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FIELD 204A

Southwest Research–Extension Center

Report of Progress
927

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Southwest Research-Extension Center

EFFICACY OF MITICIDES APPLIED POST-TASSEL TO CONTROL SPIDER MITES IN CORN, POST-TASSEL TRIAL, 2003

by

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SUMMARY

Spider mite populations increased to 1,141 mites per 2 plants at 11 to13 days post treatment, and caused severe leaf damage by the middle of September. There was a 60.3 Bu/A grain yield loss in the untreated control relative to the best treatment. The standard miticide, Capture alone at each of two rates, and the experimentalmiticide, Koromite, applied alone, gave 72, 77, and 80% control, respectively, at 6 days post-treatment, but averaged only 42, 65, and 50% season-total spider-mite control. They seemed to knock down mite populations, but they did not seem to hold them down. These treatments increased grain yield 14.2, 3.0, and 1.2 Bu/A, respectively, relative to the untreated control. Capture plus Dimethoate or Capture plus Koromite gave 80 and 78% control, respectively, at 6 days post-treatment, but averaged 76 and 73% season-total spider mite control. These treatments increased grain yield of treated corn by 12.4 and 3.7 Bu/A relative to the untreated control. The Oberon and the Oberon plus Capture treatments averaged only 51 and 50% control, respectively, over the first 11 days, but the leaf damage at the end of the season to treated corn was only about 4 leaves killed. These treatments did not seem to knock down mite populations, but they seemed to hold down the late-season twospotted spider mite populations. These treatments increased grain yield of treated corn by 29.6 and 29.9 Bu/A, respectively, relative to the untreated control. The Agri-Mek and Agri-Mek plus Capture treatments averaged 83 to 95% control, respectively, during the first 11 days, and leaf damage to treated corn was minimal at the end of the season. These treatments increased grain yield of treated corn by 59.6 and 60.3 Bu/A, respectively, relative to the untreated control. The two Agri-Mek treatments gave excellent knockdown, as well as excellent late-season twospotted spider mite control. Predator mite populations increased during the trial, but did not seem to affect spider mite populations until August. Thrip populations were large during the whorl stage, and mite populations seemed to increase as thrip populations declined. Predator mite and thrip populations did not seem to be affected by the miticide treatments.

PROCEDURES

Field corn, DKC60-10 (RR/YGCB) (110-day maturity), was planted May 5 with a John Deere MaxEmerge 6 row planter at a rate of 36,000 seeds/acre in a furrow-irrigated field (Finnup #8) at the Southwest Research-Extension Center, Finney County, Kansas. A test with 10 treatments was set up in a randomized complete block design with four replications. Plots were four rows (10 ft) wide and 50 ft long, with a 4-row (10-ft) border of untreated corn on each side and a 10-ft alley at each end. Treatments 2 through 4 were applied July 26, and treatments 5 through 10 were applied July 28. The corn was in the soft-dough stage. The treatments were applied with a high-clearance sprayer using a 10-ft boom with two nozzles directed at each row (one nozzle on each side of the row on 16-in drop hoses). The nozzles were directed at the ear zone. The sprayer was calibrated to deliver 14 gal/acre at 2 mph and 40 psi.

Banks grass mites infested the plots naturally from an adjacent wheat field to the west. In May, spider mites were sampled by collecting 3 row-ft of wheat from 6 locations around the experimental field. Then spider mites were sampled in corn during the summer by collecting half the leaves from 4 plants (4 half plants = 2 plants) from the two center rows in each plot. The plant material was placed in large paper bags and transported to the laboratory, where it was placed in 76-liter Berlese funnels. A light bulb was used to dry the vegetation and to drive arthropods down into a collecting jar containing 70% methanol. The alcohol samples were filtered on ruled white filter paper, and spider mites, predator mites, and thrips were counted under a binocular microscope. A

subsample of spider mites (about 20) was mounted on a microscope slide. The slides were examined to determine the proportion of Banks grass mites and twospotted spider mites in the population from each plot. Pre-treatment spider-mite samples were collected July 25, and post-treatment samples were collected August 1 and 8. Spider mite counts were transformed according toTaylor's power transformation for statistical analysis and were converted to mites per 4 half-plants for presentation. On September 12, the plots were rated for number of green leaves still present. Corn receiving the best treatments still had green leaves down to the ear or lower (10 or more leaves), whereas the check plots had very few green leaves. Grain yield was collected by machine harvesting two rows from each plot. Because the field was furrow irrigated from one end of the field, there was a significant gradient in the yield going down the field. Therefore, we calculated the "field yield trend" by calculating the average yield across 6 plots at each position down the field. The position means were smoothed by using rolling averages. Then this "field yield trend" was used as the covariate in the ANOVA of grain yield and number of green leaves.

RESULTS AND DISCUSSION

In May, spider-mite populations in wheat averaged 0.4 mites per row-foot. Spider mite populations averaged 2.7 mites per 2 plants on June 27. On July 25, just before treatments were applied, spider mite populations averaged 50 to 193 mites per 2 plants. The mite populations increased to an average of 1,141 mites per 2 plants by August 8. The spider mite populations were 100% Banks grass mites during the pretreatment samples, but by August 8,. the twospotted spider mite populations had increased to 36.9 % in some treatments (Table 2). The percentage of twospotted spider mites did not differ significantly across treatments because of the variability in the data. The weather changed in mid-August, and seemed to cause a further shift toward twospotted spider mites. In this region, the species complex is often observed to shift from Banks grass mites early in the season to twospotted spider mites later in the season (Sloderbeck et al. 1987). We were unable to take further samples after August 8. to verify that this shift continued, but it can be inferred from the leaf damage recorded in September and in the grain yields recorded at harvest. By September 12, the mites had killed an average of 7 more leaves per plant in the untreated control relative to the best treatment (Table 3). There was also a 60.3 Bu/A grain yield loss in the untreated control relative to the best treatment (Table 3).

The standard miticide, Capture, alone at two rates, and the experimental miticide, Koromite, applied alone, gave 72, 77, and 80% control, repectively, at 6 days post-treatment, but averaged only 42, 65, and 50% season-total spider mite control (Table 1). The Capture treatments seemed to have some of the highest twospotted spider mite percentages, (although these differences were not statistically significant) (Table 2). These treatments also did not seem to give late-season twospotted spider-mite control, because leaf damage to treated corn averaged about 6 leaves killed, and the number of green leaves was only slightly better than for the untreated control. These treatments seemed to knock down the Banks grass mite populations, but they did not seem to hold down the late-season twospotted spider mite populations. These treatments increased grain yield of treated corn by 14.2, 3.0, and 1.2 Bu/A, respectively, relative to the untreated control.

Capture plus Dimethoate or Capture plus Koromite gave 80 and 78% control, respectively, at 6 days post-treatment, but averaged 76 and 73% season-total spider mite control (Table 1). These treatments provided slightly better spider mite control than did Capture alone. These treatments also seemed to have some large twospotted spider mite percentages (Table 2). These treatments did not seem to give late-season twospotted spider mite control, because leaf damage to treated corn averaged about 6 leaves killed, and the number of green leaves was only slightly better than for the untreated control. These Capture treatments seemed to knock down the Banks grass mite populations, but they did not seem to hold down the late-season twospotted spider mite populations. These treatments increased grain yield of treated corn by 12.4 and 3.7 Bu/A, respectively, relative to the untreated control.

The Oberon and the Oberon plus Capture treatments averaged only 51 and 50% control, respectively, over the first 11 days (Table 1). But the leaf damage to treated corn at the end of the season, 4 weeks later, was moderate, with only about 4 leaves killed, and there were significantly more green leaves on these treatments than on control plants (Table 2). The Oberon and the Oberon plus Capture treatments did not seem to knock down the mite populations very well, but they seemed to hold down the late-season twospotted spider mite populations better than

did Capture alone. These treatments increased grain yield of treated corn by 29.6 and 29.9 Bu/A, respectively, relative to the untreated control.

The Agri-Mek and Agri-Mek plus Capture treatments averaged 83 to 95% control, respectively, during the first 11 days (Table 1). The leaf damage to treated corn at the end of the season was minimal, and the number of green leaves was significantly greater than any other treatment (Table 2). These treatments increased grain yield of treated corn by 59.6 and 60.3 Bu/A, respectively, relative to the untreated control. Agri-Mek treatments seemed to give excellent early-season knockdown, as well as excellent late-season twospotted spider mite control.

Predator mite populations in wheat in May averaged 0.47 mites per row-foot. Throughout July, predator mite populations remained small (data from adjacent plots). Populations increased in August and averaged as much as to 3.5 mites per 2 plants in some of these plots (Table 2). The predator mite numbers were too small to suppress spider mite populations until mid-August. Predator mite numbers were fewer in some of the best miticide treatments, but this was probably correlated with availability of spider mite prey populations (Table 1).

Thrip populations averaged 23 thrips per 2 plants on June 27 and increased to between 24 and 59 thrips per 2 plants on July 7 (data from adjacent plots). They decreased rapidly as the plants reached tassel stage, and averaged only 1 to 4 thrips per 2 plants in August (Table 2). The thrips seemed to be important early-season facultative predators of the spider mites. The spider mite populations increased rapidly when the thrip populations declined during the corn reproductive stage (Table 1).

Henderson, C.F., and W. Tilton. 1955. Tests with Acaricides against the Brown Wheat Mite. Journal of Economic Entomology. 48: 157-161.

Sloderbeck, P.E., W.P. Morrison, C.D. Patrick, and L.L. Buschman. 1988. Seasonal shift in species composition of spider mites (Tetranychidae) in corn. Southwestern Entomologist 13: 63-68.

Table 1. Spider mites per 4 half plants (=2 plants) and late-season green leaves remaining on plants in plots treated with miticides. SWREC, Garden City, Kansas. Post-Tassel Miticide Trial, 2003.

			Spider Mites[1]				% Control [2]		
	Treatment Chemical	Rate per acre	7/25 Pre-T	8/1 P-T	8/8 P-T	Total	8/1 P-T	8/8 P-T	Season Total
1	Check	—	95	**167 a**	**1141 a**	**1438 a**	**—**	**—**	**—**
2	Capture 2E	0.08 lb	130	**65 ab**	**872 abc**	**1138 ab**	**72**	**44**	**42**
3	Capture2E	0.1 lb	97	**40 b**	**365 bcde**	**516 a-d**	**77**	**69**	**65**
4	Capture 2E +Dimethoate 400EC	0.08 lb 0.5 lb	55	**31 b**	**133 de**	**196 d**	**68**	**80**	**76**
5	Oberon 240EC	0.089 lb	86	**192 a**	**318 cde**	**643 a-d**	**-27**	**69**	**51**
6	Oberon 240EC +Capture 2EC	0.089 lb 0.08 lb	50	**55 ab**	**259 de**	**376 b-d**	**37**	**57**	**50**
7	Koromite 1%EC	16 oz	177	**82 ab**	**1052 ab**	**1335 a**	**74**	**51**	**50**
8	Koromite 1%EC +Capture 2EC	16 oz 0.08 lb	193	**68 ab**	**510 abcd**	**775 a-c**	**80**	**78**	**73**
9	Agri-Mek 0.15EC	0.089 lb	129	**38 b**	**152 de**	**285 cd**	**83**	**90**	**85**
10	Agri-Mek 0.15EC +Capture 2EC	0.089 lb 0.08 lb	185	**19 b**	**106 e**	**320 cd**	**94**	**95**	**89**
	F-test-Prob.		0.227	0.0633	0.011	0.011			
	CV %		25	23	18	18			

[1] Means within a column that are followed by the same letter are not significantly different (P < 0.05, LSD).
2 Percentage of control calculated according to the method of Henderson and Tilton (1955).
Treatments 2 through 4 were applied July 26 and treatments 5 through 10 were applied July 28. The corn was in the soft- dough stage. Post-treatment counts are in bold. Leaf ratings were made September 12.

Table 2. End-of-season observations on corn, percentage of two-spotted spider mites, and numbers of predator mites and thrips per 4-half plants (=2 plants) in plots treated with miticides. SWREC, Garden City, Kansas. Post-Tassel Miticide Trial, 2003.

							Thrips		
	Treatment Chemical	Rate per acre	No. Green Leaves/plant[1] 9/12	Grain Yield[1] Bu/A	% TSM [2] 8/8	Predator Mites 8/8	7/25 Pre-T	8/1 P-T	8/8 P-T
1	Check	—	**2.6 e**	**144.7 c**	**29.6**	**0.5**	2	**2**	**2**
2	Capture 2E	0.08 lb	**3.8 de**	**158.9 bc**	**27.5**	**0.8**	2	**1**	**2**
3	Capture2E	0.1 lb	**4.2 cd**	**147.7 c**	**6.8**	**1.5**	5	**3**	**3**
4	Capture 2E +Dimethoate 400EC	0.08 lb 0.5 lb	**4.7 bcd**	**157.1 bc**	**36.9**	**0.5**	4	2	1
5	Oberon 240EC	0.089 lb	**6.2 b**	**174.3 b**	**4.4**	**3.5**	3	**3**	**2**
6	Oberon 240EC +Capture 2EC	0.089 lb 0.08 lb	**5.4 bc**	**174.6 b**	**22.8**	**0.8**	1	**3**	**1**
7	Koromite 1%EC	16 oz	**4.1 cde**	**145.9 c**	**3.9**	**0.0**	3	**2**	**1**
8	Koromite 1%EC +Capture 2EC	16 oz 0.08 lb	**3.4 de**	**148.4 c**	**16.3**	**0.0**	4	**1**	**1**
9	Agri-Mek 0.15EC	0.089 lb	**9.8 a**	**204.3 a**	**19.4**	**0.5**	5	**4**	**0**
10	Agri-Mek 0.15EC +Capture 2EC	0.089 lb 0.08 lb	**9.9 a**	**205.0 a**	**4.4**	**0.3**	4	**1**	**1**
	F-test-Prob.		>0.0001	>0.0001	>0.500	0.567	0.493	0.081	0.456
	CV %		19%	9%	69%	270	71	64	123

[1] Means within a column that are followed by the same letter are not significantly different (P < 0.05, LSD).
[2] Percentage of two-spotted spider mites.
Treatments were applied July 26 and 28, when the corn was in the soft-dough stage. Post-treatment counts are in bold. Leaf ratings were made September 12.

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SRP 910 **May 2004**