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Agricultural Experiment Station

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College of Agricultural Sciences

Department of Bioagricultural Sciences and Pest Management

Cooperative Extension

2004 Colorado Field Crop Insect Management Research and Demonstration Trial

2004 Colorado Field Crop Insect Management Research and Demonstration Trials

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TABLE OF CONTENTS

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004: Treatments were applied on 15 April 2004 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 32 psi through three 8004 (LF4) nozzles mounted on a 5.0 ft boom. Conditions were clear with northwest winds of 5-7 mph and temperature 60°F at the time of treatment. Plots were 6 rows (5.0 ft) by 28.0 ft and were arranged in six replicates of a randomized, complete block design. Crop stage at application was jointing (Zadoks 30). The crop had been infested with greenhouse-reared aphids on 9 March and 6 April 2004.

Treatments were evaluated by collecting 20 symptomatic tillers along the middle four rows of each plot one, two and three weeks after treatment. Tiller samples were placed in Berlese funnels for 24 hours to extract aphids into alcohol for counting. Precounts averaged 23 ± 2 Russian wheat aphids per tiller. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Original means are presented in the tables. Total insect days for each treatment were calculated according the method of Ruppel (Journal of Economic Entomology 76: 375-7, 1983). Reductions in insect days were calculated by Abbott's (1925) formula: (percent reduction = ((untreated-treated)/untreated) X 100). Insect days were also compared by analysis of variance and the Student-Neuman-Keul test (α=0.05) with original means presented in the tables.

Aphid pressure was as severe as in past artificially-infested winter wheat experiments, with about 64 aphids/tiller in the untreated control at 3 weeks post treatment. All treatments had fewer aphids than the untreated control at 1 and 3 weeks after treatment. Lorsban 4E-SG, 0.5, 0.25, 0.38, Di-Syston 8E, dimethoate 4E and Warrior, 0.03 treatments had fewer aphids than the untreated control at 2 weeks after treatment. All treatments had fewer aphid days than the untreated control. Lorsban 4E-SG, 0.5 and 0.25 reduced total aphid days over three weeks by more than 90%, the level of performance observed by the more effective treatments in past experiments. No phytotoxicity was observed with any treatment.

Field History

Pest:	Russian wheat aphid, *Diuraphis noxia* (Mordvilko)
Cultivar:	TAM 107
Planting Date:	10 September 2003
Irrigation:	Post planting, linear move sprinkler with drop nozzles
Crop History:	Fallow in 2003, wheat in 2002
Herbicide:	Harmony Extra, 0.5 oz/acre, Bronate 1pt/acre on 8 April 2004
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 2.5%, pH 7.5
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (middle of Block 1030 east)

Table 1. Control of Russian wheat aphid in winter wheat, ARDEC, Fort Collins, CO, 2004.

	APHIDS PER TILLER ± SEM[1]				
PRODUCT, LB (AI)/ACRE	1 WEEK	2 WEEKS	3 WEEKS	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]
Lorsban 4E-SG, 0.5	0.6 ± 0.1 E	4.0 ± 2.3 D	2.3 ± 0.4 E	774.5 ± 307.0 C	94
Lorsban 4E-SG, 0.25	1.7 ± 0.4 DE	4.6 ± 1.1 CD	4.5 ± 1.2 DE	1103.2 ± 225.1 C	92
Lorsban 4E-SG, 0.38	2.6 ± 1.4 DE	7.9 ± 4.8 CD	7.6 ± 5.8 DE	1870.7 ± 1196.3 C	86
Di-Syston 8E, 0.75	1.6 ± 0.1 DE	16.1 ± 12.1 BCD	6.9 ± 1.7 CDE	2894.7 ± 1803.5 BC	78
Dimethoate 4E 0.38	4.4 ± 1.7 CD	12.9 ± 3.3 BCD	19.6 ± 5.4 BCD	3635.0 ± 832.0 BC	72
Warrior, 0.03	5.1 ± 1.5 CD	15.6 ± 3.3 BCD	18.3 ± 4.3 BCD	3956.5 ± 662.5 BC	70
Mustang Max 0.8 E, 0.025	6.9 ± 0.7 BC	22.1 ± 1.7 ABC	19.9 ± 5.7 BCD	5103.5 ± 476.4 BC	61
Mustang Max 0.8 E, 0.02	10.0 ± 2.4 B	34.8 ± 8.8 AB	24.0 ± 3.7 BC	7385.7 ± 1522.9 B	44
Warrior, 0.01	10.1 ± 1.1 B	33.8 ± 6.3 AB	30.6 ± 8.0 B	7797.7 ± 1250.1 B	41
Untreated Control	19.3 ± 1.7 A	49.2 ± 9.9 A	64.0 ± 10.8 A	13165.5 ± 2194.2 A	—
F Value	18.89	7.71	10.58	10.25	—
p > F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	—

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2]Percent reduction in total aphid days, calculated by the Ruppel method.

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH CRUISER SEED TREATMENTS I, ARDEC, FORT COLLINS, CO, 2004

Shawn Walter, Jeff Rudolph, Terri Randolph, Aubrey Sloat, Jesse Stubbs, Emili Talmich, Kellin Bershinsky, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH CRUISER SEED TREATMENTS I, ARDEC, FORT COLLINS, CO, 2004: Seed treatments were planted on 10 September 2003 with a 6 row test plot drill at a rate of 60 lbs of seed/acre. The Lorsban treatment was applied on 15 April 2004 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 32 psi through three 8004 (LF4) nozzles mounted on a 5.0 ft boom. Conditions were clear with northwest winds of 5-7 mph and temperature 60°F at the time of treatment. Plots were 6 rows (5.0 ft) by 25.0 ft and were arranged in six replicates of a randomized, complete block design. Crop stage at application was jointing (Zadoks 30). The crop had been infested with greenhouse-reared aphids on 9 March and 6 April 2004.

Treatments were evaluated by collecting 20 random tillers along the middle four rows of each plot 3 times at 2 week intervals. Tiller samples were placed in Berlese funnels for 24 hours to extract aphids into alcohol for counting. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Original means are presented in the tables. Total insect days for each treatment were calculated according the method of Ruppel (Journal of Economic Entomology 76: 375-7, 1983). Reductions in insect days were calculated by Abbott's (1925) formula: (percent reduction = ((untreated-treated)/untreated) X 100). Insect days were also compared by analysis of variance and the Student-Neuman-Keul test (α=0.05) with original means presented in the tables.

Aphid pressure was moderate, 36 aphids per tiller in the untreated control at three weeks post treatment. All treatments had fewer aphids than the untreated control at the first sample date. Lorsban 4E-SG, 0.5 and Cruiser, 0.75 fl oz/100 lb sd had fewer aphids than the untreated control at the second sample date. No treatment had fewer aphids than the untreated control at the last sample date. Lorsban 4E-SG, 0.5 and Cruiser, 0.75 fl oz/100 lb sd had fewer aphid days than the untreated control. No treatment reduced total aphid days by more than 90% after the third sample date, the level of performance observed by the more effective treatments in past spring barley experiments. The Cruiser treated plots were infested when the plants were potentially toxic to the aphids and may not have received initial infestations comparable with other treatments. No phytotoxicity was observed with any treatment.

Field History

Pest:	Russian wheat aphid, *Diuraphis noxia* (Mordvilko)
Cultivar:	TAM 107
Planting Date:	10 September 2003
Irrigation:	Post planting, linear move sprinkler with drop nozzles
Crop History:	Fallow in 2003, wheat 2002
Herbicide:	Harmony Extra, 0.5 oz/acre, Bronate 1pt/acre on 8 April 2004
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 2.5%, pH 7.5
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (east side of Block 1030 east)

Table 1. Control of Russian wheat aphid in winter wheat with Cruiser seed treatments, ARDEC, Fort Collins, CO, 2004

	APHIDS PER TILLER ± SEM[1]				
TREATMENT	**1st WEEK**	**3rd WEEK**	**5th WEEK**	**TOTAL APHID DAYS ± SEM[1]**	**% REDUCTION[2]**
Lorsban 4E-SG, 0.5	4.2 ± 1.7 B	2.4 ± 1.2 C	6.6 ± 3.9	2382.3 ± 840.5 B	86
Cruiser, 0.75 fl oz/100 lb sd	8.5 ± 2.0 B	9.4 ± 2.8 BC	11.7 ± 3.4	5139.3 ± 1113.9 B	66
Cruiser, 1.33 fl oz/100 lb sd	6.3 ± 2.3 B	25.0 ± 11.5 AB	16.9 ± 5.9	7202.4 ± 2912.5 AB	35
Untreated Control	17.8 ± 4.5 A	35.8 ± 7.8 A	23.5 ± 7.3	12751.1 ± 3106.6 A	—
F Value	4.91	8.78	2.88	5.54	—
p > F	0.0142	0.0016	0.0710	0.0102	—

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not significantly different, SNK (α=0.05).
[2]Percent reduction in total aphid days, calculated by the Ruppel method.

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH CRUISER SEED TREATMENTS II, ARDEC, FORT COLLINS, CO, 2004

Shawn Walter, Jeff Rudolph, Terri Randolph, Aubrey Sloat, Jesse Stubbs, Emili Talmich, Kellin Bershinsky, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH CRUISER SEED TREATMENTS II, ARDEC, FORT COLLINS, CO, 2004: Seed treatments were planted on 10 September 2003 with a 6 row test plot drill at a rate of 60 lbs of seed/acre. The Warrior treatment was applied on 15 April 2004 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 32 psi through three 8004 (LF4) nozzles mounted on a 5.0 ft boom. Conditions were clear with northwest winds of 5-7 mph and temperature 60°F at the time of treatment. Plots were 6 rows (5.0 ft) by 25.0 ft and were arranged in six replicates of a randomized, complete block design. Crop stage at application was jointing (Zadoks 30). The crop had been infested with greenhouse-reared aphids on 9 March and 6 April 2004.

Treatments were evaluated by collecting 20 random tillers along the middle four rows of each plot 3 times at 2 week intervals. Tiller samples were placed in Berlese funnels for 24 hours to extract aphids into alcohol for counting. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Original means are presented in the tables. Total insect days for each treatment were calculated according the method of Ruppel (Journal of Economic Entomology 76: 375-7, 1983). Reductions in insect days were calculated by Abbott's (1925) formula: (percent reduction = ((untreated-treated)/untreated) X 100). Insect days were also compared by analysis of variance and the Student-Neuman-Keul test (α=0.05) with original means presented in the tables.

Aphid pressure was less severe than observed in past artificially-infested winter wheat experiments, 34 aphids per tiller in the untreated control at three weeks post treatment. All treatments had fewer aphids than the untreated control at the first and second sample date. All treatments except Raxil Thiram 1.77, 52.0 (AI) + Gaucho 480FS, 48.0 (AI) had few aphids than the untreated control at the third sample date. All treatments had fewer aphid days than the untreated control. Dividend Xtreme 0.96FS, 15.0(AI) + Cruiser 5FS, 39.0(AI) + Warrior w/Zeon 1CS, 0.02 reduced total aphid days by more than 90% after the third sample date, the level of performance observed by the more effective treatments in past spring barley experiments. The Cruiser and Gaucho treated plots were infested when the plants were potentially toxic to the aphids and may not have received initial infestations comparable with other treatments. No phytotoxicity was observed with any treatment.

Field History

Pest:	Russian wheat aphid, *Diuraphis noxia* (Mordvilko)
Cultivar:	Unknown
Planting Date:	10 September 2003
Irrigation:	Post planting, linear move sprinkler with drop nozzles
Crop History:	Fallow in 2003, wheat in 2002
Herbicide:	Harmony Extra, 0.5 oz/acre, Bronate 1pt/acre on 8 April 2004
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 2.5%, pH 7.5
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (west side of Block 1030 east)

Table 1. Control of Russian wheat aphid in winter wheat with Cruiser seed treatments, ARDEC, Fort Collins, CO, 2004

	APHIDS PER TILLER ± SEM[1]				
TREATMENT	1st WEEK	3rd WEEK	5th WEEK	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]
Dividend Xtreme 0.96FS, 15.0(AI) + Cruiser 5FS, 39.0(AI) + Warrior w/Zeon 1CS, 0.02	1.6 ± 0.8 C	2.4 ± 1.1 B	0.6 ± 0.2 C	482.0 ± 184.1 B	93
Dividend Xtreme 0.96FS, 11.25(AI) + Protege 0.83FS, 1.0(AI) + Cruiser 5FS, 39.0(AI)	6.3 ± 1.1 B	8.5 ± 2.2 B	3.4 ± 0.7 BC	1832.0 ± 311.0 B	75
Dividend Xtreme 0.96FS, 7.5(AI) + Protege 0.83FS, 1.0(AI) +Maxim 4FS, 1.25(AI) + Cruiser 5FS, 39.0(AI)	4.8 ± 0.9 B	8.5 ± 2.4 B	4.6 ± 0.9 BC	1842.8 ± 415.0 B	74
Dividend Xtreme 0.96FS, 11.25(AI) + Cruiser 5FS, 39.0(AI)	6.3 ± 1.4 B	5.8 ± 1.9 B	8.6 ± 5.3 BC	1871.3 ± 729.1 B	74
Dividend Xtreme 0.96FS, 15.0(AI) + Cruiser 5FS, 39.0(AI)	6.5 ± 0.4 B	10.8 ± 3.7 B	3.1 ± 1.0 BC	2152.3 ± 498.5 B	70
Raxil Thiram 1.77, 52.0 (AI) + Gaucho 480FS, 48.0(AI)	7.7 ± 1.7 B	6.7 ± 2.1 B	10.7 ± 4.3 AB	2257.2 ± 720.0 B	69
Dividend Xtreme 0.96FS, 15.0(AI)	15.8 ± 2.4 A	33.8 ± 7.8 A	19.1 ± 4.9 A	7206.8 ± 1532.4 A	—
F Value	11.25	8.83	5.79	9.63	—
p > F	< 0.0001	< 0.0001	0.0004	< 0.0001	—

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not significantly different, SNK (α=0.05).
[2]Percent reduction in total aphid days, calculated by the Ruppel method.

CONTROL OF BROWN WHEAT MITE IN WINTER WHEAT WITH SPRAYER APPLIED DIMETHOATE 4EC, LAMAR, CO, 2004

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CONTROL OF BROWN WHEAT MITE IN WINTER WHEAT WITH SPRAYER APPLIED DIMETHOATE 4EC, LAMAR, CO, 2004: Dimethoate 4EC was applied to winter wheat on 30 March 2004 using a Delco Sprayer at a rate of 0.5 pint/A calibrated to apply 12.4 gallons of water using TeeJet AI 11002 VS nozzles at 60 psi with a 20 inch nozzle spacing and a speed of 6 mph. Wind speed ranged from 3-5 mph and temperatures ranged from 61°F to 70°F during the application. Plots were approximately 50 feet by 320 feet and consisted of four replicates arranged in a split-split plot design. Two cultivars were included in the trial, Prairie Red and TAM 107 grown under two cropping systems, wheat-fallow (WF) and wheat-sorghum-fallow (WSF). Crop stage at the time of application was jointing (Zadoks 32).

Treatments were evaluated by extracting mites in 5 randomly selected rows per plot with a Vortis Suction Sampler which extracts mites in an 8 inch diameter area. Samples were collected before the first application. No further sampling of BWM occurred as the Vortis sampler broke and was not repaired in time for additional samples. Samples were placed on paper plates in Berlese funnels for 72 hours to extract the mites into alcohol for counting. Mite counts were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Yields were determined by collecting 5 meter rows from each plot and threshing the samples with a Brehon Simple Sampler portable combine. Yield was used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05).

Six weeks after treatment, samples were collected to determine the level of Russian wheat aphid in the plots. Evaluations were made by collecting 25 random tillers per plots. The number of aphids was determined by examining the tillers in the lab. During the evaluation, it was noted that a high number of the tillers had colonies of Banks grass mite. Due to the high number of tillers infested with Banks grass mite, a subsample of the samples were evaluated to determine the number present. Mite and aphid counts were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05).

There were no differences in the number of mites in the two cultivars but there were more brown wheat mite collected from wheat grown under a WF system compared to the WSF system. More Russian wheat aphid were observed in the WF system compared to the WSF system. There was more Russian wheat aphid in the plots that had been treated with dimethoate 4EC than the untreated plots but the difference was not significant. There were more Banks grass mite in the sprayed plots than the unsprayed plots. Although the differences were not significant, it is interesting to note that more Banks grass mite was found in the treated plots. The yields in the plots treated with Dimethoate 4EC were significantly higher than the untreated. Yields were slightly higher in the WSF system, there were no significant differences between systems or cultivar.

Field History

Pest:	Brown wheat mite *(Petrobia latens* Muller*),* Russian wheat aphid *(Diuraphis noxia* Mordvilko*),* Banks grass mite *(Oligonychus pratensis* (Banks))
Cultivars:	Prairie Red, TAM 107
Planting Date:	7 September 2003
Irrigation:	Dryland
Planting Rate:	45 lbs/acre
Crop History:	Wheat-Fallow or Wheat-Sorghum-Fallow
Herbicide:	8 oz/acre Clarity on 24 October 2003; 0.1 oz/acre Ally + 8 oz/A 2,4-D on 25 March 2004
Insecticide:	None prior to experiment
Fertilization:	NH_3 30 lbs/acre on 4 July 2003; 4.4 lbs/acre at planting
Soil Type:	Wiley silt loam
Location:	Southwest of Lamar on Chris Rundell Farm. Approximately 0.5 miles south of Prowers County Road AA on County Road 2. Prowers County, SW¼ Sec.8, T24S, R47W.

Table 1. Effect of brown wheat mite treatment on Bank's grass mites and Russian wheat aphids, Rundell's Farm, Lamar, CO, 2004.

System	Cultivar	Treatment	RWA ± SEM[1]	BGM ± SEM[1]	Yield[2]
Wheat-Sorghum-Fallow	TAM107	Sprayed	2.5 ± 0.5	121.0 ± 46.0	13.8 ± 3.1 A
Wheat-Sorghum-Fallow	Prairie Red	Sprayed	49.5 ± 48.5	165.0 ± 71.0	13.3 ± 4.4 A
Wheat-Fallow	TAM107	Sprayed	61.5 ± 34.5	156.0 ± 119.0	12.6 ± 4.3 A
Wheat-Fallow	Prairie Red	Sprayed	14.5 ± 9.5	130.0 ± 77.0	12.4 ± 4.9 A
Wheat-Fallow	TAM107	Untreated	61.5 ± 34.5	57.0 ± 30.0	8.4 ± 2.1 B
Wheat-Sorghum-Fallow	Prairie Red	Untreated	8.5 ± 5.5	165.5 ± 151.5	7.3 ± 1.5 B
Wheat-Fallow	Prairie Red	Untreated	0.5 ± 0.5	57.0 ± 41.0	7.0 ± 2.1 B
Wheat-Sorghum-Fallow	TAM107	Untreated	29.5 ± 29.5	207.0 ± 185.0	6.7 ± 2.4 B
F value			0.11	0.11	8.49
p > F			0.7464	0.7431	0.0130

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2]Yield presented in bushels per acre

CONTROL OF BROWN WHEAT MITE IN WINTER WHEAT WITH HAND-APPLIED DIMETHOATE 2.67 EC AT THREE GROWTH STAGES, LAMAR, CO, 2004

Cynthia Walker, Deborah Harn, Shawn Walter, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF BROWN WHEAT MITE IN WINTER WHEAT WITH HAND-APPLIED DIMETHOATE 2.67 EC AT THREE GROWTH STAGES, LAMAR, CO, 2004: Dimethoate 2.67 EC was applied to winter wheat on three dates using a 'rickshaw-type' CO_2 sprayer at a rate of 1 pt/acre calibrated to apply 18.5 gallons of water using TeeJet AI 11002 VS nozzles at 30 psi with a and a speed of 2.4 mph. Plots measured 12 feet by 50 feet and consisted of six replicates arranged in a randomized complete block design. The application date, crop growth stage, and conditions during application are shown in Table 1.

Treatments were evaluated by extracting mites in 5 randomly selected rows per plot with a Vortis Suction Sampler which extracts mites in an 8 inch diameter area. Samples were collected 1, 2 and 3 weeks after the first application and 1 week after the second application. No pretreatment levels of BWM could be made prior to the third spray, nor was any further sampling was conducted as the Vortis sampler broke and was not repaired in time for additional samples. Samples were placed on paper plates in Berlese funnels for 72 hours to extract the mites into alcohol for counting. Mite counts were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Plots were harvested on 3 July 2004 using a small plot combine which harvested an area 9.6 by 50 feet. Yields were determined by collecting 5 1-meter rows from each plot and threshing the samples with a Brehon Simple Sampler portable combine. Yield was used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05).

Both spray treatments had fewer mites than the untreated control at 3 weeks after the first treatment/1 week after the second treatment (Table 2.) No treatments had fewer mites than the untreated control at 1 and 2 weeks after the first treatment. Plots which were treated with dimethoate 2.67 EC had slightly lower yields than the untreated plots but the difference was not significant.

Field History

Pest:	Brown wheat mite *(Petrobia latens* Muller*)*
Cultivars:	Trego (hard white winter)
Planting Date:	9-10 Sept 2003
Irrigation:	Dryland
Planting Rate:	42-45 lbs/acre
Crop History:	Wheat-fallow (for over 15 years)
Herbicide:	Spot spray for bindweed using 2,4-D + Banvel
Insecticide:	None prior to experiment
Fertilization:	NH_3 40 lbs/acre on 4 July 2003
Soil Type:	Colby silt loam
Location:	Southwest of Lamar on Stulp/Ragsdale Farm. Approximately 4.5 miles south of Lamar on US Hwy 287, just south of County Road DD. Prowers County, NE¼ of Sec.31, T23S, R46W.

Table 1. Application dates, crop growth stage, and conditions during application of Dimethoate 2.67 EC for brown wheat mite.

		Weather conditions during application	
Application date	**Crop Growth Stage**	**Temperature**	**Wind Speed**
17 February 2004	Zadoks 27-28	54°-57°F	2-3 mph
2 March 2004	Zadoks 30	40°-43°F	7-8 mph
30 March 2004	Zadoks 33	58°-66°F	3-6 mph

Table 2. Effect of treatment timing of 1pt/Acre of dimethoate 2.67EC on brown wheat mite, Stulp's Farm, Lamar, CO, 2004

	Total BWM ± SEM[1]			
Treatment	**1 week post spray 1**	**2 weeks post spray 1**	**3 weeks post spray 1 / 1 week post spray 2**	**Yield2**
Spray 2, 2 March 2004	---	---	14.3 ± 2.1 B	6.3 ± 0.5
Spray 1, 17 February 2004	8.8 ± 2.8	2.8 ± 1.9	19.5 ± 7.5 B	6.4 ± 1.3
Untreated	18.5 ± 5.9	13.1 ± 4.7	88.8 ± 16.4 A	7.7 ± 0.8
F value	2.19	4.09	15.81	0.61
p > F	0.1694	0.0708	0.0002	0.5558

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2]Yield presented in bushels per acre

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004

Shawn Walter, Jeff Rudolph, Terri Randolph, Aubrey Sloat, Jesse Stubbs, Emili Talmich, Kellin Bershinsky, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004: The foliar treatment was applied on 28 May 2004 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 30 psi through three 8004 (LF4) nozzles mounted on a 5.0 ft boom. Conditions were partly cloudy and calm with a temperature of 60°F at the time of treatment. Crop stage at application date was early boot (Zadoks 26-27). Plots were 6 rows (5.0 ft) by 25.0 ft and were arranged in six replicates of a randomized, complete block design. The crop had been infested at the 2 leaf stage (Zadoks 12) with greenhouse-reared aphids on 27 April 2004.

Treatments were evaluated by collecting 20 symptomatic tillers along the middle four rows of each plot four days prior and one, two and four weeks post treatment. Tiller samples were placed in Berlese funnels for 24 hours to extract aphids into alcohol for counting. Precounts in the untreated plots averaged 15 ± 4 Russian wheat aphids per tiller. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Original means are presented in the tables. Total insect days for each treatment were calculated according the method of Ruppel (Journal of Economic Entomology 76: 375-7, 1983). Reductions in insect days were calculated by Abbott's (1925) formula: (percent reduction = ((untreated-treated)/untreated) X 100). Insect days were also compared by analysis of variance and the Student-Neuman-Keul test (α=0.05) with original means presented in the tables.

Aphid pressure was not as severe as observed in past artificially-infested spring barley experiments, 18 aphids/tiller in the untreated control at four weeks after treatment. All treatments had fewer aphids than the untreated control at one week after treatment. Warrior had fewer aphids than the untreated control at two weeks after treatment. Warrior and Lorsban treatments had fewer aphids than the untreated control at four weeks after treatment. All treatments had fewer aphid days than the untreated control. Warrior reduced total aphid days by more than 90% after 3 weeks, the level of performance observed by the more effective treatments in past spring barley experiments. No phytotoxicity was observed with any treatment.

Field History

Pest:	Russian wheat aphid, *Diuraphis noxia* (Mordvilko)
Cultivar:	Otis
Planting Date:	12 March 2004
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Corn in 2003
Herbicide:	Harmony Extra, 0.5 oz/acre, Starane plus Salvo, 1.33pt/acre on 24 May 2004
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy loam, OM 1.6%, pH 7.4
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (east edge of block 1080 south)

Table 1. Control of Russian wheat aphid in spring barley, ARDEC, Fort Collins, CO, 2004.

	APHIDS PER TILLER ± SEM[1]				
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**4 WEEKS**	**TOTAL APHID DAYS ± SEM[1]**	**% REDUCTION[2]**
Warrior 1E, 0.03	1.8 ± 0.8 B	1.0 ± 0.3 B	1.5 ± 0.6 B	818.3 ± 254.5 B	90
Lorsban 4F, 0.5	1.4 ± 0.3 B	1.7 ± 0.5 AB	3.6 ± 2.0 B	1100.9 ± 319.3 B	84
Mustang Max 0.8EC, 0.025	4.7 ± 1.1 B	6.1 ± 1.2 A	8.6 ± 2.0 AB	3267.3 ± 406.7 B	52
Mustang Max 0.8EC, 0.02	6.2 ± 0.9 B	5.7 ± 2.0 A	6.1 ± 1.5 AB	3277.0 ± 546.5 B	56
Untreated control	23.2 ± 5.6 A	6.5 ± 2.1 A	17.5 ± 6.5 A	9549.1 ± 1921.8 A	—
F Value	16.03	4.50	3.93	14.35	—
p > F	< 0.0001	0.0093	0.0164	< 0.0001	—

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not significantly different, SNK (α=0.05).
[2]Percent reduction in total aphid days, calculated by the Ruppel method.

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004: Early treatments were applied on 26 April 2004 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 30 psi through six 8004 (LF4) nozzles mounted on a 10.0 ft boom. All other treatments were applied in the same manner on 11 May 2004. Conditions were clear with northwest 5-7 mph winds and temperature of 60°F at the time of early treatments. Conditions were clear, calm and a temperature of 68°F at the time of the late treatments. Plots were 10.0 ft by 25.0 ft and arranged in four replicates of a randomized, complete block design. Untreated control and Lorsban 4F, 0.75 plots were replicated eight times for a more accurate comparison of treatment effects on yield. Crop was breaking dormancy at the time of early treatments. Crop height at the time of late treatments was 1.5 ft.

Treatments were evaluated by taking 10, 180° sweeps per plot with a standard 15 inch diameter insect net one, two and three weeks after late treatments. Precounts were taken three days prior to late treatments by taking 100, 180° sweeps. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Precounts averaged 8 alfalfa weevil larvae per sweep. Insect counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Original means are presented in the tables. Yields were taken in the Furadan 4F, 0.50(AI)/acre and untreated control plots on 7 June 2004 with a Carter forage harvester. Yields were converted to tons per acre adjusted by subsample moisture. Treated plots were compared to the untreated control using a two-tailed t-test with assumed equal variance (α=0.05).

Alfalfa weevil and pea aphid pressure was high. All treatments had fewer alfalfa weevil larvae than the untreated control at one, two and three weeks after treatment. Only Furadan 4F, 0.50 + Dimethoate 4E, 0.25 had fewer alfalfa weevil adults than the untreated control at two weeks after treatment. Mustang Max 0.8EC, 0.02, Baythroid 2E, 0.044, early and Mustang Max 0.8EC, 0.025, early had more pea aphids than the untreated control at three weeks after treatment. No phytotoxicity was observed with any treatment. The plots treated with Lorsban 4F, 0.75 (AI)/acre yielded 0.9 tons/acre, 14.3% less than the untreated plots which yielded 1.2 tons/acre. The difference was not significant (two-tailed t-test, t=-0.80, df=14, $p(t>t_{0.05})$=0.4391). Yield reduction measured since 1995 has averaged 7.1%, with a range of -14.3% to 20.9%.

Field History

Pests:	Alfalfa weevil, *Hypera postica* (Gyllenhal) Pea aphid, *Acyrthosiphon pisum* (Harris)
Cultivar:	Unknown
Plant Stand:	Mostly uniform, weeds
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Alfalfa in 2002, 2003
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 3.6%, pH 7.7
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO, 80524 (Block 1060)

Table 1. Control of alfalfa weevil larvae, ARDEC, Fort Collins, CO, 2004.

	ALFALFA WEEVIL LARVAE PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
Mustang Max 0.8EC, 0.025, early + Furadan 4F, 0.25, regular timing	0.2 ± 0.1 C	0.2 ± 0.1 C	1.1 ± 0.6 B
Mustang Max 0.8EC, 0.025	1.0 ± 0.1 BC	0.3 ± 0.1 C	0.6 ± 0.5 B
Baythroid 2E, 0.025	1.4 ± 0.4 BC	0.3 ± 0.1 C	1.0 ± 0.8 B
Warrior 1E, 0.03	2.2 ± 0.7 BC	0.3 ± 0.3 C	0.3 ± 0.2 B
Baythroid 2E, 0.044	1.5 ± 0.2 BC	0.3 ± 0.1 C	0.6 ± 0.3 B
Warrior 1E, 0.02	1.6 ± 0.4 BC	0.5 ± 0.1 C	0.3 ± 0.1 B
Mustang Max 0.8EC, 0.02	1.5 ± 0.5 BC	0.5 ± 0.2 C	0.4 ± 0.1 B
Baythroid 2E, 0.044, early	0.8 ± 0.5 BC	0.5 ± 0.1 C	4.0 ± 3.7 B
Lorsban 4F, 0.75[2]	2.1 ± 0.6 BC	0.7 ± 0.2 C	1.4 ± 0.3 B
Mustang Max 0.8EC, 0.025, early	0.6 ± 0.1 C	1.3 ± 0.9 C	1.1 ± 0.5 B
Baythroid 2F, 0.025, early	1.2 ± 0.2 BC	1.1 ± 0.1 C	0.8 ± 0.3 B
Furadan 4F, 0.50 + Dimethoate 4E, 0.25	1.3 ± 0.3 BC	1.2 ± 0.1 C	2.0 ± 0.4 B
Furadan 4F, 0.50	1.0 ± 0.2 BC	2.4 ± 0.5 C	1.9 ± 0.4 B
Furadan 4F, 0.25	3.3 ± 1.2 B	5.9 ± 2.4 B	3.5 ± 1.3 B
Untreated control[2]	14.1 ± 1.4 A	25.6 ± 3.6 A	19.7 ± 3.4 A
F Value	27.91	36.95	13.81
p > F	< 0.0001	< 0.0001	< 0.0001

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05)
[2]Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

Table 2. Control of alfalfa weevil adults, ARDEC, Fort Collins, CO, 2004.

	ALFALFA WEEVIL ADULTS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
Furadan 4F, 0.50 + Dimethoate 4E, 0.25	0.1 ± 0.0	0.1 ± 0.1 B	0.1 ± 0.1
Baythroid 2E, 0.044	0.0 ± 0.0	0.1 ± 0.1 AB	0.1 ± 0.0
Mustang Max 0.8EC, 0.025, early + Furadan 4F, 0.25, regular timing	0.1 ± 0.1	0.1 ± 0.1 AB	0.2 ± 0.1
Mustang Max 0.8EC, 0.025, early	0.4 ± 0.2	0.2 ± 0.1 AB	0.1 ± 0.1
Mustang Max 0.8EC, 0.02	0.1 ± 0.1	0.2 ± 0.1 AB	0.1 ± 0.1
Furadan 4F, 0.25	0.1 ± 0.1	0.1 ± 0.1 AB	0.2 ± 0.1
Mustang Max 0.8EC, 0.025	0.2 ± 0.1	0.2 ± 0.1 AB	0.2 ± 0.1
Untreated control[2]	0.1 ± 0.1	0.2 ± 0.1 AB	0.1 ± 0.0
Baythroid 2E, 0.044, early	0.2 ± 0.1	0.2 ± 0.1 AB	0.2 ± 0.1
Baythroid 2E, 0.025	0.1 ± 0.1	0.3 ± 0.1 AB	0.0 ± 0.0
Furadan 4F, 0.50	0.1 ± 0.0	0.3 ± 0.1 AB	0.4 ± 0.3
Baythroid 2F, 0.025, early	0.3 ± 0.1	0.3 ± 0.1 AB	0.3 ± 0.1
Warrior 1E, 0.02	0.1 ± 0.0	0.4 ± 0.0 AB	0.2 ± 0.1
Lorsban 4F, 0.75[2]	0.0 ± 0.0	0.4 ± 0.1 AB	0.0 ± 0.0
Warrior 1E, 0.03	0.2 ± 0.1	0.5 ± 0.1 A	0.1 ± 0.1
F Value	1.51	2.48	1.10
p > F	0.1429	0.0098	0.3789

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05)
[2]Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

Table 3. Control of pea aphids, ARDEC, Fort Collins, CO, 2004.

	PEA APHIDS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
Mustang Max 0.8EC, 0.02	1.1 ± 0.1 C	10.5 ± 5.4 BC	30.0 ± 4.5 A
Warrior 1E, 0.03	1.7 ± 0.8 C	8.8 ± 3.9 BC	18.2 ± 4.2 AB
Warrior 1E, 0.02	1.6 ± 0.3 C	7.3 ± 4.0 C	20.4 ± 3.3 AB
Mustang Max 0.8EC, 0.025	1.7 ± 0.2 C	10.9 ± 3.8 BC	16.3 ± 2.6 AB
Lorsban 4F, 0.75[2]	2.0 ± 0.3 C	13.5 ± 6.7 ABC	17.3 ± 2.1 AB
Baythroid 2E, 0.044	2.6 ± 0.8 C	16.1 ± 7.0 ABC	18.6 ± 3.2 AB
Furadan 4F, 0.50 + Dimethoate 4E, 0.25	2.9 ± 0.5 C	6.7 ± 1.6 BC	13.3 ± 2.8 B
Baythroid 2E, 0.025	3.0 ± 0.7 C	15.7 ± 8.9 ABC	21.4 ± 4.3 AB
Furadan 4F, 0.25	3.4 ± 0.4 BC	10.5 ± 3.5 BC	22.0 ± 3.1 AB
Furadan 4F, 0.50	3.7 ± 0.5 BC	10.4 ± 2.9 BC	16.4 ± 2.1 AB
Mustang Max 0.8EC, 0.025, early + Furadan 4F, 0.25, regular timing	4.9 ± 0.3 ABC	15.2 ± 5.6 ABC	22.0 ± 8.3 AB
Baythroid 2E, 0.044, early	7.8 ± 1.9 AB	18.1 ± 8.6 AB	31.1 ± 6.4 A
Mustang Max 0.8EC, 0.025, early	8.6 ± 3.0 AB	23.9 ± 9.7 A	30.0 ± 4.6 A
Untreated control[2]	8.3 ± 1.1 AB	13.6 ± 3.6 ABC	11.2 ± 3.4 B
Baythroid 2F, 0.025, early	10.5 ± 3.0 A	15.4 ± 1.7 AB	23.3 ± 4.6 AB
F Value	7.64	3.30	3.69
p > F	< 0.0001	0.0010	0.0004

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05)
[2]Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2004: Planting time and seed treatments were planted on 5 May 2004. Granular insecticides were applied with modified Wintersteiger meters mounted on a two-row John Deere Maxi-Merge planter. T-band granular applications were applied with a 4-inch John Deere spreader located between the disk openers and the press wheel. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Cultivation treatments were applied on 29 June 2004. Cultivation treatments were applied with modified Wintersteiger meters and incorporated with a two-row Hawkins ditcher. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Treatments were evaluated by digging three plants per plot on 12 July 2004. The roots were washed and the damage rated on the Iowa 1-6 scale (Witkowski, J.F., D.L. Keith and Z.B. Mayo. 1982. Evaluating corn rootworm soil insecticide performance. University of Nebraska Cooperative Extension NebGuide G82-597, 2 pp.) Plot means were used for analysis of variance and mean separation by the Student-Neuman-Keuls test (α=0.05). Treatment efficiency was determined as the percentage of samples with a root rating of 3.0 or lower.

Western corn rootworm pressure was moderate. All planting time treatments had less damage than the untreated control. No cultivation treatments had less damage than the untreated control, possibly because of the late treatment timing due to weather. No phytotoxicity was observed with any treatment.

Planting time Counter 15G treatments yielded 140 bushels/acre, 7.4% more than the untreated plots which yielded 120 bushels/acre. The difference was significant (two-tailed t-test, t=2.27, df=22, $p(t>t_{0.05})$ =0.0336). Yield reduction measured between 1987-2004 have averaged 12.5%, with a range of 0% to 31%. Plots were hand harvested and did not take into account any losses due to lodging.

Field History

Pest:	Western corn rootworm, *Diabrotica virgifera virgifera* LeConte
Cultivar:	Garst 8802
Planting Date:	5 May 2004
Plant Population:	31,500
Irrigation:	furrow
Crop History:	Corn in 2001, 2002, 2003
Insecticide:	None prior to experiment
Soil Type:	Clay loam
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (northeast edge of Block 3100)

Table 1. Control of western corn rootworm with planting and seed treatments, ARDEC, Fort Collins, 2004

PRODUCT[3]	**ROOT RATING**[1]	**EFFICIENCY**[2]
Cruiser 1.25 mg AI/seed + Maxim XL	2.3 B	100
Cruiser, 1.25 mg AI/seed + A14115	2.4 B	94
Poncho, 1.25 mg AI/seed	2.5 B	83
Counter 15G, 8 oz[4]	2.6 B	81
Aztec 3.8G, 3.4 oz	2.7 B	78
Aztec 2.1G, 6.7 oz	2.8 B	78
Force 3G, 5 oz	2.9 B	72
Lorsban 15G, 8 oz	2.9 B	67
Untreated control[4]	4.6 A	11
F Value	11.46	---
p > F	< 0.0001	---

[1] Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2] Percentage of 18 plants (total in 6 replicates of a treatment) with a rating of 3.0 or less.
[3] Oz of product/1000 row ft
[4] Treatment repeated (12 replicates rather than 6) for purposes of measuring yield.

Table 2. Control of western corn rootworm with cultivation treatments, ARDEC, Fort Collins, 2004

PRODUCT[3]	**ROOT RATING**[1]	**EFFICIENCY**[2]
Force 3G, 5 oz	3.8	28
Counter 15G, 8 oz	4.0	28
Untreated control	4.0	28
Lorsban 15G, 8 oz	4.1	6
F Value	0.12	---
p > F	0.9474	---

[1] Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2] Percentage of 18 plants (total in 6 replicates of a treatment) with a rating of 3.0 or less.
[3] Oz of product/1000 row ft

CONTROL OF BANKS GRASS MITE IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF BANKS GRASS MITE IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004: Early treatments were applied on 21 July 2004 using a 2 row boom sprayer mounted on a backpack calibrated to deliver 17.8 gal/acre at 32 psi with two 8002VS drop nozzles per row. All other treatments were applied in the same manner on 5 August 2004. Conditions were clear, calm and 68°F temperature at the time of early treatments. Conditions were partly cloudy, calm and 72°F temperature at the time of late treatments. Plots were 25 ft by two rows (30 inch centers) and were arranged in four replicates of a randomized complete block design. Plots were separated from neighboring plots by a single buffer row. Plots were infested on 30 June 2004 by laying mite infested corn leaves across the corn plants on which mites were to be counted. On 7 July 2004, the experimental area was treated with Assana, 5.0 fl oz/acre to control beneficial insects and to encourage buildup of spider mite densities.

Treatments were evaluated by collecting three leaves (ear leaf, 2nd leaf above the ear, 2nd leaf below the ear) from two plants per plot one day prior and one, two and three weeks after treatment. Corn leaves were placed in Berlese funnels for 48 hours to extract mites into alcohol for counting. All extracted mites were counted including males and juveniles. Precounts made on 4 August 2004 averaged 2 $\pm$ 0 mites per leaf. Mite counts and mite days (calculated by the method of Ruppel, J. Econ. Entomol. 76: 375-377) were transformed by the square root + ½ method prior to analysis of variance and means separation by the Student-Neuman-Keul method (α=0.05). Reductions in mite days were calculated by Abbott's (1925) formula: (percent reduction = ((untreated-treated)/untreated) X 100). Original mite counts at one, two and three weeks after treatment and mite days accumulated are presented in the table.

Mite densities were low due to cool, wet growing conditions. Capture 2E + dimethoate, Agri-mek 0.15, 0.0188, Oberon 240SC + dimethoate, Oberon 240SC, 0.087 + Oberon 2SC, 0.087, Capture 2E, 0.08 and Comite II 6E + dimethoate had fewer mites than the untreated control at 1 week after treatment. No treatments had fewer mites than the untreated control at 2 and 3 weeks after treatment. Due to significance of replication, mean separation is seen at 3 weeks post treatment despite the unfavorable p-value. No treatments had fewer mite days than the untreated control. No phytotoxicity was observed with any treatment.

Field History

Pest:	Banks grass mite, *Oligonychus pratensis* (Banks)
Cultivar:	Garst 8802
Planting Date:	3 May 2004
Plant Population:	30,000
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Barley in 2003
Herbicide:	RoundUp UltraMax, 23 fl oz/acre + ammonium sulphate, 1.0% on 6 July 2004
Fertilization:	120 N, 80 P
Soil Type:	Sandy clay loam, OM 1.7%, pH 7.5
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (northwest corner of Block 1080 north)

Table 1. Control of corn spider mites with hand-applied insecticides, ARDEC, Fort Collins, CO, 2004.

	MITES PER LEAF ± SEM [1]				
PRODUCT, LB (AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**	**TOTAL MITE DAYS**	**% REDUCTION[2]**
CAPTURE 2E + DIMETHOATE 4E, 0.08 + 0.50	0.6 ± 0.1 B	1.9 ± 0.4 A	2.9 ± 1.4 AB	182.8 ± 48.0 A	76
AGRI-MEK 0.15, 0.0188 (16 OZ/A)	1.6 ± 1.0 B	2.1 ± 0.8 A	1.6 ± 0.6 B	179.1 ± 21.0 A	76
AGRI-MEK 0.15, 0.0094 (8 OZ/A)	3.5 ± 2.0 AB	1.4 ± 0.4 A	2.2 ± 0.8 AB	198.3 ± 19.8 A	74
OBERON 240SC + DIMETHOATE 4E, 0.087 (2.78 OZ/A) + 0.50	1.3 ± 0.2 B	3.5 ± 1.6 A	2.8 ± 0.7 AB	271.4 ± 96.2 A	64
OBERON 240SC, 0.129 (8.5 OZ/A) (EARLY)[3]	2.2 ± 0.8 AB	2.5 ± 0.3 A	4.2 ± 1.1 AB	282.0 ± 49.2 A	62
OBERON 240SC, 0.087 (5.7 OZ/A) (EARLY)[3] + OBERON 2SC, 0.087 (5.7 OZ/A)	1.7 ± 0.8 B	4.7 ± 2.7 A	4.2 ± 1.3 AB	374.6 ± 168.1 A	50
COMITE II 6E, 1.69 (EARLY)	2.5 ± 1.0 AB	3.8 ± 1.0 A	5.5 ± 2.0 AB	383.0 ± 74.8 A	49
CAPTURE 2E, 0.08	0.6 ± 0.2 B	5.7 ± 1.6 A	4.2 ± 1.0 AB	397.9 ± 100.1 A	47
OBERON 240SC, 0.087 (5.7 OZ/A) (EARLY)[3]	3.5 ± 1.6 AB	5.5 ± 2.2 A	3.0 ± 1.4 AB	414.5 ± 125.0 A	45
COMITE II 6E + DIMETHOATE 4E, 1.69 + 0.50 (EARLY)	3.3 ± 2.2 AB	5.0 ± 1.5 A	4.7 ± 1.2 AB	437.1 ± 135.8 A	42
OBERON 240SC, 0.129 (4.13 OZ/A)	3.3 ± 1.0 AB	5.6 ± 2.9 A	4.7 ± 1.3 AB	465.4 ± 166.4 A	38
FURADAN 4F, 1.00	3.7 ± 1.5 AB	5.8 ± 0.8 A	6.8 ± 3.0 AB	521.1 ± 121.4 A	31
FURADAN 4F + DIMETHOATE 4E, 1.00 + 0.50	3.7 ± 2.7 AB	5.6 ± 1.7 A	9.1 ± 3.6 AB	594.3 ± 156.0 A	21
OBERON 240SC, 0.087 (2.78 OZ/A)	5.2 ± 2.5 AB	7.8 ± 1.9 A	5.3 ± 2.0 AB	625.1 ± 154.6 A	17
DIMETHOATE 4E, 0.50	3.5 ± 1.0 AB	5.8 ± 1.5 A	11.6 ± 4.5 A	661.4 ± 148.2 A	12
OBERON 240SC + DIMETHOATE 4E, 0.129 (4.13 OZ/A) + 0.50	2.8 ± 0.4 AB	9.5 ± 2.3 A	6.2 ± 2.8 AB	683.4 ± 168.2 A	9
COMITE II 6E + DIMETHOATE 4E, 1.69 + 0.50	1.8 ± 0.4 B	11.4 ± 4.7 A	6.0 ± 1.4 AB	745.4 ± 265.5 A	1
UNTREATED	11.8 ± 4.4 A	6.6 ± 0.9 A	6.9 ± 2.2 AB	750.4 ± 138.0 A	---
F Value	1.99	1.96	1.80	2.40	
p > F	0.0302	0.0330	0.0552	0.0083	

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2]Percent reduction in total mite days, calculated by the Ruppel method.
[3]Early Oberon treatments over-applied. Rate listed in table is rate applied.

CONTROL OF WESTERN BEAN CUTWORM IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF WESTERN BEAN CUTWORM IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2004: Treatments were applied on 21 July 2004 using a 2 row boom sprayer mounted on a backpack calibrated to deliver 17.8 gal/acre at 32 psi with one 8002VS drop nozzle per row. Conditions were clear, calm and 68°F temperature at the time of early treatments. Plots were 25 ft by two rows (30 inch centers) and were arranged in four replicates of a randomized complete block design. Crop stage at application was tasseling. The crop had been infested at the late whorl stage with western bean cutworm larvae on 27 July 2004.

Colorado State University research trials have shown that economic injury with western bean cutworm generally occurs when 8% of plants have egg masses and the crop is 95% tasseled. With a plant population of 30,000 this infestation level should result in approximately one larva per ear.

Treatments were evaluated by counting the number of western bean cutworm larvae in the ears of 17.5 row feet per plot on 9 September 2004. Counts were subjected to analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05).

No treatments had fewer western bean cutworm than the untreated control. Cutworm numbers were low in all plots making treatment differences difficult to detect. No phytotoxicity was observed with any treatment.

Field History

Pest:	Western bean cutworm, *Richia albicosta* (Smith)
Cultivar:	Garst '8802'
Planting Date:	3 May 2004
Plant Population:	30,000
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Barley in 2003
Herbicide:	RoundUp UltraMax, 23 fl oz/acre + ammonium sulphate, 1.0% on 6 July 2004
Fertilization:	120 N, 80 P
Soil Type:	Loam, OM 1.7%, pH 7.7
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (southwest corner of Block 1080 north)

Table 1. Control of western bean cutworm in corn with hand applied insecticides, ARDEC, Fort Collins, CO, 2004.

PRODUCT, LB (AI)/ACRE	LARVAE/PLANT ± SEM[1]	% CONTROL
MUSTANG MAX 0.8EC, 0.011	0.0 ± 0.0	100
SUCCESS 2EC, 0.094 (6 OZ/A)	0.0 ± 0.0	100
SUCCESS 2EC, 0.047 (3 OZ/A)	0.0 ± 0.0	100
WARRIOR 1EC, 0.015	0.2 ± 0.1	0
UNTREATED CONTROL	0.2 ± 0.1	—
F value	2.21	—
p > F	0.1289	—

[1]SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).

CONTROL OF WESTERN BEAN CUTWORM IN CORN WITH NOVEL TRANSGENIC TRAITS, ARDEC, FORT COLLINS, CO, 2004

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CONTROL OF WESTERN BEAN CUTWORM IN CORN WITH NOVEL TRANSGENIC TRAITS, ARDEC, FORT COLLINS, CO, 2004: Seeds were planted on 20 May 2004 with a two-row John Deere Maxi-Merge planter retrofitted with Kincade cones. The seeding rate was 28,000 seeds per acre. Plots were a single row 25 ft long, and were arranged in four replicates of a randomized complete block design.

Immuno strips were used to test plants for insecticidal protein production on 17 June 2004. The corn was at the V4 growth stage. Five plants were tested per plot. The immuno strip assay showed that all tested plants were producing the appropriate insecticidal proteins.

Plants were infested on 27 July 2004 with western bean cutworm egg masses. A length of 17.5 ft in the center of each plot was infested with one egg mass per every other plant. Egg masses were enclosed in plastic insect screening and stapled to the leaf closest to the whorl. Egg masses had been collected in Grant, NE on 18 and 19 July 2004, and were refrigerated until infestation.

To maintain reproductive isolation, the tassels were removed daily from plants as they emerged, 12-19 August. Tassels were removed daily from 12 Aug to 19 Aug. Larvae observed feeding on tassels during detasseling, were removed and placed onto corn silks.

The treatment SPS1008L was sprayed with Warrior 1EC, 0.015 on 18 Aug 2004. The insecticide was delivered with a single 8004 (LF4) nozzle sprayer at 3 mph and 30 psi. The application was timed to occur when 95% of the corn had tasseled.

Treatments were evaluated on 9 Sept 2004. The percentages of larvae per plant and damaged plants were determined for each plot by counting the number of larvae and damaged ears in the 17.5 ft infestation length, and then dividing by the total number of plants in that length. Transformed averages (vy + 0.01) were used for analysis of variance and separation of means was performed by the Student-Newman-Kuels (SNK) method (α=0.05). Original means are presented in the table as the percentage of plants with larvae or damage.

Larval survival and damage were lower in this trial than other experiments conducted at the same location which had been infested in a similar manner with western bean cutworm egg masses. The plants in this trial were not as physiologically mature at time of infestation because of late planting and longer growing requirements. This may have contributed to the low larval survival. Western bean cutworm larvae move to the tassel to begin feeding after hatching and in this trial the tassels were not available for the larvae to feed on until two weeks after infestation. Only thirteen larvae were recovered from all treatments.

None of the treatment means were significantly different from one another when analyzed by the SNK method. Based on averages, the treatment SPS1007L had the highest percentage of plants with larvae. The treatments SPS1007L and SPS1005L had the highest percentages of damage. No larvae or damage were observed in the SPS1003L treatments. The larvae found feeding within the ears of treatments SPS1001L and SPS1002L appeared to be visually smaller than larvae from other treatments.

No other Lepidopteran pests were observed feeding on any plants in the trial. At various times throughout the summer, Banks grass mite (*Oligonychus pratensis* (Banks)) colonies were observed on the underside of leaves, corn leaf aphids (*Rhopalosiphum maidis* Fitch) were observed on tassels, and western corn rootworm adults (*Diabrotica virgifera virgifera* Leconte) were observed feeding on corn silks. The densities of these pests did not appear to differ among treatments. No visual differences in plant color, growth, or structure were observed among the treatments.

Field History

Planting date:	21 May 2004
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Spring barley in 2003
Herbicide:	Accent, 0.67 oz/ac and Banvel, 0.5 pt/ac on 6 July 2004
Insecticide:	none prior to experiment
Fertilization:	120 lb N, 60 lb P
Soil Type:	Clay loam
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (east edge of Block 1080 north)

Table 1. GM Events: Enhanced control of lepidopterous pest of corn with new traits, western bean cutworm, ARDEC, Fort Collins, CO, 2004

TREATMENT	PERCENTAGE OF PLANTS WITH LARVAE ± SEM	PERCENTAGE OF PLANTS WITH DAMAGE ± SEM
SPS1007L (Negative isoline)	5.2 ± 0.9	5.2 ± 0.9
SPS1005L (Bt11)	3.8 ± 1.1	5.7 ± 1.2
SPS1002L (MIR152V+3243M)	1.1 ± 1.1	2.4 ± 1.2
SPS1008L (Negative isoline/Warrior 1EC)	1.0 ± 1.0	1.0 ± 1.0
SPS1001L (MIR152V+Bt11)	0.9 ± 0.9	0.9 ± 0.9
SPS1003L (MIR152V)	0.0 ± 0.0	0.0 ± 0.0
F value	1.15	0.93
p > F	0.3707	0.4828

THE 2004 GOLDEN PLAINS PEST SURVEY PROGRAM

The Golden Plains Pest Survey Program monitors economically significant insects in the Golden Plains Area through field scouting and the use of light and pheromone traps. It is sponsored solely through donations by area growers and other members of the agriculture industry. Scouting-based integrated pest management information is provided weekly to subscribers through newsletters, news releases to 24 area newspapers, radio broadcasts (The What's Bugging You Report) on 5 local radio stations, the Farm Dayta/DTN Network and the World Wide Web. This year's Golden Plains Pest Survey Program was coordinated by Barney Filla, Soil and Crop Sciences student attending Colorado State University.

We would like to thank the following individuals for their support and dedication to making this year's pest survey a success:

2004 Light Trap Operators		2004 Pest Survey Committee	
Burlington	Dale Hansen	Alan Helm	Clay Smith
Holyoke	Gary Korte	Ken Remington	Jack Rhodes
Kirk	Gene Nelson	Pete Forster	Merlin Van Deraa
Yuma	Irrigated Research Farm	Dale Hansen	Frank Peairs
		Mike Ferrari	Ron Meyer
		Gene Kleve	Kathryn Wenger

Contributors to the 2004 Golden Plains Pest Survey Program

Akron: Birdsall Young, Jr., John Hickert

Anton: Newell Herron

Arriba: Darrel Lehrkamp of Tri-Me Spraying

Bethune: Jack Lowe, Ken Hildebrandt of Warrior Aviation

Brush: David Wagers

Burlington: Ryan Weaver, John Fortmeyer of 3JF Inc, Dale Hansen, Barry Hinkhouse, Western Fertility, Clay Smith of High Plains Ag

Cope: Ed Cecil

Eckley: Max Schafer, Merle Gardner

Flagler: Dallas Saffer of Flagler Aerial Spraying Inc

Goodland, KS: Bill Shields of UAP Pueblo

Grant, NE: Larry Appel of Appel Crop Consulting, Inc

Greeley: Tom Farris of UAP Pueblo

Haigler, NE: Jerry Olsen of Dundy Ag Service, Inc

Haxtun: Larry Anderson, Jared Anderson of Anderson Alfalfa, Quentin Biesemeier

Holyoke:	Holyoke Coop, Jeff Franklin of Bank of Colorado, Gary Korte, Raymond Korte, Lenz Farms, Tom Bennett of First Pioneer National Bank, John Schneider of Community First, Jack Rhodes
Joes:	Richard Schneider
Kearney, NE:	Rick Reinsch
Kirk:	Gene Nelson, Idler Brothers
McDonald, KS:	C. W. Antholz
Otis:	Gene Perry (Perry Brothers Seed)
Sterling:	Frank Molinaro of Ag Crop Services
Stratton:	Mike Livingston, Dan Slinger of Stratton Equity Coop
Stromsburg, NE:	Gail Stratman of FMC
Sutherland, NE:	John Flynn of J. C. Robinson Seeds
Wray:	Alan Welp, Dave Wilson of Stalk Inc, Dwight and Nancy Rockwell, Larry Gardner
Yuma:	Don and Peggy Brown, First National Bank of Yuma, Yuma Ag Service, Rodney Terrell of Bartlet Grain, Irrigation Research Foundation, Merlin Van Deraa of Terra Firma Ag

Colorado Sunflower Administrative Committee (CSAC) and Stratton Coop are major sponsors of Pest Survey Program. Generous donations by these organizations along with individual contributions allow this program to provide Integrated Pest Management information to northeastern Colorado. We are also very grateful to our light trap operators for their time and effort.

SUMMARY OF 2004 LIGHT AND SUCTION TRAP CATCHES

The following graphs compare the 2004 European corn borer and western bean cutworm moth flights with the historical average moth flight (including 2004) by geographic location. Geographic location is defined as a 10 square mile area. The number of years contributing to the historical average ranges between 5 and 15.

European Corn Borer Moth Flight

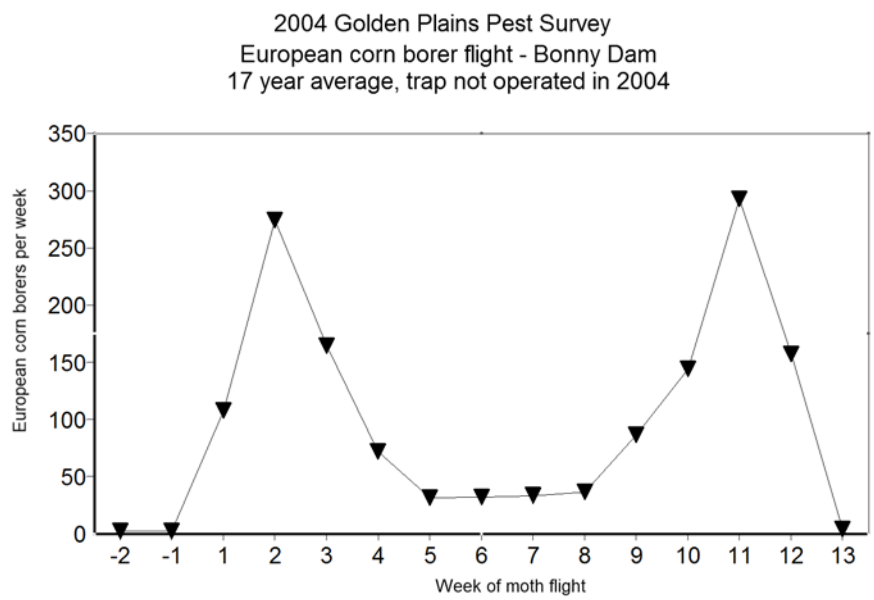
First generation European corn borer moth flight began on or before the week of 6 June and peaked the week of 13 June. All locations had lower trap captures of first generation moths compared to the historical average.

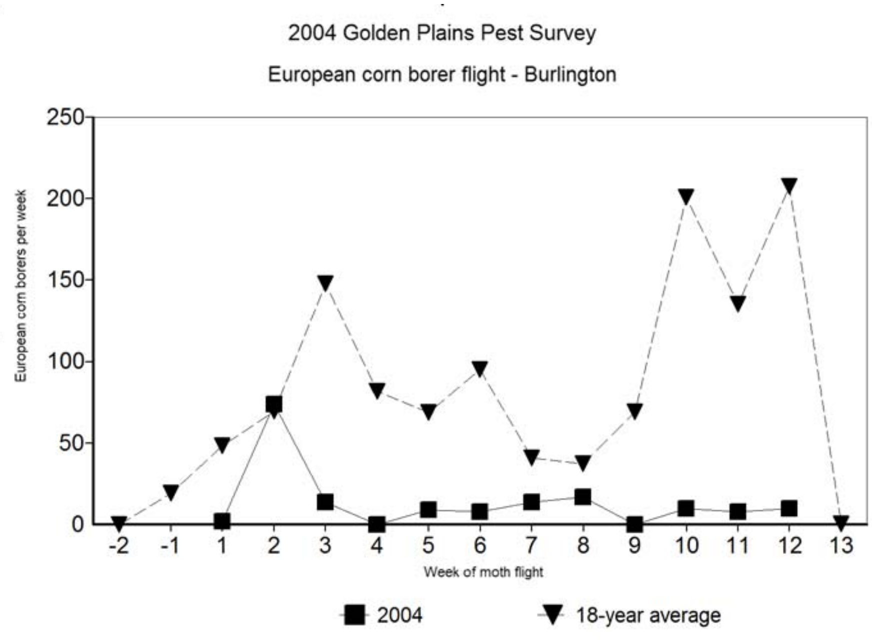
Second generation flight peaked the week of 8 August in most locations. All locations had lower trap captures of first generation moths compared to the historical average.

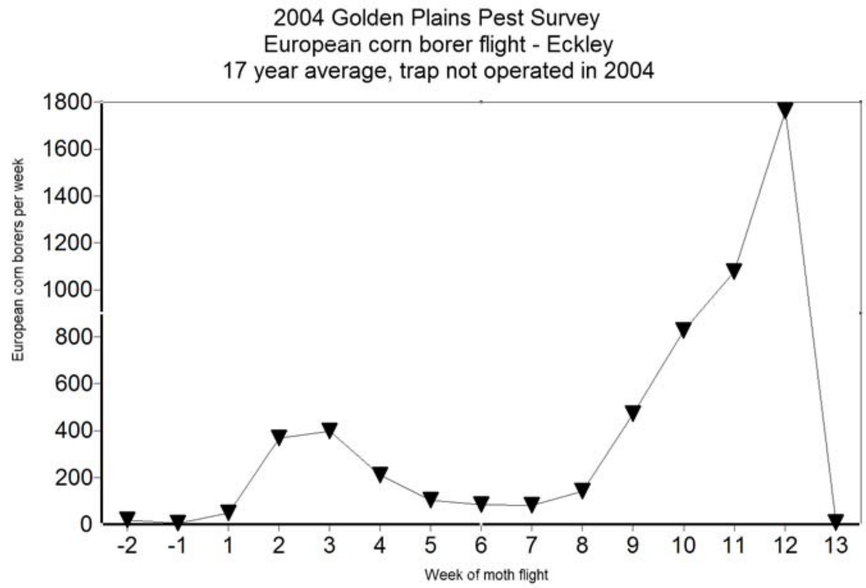
Western Bean Cutworm

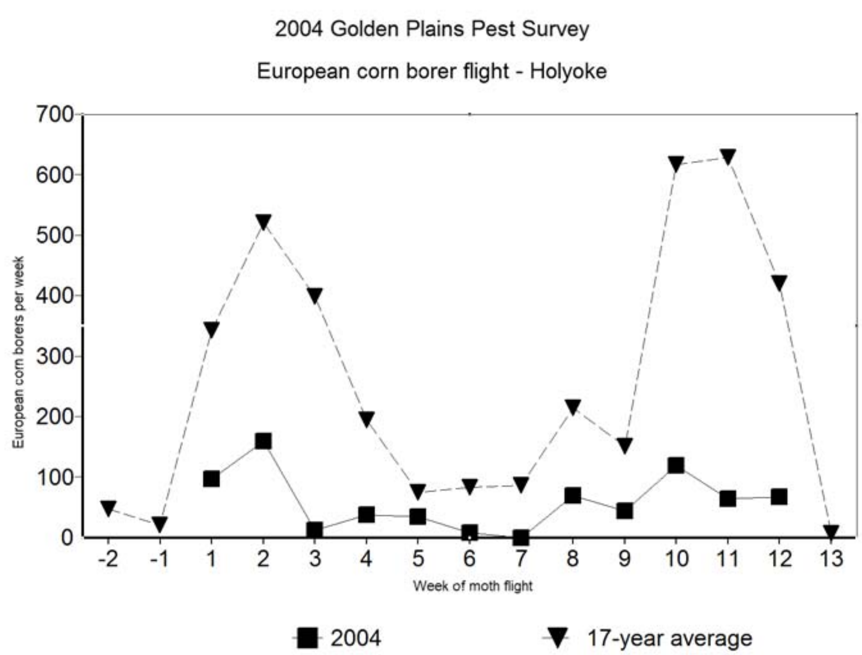
Western bean cutworm moth flight activity began the week of 27 June and peaked the week of 18 July in all locations. Holyoke and Kirk had high trap captures of western bean cutworm moths compared to the historical average.

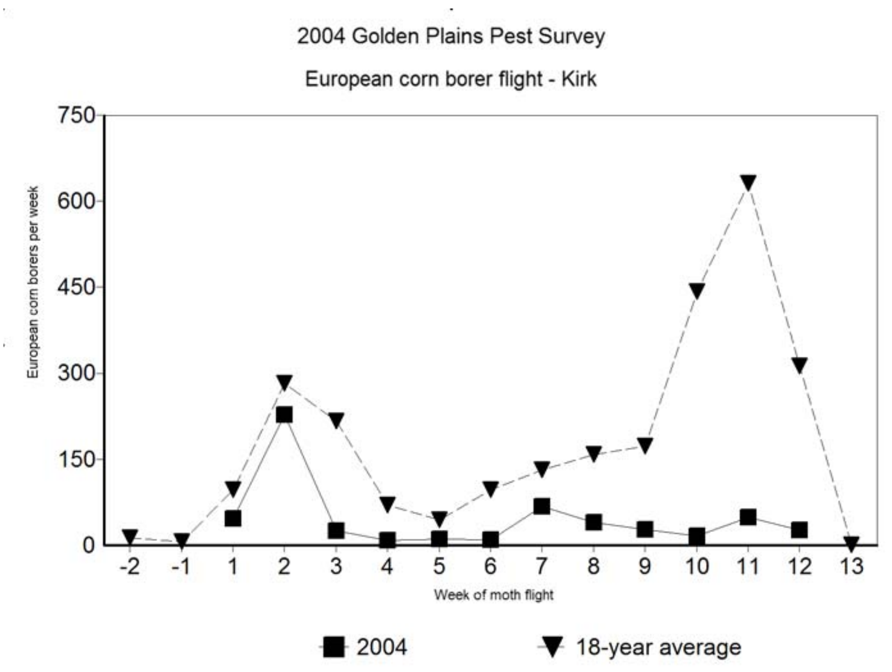
Note that the y-axis scale changes from graph to graph (number of moths caught per week).


2004 Golden Plains Pest Survey
European corn borer flight - Bonny Dam
17 year average, trap not operated in 2004
European corn borers per week
350
300
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight

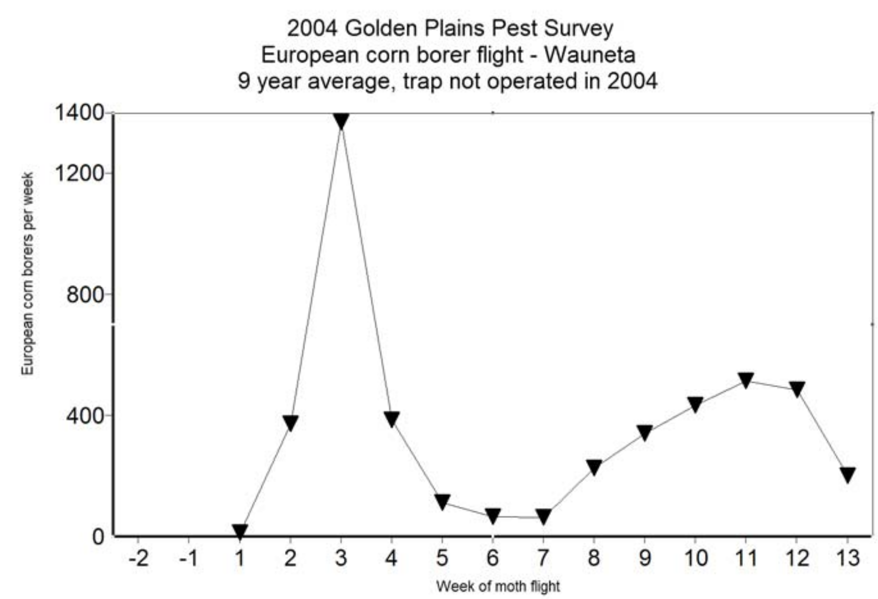

2004 Golden Plains Pest Survey
European corn borer flight - Burlington
European corn borers per week
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2004
18-year average


2004 Golden Plains Pest Survey
European corn borer flight - Eckley
17 year average, trap not operated in 2004
European corn borers per week
1800
1600
1400
1200
1000
800
600
400
200
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight

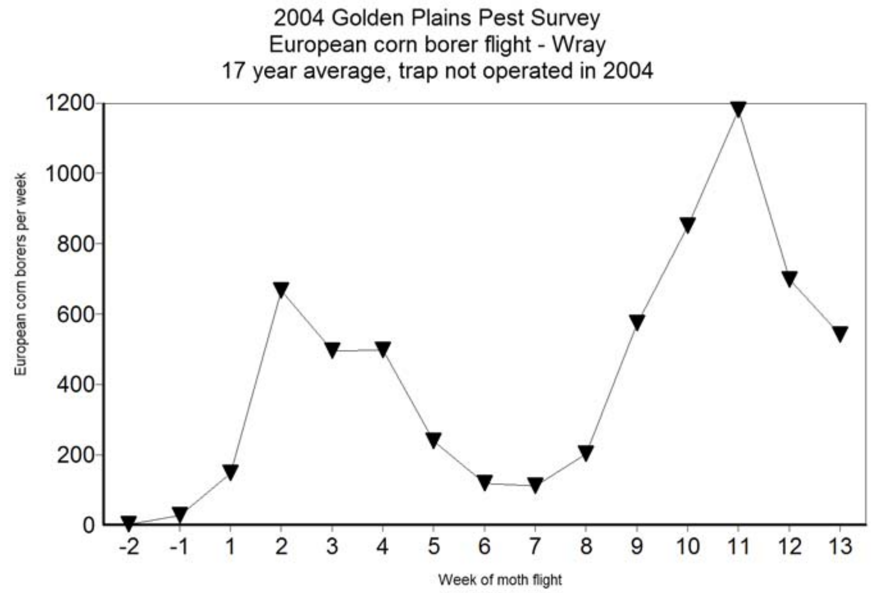

2004 Golden Plains Pest Survey
European corn borer flight - Holyoke
European corn borers per week
700
600
500
400
300
200
100
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2004
17-year average

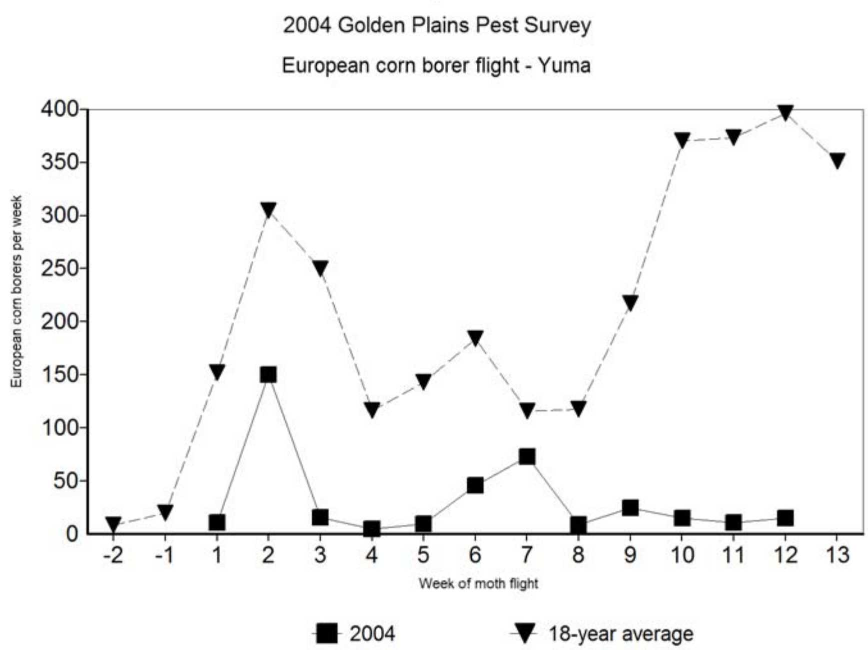


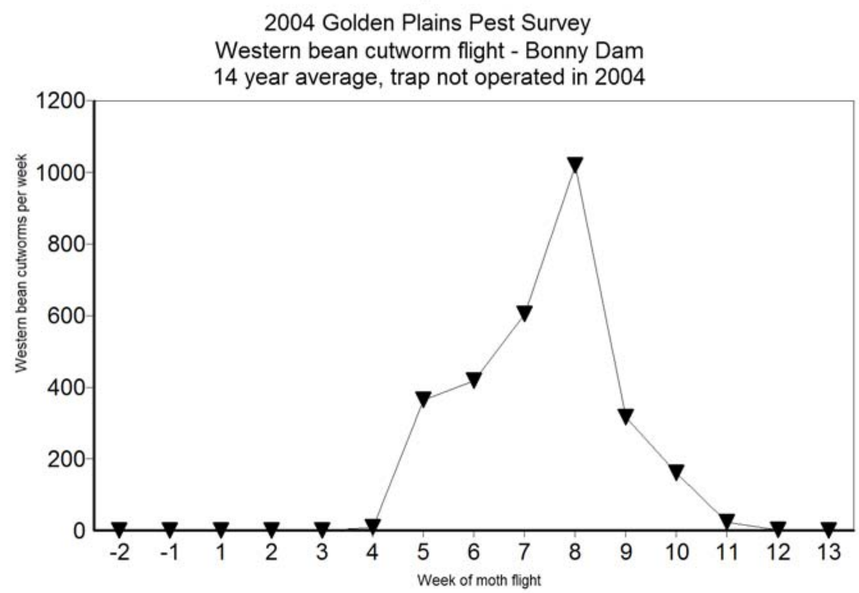
2004 Golden Plains Pest Survey
European corn borer flight - Kirk
European corn borers per week
750
600
450
300
150
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2004
18-year average



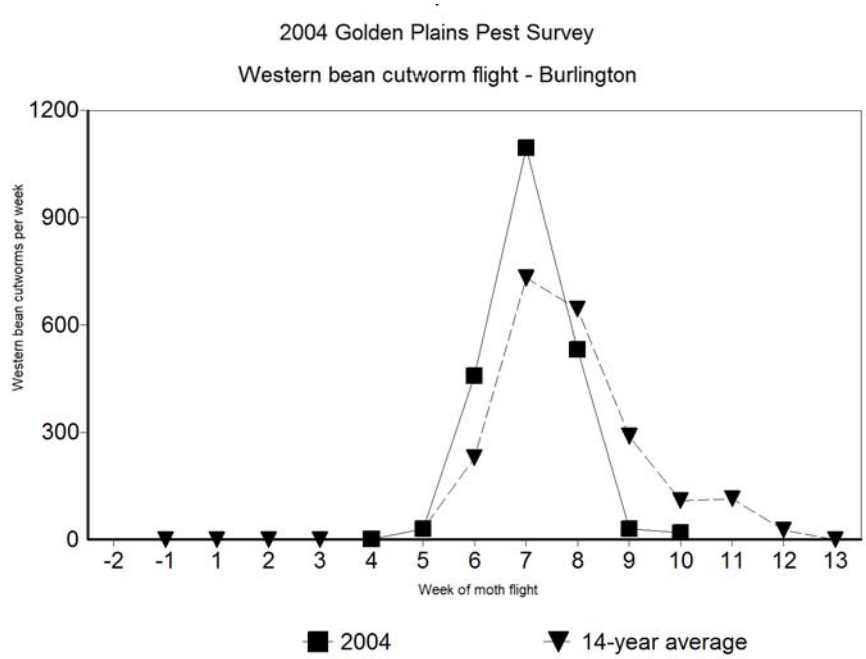
2004 Golden Plains Pest Survey
European corn borer flight - Wauneta
9 year average, trap not operated in 2004
European corn borers per week
1400
1200
800
400
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight


2004 Golden Plains Pest Survey
European corn borer flight - Wray
17 year average, trap not operated in 2004
European corn borers per week
1200
1000
800
600
400
200
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight

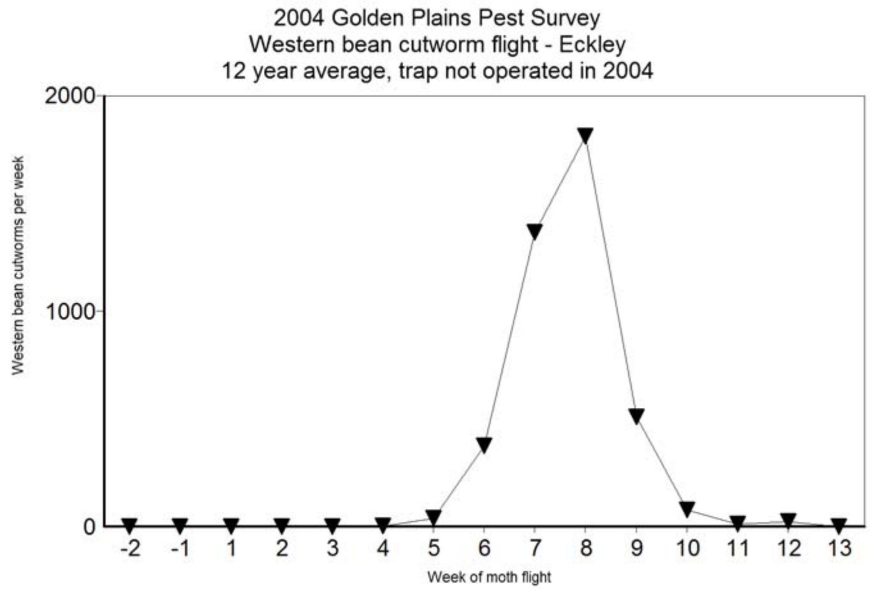

2004 Golden Plains Pest Survey
European corn borer flight - Yuma
European corn borers per week
400
350
300
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2004
18-year average

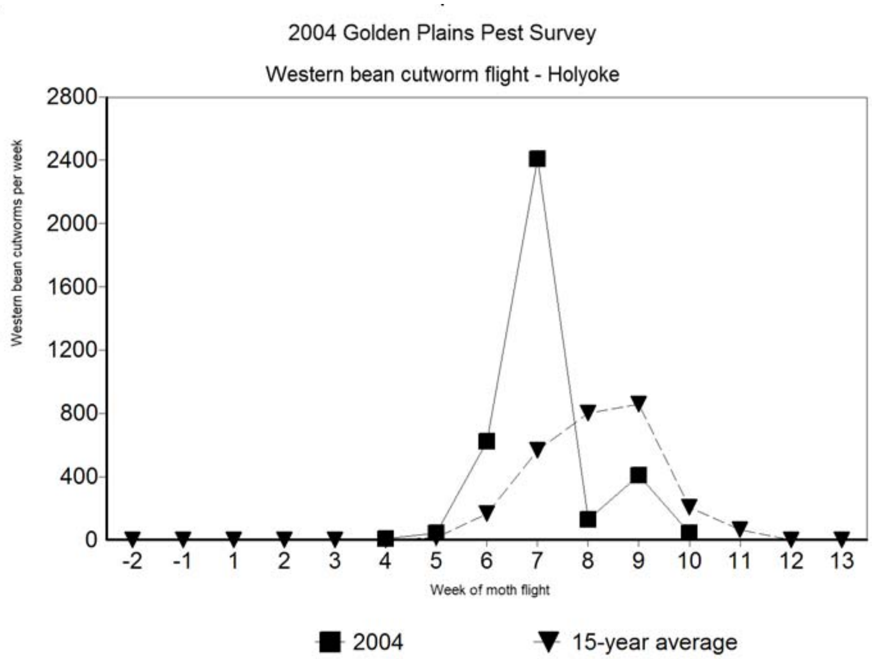


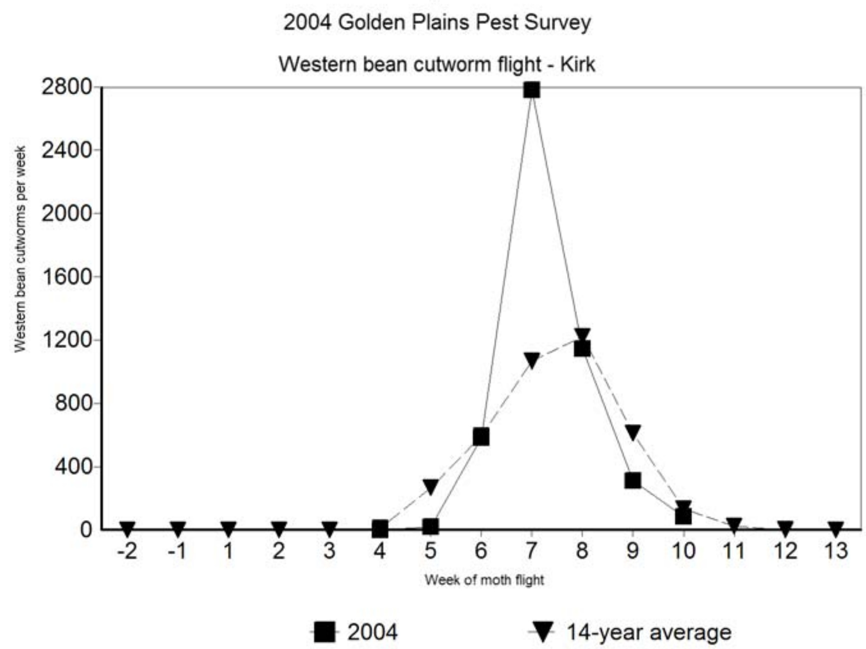
2004 Golden Plains Pest Survey
Western bean cutworm flight - Bonny Dam
14 year average, trap not operated in 2004
Western bean cutworms per week
Week of moth flight

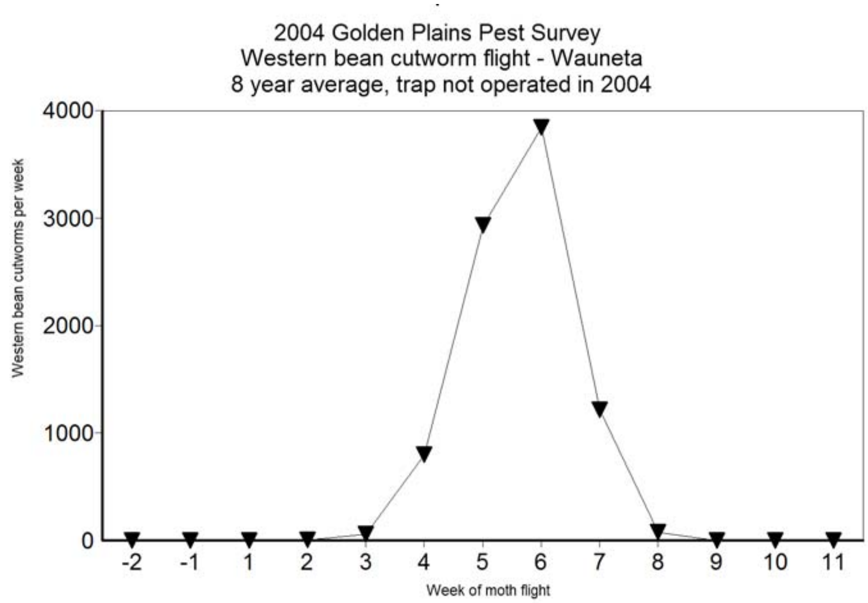


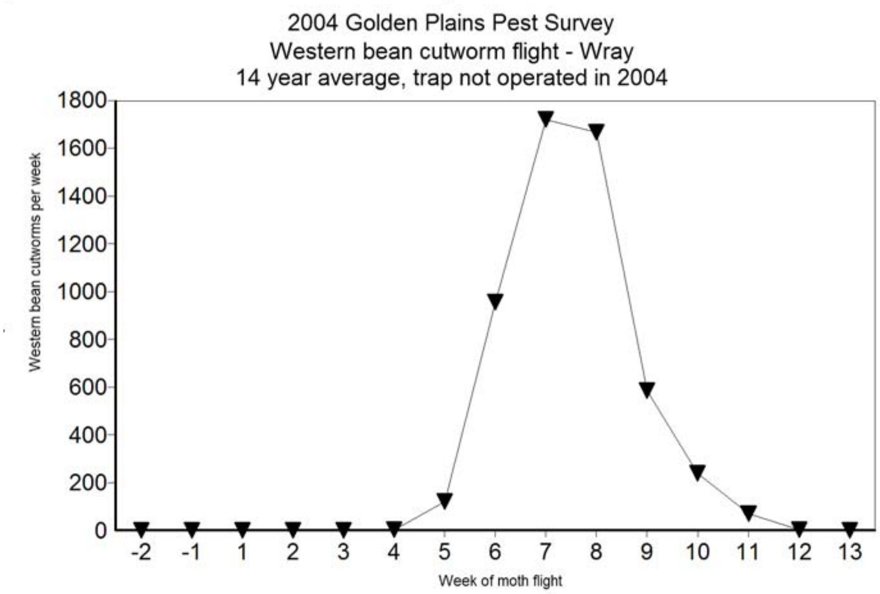
2004 Golden Plains Pest Survey
Western bean cutworm flight - Burlington
Western bean cutworms per week
Week of moth flight
2004
14-year average


2004 Golden Plains Pest Survey
Western bean cutworm flight - Eckley
12 year average, trap not operated in 2004
Western bean cutworms per week
2000
1000
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight

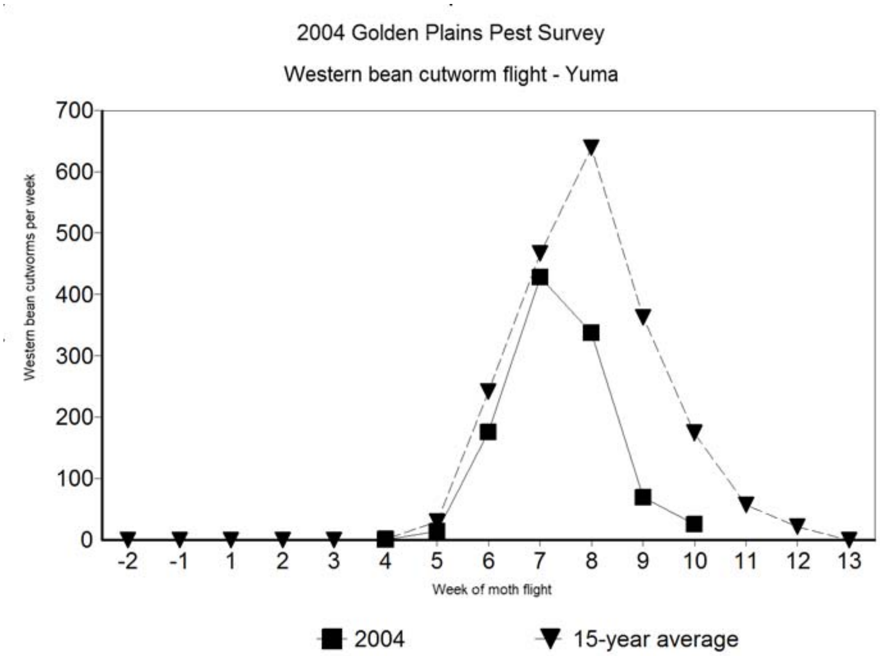

2004 Golden Plains Pest Survey
Western bean cutworm flight - Holyoke
Western bean cutworms per week
2800
2400
2000
1600
1200
800
400
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2004
15-year average


2004 Golden Plains Pest Survey
Western bean cutworm flight - Kirk
Western bean cutworms per week
2800
2400
2000
1600
1200
800
400
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2004
14-year average


2004 Golden Plains Pest Survey
Western bean cutworm flight - Wauneta
8 year average, trap not operated in 2004
Western bean cutworms per week
4000
3000
2000
1000
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11
Week of moth flight



2004 Golden Plains Pest Survey
Western bean cutworm flight - Wray
14 year average, trap not operated in 2004
Western bean cutworms per week
0
200
400
600
800
1000
1200
1400
1600
1800
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight

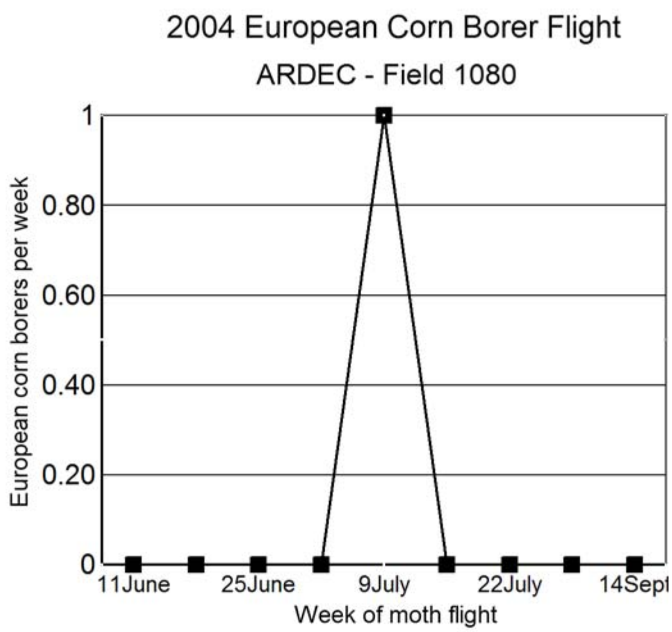


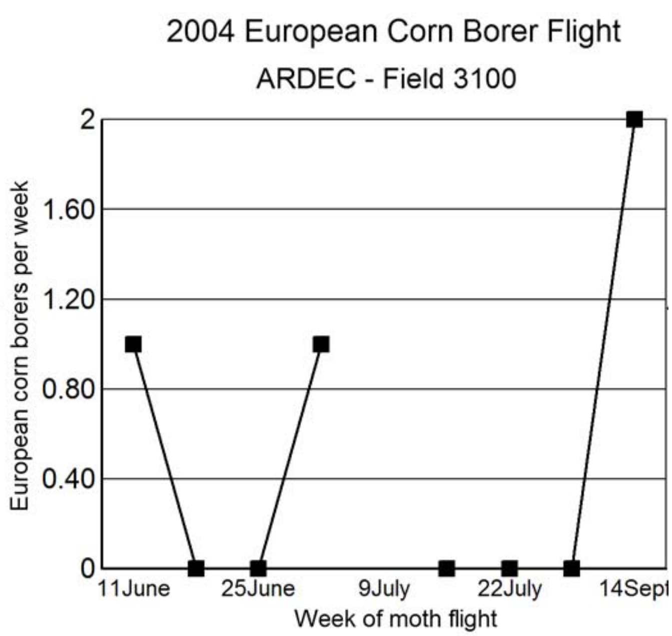
2004 Golden Plains Pest Survey
Western bean cutworm flight - Yuma
Western bean cutworms per week
0
100
200
300
400
500
600
700
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2004
15-year average

PHEROMONE TRAPS, ARDEC, 2004

Pheromone trapping was conducted at ARDEC for army cutworm, banded sunflower moth, corn earworm, European corn borer, southwestern corn borer, pale western cutworm, sunflower head moth and western bean cutworm. Traps were checked weekly throughout the growing season. Trap catches for all insects with greater than three sampling dates are displayed below. Counts were low for all insects. This year's pheromone trapping was coordinated by Jesse Stubbs.

Note that the y-axis scale changes from graph to graph (number of moths caught per week).





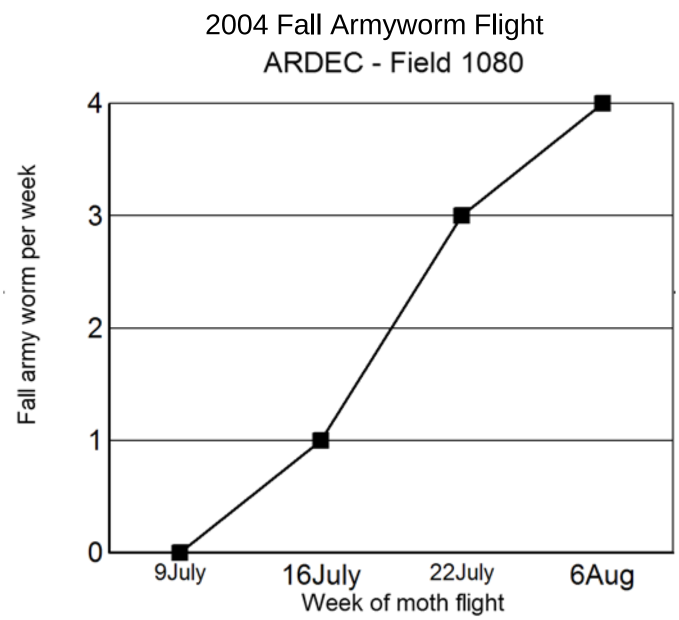

2004 Fall Armyworm Flight
ARDEC - Field 1080
Fall army worm per week
0
1
2
3
4
9July
16July
22July
6Aug
Week of moth flight

Table 1. Russian wheat aphid suction trap results at four Colorado locations, 1987-2004.

	AKRON	BRIGGSDALE[1]	LAMAR	WALSH
1987	—	1832	—	392
1988	172	92	0	4636
1989	177	102	112	5003
1990	1234	1353	1315	1275
1991	79	1679	703	883
1992	186	1685	0	789
1993	7	2	69	374
1994	496	867	84	3216
1995	73	322	700	361
1996	66	502	1	—
1997	301	216	1775	2501
1998	36	550	—[5]	31
1999	1257	573	805	257
2000	121	430	92	140
2001	0	5	40	3
2002	7	2[2]	28	16
2003	—	13[3]	9	25
2004	—	429[4]	15	22

[1]Trap moved to ARDEC (Agricultural Research, Development and Education Center, Colorado State University, Fort Collins, CO) from Briggsdale in 1990. Trap moved back to another location near Briggsdale in 1999.
[2]Trap was non-functional June-August 2002.
[3]Trap was non-functional April-May 2003.
[4] Trap was non-functional April 2004 and the weeks of 22 July and 12 August - 3 September 2004.
[5] Trap was vandalized and non-functional

INSECTICIDE PERFORMANCE SUMMARIES

Insecticide performance in a single experiment can be quite misleading. To aid in the interpretation of the tests included in this report, long term performance summaries for insecticides registered for use in Colorado are presented below. These summaries are complete through 2002.

Table 1. Performance of planting-time insecticides against western corn rootworm, 1987-2004, in northern Colorado

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
AZTEC 2.1G	2.6 (26)
COUNTER 15G	2.6 (29)
COUNTER 20CR	2.6 (40)
DYFONATE 20G	2.8 (12)
FORCE 1.5G (8 OZ) or 3G (4 OZ)	2.7 (28)
FORCE 3G (5 OZ)	3.0 (4)
FORTRESS 5G	2.8 (14)
LORSBAN 15G	3.0 (22)
REGENT 4SC, 3-5 GPA	3.0 (5)
THIMET 20G	3.4 (15)
UNTREATED CONTROL	4.1 (33)

[1]Rated on a scale of 1-6, where 1 is least damaged, and 6 is most heavily damaged. Number in parenthesis is number of times tested for average. Planting time treatments averaged over application methods.

Table 2. Performance of cultivation insecticide treatments against western corn rootworm, 1987-2004, in northern Colorado.

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
COUNTER 15G	2.8 (20)
DYFONATE 20G	3.1 (9)
FORCE 1.5G or 3G	3.2 (7)
FURADAN 4F, 2.4 OZ, BANDED OVER WHORL	3.2 (12)
FURADAN 4F, 1.0, INCORPORATED	3.3 (3)
LORSBAN 15G	3.1 (16)
THIMET 20G	2.9 (19)
UNTREATED CONTROL	4.2 (24)

[1]Rated on a scale of 1-6, where 1 is least damaged, and 6 is most heavily damaged. Number in () is number of times tested for average. Planting time treatments averaged over application methods.

Table 3. Insecticide performance against first generation European corn borer, 1982-2002, in northeast Colorado.

MATERIAL	LB/ACRE	METHOD[1]	% CONTROL[2]
DIPEL 10G	10.00	A	66 (4)
DIPEL 10G	10.00	C	84 (2)
DIPEL ES	1 QT + OIL	I	91 (4)
LORSBAN 15G	1.00 (AI)	A	77 (5)
LORSBAN 15G	1.00 (AI)	C	80 (6)
LORSBAN 4E	1.0 (AI)	I	87 (9)
POUNCE 3.2E	0.15 (AI)	I	88 (11)
POUNCE 1.5G	0.15 (AI)	C	87 (4)
POUNCE 1.5G	0.15 (AI)	A	73 (7)
THIMET 20G	1.00 (AI)	C	77 (4)
THIMET 20G	1.00 (AI)	A	73 (3)
WARRIOR 1E	0.03 (AI	I	85 (4)

[1]A = Aerial, C = Cultivator, I = Center Pivot Injection. CSU does not recommend the use of aerially-applied liquids for control of first generation European corn borer.
[2]Numbers in () indicate that percent control is the average of that many trials.

Table 4. Insecticide performance against western bean cutworm, 1982-2002, in northeast Colorado.

MATERIAL	LB (AI)/ACRE	METHOD[1]	% CONTROL[2]
AMBUSH 2E	0.05	A	99 (2)
AMBUSH 2E	0.05	I	99 (2)
CAPTURE 2E	0.08	A	98 (5)
CAPTURE 2E	0.08	I	98 (5)
LORSBAN 4E	0.75	A	88 (4)
LORSBAN 4E	0.75	I	94 (4)
POUNCE 3.2E	0.05	A	97 (7)
POUNCE 3.2E	0.05	I	99 (5)
WARRIOR 1E (T)	0.02	I	96 (2)

[1]A = Aerial, I = Center Pivot Injection
[2]Numbers in () indicated that percent control is average of that many trials.

Table 5. Insecticide performance against second generation European corn borer, 1982-2002, in northeast Colorado.

MATERIAL	LB (AI)/ACRE	METHOD[1]	% CONTROL[2]
DIPEL ES	1 QT PRODUCT	I	56 (16)
CAPTURE 2E	0.08	A	85 (8)
CAPTURE 2E	0.08	I	86 (14)
FURADAN 4F	1.00	A	62 (6)
LORSBAN 4E	1.00	A	41 (6)
LORSBAN 4E	1.00 + OIL	I	72 (14)
PENNCAP M	1.00	A	74 (7)
PENNCAP M	1.00	I	74 (8)
POUNCE 3.2E	0.15	I	74 (11)
WARRIOR 1E	0.03	A	81 (4)
WARRIOR 1E	0.03	I	78 (4)

[1]A = Aerial, I = Center Pivot Injection
[2]Numbers in () indicate how many trials are averaged.

Table 6. Performance of hand-applied insecticides against alfalfa weevil larvae, 1984-2004, in northern Colorado.

PRODUCT	LB (AI)/ACRE	% CONTROL AT 2 WK[1]
BAYTHROID 2E	0.025	97 (11)
FURADAN 4F	0.25	85 (13)
FURADAN 4F	0.50	91 (26)
FURADAN 4F+DIMETHOATE 4E	0.50 + 0.25	88 (7)
LORSBAN 4E	0.75	93 (18)
LORSBAN 4E	1.00	96 (6)
LORSBAN 4E	0.50	83 (10)
PENNCAP M	0.75	84 (11)
PERMETHRIN [2]	0.10	67 (7)
PERMETHRIN [2]	0.20	80 (4)
STEWARD	0.065	75 (4)
STEWARD	0.110	83 (4)
WARRIOR 1E or T	0.02	93 (15)
WARRIOR 1E or T	0.02 (early)	61 (4)
WARRIOR 1E or T	0.03	90 (4)

[1]Number in () indicates number of years included in average.
[2]Includes both Ambush 2E and Pounce 3.2E.

Table 7. Control of Russian wheat aphid with hand-applied insecticides in winter wheat, 1986-2004[1].

PRODUCT	LB (AI)/ACRE	TESTS WITH > 90% CONTROL	TOTAL TESTS	% TESTS
LORSBAN 4E	0.50	24	40	60
DI-SYSTON 8E	0.75	16	42	38
DIMETHOATE 4E	0.375	7	34	21
DI-SYSTON 8E	0.50	2	10	20
PENNCAP M	0.75	3	18	17
LORSBAN 4E	0.25	8	22	36
LORSBAN 4E	0.38	2	3	67
THIODAN 3E	0.50	1	4	25
WARRIOR 1E	0.03	2	12	17

[1]Includes data from several states.

Table 8. Control of spider mites in artificially-infested corn with hand-applied insecticides, ARDEC, 1993-2004.

PRODUCT	LB (AI)/ACRE	% REDUCTION IN TOTAL MITE DAYS[1]
CAPTURE 2E	0.08	58 (11)
CAPTURE 2E + DIMETHOATE 4E	0.08 + 0.50	68 (11)
CAPTURE 2E + FURADAN 4F	0.08 + 0.50	66 (4)
COMITE II	1.64	29 (9)
COMITE II	2.53	51 (4)
COMITE II + DIMETHOATE 4E	1.64 + 0.50	60 (6)
DIMETHOATE 4E	0.50	50 (11)
FURADAN 4F	1.00	43 (11)
FURADAN 4F + DIMETHOATE 4E	1.00 + 0.50	50 (6)

[1]Number in () indicates number of tests represented in average.

Table 9. Control of sunflower stem weevil with planting and cultivation treatments, USDA Central Great Plains Research Station, 1998-2002.

PRODUCT	LB (AI)/ACRE	TIMING	% CONTROL[1]
BAYTHROID 2E	0.02	CULTIVATION	57 (3)
BAYTHROID 2E	0.03	CULTIVATION	52 (3)
FURADAN 4F	0.75	CULTIVATION	61 (3)
FURADAN 4F	1.0	PLANTING	91 (3)
FURADAN 4F	1.0	CULTIVATION	83 (3)
WARRIOR 1E	0.02	CULTIVATION	63 (3)
WARRIOR 1E	0.03	CULTIVATION	1 (3)

[1]Number in () indicates number of tests represented in average.

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INDEX