FIELD DAY 2006

Southwest Research–Extension Center

Report of Progress 961

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Southwest Research-Extension Center

EFFICACY OF MITICIDES APPLIED POST-TASSEL FOR CONTROL OF SPIDER MITES IN CORN, 2005

by

Larry Buschman, Holly Davis, Randall Currie, and Phil Sloderbeck

SUMMARY

The Banks grass mite (BGM) populations increased from 26 to 240 mites per 2 plants by August 8 and then declined to 12 mites per 2 plants on August 23. The twospotted spider mite (TSM) populations increased rapidly in August, from 13 per 2 plants on August 8 to 628 per 2 plants on September 8. The percentage of the population that was TSM increased from 5% to 97% during the season. The two rates of the standard miticide, Capture® 2EC (bifenthrin active ingredient), gave some early control (up to 40%) of BGM. The combination of Capture® plus Dimethoate also seemed to give some early control of both mites. The two rates of Fanfare® (bifenthrin active ingredient) gave some early control of BGM (up to 65%). The two Onager® combinations gave reasonable BGM control, 38 to 85% from 7 to 21 days after treatment (DAT). The Onager® plus Capture® treatment seemed to have some impact (24 to 39%) on the TSM populations. The two formulations of Oberon® gave excellent BGM control, 53 to 89% out to 14 DAT, but the Oberon® 480EC treatment seemed to fade at 22 DAT. These treatments seemed to have some impact on the twospotted spider mites, on the samples through 22 DAT (3 to 76%). Predator numbers were very small for most of the season, but predator mite populations increased late in the season, when spider mite populations were high. No differences in predator mite populations were observed among treatments. There were no significant differences in yields among the treatments, even though the coefficient of variance (CV) was only 8%.

PROCEDURES

Field corn, N73-F7 (GT/LL/YGCB) (112-day maturity), was planted April 26 with a John Deere MaxEmerge 6-row planter at a rate of 35,000 seeds/acre in wheat stubble under a center-pivot irrigation system (Field N34) 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. The field received 170 lb of N as anhydrous ammonia and was irrigated 16 times, receiving 14.5 inches of water. The plots were manually infested with BGM July 12 by tying on mite-infested leaves collected from a cornfield in Stevens County. We infested 6 plants in each plot, 3 for each of the two center rows. Treatments were applied August 1, when the corn was soft dough stage, 2 wk post-tassel. The treatments were applied with a high-clearance sprayer using a 10-ft boom with two nozzles directed at each row (one on each side of the row on a 18-in drop hose). The nozzles were directed to the ear zone of the plants. The sprayer was calibrated to deliver 14 gal/acre at 2 mph and 40 psi.

Spider mites were sampled by collecting half the leaves from 4 plants (4 half plants = 2 plants) from the two center rows in each plot. Early in the season, we sampled plants next to the infested plants. The plant material from each plot was placed in separate large paper bags and transported to the laboratory, where the plant material was placed in separate, large 76-liter Berlese funnels. A 100-watt light bulb was used to dry the vegetation and 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 BGM and TSM in the populations from each plot. Pre-treatment spider mite samples were collected July 25 and post-treatment samples were collected August 8, 15, and 23 and September 8. Spider mite counts were transformed with Taylor's power transformation

for statistical analysis, and were back-transformed to mites per 4 half-plants for presentation. Grain yield was collected by machine harvesting two rows from each plot. There was considerable variation in the plant height and a gradient in the yield going down the field, so we calculated the "field yield trend" by calculating the average yield across 6 rows of plots going 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. The F-value for the covariate was 4.9596; that for treatment was 0.8069.

RESULTS AND DISCUSSION

The BGM and TSM populations averaged 50 mites per 2 plants on July 25. The BGM populations in the untreated control increased from 26 to 240 mites per 2 plants by August 8 and then declined to 12 mites per 2 plants on August 23 (Table 1). In the untreated control, the TSM populations were present in very small numbers during July, but they increased rapidly in August, from 13 per 2 plants on August 8 to 628 per 2 plants on September 8 (Table 4). The percentage of the population that was TSM increased from 6% on July 25 to 95% by September 8. There was a period of wet weather in early August that seemed to be associated with the collapse of the BGM populations, followed by increasing TSM populations. This confirms previous observations in this region that the species composition often shifts from mostly BGM early in the season to TSM later in the season).

The two rates of the standard miticide, Capture® 2EC (bifenthrin active ingredient), gave some early control (up to 40%) of BGM (Table 2), and the high rate also seemed to give some control of TSM (Table 4). The combination of Capture® plus Dimethoate also seemed to give some early control of both mites (Tables 2 and 4). The season-total percentage control was low for both spider mites (Table 2 and 4). The percentage of the population that was TSM did not differ meaningfully between the Capture® and control treatments (Table 5).

The two rates of Fanfare® (bifenthrin active ingredient) gave some early control of BSM (up to 40%) (Table 2), but little control of TSM (Table 4). The season-total percentage control was a little higher than it was for Capture® (Table 2 and 4), but there was too much variation in the performance of the two bifenthrin treatments to determine if there were any meaningful differences among them.

The two Onager® combinations gave reasonable BGM control, 38 to 85% from 7 to 21 DAT (Table 2). The season total BGM control was 47 to 51% (Table 2). The Onager® plus Capture® treatment seemed to have some impact (24 to 39%) on the TSM populations (Table 4). But these treatments seemed to have little impact on season-total control, (3 to 47%) (Table 2 and 4), and the control for the season total for both spider mites was 14 to 20% (Table 6). It was not clear if there was a meaningful increase in the percentage of TSM in the Onager®-treated plots (Table 5).

The two formulations of Oberon® gave excellent BGM control, 53 to 89% out to 14 DAT (Table 2). The season-total BGM control was 50 to74% (Table 2). For some odd reason, the Oberon® 480EC treatment seemed to fade at 22 DAT. These treatments seemed to have some impact on the TSM, on the samples through 22 DAT (3 to 76%) (Table 4), and the season-total control for both spider mites was 20 to 23% (Table 6). There was no clear indication of a difference in performance of the two Oberon® formulations.

Predator mite populations increased from 0.3 to 35.0 per 2 plants during the growing season (Table 6). During this time, the spider mite populations increased from 34 to 1215 mites per 2 plants (Table 6). This was the only predator population that seemed to increase as spider mite populations increased. The predator mite numbers were significantly smaller for all the treatments at 14 DAT (Table 6). Thrips populations, *Frankliniella* spp., decreased from 2.1 to 0.6 per 2 plants during the sampling period. They were sampled during the post-tassel period, when thrips numbers are usually smaller than they are during the early to mid-whorl stages. In the past, these thrips seemed to be important early-season facultative predators of spider mites. The spider mite populations generally increase rapidly during the corn reproductive stage, when the thrips populations are low. Sixspotted thrips, *Scolothrip* spp., were present, but populations decreased from 0.17 to 0.00 per 2 plants during the sampling period. These thrips are reported to be important predators of the spider mites, but we have recorded them only infrequently. Both thrips populations were too low to determine if there were differences in their responses to the miticide treatments.

There were no significant differences in yields among the treatments, even though the CV was only 8%. None of the treatments were good enough to protect enough yield to be detected in this trial.

Table 1. Banks grass mites per 4 half plants (=2 plants) in plots treated with miticides* Southwest Research - Extension Center, Garden City, Kansas, 2005.

No.	Treatment	Rate	BGM/4 half-plants [a] July 25 Pre-treat.	Aug. 8 7 days	Aug. 15 14 days	Aug. 23 22 days	Sept. 8 38 days	Season total
1	Check	—	*26*	240	44	12 b-e	22 ab	417
2	Capture 2EC	0.08 lb	*13*	123	40	40 a-d	96 a	439
3	Capture 2EC	0.1 lb	*36*	157	32	61 ab	21 ab	373
4	Capture 2EC	0.08 lb						
	Dimethoate 400EC	0.5 lb	*55*	137	57	101 a	3 b	419
5	Onager 1E	6 oz						
	Capture 2EC	0.08 lb	*63*	104	20	5 de	15 ab	248
6	Onager 1E	6 oz						
	Dimethoate 400EC	0.5 lb	*38*	57	7	8 cde	95 a	239
7	Fanfare 2EC	0.08 lb	*22*	81	61	25 a-e	0 b	207
8	Fanfare 2EC	0.1 lb	*20*	110	41	49 abc	0 b	229
9	Oberon 240EC	8.5 oz						
	COC	1%	*22*	26	14	3 e	2 b	106
10	Oberon 480EC	4.25 oz						
	COC	1%	*21*	35	20	13 b-e	88 a	199
	F-test P value		0.0413	0.1347	0.2950	0.0190	0.0244	0.1236

*Treatments made August 1, 2005, when the corn was soft dough stage.
[a] Means followed by the same letter are not significantly different (P < 0.05, LSD)

Table 2. Percentage control of Banks grass mites in plots treated with miticides*, Southwest Research - Extension Center, Garden City, Kansas, 2005.

No.	Treatment	Rate	Percentage control for BGM July 25 Pre-treat.	Aug. 8 7 days	Aug. 15 14 days	Aug. 23 22 days	Sept. 8 38 days	Season total
1	Check	—	—	—	—	—	—	—
2	Capture 2EC	0.08 lb	—	40	0	0	0	0
3	Capture 2EC	0.1 lb	—	39	33	0	11	17
4	Capture 2EC	0.08 lb						
	Dimethoate 400EC	0.5 lb	—	52	0	0	87	15
5	Onager 1E	6 oz						
	Capture 2EC	0.08 lb	—	65	64	67	46	51
6	Onager 1E	6 oz						
	Dimethoate 400EC	0.5 lb	—	78	85	38	0	47
7	Fanfare 2EC	0.08 lb	—	65	0	0	100	48
8	Fanfare 2EC	0.1 lb	—	51	0	0	99	42
9	Oberon 240EC	8.5 oz						
	COC	1%	—	89	67	73	90	74
10	Oberon 480EC	4.25 oz						
	COC	1%	—	85	53	0	0	50

*Treatments made Aug. 1, 2005, when the corn was soft dough stage.

Table 3. Twospotted spider mites per 4 half plants (=2 plants) in plots treated with miticides*, Southwest Research - Extension Center, Garden City, Kansas, 2005.

No.	Treatment	Rate	TSM/4 half-plants [a] July 25 Pre-treat.	Aug. 8 7 days	Aug. 15 14 days	Aug. 23 22 days	Sept. 8 38 days	Season total
1	Check	—	2	13	21	97	628	798
2	Capture 2EC	0.08 lb	1	12	30	130	740	953
3	Capture 2EC	0.1 lb	2	0	25	27	682	759
4	Capture 2EC	0.08 lb						
	Dimethoate 400EC	0.5 lb	4	13	27	51	707	828
5	Onager 1E	6 oz						
	Capture 2EC	0.08 lb	2	9	12	56	612	721
6	Onager 1E	6 oz						
	Dimethoate 400EC	0.5 lb	4	19	36	101	619	803
7	Fanfare 2EC	0.08 lb	1	20	33	65	713	882
8	Fanfare 2EC	0.1 lb	1	14	20	49	757	851
9	Oberon 240EC	8.5 oz						
	COC	1%	1	4	15	66	731	823
10	Oberon 480EC	4.25 oz						
	COC	1%	2	3	13	73	657	774
	F-test P value		0.9544	0.2728	0.6861	0.2501	0.9847	0.9817

*Treatments made Auguest 1, 2005, when the corn was soft dough stage.
[a] Means followed by the same letter are not significantly different (P < 0.05, LSD)

Table 4. Percentage control of twospotted spider mites in plots treated with miticides*, Southwest Research - Extension Center, Garden City, Kansas, 2005.

No.	Treatment	Rate	Percentage control for TSM [a] July 25 Pre-treat.	Aug. 8 7 days	Aug. 15 14 days	Aug. 23 22 days	Sept. 8 38 days	Season total
1	Check	—	—	—	—	—	—	—
2	Capture 2EC	0.08 lb	—	0	0	0	0	0
3	Capture 2EC	0.1 lb	—	97	0	71	0	0
4	Capture 2EC	0.08 lb						
	Dimethoate 400EC	0.5 lb	—	10	0	54	0	8
5	Onager 1E	6 oz						
	Capture 2EC	0.08 lb	—	24	39	37	0	3
6	Onager 1E	6 oz						
	Dimethoate 400EC	0.5 lb	—	0	0	10	15	13
7	Fanfare 2EC	0.08 lb	—	0	0	25	0	0
8	Fanfare 2EC	0.1 lb	—	0	0	34	0	0
9	Oberon 240EC	8.5 oz						
	COC	1%	—	61	3	10	0	0
10	Oberon 480EC	4.25 oz						
	COC	1%	—	76	38	25	0	3

*Treatments made August 1, 2005, when the corn was soft dough stage.

Table 5. Percentage of spider mites, in plots treated with miticides*, that are twospotted spider mites, Southwest Research - Extension Center, Garden City, Kansas, 2005.

No.	Treatment	Rate	Percent population TSM: July 25 Pre-treat.	Aug. 8 7 days	Aug. 15 14 days	Aug. 23 22 days	Sept. 8 38 days	Season total
1	Check	—	7	5	32	89	97	66
2	Capture 2EC	0.08 lb	7	9	43	76	89	68
3	Capture 2EC	0.1 lb	4	0	44	30	97	67
4	Capture 2EC	0.08 lb						
	Dimethoate 400EC	0.5 lb	6	9	32	33	100	66
5	Onager 1E	6 oz						
	Capture 2EC	0.08 lb	2	8	37	92	98	74
6	Onager 1E	6 oz						
	Dimethoate 400EC	0.5 lb	9	25	83	92	87	77
7	Fanfare 2EC	0.08 lb	5	20	35	72	100	81
8	Fanfare 2EC	0.1 lb	3	11	32	50	100	79
9	Oberon 240EC	8.5 oz						
	COC	1%	3	13	52	95	100	89
10	Oberon 480EC	4.25 oz						
	COC	1%	9	8	40	84	88	80
	Mean		6	11	43	72	95	75

*Treatments made August 1, 2005, when the corn was soft dough stage.

Table 6. Numbers of predator mites, season total numbers of spider mites, and grain yield for plots treated with miticides*, SWREC, Garden City, Kansas, 2005.

No.	Treatment	Rate	Predator mites/4 half-plants [a]: July 25 Pretreat	Aug. 15 14 days	Sept. 8 38 days	Spider mites /4 half-plants [a]: Season Totals BGM	TSM	Sum	% Control	Grain yield [a] Bu/acre
1	Check	—	0.3	35.0 a	20.5	417	798	1215	—	162.6
2	Capture 2EC	0.08 lb	0.0	11.8 bc	22.5	439	953	1392	0	171.5
3	Capture 2EC	0.1 lb	0.3	11.3 bc	14.0	373	759	1132	7	165.8
4	Capture 2EC	0.08 lb								
	Dimethoate 400EC	0.5 lb	0.0	15.5 bc	26.3	419	828	1247	0	180.4
5	Onager 1E	6 oz								
	Capture 2EC	0.08 lb	0.5	8.8 bc	17.3	248	721	969	20	167.4
6	Onager 1E	6 oz								
	Dimethoate 400EC	0.5 lb	0.5	10.5 bc	37.8	239	803	1042	14	173.9
7	Fanfare 2EC	0.08 lb	1.0	23.3 ab	13.0	207	882	1089	10	163.0
8	Fanfare 2EC	0.1 lb	1.3	6.8 c	36.8	229	851	1080	11	172.2
9	Oberon 240EC	8.5 oz								
	COC	1%	0.0	6.8 c	12.3	106	823	929	23	160.7
10	Oberon 480EC	4.25 oz								
	COC	1%	0.3	7.3 c	19.0	199	774	973	20	164.1
	F-test P value		—	0.0227	0.4326	0.1236	0.9817	—	—	<0.5000

*Treatments made August 1, 2005, when the corn was soft dough stage.
[a] Means followed by the same letter are not significantly different (P < 0.05, LSD)

Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan 66506

SRP 961 **August 2006**

