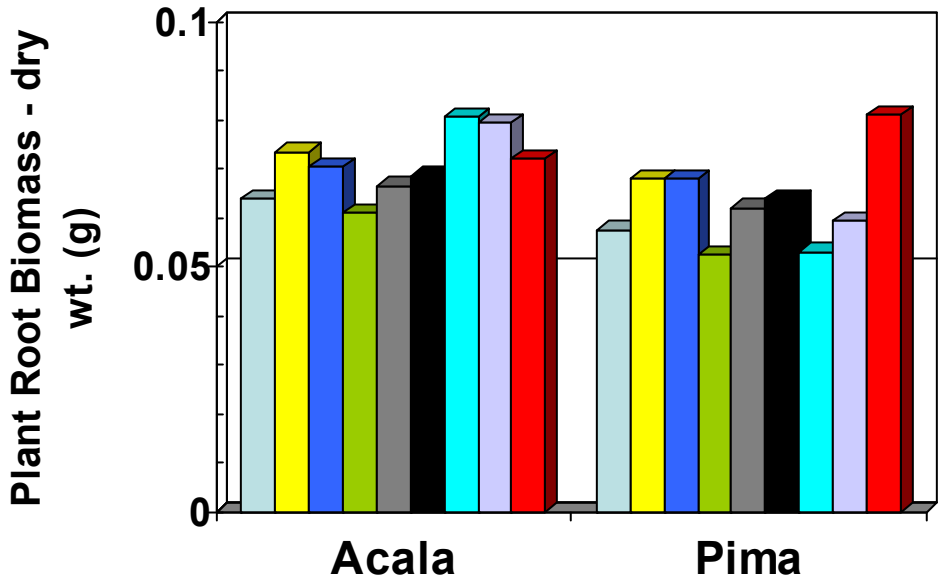


Figure 4. Cotton plant response (above-ground and below ground biomass values) following treatments for western flower thrips in 2008. Data collected on the final sample date (11 days after the second foliar application).