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Evaluation of Agri-Mek, Agri-Flex, and Zeal as Potential New Miticides for Spider Mite Control in Field Corn

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Summary

All of the miticide treatments were equally effective in reducing Banks grass mite infestations by 13 days after being applied. These miticide products also were relatively safe on mite predators, particularly a thrips complex. It is important to have miticides which conserve predators that naturally suppress mite infestations and other corn insect pests.

Objective

To evaluate the efficacy Agri-Mek at 2.0 and 2.5 fl oz/A, Agri-Flex at 8.5 fl oz/A, and Zeal at 2.0 oz/A for control of spider mites infesting tassel stage corn.

Methods & Materials

Agronomic Practices and Weather

A center pivot irrigated field near Friona, TX in Parmer County was planted to Pioneer P32B11 corn hybrid on April 27, 2011. Agronomic practices for irrigation, fertilizer, and herbicide were standard for corn production in the Texas High Plains. Climatic conditions were extremely hot and dry and the field was under severe drought stress even with being irrigated. No rainfall had been reported from January 2011 through the time the experiment was conducted.

Experimental Design

The experiment was arranged in a randomized complete block design having four (4) replications. Plots were four rows wide (38 inch center) by 40 ft. long.

Insecticide Application

Applications of Agri-Mek (2.0 and 2.5 fl oz/A), Agri-Flex (8.5 fl oz/A), Zeal (2.0 oz/A), Oberon 4SC® (4.25 fl. oz/A), and Onager 1E® (10 fl. oz/A) were made on July 16. Each of the AgriMek and AgriFlex application rates were mixed with a 0.25% v/v rate of a non-ionic surfactant (Activator 90). The application of Zeal was mixed with a 0.1% v/v rate of the non-ionic surfactant. Treatments were

sprayed at 14.5 gpa with a CO_2 pressurized (30 psi) hand-carried backpack sprayer with the boom held at the base of corn tassels. The boom was equipped with 5 (T-jet® 8002VS) nozzles on 20 inch centers. At application the temperature was 65° F with a light wind of 2 mph from the south/southwest.

Insect Samples and Data Analysis.

Sample counts were taken the 1 day before the miticide applications and at 5 and 13 days following application. The number of visible mobile mites and predators were counted from 5 leaves per plot with the aid of an Optivisor® binocular magnifier, model DA10. The leaf sampled was the 4th leaf up the plant from the lowest leaf on the plant with at least 1/3 of the leaf green. Data were first corrected using the formula Log(x + 1.0) and then analyzed using PROC GLM analysis of variance (SAS 9.2 version). Treatment mean differences were separated with Duncan's multiple range test (P=0.05).

Results & Discussion

The corn field was in the tassel growth stage with green silks beginning to become exposed from the corn ears. The corn plants were showing light mite feeding damage on the lower 1/3rd of the plant. And, Banks grass mite colonies were starting to become established as evident from densities at the pretreatment sample date (Table 1). Along with the mites becoming established, predatory thrips and a few western flower thrips were seen on the corn leaves (Table 2). The thrips accounted for 98.9% of all natural enemies found at the pretreatment sample count. By 5 days after treatment (DAT) mites in the untreated check plots were showing an increase in numbers. In general the activity of the miticide treatments was not evident at the 5 DAT count. Even when the mite numbers were statistically lower from the untreated in the Agri-Mek 2.0 fl oz/A and Onager treatments, it is unlikely that these two treatments were performing better than the miticides. We should not expect the low rate of Agi-Mek (2.0 fl oz/A) to be better than the higher rate of Agi-Mek (2.5 fl oz/A). The thrips, which were 99.1% of all natural mite enemies, did increase in numbers from the pretreatment levels. By 13 DAT, it was evident that all miticide treatments were reducing mite numbers below the untreated density levels. But, statistically there were no differences among the different miticides. Thirps were still present in relatively good numbers in all treatments at the 13 DAT sample date. This shows that all of these miticides are safe on mite predators, specifically the thrips complex. These thrips densities were beginning to have an impact on the mite numbers as evidenced by a reduction in mite numbers in the untreated check. It is important to have miticides which conserve predators that naturally suppress mite infestations and other corn insect pests.

Table 1. Mean Number of spider mites per sampled leaf 1 day before treatment (Pre-trt) and at 5 and 13 days after treatment (DAT).[ab]

Treatment	Rate / A	Pre-trt	5 DAT	13 DAT
Agri-Mek + 0.25% NIS	2.0 fl oz	34.4 a	13.6 c	3.3 b
Agri-Mek + 0.25% NIS	2.5 fl oz	32.3 a	23.5 ab	5.1 bc
Agri-Flex + 0.25% NIS	8.5 fl oz	36.4 a	25.0 ab	4.4 b
Oberon	4.25 fl oz	32.1 a	23.2 ab	4.8 b
Onager	10 fl oz	21.1 a	19.6 bc	3.5 b
Zeal + 0.1% NIS	2 oz	20.9 a	26.8 ab	5.8 b
Untreated Check		20.4 a	35.7 a	18.0 a
CV		32.3102	32.7058	48.3646
Rep(Prob F)		0.0009	<0.0001	0.0279
Trt(Prob F)		0.0734	0.0070	0.0002

[a] Means in a column followed by the same letter are not significantly different according to Duncan's multiple range test (P=0.05, SAS Institute 2009).
[b] Data were corrected using the formula Log(x + 1.0) prior to conducting ANOVA.

Table 2. Mean number of predators per sampled leaf -1 day before treatment (Pre-trt) and at 5 and 13 days after treatment (DAT).[ab]

Treatment	Rate / A	Pre-trt	5 DAT	13 DAT
Agri-Mek + 0.25% NIS	2.0 fl oz	0.7 a	3.3 a	2.4 a
Agri-Mek + 0.25% NIS	2.5 fl oz	0.7 a	1.8 ab	3.4 a
Agri-Flex + 0.25% NIS	8.5 fl oz	0.6 a	3.4 a	3.3 a
Oberon	4.25 fl oz	1.4 a	1.9 ab	3.0 a
Onager	10 fl oz	0.7 a	1.0 b	2.9 a
Zeal + 0.1% NIS	2 oz	0.4 a	2.0 ab	3.3 a
Untreated Check		0.4 a	3.4 a	2.7 a
CV		144.2377	71.8047	59.5400
Rep(Prob F)		0.9031	0.0176	0.6004
Trt(Prob F)		0.1272	0.0248	0.7811

[a] Means in a column followed by the same letter are not significantly different according to Duncan's multiple range test (P=0.05, SAS Institute 2009).
[b] Data were corrected using the formula Log(x + 1.0) prior to conducting ANOVA.

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