

# Spider Mite Management in Spring Alfalfa Utilizing Swather Applied Treatments, 2003

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## *Abstract*

*An experiment was initiated utilizing a swather based sprayer to determine if miticides applied at cutting would be an effective control method of spider mites in low desert alfalfa hay. Two treatments (Trilogy, Trilogy + Kinetic) were applied the morning of May 23, 2003, to alfalfa with very high numbers of spider mites. Treatments had five replications, with plots sampled on June 2, 9 and 18. Data indicated a severe reduction in spider mite numbers as of June 2 in all treatments (including untreated) thought due to high temperatures experienced shortly after cutting that exceeded lethal thresholds for spider mite survival. Differences in treatments for spider mites or western flower thrips were not noted until June 18, when significantly fewer spider mites were noted in Trilogy treated plots than untreated check plots. Trilogy + Kinetic treatments resulted in numerically fewer spider mites than the untreated check on this sample date, but numerically more than Trilogy treatment.*

## **Introduction**

Spider mites have been problematic in alfalfa in the Palo Verde Valley and other valleys situated in the Colorado River basin in recent years, with growers noting and commenting that spider mites are seemingly becoming more prevalent during this same time period. Spider mite populations in the spring of 2003 were extremely high in some area fields, with some harvest equipment noticeably webbed by spider mites after sitting overnight following the cutting of a severely infested field. Documented populations of spider mites on area alfalfa reached an average of as many as 196 spider mites (eggs, immatures and adults)/alfalfa stem in plots sampled on May 19, 2003. Swathing of stems that have spider mites present often allows spider mites to colonize the new regrowth, resulting in continuation of population increases and resulting damage from spider mite feeding, especially on alfalfa grown utilizing bedded production practices.

Data from another local experiment conducted in 2003 by the authors indicated that yields were more affected by spider mite feeding than was quality when a normal cutting (approximately 30 day) cycle was followed, although an extended cutting cycle may allow for increased leaf loss when spider mite populations are at high levels. Data from the related 2003 experiment also indicated that yields were more closely correlated with total spider mite numbers early in the regrowth cycle rather than when plants were taller, similar to that documented for aphids (University of California IPM, 1985).

Most currently registered effective miticides for alfalfa forage have pre-harvest intervals that are not conducive for application on alfalfa for spider mite control late in the cutting cycle. Local professional crop advisors (PCAs) are waiting until hay is removed from the field for such applications, and recommending treatments be made as soon as possible on alfalfa regrowth. A few products registered for usage on alfalfa forage with miticide activity do have a zero day pre-harvest interval, allowing applications to be made with a swather as alfalfa is harvested. This experiment was initiated to determine if treatments applied via a swather at cutting would provide effective control of spider mites in spring alfalfa. This method, if successful, also has the potential to increase the economical aspects of miticide applications in alfalfa.

## **Methods and Materials**

Treatments were applied the morning of May 23, 2003, with a Hesston 8400 swather to alfalfa stubble (var. UC Cibola, third year of production) remaining immediately as forage was cut and harvested. The treatments consisted of Trilogy at 1 qt/acre (active ingredient = clarified neem oil, Certis USA, Columbia, MD), Trilogy at 1 qt/acre + the adjuvant Kinetic (a surfactant containing organosilicone, Helena Chemical Co., Memphis, TN) at the rate of 10 oz/44 gal compared with an untreated check. Treatments were replicated five times in a randomized complete block design, and each plot was 8 beds wide (40 inch center spacings) by field length.

The Hesston 8400 swather utilized had been modified to allow for pesticide application and had four spray tips, with the outer two positioned behind the front wheels and the inner two located just behind the cutting bar. Each spray nozzle was equipped with a TeeJet 11003VS spray tip. Treatments were applied in a mixture of water applied at the rate of seven gallons/acre. Alfalfa was heavily infested with spider mites was cut and treatments applied, with high numbers of spider mites therefore expected for initial infestation of the subsequent alfalfa regrowth cycle. Alfalfa that was harvested from four beds by the swather was placed on the center two beds on top of treated stubble.

After alfalfa was harvested (baled and removed) sampling was initiated. Samples were collected on June 2, 9 and 18. Sampling consisted of collecting 12 stems per bed (two stems per bed from the center six of the eight beds). Samples were obtained by cutting at or just below the previous harvest level. Stems were then transferred to gallon size plastic food storage bags. Bags were then sealed and returned to the laboratory where they were placed in a refrigerator at 5°C to halt spider mite development while not freezing the foliage or mites. Plant material was then examined using microscopes, and eggs, immatures and adult spider mites were counted and recorded at each node. Numbers of western flower thrips adults and nymphs present were also recorded.

Mean numbers of eggs, immatures and adult spider mites as well as thrips per stem for each plot were then calculated. Means were then analyzed with Fishers least significant difference to determine if significant differences existed between the various treatments.

## **Results**

Spider mite numbers were very low in the field after the applications. Temperatures recorded at an area weather station in the Palo Verde Valley located just a few miles from the plots were 107 and 109°F on May 27 and 28 respectively in the shade. Much higher temperatures were probably experienced on the soil surfaces in the treated plots and remaining alfalfa foliage when heated by the sun as little foliage was available to provide shade. These high temperatures and related solar radiation were thought to have exceeded lethal threshold temperatures for spider mites, severely reducing their survival on the alfalfa foliage remaining after harvest was completed. A similar reduction in spider mite population was noted in other experimentation located in the same field.

No significant differences existed for any spider mite life forms (eggs, adults, total, etc.) or for western flower thrips on June 2 or 9, although numerically more spider mite eggs and immatures were noted in the Trilogy + Kinetic treatments on June 2, while the untreated check had the most adults on this sample date. Mite numbers were very similar on June 9, as were numbers of western flower thrips.

Significant differences in spider mite numbers were noted on June 18 however, with the untreated check having significantly more eggs and immatures than the Trilogy plots, and numerically more adult spider mites than all other

treatments. The Trilogy + Kinetic treatment also had fewer spider mites than the untreated check, but had about 45% (34-60%) more spider mites of each life stage denoted than did the Trilogy alone. The reason for the differences noted between the treatments are unclear, but do not appear to be related to numbers of thrips.

The results from this study as affected by the hot temperatures do not allow adequate conclusions to be reached in regard to the effectiveness of this control strategy. Further testing earlier in the spring is recommended to enable adequate evaluation of this potential control strategy.

### Literature Cited

University of California Statewide Integrated Pest Management Project. 1981. Integrated Pest Management for Alfalfa Hay. Publication 3312. 97 pp.

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**Table 1. Mean numbers of two spotted spider mite and western flower thrips life forms/alfalfa stem on June 2, 2003, following application on May 23, 2003, Blythe, CA.**

<u>Treatment</u>	<u>Rate/ acre</u>	<u>Spider mites</u>			<u>Western flower thrips</u>	
		<u>Eggs</u>	<u>Immatures</u>	<u>Adults</u>	<u>Immatures</u>	<u>Adults</u>
Trilogy	1 qt	2.60a	0.03a	1.17a	0.07a	0.51a
Trilogy + Kinetic	1 qt	4.38a	0.35a	1.57a	0.28a	0.48a
Untreated check	--	3.28a	0.02a	1.90a	0.10a	0.77a

*Means in columns followed by the same letter are not statistically different at the  $p \leq 0.05$  level (Fishers LSD test).*

**Table 2. Mean numbers of two spotted spider mite and western flower thrips life forms/alfalfa stem on June 9, 2003, following application on May 23, 2003, Blythe, CA.**

<u>Treatment</u>	<u>Rate/ acre</u>	<u>Spider mites</u>			<u>Western flower thrips</u>	
		<u>Eggs</u>	<u>Immatures</u>	<u>Adults</u>	<u>Immatures</u>	<u>Adults</u>
Trilogy	1 qt	3.01a	0.48a	3.68a	0.48a	0.15a
Trilogy + Kinetic	1 qt	3.17a	0.42a	2.35a	0.40a	0.22a
Untreated check --		2.22a	0.45a	3.83a	0.39a	0.28a

*Means in columns followed by the same letter are not statistically different at the  $p \leq 0.05$  level (Fishers LSD test).*

**Table 3. Mean numbers of two spotted spider mite and western flower thrips life forms/alfalfa stem on June 18, 2003, following application on May 23, 2003, Blythe, CA.**

<u>Treatment</u>	<u>Rate/ acre</u>	<u>Spider mites</u>			<u>Western flower thrips</u>	
		<u>Eggs</u>	<u>Immatures</u>	<u>Adults</u>	<u>Immatures</u>	<u>Adults</u>
Trilogy	1 qt	7.12a	0.82a	3.15a	0.02a	0.02a
Trilogy + Kinetic	1 qt	9.55ab	1.27ab	5.17a	0.03a	0.05a
Untreated check --		17.65 b	2.25 b	6.42a	0.00a	0.10a

*Means in columns followed by the same letter are not statistically different at the  $p \leq 0.05$  level (Fishers LSD test).*