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Efficacy of Miticides Applied at Tassel Stage for the Control of Spider Mites in Corn, 2020

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Summary

Spider mite populations peaked during the week of August 19 and declined rapidly by August 26. Mite populations were made up entirely of two-spotted spider mites (*Tetranychus urticae*). The Portal with Exponent, Oberon, and Zeal treatments provided the best season-long control in this trial while Portal, Onager, and Mitomax II provided the most control 14 to 21 days after treatment. The lowest overall reduction in predatory mites during the season, when compared to control plots, occurred in the Portal and Onager treatments.

Experimental Procedures

A center pivot irrigated field near Garden City, KS, in Finney County was planted to Mycogen MY10Z28R8 corn hybrid on May 29, 2020, at a rate of 35,000 seeds per acre. Agronomic practices for irrigation, fertilizer, and herbicide were standard for corn production in the southwest Kansas region. Average maximum air temperature between onset of tasseling and the end of the trial was 89.8°F and 6.99 inches of precipitation was recorded. The trial was arranged in a randomized complete block design with 8 treatments (includes untreated check) replicated four times. Plots were 4 rows wide (30-in. center) by 30-ft long. Replications were separated by 4 rows of buffer corn while individual plots within replications were separated by 10-ft alleyways. All treatments were applied on August 5 at 15.0 gpa with an air pressurized (30 psi) 10-foot-wide high-clearance spray boom. All applications were mixed with a .25% v/v rate of non-ionic surfactant (except for the Mitomax II treatment). The boom was equipped with 8 (XR TeeJet 8002VS) nozzles on 18-inch centers. At application the temperature was 78°F (64% RH) with a wind speed of 10 mph from the south.

Samples were taken 1 day before the miticide applications and at 7, 14, and 21 days thereafter. On each sample date, half the leaves were taken from each of two plants randomly selected from the middle two rows of the plot. Leaves were bagged within the plot and transferred to the laboratory and placed in 5-gallon Berlese funnels equipped with 60-watt incandescent light bulbs for 3 days. Mites exiting the leaves fell into 50-mL centrifuge tubes filled with 70% methanol. Mites were separated from the methanol using a vacuum aspirator and counted under a stereoscope. Insect data were log transformed (Log (x + 1.0)) and analyzed using PROCMIX (SAS 9.4) and then back-transformed to mites per plant for presentation. All "percent reduction" calcula-

tions were made using Henderson-Tilton's formula. Grain yield data were not collected because mite infestation never reached economic levels.

Results and Discussion

In untreated plots, two-spotted spider mite populations peaked at 24.8 mites per plant on August 19 and rapidly fell to 1.8 per plant by August 26 (Table 1). On September 2, active mite colonies were no longer present and evidence of the entomopathogenic fungus *Neozygites sp.* was widespread throughout the plots. Natural enemy populations were present during each week of sampling before and after treatments and predatory mites (*Neoseiulus sp.*) were abundant (Table 2). Overall, spider mite pressure during this trial was low, but the number of mites per plant prior to treatments were not significantly different (Table 1).

Portal with Exponent, Zeal, and Oberon all provided the highest season long control with up to 98%, 100%, and 97%, respectively, and all three provided a significant reduction of spider mites 7 DAT (Tables 1 and 3). Oberon's control began to wane after two weeks, while Portal with Exponent along with Zeal held up for 3 weeks (Tables 1 and 3). Onager provided limited control 7 days after treatment (DAT) but increased significantly to 70% 14 DAT and offered no additional control 21 DAT (Table 3). Significant control with Mitomax II was not achieved until 14 DAT (Table 3). Control by Portal alone was modest 7 DAT but steadily increased to a peak of 59% 21 DAT (Table 3). Initial control by Portal with Zeal was better (51%) but declined steadily and offered no additional control 21 DAT (Table 3). Predatory mites were present in all plots both before and after treatment and their population peaked and declined in step with the spider mite population (Table 2). A significant reduction in predatory mites 7 DAT when compared to untreated plots occurred in the Portal with Exponent (60%), Portal with Zeal (77%), Zeal (74%) and Oberon (75%) treatments (Table 4). Predatory mite reductions steadily continued through 21 DAT in the Portal alone, Onager, and Mitomax II treatments (Table 4). Average overall reduction in predatory mites through the season was lowest in the Portal alone and Onager treatments (21% and 26%, respectively) while the highest overall reduction in predatory mites through the season occurred in the treatments containing Zeal, up to 68% (Table 4).

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Table 1. Average number of spider mites per plant (± SE)

Treatment	Rate, oz/a	1 DPT	7 DAT	14 DAT	21 DAT
UTC	.	20.5±8.1Aba	24.8±7.7Aa	9.8±5.5Ba	1.8±1.4Ba
Portal	32	27.5±8.9Aa	24.0±10.2Aa	5.8±2.3Ba	1.0±1.0Ba
Portal+Exponent	32 + 8	43.8±19.1Aa	11.8±9.1Ba	0.5±0.3Ca	0.8±0.3Ca
Portal+Zeal SC	32 +4	22.3±5.8Aa	13.3±7.7Aba	5.8±2.8Ba	2.0±1.7Ba
Zeal SC	4	41.3±18.0Aa	12.0±6.7Ba	3.5±2.1BCa	0.0±0.0Ca
Oberon 4SC	6	54.3±22.1Aa	11.0±8.4Ba	0.8±0.8Ca	2.3±1.3BCa
Onager	12	24.3±13.6Aa	28.8±16.6Aa	3.5±2.3Ba	3.3±1.6Ba
Mitomax II	54	31.3±9.3Aa	21.5±9.3Aa	2.8±1.1Ba	1.3±0.6Ba

Different uppercase letters indicate significant differences within a treatment over sampling times. Different lowercase letters indicate significant differences between treatments within a given sampling time.
DPT = days pretreatment. DAT = days after treatment. UTC = Untreated control.

Table 2. Average number of predatory mites per plant (± SE)

Treatment	Rate, oz/a	1 DPT	7 DAT	14 DAT	21 DAT
UTC	.	22.5±4.6Ba	64.3±10.3Aa	34.8±6.2ABa	20.0±4.0Ba
Portal	32	20.5±4.3Aa	55.0±21.1Aab	33.3±7.9Aa	7.8±5.1Bb
Portal+Exponent	32 + 8	19.3±1.7Aa	22.3±6.2Ab	33.8±11.0Aa	6.5±3.4Bb
Portal+ZealSC	32 + 4	27.8±7.4Aa	18.5±6.1Ab	23.3±4.8Aa	5.0±1.8Bb
Zeal SC	4	27.0±10.5Aa	20.0±12.4Ab	22.0±9.2Aa	5.0±2.0Bb
Oberon 4SC	6	20.3±3.0Aa	14.3±5.0Ab	24.3±3.0Aa	12.0±3.4Ab
Onager	12	18.8±2.9Ba	47.0±12.9Aab	21.0±1.4ABa	10.5±1.7Bb
Mitomax II	54	29.0±6.4Ba	61.8±11.1Aa	30.5±6.9Ba	9.5±2.5Cb

Different uppercase letters indicate significant differences within a treatment over sampling times. Different lowercase letters indicate significant differences between treatments within a given sampling time.
DPT = days pretreatment. DAT = days after treatment. UTC = Untreated control.

Table 3. Percent reduction in spider mites compared to untreated plots

Treatment	Rate, oz/a	1 DPT	7 DAT	14 DAT	21 DAT	Season average
UTC	.	20.5	24.8	9.8	1.8	
Portal	32		28	56	59	48
Portal+Exponent	32 + 8		64	98	79	80
Portal+ZealSC	32 + 4		51	46	0	32
Zeal SC	4		76	82	100	86
Oberon 4SC	6		83	97	52	77
Onager	12		2	70	0	24
Miteomax II	54		43	81	53	59

Highlighted cells are the mite counts from untreated plots used in calculations.
DPT = days pretreatment. DAT = days after treatment. UTC = Untreated control.

Table 4. Percent reduction in predatory mites compared to untreated plots

Treatment	Rate, oz/a	1 DPT	7 DAT	14 DAT	21 DAT	Season average
UTC	.	22.5	64.3	34.8	20.0	
Portal	32		6	0	57	21
Portal+Exponent	32 + 8		60	0	62	41
Portal+ZealSC	32 + 4		77	46	80	68
Zeal SC	4		74	47	79	67
Oberon 4SC	6		75	23	34	44
Onager	12		13	28	37	26
Miteomax II	54		25	32	63	40

Highlighted cells are the mite counts from untreated plots used in calculations.
DPT = days pretreatment. DAT = days after treatment. UTC = Untreated control.