MITICIDES FOR TWO-SPOTTED SPIDER MITE CONTROL

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Abstract

Pirate 3SC at a rate of .10 lbs ai/ac and Kelthane MF 4EC at a rate of 1.0 lbs ai/ac provided consistent spider mite control with no population rebound. Curacron 8E and Lorsban 4E provided good initial spider mite suppression, though not consistent, but mite population tended to rebound. Strong data bases concerning the use of Zephyr 0.15EC or Capture 2EC for spider mite control are not yet available.

Introduction

The Two-spotted spider mite, *Tetranychus urticae* Koch, can have a detrimental impact on cotton profitability in Arkansas and the Mid-South region of the U.S. Cotton Belt. Losses due to spider mites in Arkansas were estimated at 350 bales in 1998 with a value of some $109,000 (Williams, 1999). Treatment costs for spider mite control in Arkansas were estimated at $557,000. As a result of reduced yield and control costs, total cost, due to spider mites, to Arkansas producers was about $666,000 in 1998. Allen et al. (1999) reported that the total cost to Arkansas producers from spider mites was $1.3 million in 1997. The objective of this study was to determine the efficacy and residual activity of selected miticides in the field for the control of spider mites in Arkansas cotton.

Materials and Methods

This paper summarizes data from four tests, conducted in 1996, 1997, 1998, and 1999, against the two-spotted spider mite. *T. urticae*.

The 1996 test was conducted on the Southeast Branch Experiment Station at Rohwer, AR. The test was conducted on Suregrow 125 cotton planted on 5-2-96 and grown using standard production practices. This test was treated on 7-17-96 using a John Deere high clearance sprayer applying 10.0 gallons of finished spray per acre. Plots were 140 feet long by 8 rows wide and were unreplicated. Five subplots were established per treatment.

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The 1997 test was conducted on the Randy Eagle Farm near Grady, AR. The test was conducted on Deltapine Nucoton 33B cotton planted on 5-6-97 and grown using standard production practices. The test was treated on 7-24-98 using a CO_2 charged backpack sprayer applying 13.6 gallons of finished spray per acre. In this test, plots were 25 feet long by 2 rows wide and the test was conducted using a Randomized Complete Block Design with four replications of each treatment.

The 1998 test was conducted on the Mike Norris Farm near Pickens, AR. The test was conducted on Stoneville 474 cotton planted on 5-5-98 and grown using standard production practices. The test was treated on 7-29-98 using a CO_2 charged backpack sprayer applying 10.0 gallons of finished spray per acre. Plots were 25 feet long by 2 rows wide and the test was conducted using a Randomized Complete Block Design with four replications per treatment.

The 1999 test was conducted on the Randy Eagle Farm near Grady, AR. The test was conducted on Stoneville BXN 47 cotton planted on 4-25-99 and grown using standard production practices. The test was treated on 7-28-99 using a CO_2 charged backpack sprayer applying 10.0 gallons of finished spray per acre. Plots were 25 feet long by 2 rows wide and the test was conducted using a Randomized Complete Block Design with four replications per treatment.

Data were collected on each post-treatment sampling date by collecting 5 maintstem leaves (4 nodes below terminal) per plot (5 leaves per subplot in 1996 test). The leaves were placed in a ziplock bag, held on ice and transported to the laboratory. In the lab, one 20X microscope field (4.5 mm^2) containing the central leaf vein was examined and the live spider mites were counted. Data from each plot (subplot in 1996) were averaged and the plot or subplot means were analyzed. Kruskal-Wallis and LSD were used to analyze the 1996 test, while ANOVA and LSD were used with the 1997, 1998, and 1999 data.

Results and Discussion

The results of the testing conducted over 4 years are shown in Tables 1-4.

The 1996 data (Table 1) shows relatively good separation of the treatments two days after treatment (2 DAT). However, at 6 DAT a fungal pathogen had reduced spider mite populations in all treatments. At 2 DAT Pirate at .15 lb ai/ac provided significantly superior reduction of mite populations than all other treatments. In addition, Curacron, 1.0 lb ai/ac, was the only other treatment which significantly reduced mite populations below that of the untreated check. However, Curacron was not statistically different from Lorsban or Zephyr.

The 1997 data (Table 2) shows good separation of treatments at 2 and 5 DAT, but only non-significant trends by 6 DAT. At 2 DAT, all miticides significantly reduced mite populations below that of the untreated check. However, Ovasyn, .5 lb ai/ac, had significantly higher populations than the other miticides. By 5 DAT, only Pirate at both .1 and .15 lb ai/ac still had significantly lower mite populations than the untreated check, but they did not differ from the other miticides. Ovasyn, Curacron at .75 lb ai/ac, and Lorsban at 1.0 lb ai/ac were not different from the untreated check. Lorsban treated plots did have population rebounds at 5 DAT. By 6 DAT, there were no differences between any of the treatments.

The 1998 data (Table 3) shows good separation of treatments at 1, 2, and 3 DAT. At 1 DAT, Pirate at .05, .10, and .15 lb ai/ac and Curacron, 1.0 lb ai/ac had significantly lower mite populations than the untreated check, but they did not differ from Lorsban, 1.0 lb ai/ac, or Ovasyn, .25 lb ai/ac. Ovasyn, Pirate, all three rates, and Curacron still had significantly lower mite populations than the untreated check at 2 DAT. However, Curacron treated plots had a considerable increase in mite populations. By 3 DAT, only Ovasyn and the 3 rates of Pirate had significantly fewer mites than the untreated check.

The 1999 data (Table 4) shows strong separation between treatments at 2, 4, and 6 DAT. However, at 15 DAT mite populations tended to reduce in all treatments. At 2, 4, and 6 DAT, all miticides significantly reduced mite populations below that of the untreated check. However, Lorsban and Curacrron treated plots experienced population rebounds between each collection day. By 15 DAT, Lorsban and Curacron had significantly higher mite populations than the untreated check.

Summary

Pirate 3SC, at all 3 rates tested, provided strong control of two-spotted spider mite populations with no indications (in this study) of short term population rebound. Curacron, at rates tested, showed good initial spider mite suppression, however population rebounds were evident in 1998 and 1999 data. Lorsban, at tested rates, showed less consistent initial control and mite populations tended to rebound. Likewise, Studebaker (1997) presented similar population rebounds after Curacron and Lorsban treatments in a 1996 miticide trial. In addition, he also showed good miticidal activity from both Pirate and Kelthane MF 4EC in that study. Kelthane at 1.0 lb ai/ac showed good initial mite suppression with no population rebounds in this study.

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Table 1. Live spider mites after miticide application[1]. Rohwer, AR. 1996.

Miticide	Rate lb ai/ac	Mites/Microscope Field 2 DAT	6 DAT
Check	—	5.3a	1.9a
Lorsban 4E	0.75	3.6ab	1.2a
Curacron 8E	1.0	2.1b	0.7a
Zephyr 0.15EC	0.0094	3.1ab	0.9a
Pirate 3SC	0.15	0.4c	0.5a

[1]Means in column followed by the same letter are not significantly different at the 5% level of significance.

Table 2. Live spider mites after miticide application[1]. Grady, AR. 1997.

Miticide	Rate lb ai/ac	Mites/Microscope Field 2 DAT	5 DAT	6 DAT
Check	—	6.0a	6.2a	4.2a
Ovasyn 1.5	0.5	3.4b	2.0ab	0.4a
Curacron 8E	0.75	1.2c	1.5ab	0.9a
Lorsban 4E	1.0	0.8c	3.3ab	0.6a
Pirate 3SC	0.1	0.4c	0.2b	0.1a
Pirate 3SC	0.15	0.4c	0.1b	0.1a

[1]Means in column followed by the same letter are not significantly different at the 5% level of significance.

Table 3. Live spider mites after miticide application[1]. Pickens, AR. 1998.

Miticide	Rate lb ai/ac	Mites/Microscope Field		
		1 DAT	2 DAT	3 DAT
Check	—	8.5a	11.0a	9.6a
Curacron 8E	1.0	1.9b	4.0c	8.8ab
Lorsban 4E	1.0	5.6ab	8.5ab	6.2abc
Ovasyn 1.5	0.25	5.0ab	4.8bc	4.3bc
Pirate 3SC	0.05	3.7b	1.8c	1.8c
Pirate 3SC	0.1	2.3b	1.1c	1.3c
Pirate 3SC	0.15	3.8b	1.1c	1.1c

[1]Means in column followed by the same letter are not significantly different at the 5% level of significance.

Table 4. Live spider mites after miticide application[1]. Grady, AR. 1999.

Miticide	Rate lb ai/ac	Mites/Microscope Field			
		2 DAT	4 DAT	6 DAT	15 DAT
Check	—	17.0a	17.7a	20.0a	0.6b
Capture 2EC	0.078	7.4b	5.3c	4.2c	0.6b
Lorsban 4E	1.0	7.1b	10.1b	13.1b	7.3a
Pirate 3SC	0.1	4.8bc	0.6c	0.5c	0.1b
Zephyr 0.15EC	0.0094	4.2bc	2.9c	1.8c	0.3b
Kelthane MF 4EC	1.0	3.8bc	0.8c	1.3c	1.8b
Curacron 8E	1.0	1.5c	2.2c	3.4c	7.0a

[1]Means in column followed by the same letter are not significantly different at the 5% level of significance.