2002 Colorado Field Crop Insect Management Research and Demonstration Trials

Shawn M. Walter
Frank B. Peairs
Assefa Gebre-Amlak

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CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Shawn Walter, Jeff Rudolph, Terri Randolph, Frank Peairs, Jesse Stubbs, Alicia Bosley, Lief Youngs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002: Treatments were applied on 9 May 2002 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 clear with northwest winds of 5mph and temperature 42°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 33-35). The crop had been infested with greenhouse-reared aphids on 29 March and 9 April 2002.

Treatments were evaluated by collecting 10 symptomatic tillers along the middle four rows of each plot one day prior to treatment. Post treatment counts were taken 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 30 ± 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. A test for outliers was run on the data for each week and 5 data points were removed from the analysis. 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 70 aphids/tiller in the untreated control at 3 weeks post treatment. The wheat was severely drought stressed. All treatments except F1785 50 DF, 0.071 and 0.036 had fewer aphids than the untreated control at 2 and 3 weeks after treatment. All treatments except F1785 50 DF, 0.071 and 0.036 had fewer aphid days than the untreated control over the course of the experiment. Lorsban 4E-SG, 0.25 and 0.5 treatments 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:	11 September 2001
Irrigation:	Post planting and 11 April 2002, linear with drop nozzles
Crop History:	Alfalfa in 2000
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Clay loam, OM 2.9%, pH 7.5
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (southwest corner of Block 1030)

Table 1. Control of Russian wheat aphid in winter wheat, ARDEC, Fort Collins, CO, 2002.

	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, 0.25	1.0 ± 0.4 C	0.5 ± 0.3 B	3.8 ± 1.0 B	170.9 ± 35.4 B	97
Lorsban 4E-SG, 0.5	2.0 ± 0.9 C	0.7 ± 0.4 B	4.0 ± 1.5 B	280.7 ± 67.6 B	95
Warrior T, 0.03	6.4 ± 2.2 BC	4.9 ± 4.2 B	1.5 ± 0.5 B	616.6 ± 356.8 B	90
XDE-225 60 g/l, 0.015	5.2 ± 1.3 BC	2.4 ± 0.9 B	9.2 ± 4.4 B	693.0 ± 191.5 B	88
Warrior T, 0.02	6.4 ± 2.5 BC	2.6 ± 1.2 B	14.0 ± 3.6 B	951.3 ± 225.8 B	84
Dimethoate 4E, 0.38	1.0 ± 0.4 C	8.6 ± 5.4 B	10.8 ± 5.2 B	1013.3 ± 382.2 B	83
F0570 0.8 EW, 0.025	3.3 ± 1.3 C	10.3 ± 3.1 B	8.3 ± 3.9 B	1127.0 ± 276.8 B	81
F0570 0.8 EW, 0.021	11.3 ± 3.9 ABC	7.7 ± 2.3 B	9.0 ± 4.7 B	1250.7 ± 294.3 B	79
XDE-225 60 g/l, 0.005	11.6 ± 4.0 ABC	9.9 ± 5.7 B	17.9 ± 5.5 B	1723.2 ± 529.5 B	71
F1785 50 DF, 0.071	19.7 ± 7.3 AB	37.7 ± 10.5 A	64.0 ± 23.1 A	5065.9 ± 1315.7 A	14
F1785 50 DF, 0.036	19.7 ± 5.7 AB	31.6 ± 6.4 A	76.8 ± 18.7 A	5588.3 ± 831.0 A	5
Untreated Control	22.8 ± 4.7 A	37.6 ± 5.6 A	70.0 ± 15.9 A	5879.4 ± 894.1 A	—
F Value	6.12	10.91	16.41	17.62	—
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 SPRING BARLEY WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Shawn Walter, Jeff Rudolph, Terri Randolph, Jesse Stubbs, Alicia Bosley, Lief Youngs, 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, 2002: Treatments were applied on 29 May 2002 with a 'rickshaw-type' CO_2 powered sprayer calibrated to apply 20 gal/acre at 3 mph and 30 psi through four 8004 (LF4) nozzles mounted on a 5.0 ft boom. Conditions were clear and calm and temperature was 65°F at the time of treatment. Crop stage at application date was 3 leaf (Zadoks 13). 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 22 and 29 April 2002.

Treatments were evaluated by collecting 20 symptomatic tillers along the middle four rows of each plot three days prior and 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 39 ± 9 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. Yields were taken on 31 July 2002 with a Wintersteiger plot combine. Yields were converted to bushels per acre adjusted by subsample moisture to 12% moisture. Plot yields were compared by analysis of variance and the Student-Neuman-Keul test (α=0.05).

Aphid pressure was much more severe than observed in past artificially-infested spring barley experiments, 573 aphids/tiller in the untreated control at 3 weeks after treatment. All treatments except F1785 50 DF, 0.036 had fewer aphids than the untreated control at one and two weeks after treatment. All treatments except F1785 50 DF, 0.036 had fewer aphid days than the untreated control. No treatment 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 (Table 1). Lorsban 4E-SG, 0.50 and Warrior T, 0.03 yielded more than the untreated control (Table 1). No phytotoxicity was observed with any treatment.

Field History

Pest:	Russian wheat aphid, *Diuraphis noxia* (Mordvilko)
Cultivar:	Moravian 37
Planting Date:	27 March 2002
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Corn in 2001
Herbicide:	Banvel, 0.5 pt/acre, Harmony Extra, 0.3 oz/acre on 7 June 2002
Insecticide:	None prior to experiment
Fertilization:	None
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (southwest corner of Block 1080)

Table 1. Control of Russian wheat aphid in spring barley, ARDEC, Fort Collins, CO, 2002.

PRODUCT, LB(AI)/ACRE	APHIDS PER TILLER ± SEM[1]			TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
	1 WEEK	2 WEEKS	3 WEEKS			
Lorsban 4E-SG, 0.5	2.5 ± 1.1 C	28.5 ± 16.3 D	39.6 ± 10.2 E	6938.8 ± 2159.2 D	89	13 A
Warrior T, 0.03	23.2 ± 4.3 B	75.7 ± 20.0 CD	121.8 ± 48.6 DE	20751.5 ± 4727.5 CD	69	11 AB
Warrior T, 0.01	27.8 ± 2.7 B	100.1 ± 24.8 BCD	146.1 ± 14.8 CDE	26182.3 ± 3843.5 CD	61	6 CD
XDE-225 60 g/l, 0.015	27.1 ± 4.9 B	100.3 ± 13.8 BCD	211.4 ± 65.5 BCD	30730.0 ± 3952.9 CD	54	7 BC
F0570 0.8 EW, 0.025	29.2 ± 4.7 B	113.3 ± 10.7 BC	274.5 ± 70.3 ABCD	37118.7 ± 5345.5 BCD	44	8 BC
F1785 50 DF, 0.071[4]	32.6 ± 6.1 B	80.5 ± 16.3 BCD	482.3 ± 102.3 AB	47316.5 ± 6477.3 BC	29	5 CD
F0570 0.8 EW, 0.021	47.8 ± 7.3 B	147.4 ± 32.2 BC	384.6 ± 96.0 ABC	50903.4 ± 6856.7 BC	23	4 CD
XDE-225 60 g/l, 0.005	46.8 ± 5.4 B	172.5 ± 35.7 BC	413.0 ± 143.8 ABC	56330.2 ± 12542.8 BC	15	4 CD
F1785 50 DF, 0.036[4]	90.9 ± 27.4 A	218.3 ± 23.9 AB	527.7 ± 159.1 AB	73858.8 ± 7255.8 AB	-11	1 D
Untreated Control	113.4 ± 11.5 A	344.4 ± 59.9 A	572.6 ± 119.5 A	96237.1 ± 13611.3 A	—	2 CD
F Value	20.59	8.60	8.96	10.72	—	8.55
p > F	< 0.0001	< 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 significantly different, SNK (α=0.05).
[2]Percent reduction in total aphid days, calculated by the Ruppel method.
[3]Yield presented in bushels/acre adjusted to 12% moisture.
[4]Four replications

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH COORS RESISTANT LINES, ARDEC, FORT COLLINS, CO, 2002

Shawn Walter, Jeff Rudolph, Terri Randolph, Hayley Miller, Silas Davidson, Jesse Stubbs, Alicia Bosley, Lief Youngs, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH COORS RESISTANT LINES, ARDEC, FORT COLLINS, CO, 2002: Treated and untreated liness were planted on 27 March 2002 with a 6 row test plot drill at a rate of 85 lbs of seed/acre. Plots were 6 rows (5.0 ft) by 25.0 ft and were arranged in four replicates of a spilt plot design. Due to a very large treatment effect, treated and untreated plots were analyzed separately using a randomized, complete block design. The crop had been infested at the 3 leaf stage (Zadoks 13) with greenhouse-reared aphids on 22 and 29 April 2002.

Treatments were evaluated by collecting 20 tillers at random along the middle four rows of each plot each week for four weeks. 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. A test for outliers was run on each week's data and six data points were removed from the analysis. 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. Yields were taken on 31 July 2002 with a Wintersteiger plot combine. Yields were converted to bushels per acre adjusted to 12% by subsample moisture. Plot yields were compared by analysis of variance and the Student-Neuman-Keul test (α=0.05).

Aphid pressure was as severe as observed in past artificially-infested spring barley experiments, 259 aphids per tiller in the untreated Moravian 37 at the third week's sampling. Due to the very large treatment effect, Cruiser treated lines and untreated lines were analyzed separately. All untreated resistant lines had fewer aphids than the untreated Moravian 37 at the third week's sampling (Table 1). All untreated resistant lines had fewer aphid days than the untreated Moravian 37 (Table 1). No untreated resistant line reduced total aphid days by more than 90% after 4 weeks compared to untreated Moravian 37, the level of performance observed by the more effective insecticide treatments in past spring barley experiments (Table 1). All untreated resistant lines yielded more than untreated Moravian 37 (Table 1). No Cruiser 5FS treated resistant line had fewer aphids than the treated Moravian 37 at any sampling week (Table 2). No Cruiser 5FS treated resistant line had fewer aphid days than the treated Moravian 37 (Table 2). All treated resistant lines except line 5 reduced total aphid days by more than 90% after 4 weeks compared to the untreated resistant line, the level of performance observed by the more effective treatments in past spring barley experiments (Table 2). No treated resistant line yielded more than treated Moravian 37 (Table 2). 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:	Moravian 37, experimental lines
Planting Date:	27 March 2002
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Corn in 2001
Herbicide:	Bronate, 0.5 pt/acre, Harmony Extra, 0.3 oz/acre on 7 June 2002
Insecticide:	None prior to experiment
Fertilization:	None
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (south side of Block 1080)

Table 1. Control of Russian wheat aphid in untreated Coors resistant barley, ARDEC, Fort Collins, CO, 2002.

LINE	TREATMENT	APHIDS PER TILLER ± SEM[1] 30 MAY	6 June	12 June	19 June	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
Line 3	Untreated	9.7 ± 1.3	32.5 ± 4.8	26.1 ± 7.3 BC	34.6 ± 17.6	535.8 ± 89.9 B	82	20.2 A
Line 5	Untreated	7.3 ± 2.6	29.5 ± 14.8	30.2 ± 9.1 BC	51.7 ± 29.6	594.1 ± 136.3 B	80	32.9 A
Line 2	Untreated	8.7 ± 2.8	7.6 ± 3.7	11.1 ± 2.8 C	154.0 ± 125.5	690.8 ± 455.9 B	76	22.0 A
Line 4	Untreated	9.1 ± 2.1	33.5 ± 10.1	31.8 ± 2.9 BC	81.9 ± 14.1	742.4 ± 111.4 B	75	31.9 A
Line 1	Untreated	21.1 ± 10.0	39.9 ± 13.8	78.9 ± 23.9 B	233.2 ± 84.6	1636.1 ± 711.4 B	44	19.0 A
Moravian 37	Untreated	24.8 ± 3.9	68.6 ± 32.9	258.7 ± 40.7 A	203.4 ± 92.1	2926.2 ± 395.7 A	—	2.5 B
F Value		2.27	1.47	25.12	2.38	9.99	—	11.61
p > F		0.1007	0.2574	< 0.0001	0.0887	0.0003	—	< 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 of the Cruiser treated line compared the untreated line (Table 1), calculated by the Ruppel method.
[3]Yield presented in bushels/acre adjusted to 12% moisture.

Table 2. Control of Russian wheat aphid in Cruiser treated Coors resistant barley, ARDEC, Fort Collins, CO, 2002.

		APHIDS PER TILLER ± SEM[1]						
LINE	TREATMENT	30 MAY	6 June	12 June	19 June	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
Line 4	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.0 ± 0.0	0.6 ± 0.1	0.5 ± 0.1	2.6 ± 1.3	16.2 ± 4.3	99	36.8
Line 1	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.1 ± 0.1	0.8 ± 0.4	1.4 ± 0.6	5.2 ± 1.5	27.2 ± 7.1	98	24.4
Moravian 37	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.1 ± 0.0	0.3 ± 0.2	2.9 ± 1.3	3.7 ± 0.2	28.3 ± 10.0	91	22.6
Line 3	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.1 ± 0.0	0.2 ± 0.1	2.9 ± 1.5	3.1 ± 0.5	30.9 ± 8.7	94	26.8
Line 2	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.1 ± 0.0	3.7 ± 3.2	2.3 ± 1.8	5.9 ± 2.2	59.5 ± 23.1	98	33.0
Line 5	Cruiser 5FS, 1.33 fl oz/100 lb seed	0.0 ± 0.0	8.7 ± 5.7	0.5 ± 0.2	3.7 ± 2.6	72.0 ± 46.9	88	36.0
F Value		0.50	1.57	1.07	0.61	1.60	—	2.90
p > F		0.7682	0.2356	0.4147	0.6927	0.2460	—	0.0531

[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 compared to line's untreated control (Table 1), calculated by the Ruppel method.
[3]Yield presented in bushels/acre adjusted to 12% moisture.

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY AND SPRING WHEAT WITH GAUCHO AND CRUISER SEED TREATMENTS, ARDEC, FORT COLLINS, CO, 2002

Shawn Walter, Jeff Rudolph, Terri Randolph, Jesse Stubbs, Alicia Bosley, Lief Youngs, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY AND SPRING WHEAT WITH GAUCHO AND CRUISER SEED TREATMENTS, ARDEC, FORT COLLINS, CO, 2002: Treatments were planted on 27 March 2002 with a 6 row test plot drill at a rate of 85 lbs of seed/acre. Plots were 6 rows (5.0 ft) by 25.0 ft and were arranged in four replicates of a randomized, complete block design. The crop had been infested at the 3 leaf stage (Zadoks 13) with greenhouse-reared aphids on 22 and 29 April 2002.

Treatments were evaluated by collecting 20 tillers at random along the middle four rows of each plot 4 times at 1 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. Yields were taken on 31 July 2002 with a Wintersteiger plot combine. Yields were converted to bushels per acre adjusted to 12% by subsample moisture. Plot yields were compared by analysis of variance and the Student-Neuman-Keul test (α=0.05).

Aphid pressure was as severe than observed in past artificially-infested spring barley experiments, 224 aphids per tiller in the Moravian untreated control at the third sample date. All treatments had fewer aphids than both untreated controls at the first, third and fourth sample date. All treatments had fewer aphid days than the Moravian untreated control. All treatments except Oxen, 8.3 fl oz Gaucho/100lb seed reduced total aphid days by more than 90% after the fourth sample date, the level of performance observed by the more effective treatments in past spring barley experiments. All treatments yielded more than both untreated controls (Table 1). 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:	Moravian 37 (malt barley), Oxen (spring wheat)
Planting Date:	27 March 2002
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Corn in 2001
Herbicide:	Bronate, 0.5 pt/acre, Harmony Extra, 0.3 oz/acre on 7 June 2002
Insecticide:	None prior to experiment
Fertilization:	None
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (southwest corner of Block 1080)

Table 1. Control of Russian wheat aphid in spring barley and spring wheat with Gaucho and Cruiser seed treatments, ARDEC, Fort Collins, CO, 2002

VARIETY AND TREATMENT	APHIDS PER TILLER ± SEM[1]				TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
	1st WEEK	2nd WEEK	3rd WEEK	4th WEEK			
Moravian 37, 0.75 fl oz Cruiser/100 lb seed	0.0 ± 0.0 C	1.0 ± 0.4 B	2.4 ± 1.3 C	6.4 ± 3.9 C	888.3 ± 444.2 B	99	48.7 A
Oxen, 1.33 fl oz Cruiser/100 lb seed	0.0 ± 0.0 C	1.1 ± 0.9 B	1.1 ± 0.2 C	11.3 ± 10.3 C	1074.4 ± 832.1 B	93	46.5 A
Moravian 37, 8.3 fl oz Gaucho/100 lb seed	0.1 ± 0.0 C	1.4 ± 1.1 B	2.2 ± 1.5 C	9.0 ± 8.6 C	1100.8 ± 929.0 B	98	52.7 A
Moravian 37, 1.33 fl oz Cruiser/100 lb seed	0.1 ± 0.0 C	0.5 ± 0.2 B	7.7 ± 7.2 C	1.3 ± 0.6 C	1156.5 ± 1003.4 B	98	45.5 A
Oxen, 8.3 fl oz Gaucho/100 lb seed	0.0 ± 0.0 C	2.0 ± 1.0 B	6.1 ± 3.6 C	9.9 ± 5.9 C	1742.5 ± 944.7 B	88	43.7 A
Oxen, Untreated	5.6 ± 0.9 B	32.7 ± 18.2 B	39.2 ± 11.6 B	70.8 ± 9.5 B	14693.3 ± 355.5 B	—	18.7 B
Moravian 37, Untreated	28.4 ± 5.7 A	111.8 ± 41.0 A	223.7 ± 25.4 A	351.4 ± 82.5 A	70194.3 ± 10122.8 A	—	5.7 B
F Value	67.34	12.63	42.59	29.48	38.37	—	36.26 (Moravian) 27.80 (Oxen)
p > F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	—	<0.0001(Moravian) 0.0009 (Oxen)

[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. Moravian treatments compared to Moravian untreated, Oxen treatments compared to Oxen untreated.
[3]Yield presented in bushels/acre adjusted to 12% moisture. Moravian and Oxen treatments analyzed separately.

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Silas Davidson, Shawn Walter, Jeff Rudolph, Terri Randolph, Jesse Stubbs, Alicia Bosley, Leif Youngs, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002: Early treatments were applied on 24 April 2002 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 21 May 2002. Conditions were clear with southeast 4-7 mph winds and temperature of 42°F at the time of early treatments. Conditions were partly cloudy with 0-4 mph winds and temperature of 58°F at the time of 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 Furadan 4F 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 to 2.0 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 one day prior to late treatments by taking 100, 180° sweeps per replication. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Precounts averaged 1.2 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 lb(AI)/acre and untreated control plots on 10 June 2002 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 low. The field was burned to clear debris prior to the experiment which may have contributed to the low insect numbers. All treatments had fewer alfalfa weevil larvae than the untreated control at one week after treatment. No treatments had fewer alfalfa weevil adults than the untreated control at one, two or three weeks after treatment. Warrior 1E, 0.02 and Furadan 4F, 0.05 + dimethoate 4E, 0.25 had fewer pea aphids than the untreated control at one and two weeks after treatment. No phytotoxicity was observed with any treatment. The plots treated with Furadan 4F, 0.50 lb(AI)/acre yielded 1.52 tons/acre, 1.4% more than the untreated plots which yielded 1.38 tons/acre. The difference was not significant (two-tailed t-test, t=0.96, df=14, $p(t>t_{0.05})$=0.3525). Yield reduction measured since 1995 has averaged 9.0%, with a range of 1.4% to 20.9%.

Field History

Pests:	Alfalfa weevil, *Hypera postica* (Gyllenhal)
	Pea aphid, *Acyrthosiphon pisum* (Harris)
Cultivar:	Unknown
Plant Stand:	Mostly uniform, few bare patches
Irrigation:	Flood
Crop History:	Alfalfa in 2001
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Clay, OM 1.3%, pH 8.0
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO, 80524 (Block 3700)

Table 1. Control of alfalfa weevil larvae, ARDEC, Fort Collins, CO, 2002.

	ALFALFA WEEVIL LARVAE PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
WARRIOR 1E, 0.03 (EARLY)	0.1 ± 0.1 B	0.3 ± 0.1 D	1.1 ± 0.4 B
F0570, 0.02	0.3 ± 0.1 B	0.5 ± 0.1 CD	0.5 ± 0.2 B
F0570, 0.018 (EARLY)	0.2 ± 0.2 B	0.6 ± 0.3 CD	1.8 ± 0.5 B
WARRIOR 1E, 0.02	0.0 ± 0.0 B	0.8 ± 0.3 BCD	0.6 ± 0.0 B
BAYTHROID 2E, 0.025	0.1 ± 0.1 B	0.9 ± 0.4 BCD	0.3 ± 0.1 B
F0570, 0.025	0.1 ± 0.1 B	1.0 ± 0.5 BCD	0.8 ± 0.2 B
F0570, 0.011 (EARLY)	0.1 ± 0.1 B	1.1 ± 0.4 BCD	2.0 ± 0.6 B
WARRIOR 1E, 0.02 (EARLY)	1.3 ± 1.3 B	7.4 ± 7.2 BCD	8.5 ± 8.0 B
F0570, 0.019	0.7 ± 0.5 B	5.9 ± 4.8 BCD	5.3 ± 4.2 B
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	0.1 ± 0.1 B	4.8 ± 1.6 BCD	8.1 ± 0.9 AB
LORSBAN 4E, 0.75	0.1 ± 0.1 B	4.9 ± 0.6 BCD	5.1 ± 2.3 AB
FURADAN 4F, 0.50[2]	0.3 ± 0.2 B	6.6 ± 1.5 BCD	7.4 ± 1.9 AB
FURADAN 4F, 0.25	0.6 ± 0.3 B	11.0 ± 6.5 BCD	9.4 ± 5.5 AB
STEWARD, 0.11	0.2 ± 0.1 B	11.1 ± 1.0 BC	8.1 ± 1.8 AB
STEWARD, 0.065	0.4 ± 0.2 B	12.2 ± 1.5 B	8.1 ± 1.3 AB
UNTREATED CONTROL[2]	3.6 ± 0.8 A	27.7 ± 4.1 A	17.1 ± 1.0 A
F Value	6.05	7.85	5.46
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, 2002.

	ALFALFA WEEVIL ADULTS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
STEWARD, 0.065	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
STEWARD, 0.11	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
F0570, 0.011 (EARLY)	0.2 ± 0.1	0.0 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.25	0.1 ± 0.1	0.0 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.50[2]	0.1 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
F0570, 0.018 (EARLY)	0.1 ± 0.1	0.1 ± 0.1	0.0 ± 0.0
WARRIOR 1E, 0.02	0.0 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
WARRIOR 1E, 0.03 (EARLY)	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1
UNTREATED CONTROL[2]	0.1 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
BAYTHROID 2E, 0.025	0.0 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	0.0 ± 0.0	0.1 ± 0.1	0.0 ± 0.0
WARRIOR 1E, 0.02 (EARLY)	0.1 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
F0570, 0.025	0.1 ± 0.1	0.1 ± 0.0	0.1 ± 0.0
F0570, 0.019	0.0 ± 0.0	0.1 ± 0.1	0.1 ± 0.1
F0570, 0.02	0.0 ± 0.0	0.1 ± 0.1	0.0 ± 0.0
LORSBAN 4E, 0.75	0.1 ± 0.1	0.1 ± 0.1	0.0 ± 0.0
F Value	1.23	1.26	0.94
p > F	0.2831	0.2588	0.5242

[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, 2002.

PRODUCT, LB(AI)/ACRE	PEA APHIDS PER SWEEP ± SEM[1]		
	1 WEEK	2 WEEKS	3 WEEKS
WARRIOR 1E, 0.02	0.9 ± 0.2 E	11.1 ± 2.7 E	31.1 ± 7.5 ABCD
LORSBAN 4E, 0.75	1.0 ± 0.4 E	26.1 ± 5.6 BCDE	25.0 ± 4.7 CD
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	1.4 ± 0.3 E	12.6 ± 4.1 E	24.1 ± 7.4 D
F0570, 0.025	2.0 ± 0.6 E	16.9 ± 4.8 DE	38.9 ± 5.4 ABCD
F0570, 0.02	3.9 ± 1.9 DE	14.5 ± 1.8 DE	33.0 ± 10.7 BCD
BAYTHROID 2E, 0.025	4.7 ± 1.8 CDE	26.6 ± 5.8 BCDE	59.4 ± 17.8 ABCD
F0570, 0.019	6.3 ± 3.1 CDE	22.1 ± 3.9 BCDE	54.0 ± 5.5 ABCD
WARRIOR 1E, 0.03 (EARLY)	7.0 ± 1.7 BCDE	41.5 ± 9.2 ABCDE	58.5 ± 20.4 ABCD
WARRIOR 1E, 0.02 (EARLY)	11.1 ± 3.4 ABCD	53.9 ± 18.0 ABCD	52.8 ± 11.4 ABCD
FURADAN 4F, 0.25	14.0 ± 6.9 ABCD	51.5 ± 17.7ABCD	54.4 ± 9.5 ABCD
FURADAN 4F, 0.50[2]	12.4 ± 1.2 ABC	45.1 ± 8.3 ABCDE	49.9 ± 5.1 ABCD
F0570, 0.018 (EARLY)	17.5 ± 5.1 AB	76.0 ± 14.7 A	70.2 ± 17.9 AB
F0570, 0.011 (EARLY)	18.2 ± 1.8 A	69.8 ± 13.5 AB	73.5 ± 17.3 A
STEWARD, 0.11	18.6 ± 2.6 A	63.6 ± 16.1 ABC	65.6 ± 21.2 ABC
STEWARD, 0.065	19.4 ± 3.5 A	75.8 ± 17.3 A	73.6 ± 16.8 A
UNTREATED CONTROL[2]	23.1 ± 2.8 A	71.1 ± 12.6 AB	57.6 ± 8.4 ABCD
F Value	13.21	7.01	3.61
p > F	< 0.0001	< 0.0001	0.0003

[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, 2002

Hayley Miller, Shawn Walter, Jeff Rudolph, Terri Randolph, Laurie Kerzicnik, Jesse Stubbs, Alicia Bosley, Silas Davidson, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2002: Planting time and seed treatments were planted on 14 May 2002. Granular insecticides were applied with modified Wintersteiger meters mounted on a two-row John Deere Maxi-Merge planter. In-furrow granular applications were applied by directing a drop tube into the seed furrow. T-band granular applications were applied with a 4-inch John Deere spreader located between the disk openers and the press wheel. Liquid insecticides were applied with a CO_2 powered applicator mounted on the planter. T-band liquid applications were applied with a 80° nozzle 650067 calibrated to apply 3.3 gpa held 2 inches above the seed slot 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 18 June 2002. All cultivation treatments were applied with 6 inch Gandy spreaders held 2 inches above the plant, incorporated with a Hawkins ditcher. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Treatments were evaluated by digging three consecutive plants per plot on 10 July 2002. 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. No planting time treatments had less damage than the untreated control. All cultivation and seed treatments had less damage than the untreated control. No phytotoxicity was observed with any treatment.

Planting time Counter 20CR treatments yielded 130 bushels/acre, 0.5% more than the untreated plots which yielded 129 bushels/acre but the difference was not significant (two-tailed t-test, t=-0.10, df=22, $p(t>t_{0.05})$ =0.9175). Yield reduction measured between 1987-2002 have averaged 14%, 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:	Pioneer '37H26'
Planting Date:	14 May 2002
Irrigation:	furrow
Crop History:	Corn in 2001
Herbicide:	Celebrity Plus, 4.7 oz/acre, Solis, 1.6 oz/acre on 11 June 2002
Insecticide:	None prior to experiment
Fertilization:	150 N, 50 P
Soil Type:	Clay loam
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (north edge of Block 3100)

Table 1. Control of western corn rootworm with planting treatments, ARDEC, Fort Collins, 2002

PRODUCT	RATE	VOLUME	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
COUNTER 20CR[3]	6 oz	—	Banded	2.8 A	83
AZTEC 2.1G	6.7 oz	—	Banded	2.8 A	94
COUNTER 15G	8 oz	—	Banded	2.8 A	89
FORCE 3G	4 oz	—	Banded	2.8 A	83
FORCE 3G	5 oz	—	Banded	2.9 A	89
LORSBAN 15G	8 oz	—	Banded	3.0 A	78
CAPTURE 2E	0.30 fl oz	3-5gal/ac	Banded	3.3 A	56
UNTREATED CONTROL[3]	—	—	—	3.6 A	58
F Value				3.03	—
p > F				0.0103	—

[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]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, 2002

PRODUCT	RATE	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
COUNTER 15G	8 oz	Banded	2.4 B	100
THIMET 20G	6 oz	Banded	2.5 B	100
COUNTER 20CR	6 oz	Banded	2.8 B	78
LORSBAN 15G	8 oz	Banded	3.0 B	72
UNTREATED CONTROL	—	—	4.3 A	28
F Value			14.13	—
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.

Table 3. Control of western corn rootworm with seed treatments, ARDEC, Fort Collins, 2002

PRODUCT	RATE	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
PONCHO	1.25 mg AI/kernel	—	2.3 C	100
AZTEC	6.7 oz	Banded	2.6 BC	89
FORCE 3G	5 oz	Banded	2.9 BC	89
COUNTER 20CR	6 oz	Banded	3.2 B	72
UNTREATED CONTROL	—	—	3.8 A	39
F Value			9.22	—
p > F			0.0002	—

[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.

CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Laurie Kerzicnik, Shawn Walter, Terri Randolph, Jeff Rudolph, Silas Davidson, Jesse Stubbs, Alicia Bosley, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002: The early treatments were applied on 16 July 2002 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. Conditions were clear and calm with an air temperature of 72°F. No other treatments were applied due to a reduction in mite populations to undetectable levels. 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. Crop was 2.5 ft at the time of application.

Treatments were evaluated by collecting three leaves (ear leaf, 2^{nd} leaf above the ear, 2^{nd} 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. Precounts made on 15 July 2002 averaged 2.3 ± 0.5 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 the precounts and mite days accumulated are presented in the table.

Mite densities were high early in the season and then dropped to undetectable levels. Because of mite population levels no late treatments were applied. No early treatments had fewer mites than the untreated control at 1, 2 and 3 weeks after treatment. Both Onager treatments had fewer mite days than the untreated control. Mite densities in all treatments were below economic thresholds. No phytotoxicity was observed with any treatment.

Field History

Pest:	Banks grass mite, *Oligonychus pratensis* (Banks)
Cultivar:	Pioneer ‘37H26'
Planting Date:	7 May 2002
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Fallow in 2001
Herbicide:	Banvel, 0.5 pt/acre + Accent 2/3 oz/acre + NIS + ammonium sulfate on 7 June 2002
Insecticide:	none prior to experiment
Fertilization:	175 N, 50 P
Soil Type:	Clay, OM 1.5%, pH 7.9
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (north side of Block 1080)

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Silas Davidson, Shawn Walter, Jeff Rudolph, Terri Randolph, Jesse Stubbs, Alicia Bosley, Leif Youngs, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002: Early treatments were applied on 24 April 2002 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 21 May 2002. Conditions were clear with southeast 4-7 mph winds and temperature of 42°F at the time of early treatments. Conditions were partly cloudy with 0-4 mph winds and temperature of 58°F at the time of 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 Furadan 4F 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 to 2.0 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 one day prior to late treatments by taking 100, 180° sweeps per replication. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Precounts averaged 1.2 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 lb(AI)/acre and untreated control plots on 10 June 2002 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 low. The field was burned to clear debris prior to the experiment which may have contributed to the low insect numbers. All treatments had fewer alfalfa weevil larvae than the untreated control at one week after treatment. No treatments had fewer alfalfa weevil adults than the untreated control at one, two or three weeks after treatment. Warrior 1E, 0.02 and Furadan 4F, 0.05 + dimethoate 4E, 0.25 had fewer pea aphids than the untreated control at one and two weeks after treatment. No phytotoxicity was observed with any treatment. The plots treated with Furadan 4F, 0.50 lb(AI)/acre yielded 1.52 tons/acre, 1.4% more than the untreated plots which yielded 1.38 tons/acre. The difference was not significant (two-tailed t-test, t=0.96, df=14, $p(t>t_{0.05})$=0.3525). Yield reduction measured since 1995 has averaged 9.0%, with a range of 1.4% to 20.9%.

Field History

Pests:	Alfalfa weevil, *Hypera postica* (Gyllenhal) Pea aphid, *Acyrthosiphon pisum* (Harris)
Cultivar:	Unknown
Plant Stand:	Mostly uniform, few bare patches
Irrigation:	Flood
Crop History:	Alfalfa in 2001
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Clay, OM 1.3%, pH 8.0
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO, 80524 (Block 3700)

Table 1. Control of alfalfa weevil larvae, ARDEC, Fort Collins, CO, 2002.

PRODUCT, LB(AI)/ACRE	ALFALFA WEEVIL LARVAE PER SWEEP ± SEM[1]		
	1 WEEK	2 WEEKS	3 WEEKS
WARRIOR 1E, 0.03 (EARLY)	0.1 ± 0.1 B	0.3 ± 0.1 D	1.1 ± 0.4 B
F0570, 0.02	0.3 ± 0.1 B	0.5 ± 0.1 CD	0.5 ± 0.2 B
F0570, 0.018 (EARLY)	0.2 ± 0.2 B	0.6 ± 0.3 CD	1.8 ± 0.5 B
WARRIOR 1E, 0.02	0.0 ± 0.0 B	0.8 ± 0.3 BCD	0.6 ± 0.0 B
BAYTHROID 2E, 0.025	0.1 ± 0.1 B	0.9 ± 0.4 BCD	0.3 ± 0.1 B
F0570, 0.025	0.1 ± 0.1 B	1.0 ± 0.5 BCD	0.8 ± 0.2 B
F0570, 0.011 (EARLY)	0.1 ± 0.1 B	1.1 ± 0.4 BCD	2.0 ± 0.6 B
WARRIOR 1E, 0.02 (EARLY)	1.3 ± 1.3 B	7.4 ± 7.2 BCD	8.5 ± 8.0 B
F0570, 0.019	0.7 ± 0.5 B	5.9 ± 4.8 BCD	5.3 ± 4.2 B
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	0.1 ± 0.1 B	4.8 ± 1.6 BCD	8.1 ± 0.9 AB
LORSBAN 4E, 0.75	0.1 ± 0.1 B	4.9 ± 0.6 BCD	5.1 ± 2.3 AB
FURADAN 4F, 0.50[2]	0.3 ± 0.2 B	6.6 ± 1.5 BCD	7.4 ± 1.9 AB
FURADAN 4F, 0.25	0.6 ± 0.3 B	11.0 ± 6.5 BCD	9.4 ± 5.5 AB
STEWARD, 0.11	0.2 ± 0.1 B	11.1 ± 1.0 BC	8.1 ± 1.8 AB
STEWARD, 0.065	0.4 ± 0.2 B	12.2 ± 1.5 B	8.1 ± 1.3 AB
UNTREATED CONTROL[2]	3.6 ± 0.8 A	27.7 ± 4.1 A	17.1 ± 1.0 A
F Value	6.05	7.85	5.46
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, 2002.

	ALFALFA WEEVIL ADULTS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
STEWARD, 0.065	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
STEWARD, 0.11	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
F0570, 0.011 (EARLY)	0.2 ± 0.1	0.0 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.25	0.1 ± 0.1	0.0 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.50[2]	0.1 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
F0570, 0.018 (EARLY)	0.1 ± 0.1	0.1 ± 0.1	0.0 ± 0.0
WARRIOR 1E, 0.02	0.0 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
WARRIOR 1E, 0.03 (EARLY)	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1
UNTREATED CONTROL[2]	0.1 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
BAYTHROID 2E, 0.025	0.0 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	0.0 ± 0.0	0.1 ± 0.1	0.0 ± 0.0
WARRIOR 1E, 0.02 (EARLY)	0.1 ± 0.0	0.1 ± 0.0	0.0 ± 0.0
F0570, 0.025	0.1 ± 0.1	0.1 ± 0.0	0.1 ± 0.0
F0570, 0.019	0.0 ± 0.0	0.1 ± 0.1	0.1 ± 0.1
F0570, 0.02	0.0 ± 0.0	0.1 ± 0.1	0.0 ± 0.0
LORSBAN 4E, 0.75	0.1 ± 0.1	0.1 ± 0.1	0.0 ± 0.0
F Value	1.23	1.26	0.94
p > F	0.2831	0.2588	0.5242

[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, 2002.

	PEA APHIDS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
WARRIOR 1E, 0.02	0.9 ± 0.2 E	11.1 ± 2.7 E	31.1 ± 7.5 ABCD
LORSBAN 4E, 0.75	1.0 ± 0.4 E	26.1 ± 5.6 BCDE	25.0 ± 4.7 CD
FURADAN 4F, 0.50 + DIMETHOATE 4E, 0.25	1.4 ± 0.3 E	12.6 ± 4.1 E	24.1 ± 7.4 D
F0570, 0.025	2.0 ± 0.6 E	16.9 ± 4.8 DE	38.9 ± 5.4 ABCD
F0570, 0.02	3.9 ± 1.9 DE	14.5 ± 1.8 DE	33.0 ± 10.7 BCD
BAYTHROID 2E, 0.025	4.7 ± 1.8 CDE	26.6 ± 5.8 BCDE	59.4 ± 17.8 ABCD
F0570, 0.019	6.3 ± 3.1 CDE	22.1 ± 3.9 BCDE	54.0 ± 5.5 ABCD
WARRIOR 1E, 0.03 (EARLY)	7.0 ± 1.7 BCDE	41.5 ± 9.2 ABCDE	58.5 ± 20.4 ABCD
WARRIOR 1E, 0.02 (EARLY)	11.1 ± 3.4 ABCD	53.9 ± 18.0 ABCD	52.8 ± 11.4 ABCD
FURADAN 4F, 0.25	14.0 ± 6.9 ABCD	51.5 ± 17.7ABCD	54.4 ± 9.5 ABCD
FURADAN 4F, 0.50[2]	12.4 ± 1.2 ABC	45.1 ± 8.3 ABCDE	49.9 ± 5.1 ABCD
F0570, 0.018 (EARLY)	17.5 ± 5.1 AB	76.0 ± 14.7 A	70.2 ± 17.9 AB
F0570, 0.011 (EARLY)	18.2 ± 1.8 A	69.8 ± 13.5 AB	73.5 ± 17.3 A
STEWARD, 0.11	18.6 ± 2.6 A	63.6 ± 16.1 ABC	65.6 ± 21.2 ABC
STEWARD, 0.065	19.4 ± 3.5 A	75.8 ± 17.3 A	73.6 ± 16.8 A
UNTREATED CONTROL[2]	23.1 ± 2.8 A	71.1 ± 12.6 AB	57.6 ± 8.4 ABCD
F Value	13.21	7.01	3.61
p > F	< 0.0001	< 0.0001	0.0003

[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, 2002

Hayley Miller, Shawn Walter, Jeff Rudolph, Terri Randolph, Laurie Kerzicnik, Jesse Stubbs, Alicia Bosley, Silas Davidson, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2002: Planting time and seed treatments were planted on 14 May 2002. Granular insecticides were applied with modified Wintersteiger meters mounted on a two-row John Deere Maxi-Merge planter. In-furrow granular applications were applied by directing a drop tube into the seed furrow. T-band granular applications were applied with a 4-inch John Deere spreader located between the disk openers and the press wheel. Liquid insecticides were applied with a CO_2 powered applicator mounted on the planter. T-band liquid applications were applied with a 80° nozzle 650067 calibrated to apply 3.3 gpa held 2 inches above the seed slot 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 18 June 2002. All cultivation treatments were applied with 6 inch Gandy spreaders held 2 inches above the plant, incorporated with a Hawkins ditcher. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Treatments were evaluated by digging three consecutive plants per plot on 10 July 2002. 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. No planting time treatments had less damage than the untreated control. All cultivation and seed treatments had less damage than the untreated control. No phytotoxicity was observed with any treatment.

Planting time Counter 20CR treatments yielded 130 bushels/acre, 0.5% more than the untreated plots which yielded 129 bushels/acre but the difference was not significant (two-tailed t-test, t=-0.10, df=22, $p(t>t_{0.05})$ =0.9175). Yield reduction measured between 1987-2002 have averaged 14%, 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:	Pioneer ‘37H26'
Planting Date:	14 May 2002
Irrigation:	furrow
Crop History:	Corn in 2001
Herbicide:	Celebrity Plus, 4.7 oz/acre, Solis, 1.6 oz/acre on 11 June 2002
Insecticide:	None prior to experiment
Fertilization:	150 N, 50 P
Soil Type:	Clay loam
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (north edge of Block 3100)

Table 1. Control of western corn rootworm with planting treatments, ARDEC, Fort Collins, 2002

PRODUCT	RATE	VOLUME	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
COUNTER 20CR[3]	6 oz	—	Banded	2.8 A	83
AZTEC 2.1G	6.7 oz	—	Banded	2.8 A	94
COUNTER 15G	8 oz	—	Banded	2.8 A	89
FORCE 3G	4 oz	—	Banded	2.8 A	83
FORCE 3G	5 oz	—	Banded	2.9 A	89
LORSBAN 15G	8 oz	—	Banded	3.0 A	78
CAPTURE 2E	0.30 fl oz	3-5gal/ac	Banded	3.3 A	56
UNTREATED CONTROL[3]	—	—	—	3.6 A	58
F Value				3.03	—
p > F				0.0103	—

[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]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, 2002

PRODUCT	RATE	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
COUNTER 15G	8 oz	Banded	2.4 B	100
THIMET 20G	6 oz	Banded	2.5 B	100
COUNTER 20CR	6 oz	Banded	2.8 B	78
LORSBAN 15G	8 oz	Banded	3.0 B	72
UNTREATED CONTROL	—	—	4.3 A	28
F Value			14.13	—
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.

Table 3. Control of western corn rootworm with seed treatments, ARDEC, Fort Collins, 2002

PRODUCT	RATE	PLACEMENT	ROOT RATING[1]	EFFICIENCY[2]
PONCHO	1.25 mg AI/kernel	—	2.3 C	100
AZTEC	6.7 oz	Banded	2.6 BC	89
FORCE 3G	5 oz	Banded	2.9 BC	89
COUNTER 20CR	6 oz	Banded	3.2 B	72
UNTREATED CONTROL	—	—	3.8 A	39
F Value			9.22	—
p > F			0.0002	—

[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.

CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002

Laurie Kerzicnik, Shawn Walter, Terri Randolph, Jeff Rudolph, Silas Davidson, Jesse Stubbs, Alicia Bosley, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2002: The early treatments were applied on 16 July 2002 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. Conditions were clear and calm with an air temperature of 72°F. No other treatments were applied due to a reduction in mite populations to undetectable levels. 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. Crop was 2.5 ft at the time of application.

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. Precounts made on 15 July 2002 averaged 2.3 ± 0.5 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 the precounts and mite days accumulated are presented in the table.

Mite densities were high early in the season and then dropped to undetectable levels. Because of mite population levels no late treatments were applied. No early treatments had fewer mites than the untreated control at 1, 2 and 3 weeks after treatment. Both Onager treatments had fewer mite days than the untreated control. Mite densities in all treatments were below economic thresholds. No phytotoxicity was observed with any treatment.

Field History

Pest:	Banks grass mite, *Oligonychus pratensis* (Banks)
Cultivar:	Pioneer '37H26'
Planting Date:	7 May 2002
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Fallow in 2001
Herbicide:	Banvel, 0.5 pt/acre + Accent 2/3 oz/acre + NIS + ammonium sulfate on 7 June 2002
Insecticide:	none prior to experiment
Fertilization:	175 N, 50 P
Soil Type:	Clay, OM 1.5%, pH 7.9
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (north side of Block 1080)

Table 1. Control of corn spider mites with hand-applied insecticides, ARDEC, Fort Collins, CO, 2002.

	MITES PER LEAF ± SEM[1]					
PRODUCT, LB (AI)/ACRE	1 WEEK	2 WEEKS	3 WEEKS	4 WEEKS	TOTAL MITE DAYS	% REDUCTION[2]
ONAGER 2E, 8 oz (early)	0.1 ± 0.1	0.0 ± 0.0	0.2 ± 0.2	0.1 ± 0.1	14.3 ± 6.9 C	84
ONAGER 2E, 6 oz (early)	1.2 ± 0.8	0.3 ± 0.3	0.3 ± 0.1	0.3 ± 0.1	47.3 ± 21.9 B	47
COMITE II 6E, 1.69 (early)	1.0 ± 0.3	0.3 ± 0.1	0.5 ± 0.3	2.3 ± 1.6	91.0 ± 34.1 A	-2
UNTREATED	2.0 ± 0.9	0.3 ± 0.1	0.5 ± 0.2	1.2 ± 0.7	89.3 ± 22.2 A	—
F Value	1.63	1.60	0.52	1.96	14.57	
p > F	0.2509	0.2557	0.6776	0.1904	0.0008	

[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.

CONTROL OF SUNFLOWER STEM WEEVIL WITH PLANTING AND CULTIVATION TREATMENTS, CENTRAL GREAT PLAINS RESEARCH STATION, AKRON, CO, 2001

Mike Koch, Central Great Plains Research Station; Assefa Gebre-Amlak, Golden Plains Area Cooperative Extension; Shawn Walter, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF SUNFLOWER STEM WEEVIL WITH PLANTING AND CULTIVATION TREATMENTS, CENTRAL GREAT PLAINS RESEARCH STATION, AKRON, CO, 2001: The planting time treatment was applied on 19 May 2001 with a John Deere Maxi-Merge planter equipped with a CO_2 powered micro-tube directed into the seed furrow ½ inch above the seed. Cultivation treatments were applied on 30 June 2001 in a 12 inch band with a CO_2 powered sprayer at 17.5 psi with an over-whorl nozzle (11001 VS-TJ) positioned 6 inches above the whorl mounted on an Orthman cultivator. Plots were four rows by 50 ft (30 inch centers) and arranged in six replicates of a randomized complete block design. Crop stage at cultivation was V4 to V8 with 70% of the plants at V8. Sunflower stem weevil densities at cultivation averaged four adults per three plants.

Treatments were evaluated beginning 30 October 2001 by dissecting 4 plants per plot and counting the number of sunflower stem weevil larvae in the lowest 18 inches of stalk. Weevil counts were subjected to analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05). Harvest was performed by clipping the heads in 2 rows, 17.5 ft long in the center of each plot. Heads were threshed with a Almaco stationary small plot thresher. Seed was cleaned with an aspirator and a 1 lb sub-sample was used to obtain the percent large seeds using a Ferrell-Ross Clipper separating unit with a 20 mesh screen. Yield and percent large seed over 20 mesh were subjected to analysis of variance and mean separation by the Student-Neuman-Keul test (α=0.05).

No treatment had fewer sunflower stem weevil than the untreated control (Table 1). No treatment had less lodging than the untreated control (Table 1). No treatment yielded more than the untreated control (Table 1). No phytotoxicity was observed with any treatment.

Field History:

Pest:	Sunflower stem weevil, *Cylindrocopturus adspersus* (LeConte)
Cultivar:	Triumph 765 confectionary
Planting Date:	19 May 2001
Plant Population:	16,200
Irrigation:	None
Crop History:	Fallow previous year
Herbicide:	Spartan, 2 oz/acre + Prowl, 38 oz/acre on 18 May 2001
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Weld Silt Loam and Platner Loam, O.M. 1%, pH 7.0
Location:	USDA Central Great Plains Research Station, Akron, CO.

Table 1. Control of spotted sunflower stem weevil with planting and cultivation timed treatments, Central Great Plains Research Station, Akron, CO, 2001.

PRODUCT, LB(AI)/ACRE	TIMING	LARVAE/ PLANT[1]	% LODGING[1]	YIELD[1]	% LARGE SEEDS[1,2]
WARRIOR T, 0.02	Cultivation	34.3	5.8	1425	—
BAYTHROID 2E, 0.02	Cultivation	30.2	3.6	1361	—
F0570, 0.017	Cultivation	29.5	6.6	1331	—
FURADAN 4F, 1.0	Planting	29.0	5.2	1442	—
UNTREATED CONTROL	—	28.3	4.9	1351	72.5
FURADAN 4F, 0.75	Cultivation	27.2	3.3	1468	72.3
F value		0.14	0.30	0.13	0.19
p > F		0.980	0.910	0.985	0.896

[1]Means in the same column followed by the same letter(s) are not statistically different, SNK (α=0.05).
[2]Percent large seed over 20 mesh analyzed for untreated control and Furadan 4F, 0.75 treatments only.

THE 2002 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:

2002 Light Trap Operators		**2002 Pest Survey Committee**	
Bonny Dam	Bill Cody Jr. and Family	Allan Brax	Ron Meyer
Burlington	Dale Hansen	Bill Brown	Frank Peairs
Eckley	Merle and Hazel Gardner	Mike Ferrari	Jack Rhodes
Holyoke	Scott Korte	Pete Forster	Clay Smith
Kirk	Gene Nelson	Dave Green	Merlin Van Deraa
Wauneta	Kylie Lenz	Gene Kleve	Kathryn Wenger
Wray	Randy Doke		
Yuma	Irrigated Research Farm		

Contributors to the 2002 Golden Plains Pest Survey Program

Akron: Birdsall Young, Jr., Glenn Baker, Hickert Brothers, Theurer Farms

Amherst: Jim Tomky, Keith Rodeman

Anton: Chester Kenney (Anton Coop)

Arapahoe: Pat Hornung

Arriba: Darrel Lehrkamp (Tri-Me Spraying Service)

Bayard, NE: Larry and Shirley Kildow

Benkelman, NE: Doran Jesse

Bethune: Ken Hildenbrandt (Warrior Aviation), Craig Schaal (Servi-Tech)

Brush: David Wagers

Burlington: Equity Coop, Gary Mulch, Jeff Counter (Kugler), David Cunningham (Burlington Fertilizer Plant), Barry Hinkhouse, Allan Schutte, Wilcox Oil & Chemical, Ryan and Linda Weaver, Bill Hinkhouse, Mr. Dale Hansen, John Fortmeyer, Jeff Nitsch (Servi-Tech), Larry Feldhousen

Cope: Ed and Ellen Cecil (Cecil Ranch), Sackett's Inc

Dalton, NE: Ted and Kathy Kyle (Watchom Seeds)

Eaton: Gary Schaneman (FMC)

Eckley: Ted Tuell (Tuellland Inc.), Max Schafer, Merle and Hazel Gardner (Spittoon Ranch), Kathy Wenger

Elsie, NE: Matt and Kelley Hasenauer

Enders, NE: Terry Bilka

Flagler: Dallas Saffer (Flagler Aerial Spraying Inc), Wes Pollart (Dekalb Seed), Rex Loutzenhiser

Fleming: Jim Atkin (Atkin Seed)

Gering, NE: Tim and Val Wolf

Goodland, KS: Bill Shields (UAP Pueblo)

Grant, NE: Mark and Nita McGreer, Larry Appel (Appel Crop Consulting, Inc)

Greeley: Tom Farris (UAP Pueblo), Calvin Heimbouch, Bill and Angie Curran

Haigler, NE: Jerry Olsen (Dundy Ag Service, Inc)

Haxtun: Leonard Michael, Dave Green (Servi-Tech), Larry McConnell (Pioneer Seed), Cal Birkhofer (Grainland Coop), Jared Anderson (Anderson Alfalfa), Jared Anderson (Servi-Tech), Quentin Biesemeier, Dennis Eckman, Larry Anderson, Branden Thayer (Servi-Tech), Dora Gregory (Gregory Ag Consulting)

Hays Springs, NE: Steve and Marci Sandberg

Hemingford, NE: Dave and Kim Engel

Holyoke: Roger Gordon (Holyoke Coop), Richard Einspahr (RSMT LTD), Shawn Dalton (Pro-Agronomics Inc), Gary Korte, Lenz Farms, Jack Rhodes, Aaron Powell (Servi-Tech), Erik Vieselmeyer

Idalia: Ken Penzing (Vision Seed & Supply)

Imperial, NE: Rod Johnson (R-Nette Inc.)

Joes: Randy Haarberg (Haarberg Consulting, Inc.), Kenneth, Richard and Troy Schneider (Schneider Farms Inc)

Julesburg: Gary Lancaster

Kanarado, KS: Dave Heisey (Servi-Tech)

Kimball, NE: Jack and Deb Cochran

Kirk: Doug, Darrell and James Idler (Idler Brothers), Ervin Frank (Frank Farms), Kent Ficken, Tom Keller (First National Bank of Kirk), Edsel Collette

Lamar: Kent Miller

Limon: Mark Klapperich

Lodgepole, NE: Mike and Kathy Behrends

Loveland: Paul Koehler (Monsanto)

McDonald, KS: C. W. Antholz

Melbeta, NE: Ty and Karri Marker

Morrill, NE: Gordon Strauch, Jerry and Melvina Dillman

Ogallala, NE: Allan Brax, Guy and Carol Jones

Otis: Gene Perry (Perry Brothers Seed), Ken Melendy, Richard Lewton (Lewton Farms)

Scottsbluff, NE: Bill and Charlotte Rexus

Sterling: Frank Molinaro (Ag Crop Services)

Stratton: Paul Barr and Dave Thompson (Stratton Equity Coop), Kevin Freund (Servi-Tech), Mike Livingston

Stromsburg, NE: Gail Stratman (FMC)

Wheatland, WY: Dan and Milinda Melcher

Wray: Dave Wilson (Stalk Inc), Dwight Rockwell, Larry Gardner, Alan Welp, Great Plains Coop, Don Godsey, Dick Yearous (JR Simplot), Jim Bowman, Daryl Monasmith (PUC-West Crop Consulting), Dennis Atwell (Pioneer Seed), Randy Doke

Yuma: Merlin Van Deraa (Terra Firma Ag Consulting), Carroll Josh, FSK Partnership, Irrigation Research Foundation, Ralph Goeglein, Bartlett Grain, Don and Peggy Brown, Yuma Ag Service, Jim Lengel (Grand Valley Hybrids), March Cartwright (Servi-Tech), Brett Mermis (Servi-Tech), Mike Ferrari (Servi-Tech), JR Unger, Scott Wall

SUMMARY OF 2002 LIGHT AND SUCTION TRAP CATCHES

The following graphs compare the 2002 European corn borer and western bean cutworm moth flights with the historical average moth flight (including 2002) 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 the week of 6 June and peaked between 13 and 27 June. All locations had lower trap captures of first generation moths compared to the historical average.

Second generation flight peaked the week of 15 August in most locations. Eckley had high trap captures of second generation European corn borer moths compared to the historical average. Bonny Dam, Burlington, Kirk and Wray had lower trap captures of second generation moths.

Western Bean Cutworm

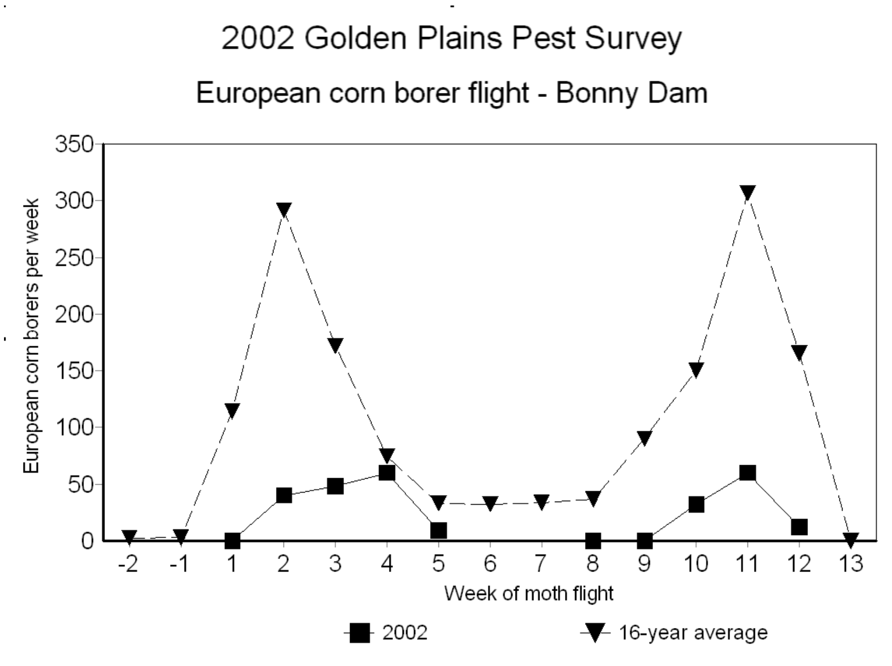
Western bean cutworm moth flight activity began the week of 4 July and peaked between 18 and 25 July in most locations. Eckley, Holyoke, Kirk and Wauneta had high trap captures of western bean cutworm moths compared to the historical average. Bonny Dam, Burlington, Wray and Yuma had lower trap captures of western bean cutworm moths.

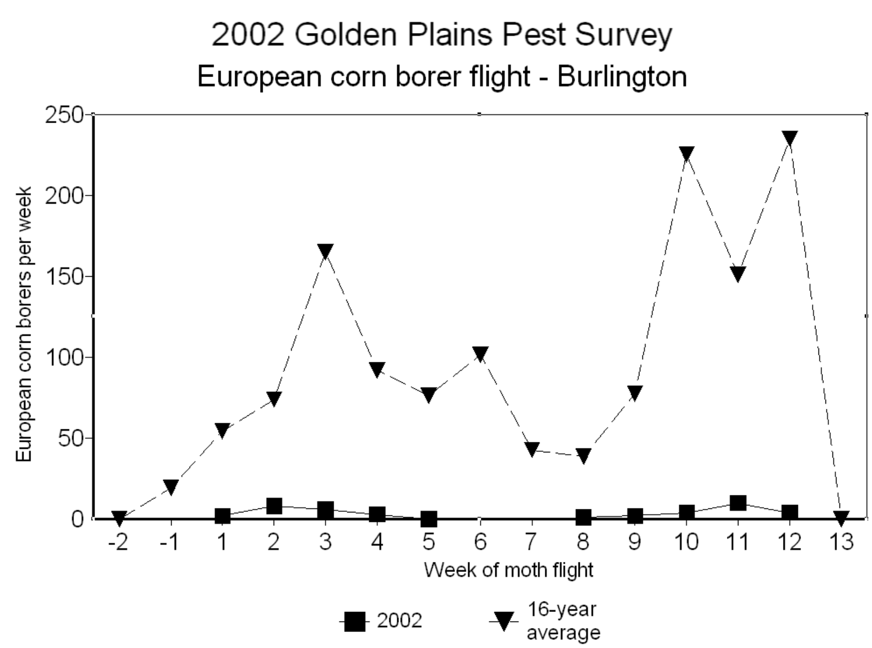
Note that the y-axis scale changes from graph to graph (number of moths caught per week).

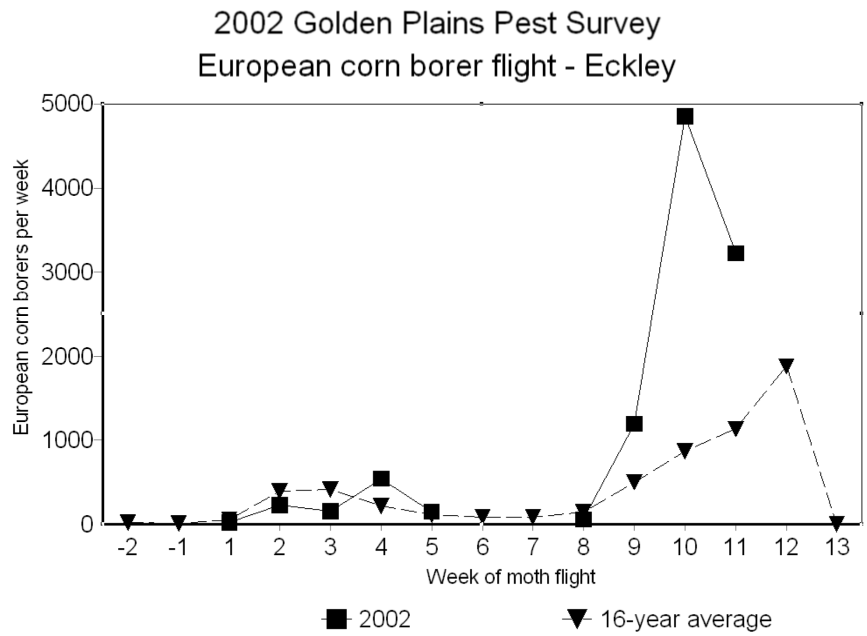
Table 1. Russian wheat aphid suction trap results at four Colorado locations, 1987-2002.

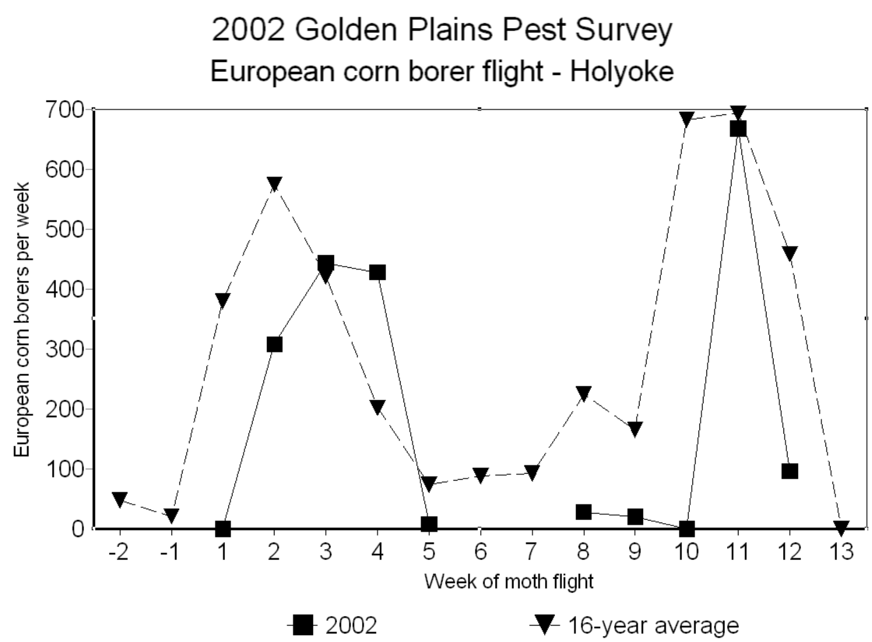
	AKRON	BRIGGSDALE[1]	LAMAR	WALSH
1987	—	1832	—	392
1988	172	92	0	4636
1989	177	102	112	5003
1990	1234	1353	1315	1275
1991	79	1679	703	883
1992	186	1685	0	789
1993	7	2	69	374
1994	496	867	84	3216
1995	73	322	700	361
1996	66	502	1	—
1997	301	216	1775	2501
1998	36	550	—	31
1999	1257	573	—	257
2000	121	430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

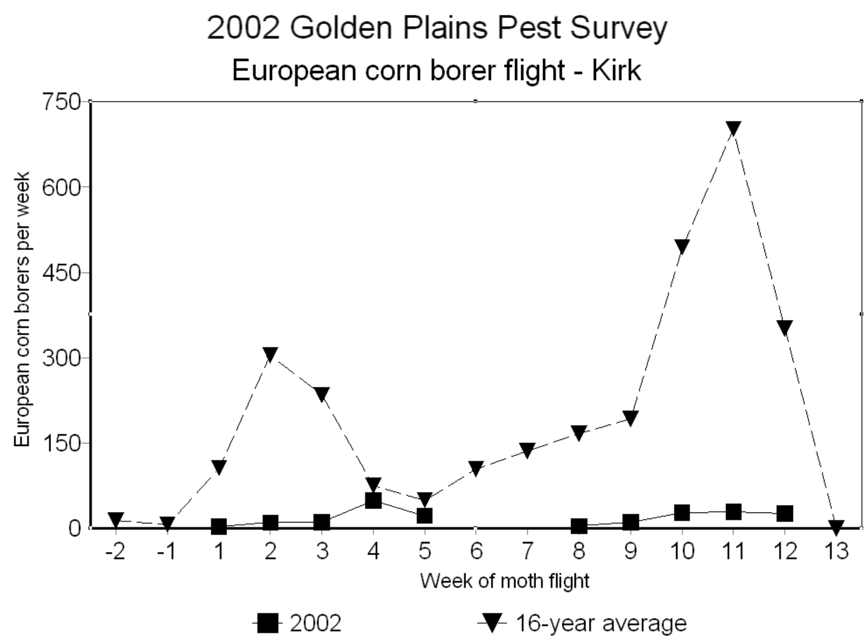
[1]Trap moved to ARDEC (Agricultural Research, Development and Education Center, Colorado State University, Fort Collins, CO) from Briggsdale in 1990. Trap moved back to another location near Briggsdale in 1999.
[2]Trap was non-functional June-August 2002.

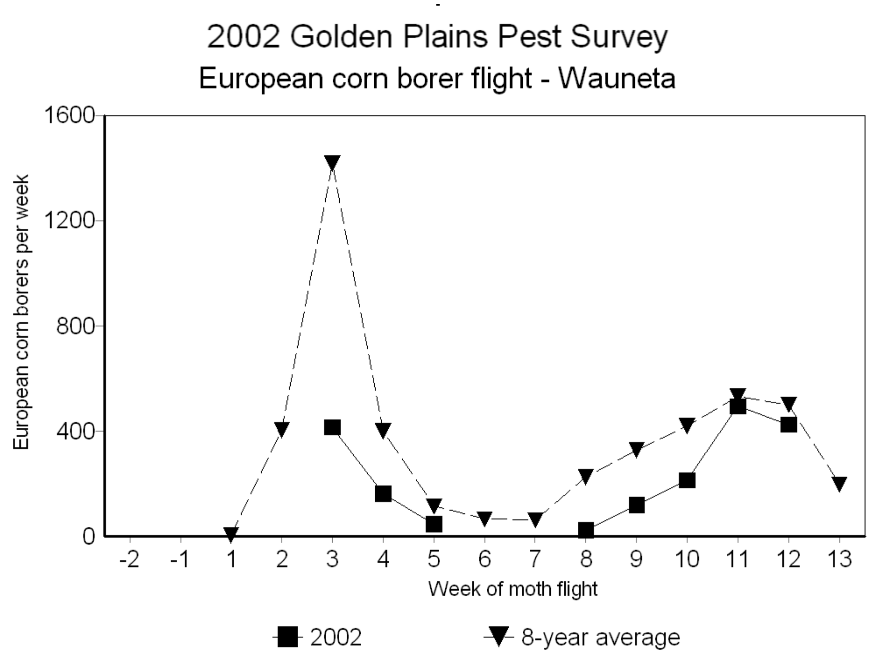

2002 Golden Plains Pest Survey
European corn borer flight - Bonny Dam
European corn borers per week
Week of moth flight
2002
16-year average

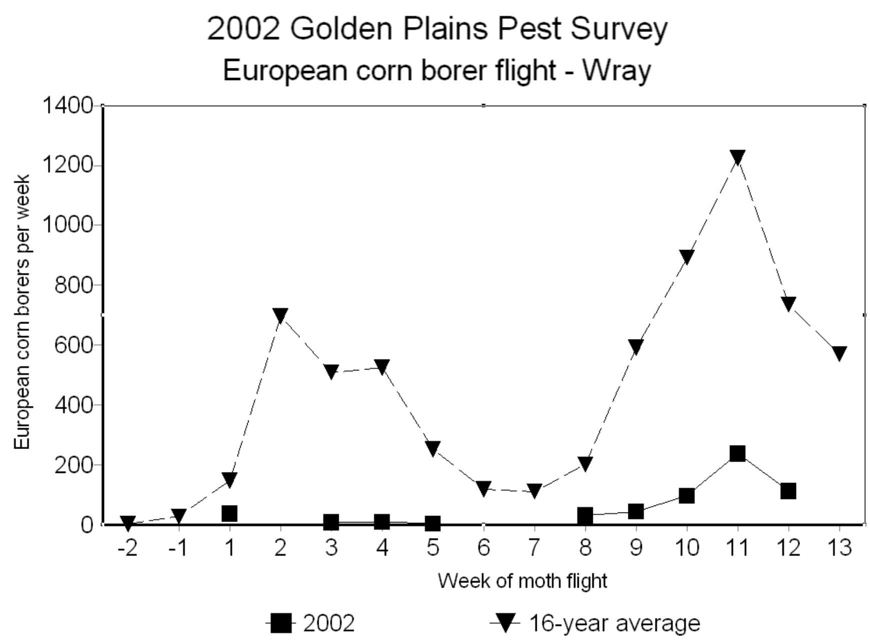

2002 Golden Plains Pest Survey
European corn borer flight - Burlington
European corn borers per week
Week of moth flight
2002
16-year average

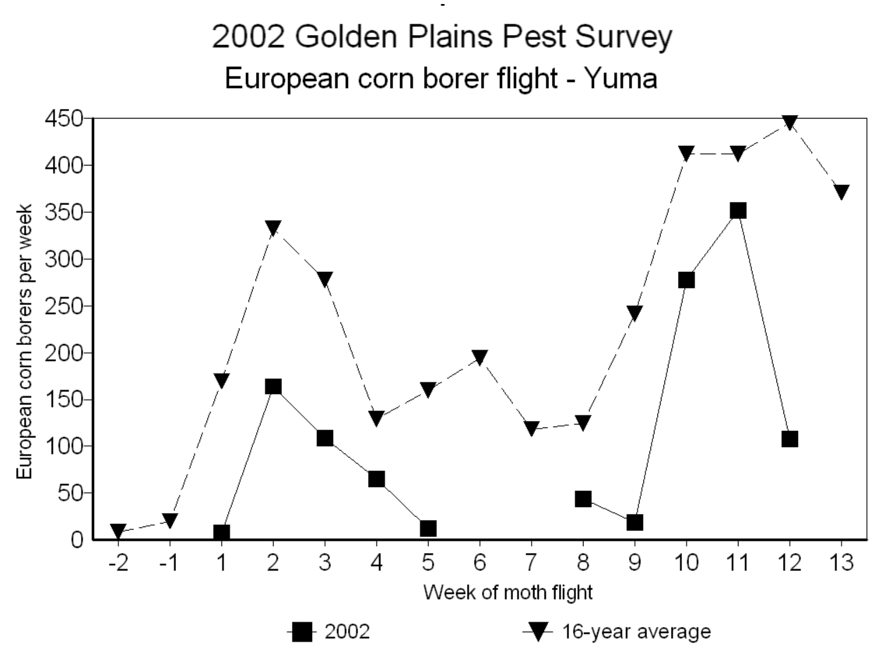

2002 Golden Plains Pest Survey
European corn borer flight - Eckley
European corn borers per week
0
1000
2000
3000
4000
5000
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
16-year average

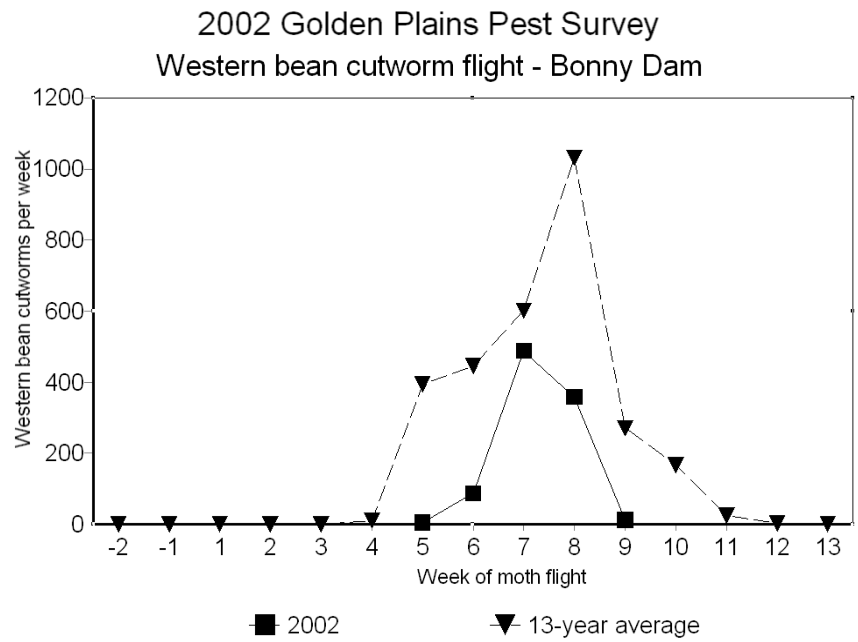

2002 Golden Plains Pest Survey
European corn borer flight - Holyoke
European corn borers per week
0
100
200
300
400
500
600
700
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
16-year average

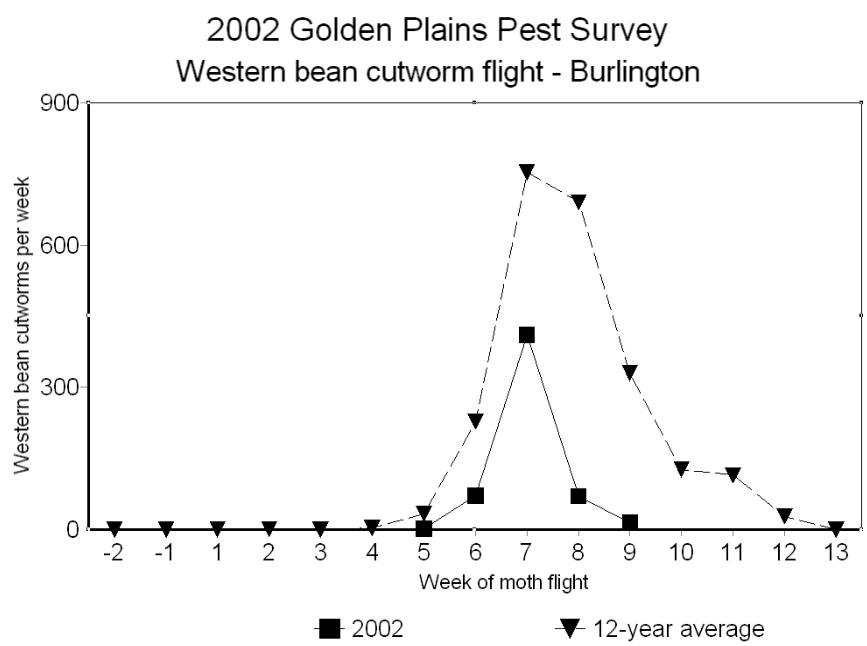

2002 Golden Plains Pest Survey
European corn borer flight - Kirk
750
600
450
300
150
0
European corn borers per week
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
16-year average

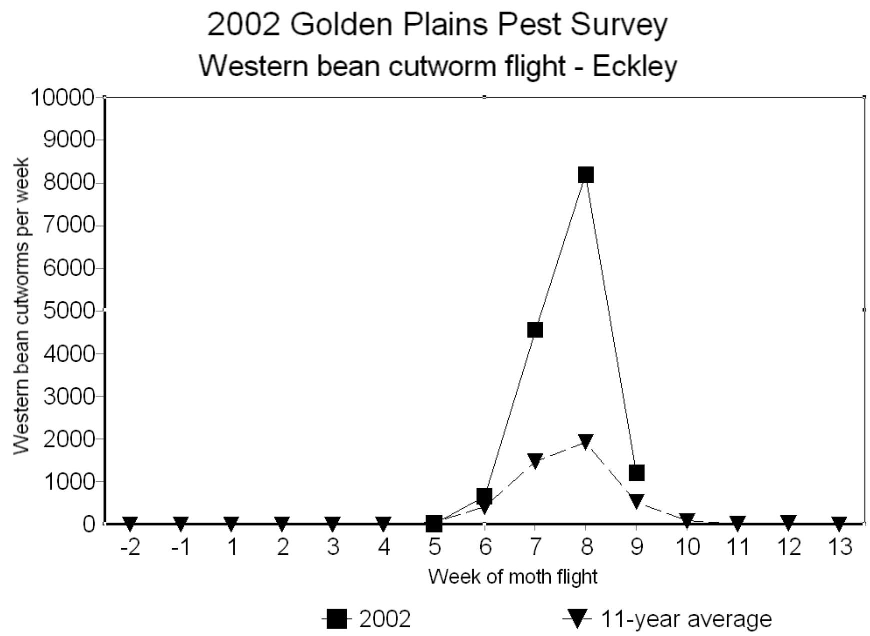

2002 Golden Plains Pest Survey
European corn borer flight - Wauneta
1600
1200
800
400
0
European corn borers per week
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
8-year average

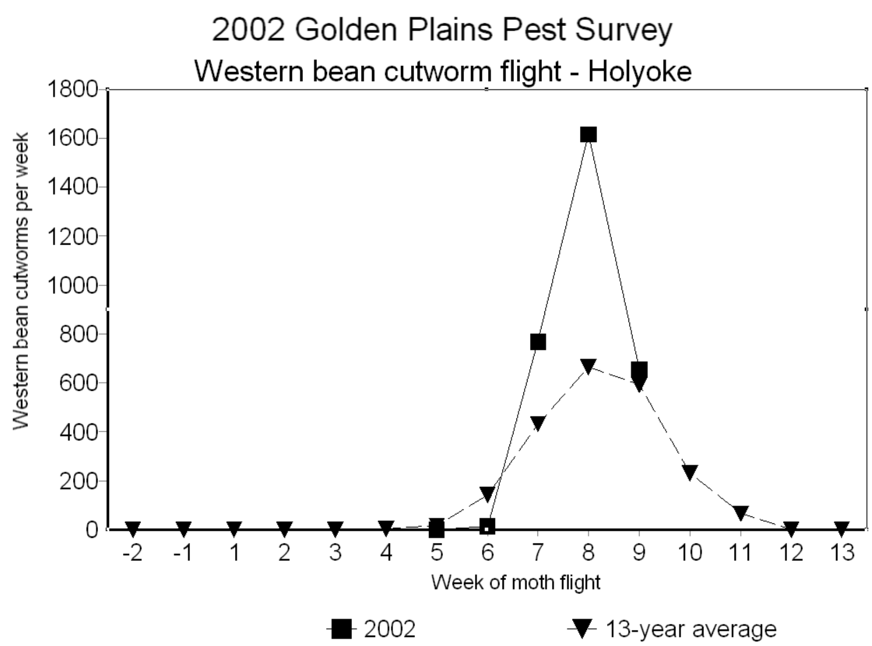

2002 Golden Plains Pest Survey
European corn borer flight - Wray
European corn borers per week
1400
1200
1000
800
600
400
200
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
16-year average

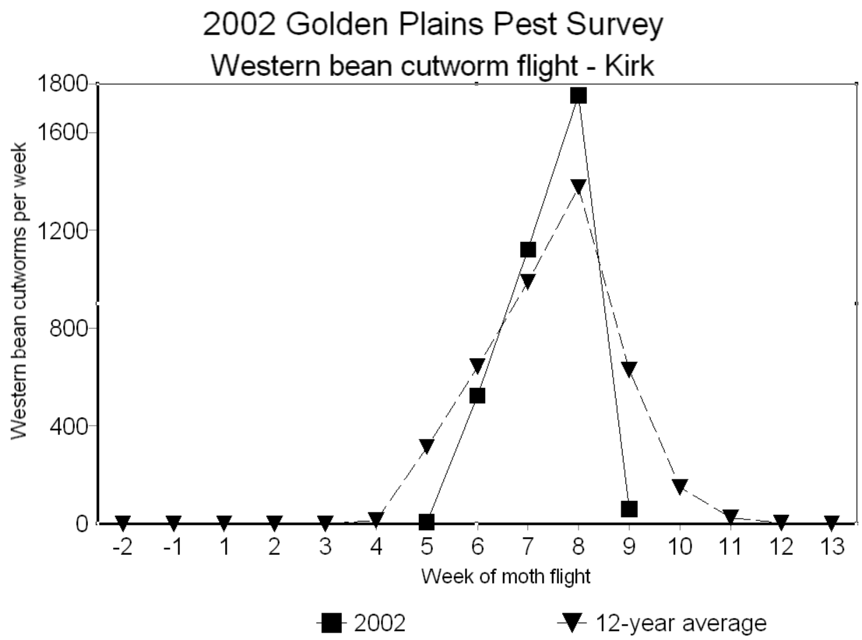

2002 Golden Plains Pest Survey
European corn borer flight - Yuma
European corn borers per week
450
400
350
300
250
200
150
100
50
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
16-year average

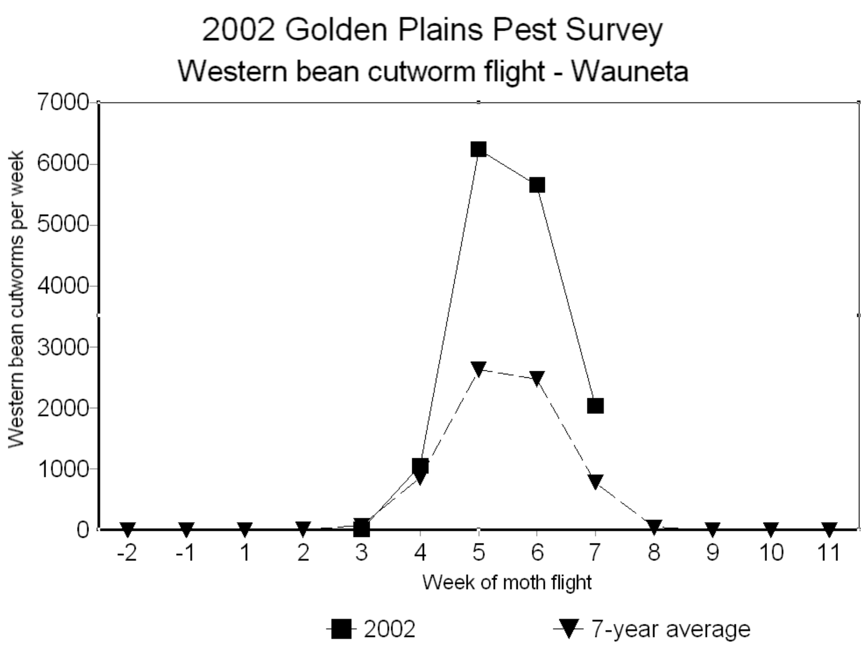

2002 Golden Plains Pest Survey
Western bean cutworm flight - Bonny Dam
Western bean cutworms per week
0
200
400
600
800
1000
1200
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2002
13-year average

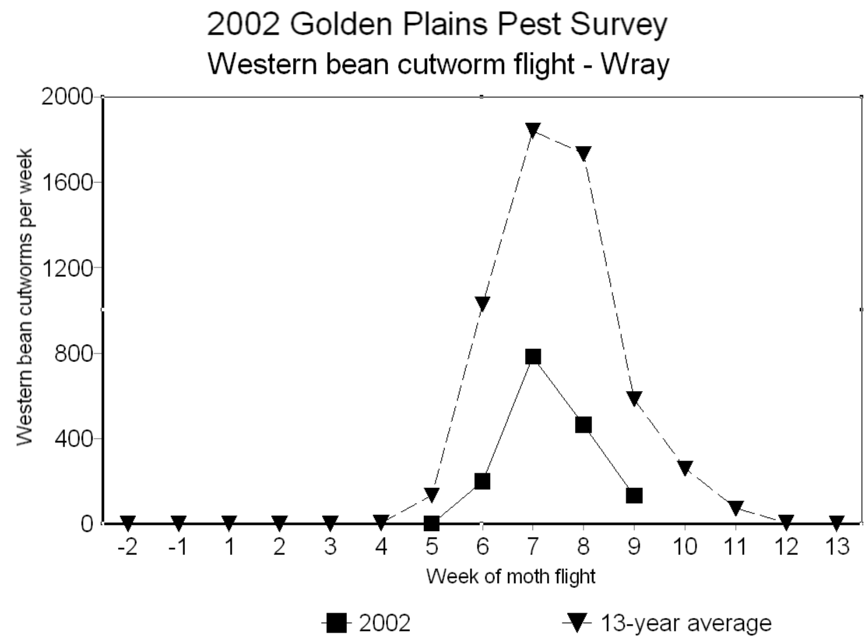

2002 Golden Plains Pest Survey
Western bean cutworm flight - Burlington
Western bean cutworms per week
0
300
600
900
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2002
12-year average


2002 Golden Plains Pest Survey
Western bean cutworm flight - Eckley
Western bean cutworms per week
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
11-year average

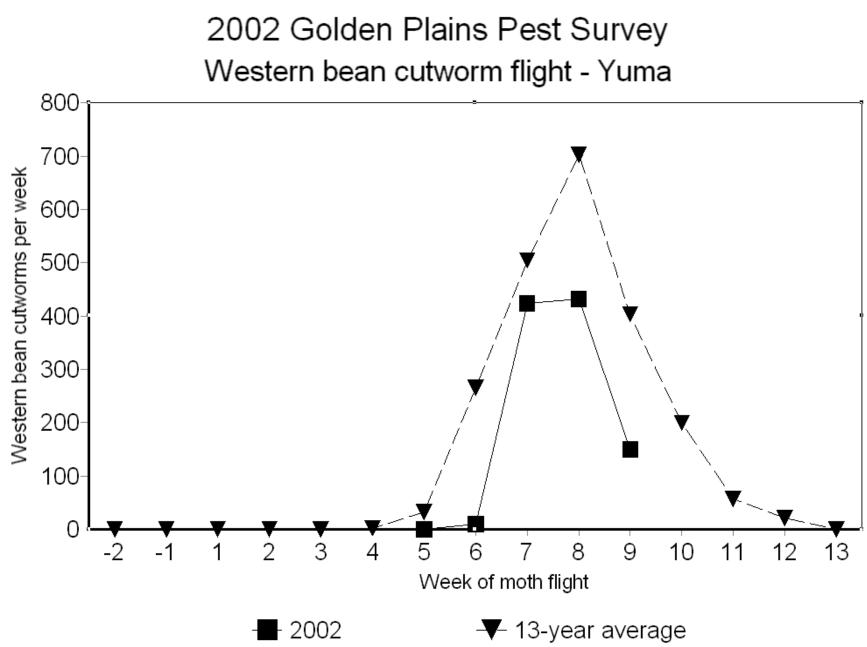

2002 Golden Plains Pest Survey
Western bean cutworm flight - Holyoke
Western bean cutworms per week
1800
1600
1400
1200
1000
800
600
400
200
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2002
13-year average


2002 Golden Plains Pest Survey
Western bean cutworm flight - Kirk
1800
1600
1200
800
400
0
Western bean cutworms per week
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2002
12-year average


2002 Golden Plains Pest Survey
Western bean cutworm flight - Wauneta
7000
6000
5000
4000
3000
2000
1000
0
Western bean cutworms per week
-2
-1
1
2
3
4
5
6
7
8
9
10
11
Week of moth flight
2002
7-year average



2002 Golden Plains Pest Survey
Western bean cutworm flight - Wray
Western bean cutworms per week
0
400
800
1200
1600
2000
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2002
13-year average



2002 Golden Plains Pest Survey
Western bean cutworm flight - Yuma
Western bean cutworms per week
0
100
200
300
400
500
600
700
800
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2002
13-year average

2002 CEREAL LEAF BEETLE SURVEY

Six irrigated barley fields, located in Boulder, Weld and Larimer counties, were chosen to survey for presence of cereal leaf beetle. Coors malting barley Moravian 37 was planted at sites 1-5. A feed barley variety was planted at site 6. Ten samples of 100-180° sweeps were collected for each site for a total of 1000 sweeps per site. The number of cereal leaf beetle adult and larvae were counted for each sample. Samples were not collected in fields that had been recently irrigated or had been sprayed with insecticide.

Cereal Leaf Beetle Sample Site Locations, 2002

Site	County	Location
1	Weld	County Road 1, South of Highway 119
2	Boulder	County Road 115, North of Highway 66
3	Larimer	County Road 6C
4	Weld	County Road 46 X County Road 5
5	Larimer	County Road 11, North of County Road 16
6	Larimer	I-25 East Frontage Road, North of County Road 58

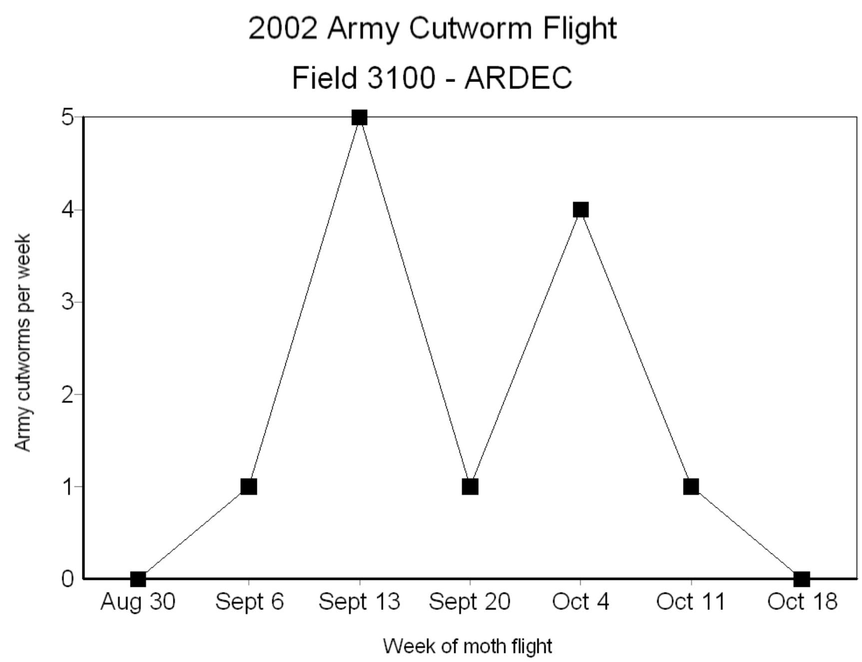
Number of Cereal Leaf Beetle Adults and Larvae per 1000 Sweeps, 2002

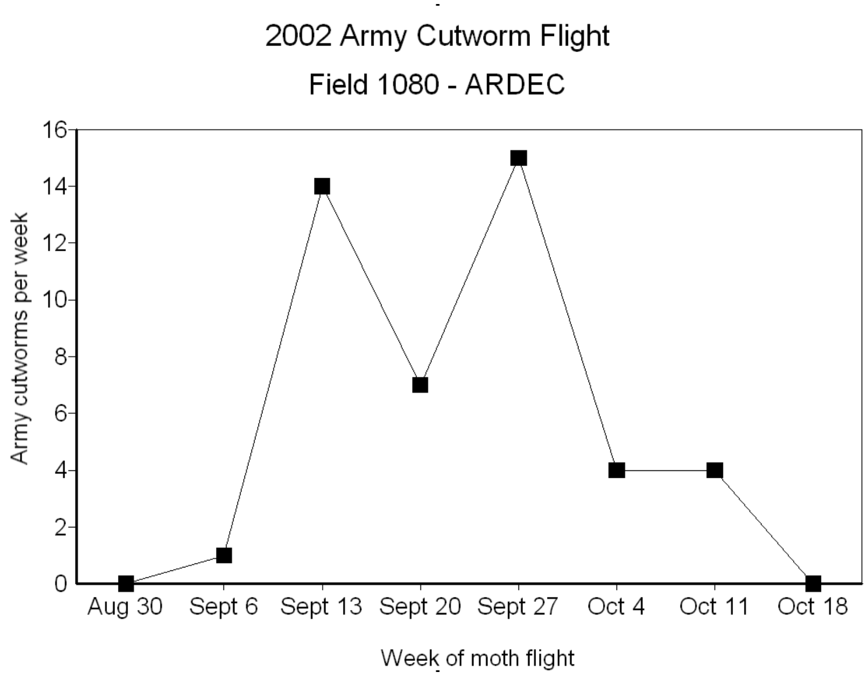
	13 May		30 May (28 May-Site 6)		13 June	
Site	Adults	Larvae	Adults	Larvae	Adults	Larvae
1	0	0	5	2	0	7
2	2	0	1	183	Field Sprayed	
3	No sample due to irrigation		5	94	Field Sprayed (Warrior)	
4	0	0	0	1	Field Sprayed	
5	1	0	0	0	Field Sprayed	
6	—	—	2	0	0	16

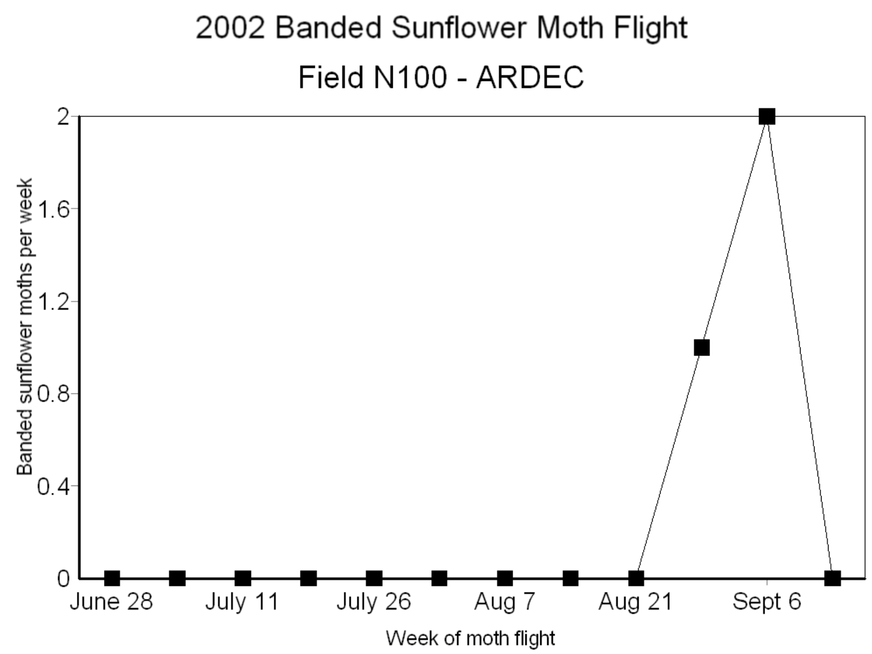
PHEROMONE TRAPS, ARDEC, 2002

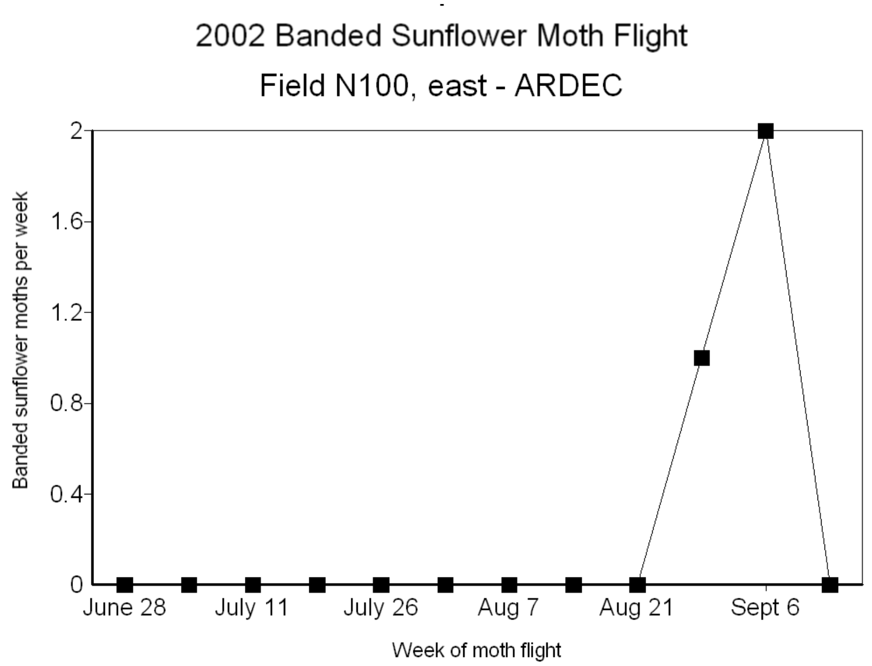
Pheromone trapping was conducted at ARDEC for army cutworm, banded sunflower moth, corn earworm, European corn borer, pale western cutworm, sunflower head moth and western bean cutworm. Traps were checked weekly throughout the growing season. Trap catches for all insects are displayed below with the exception of sunflower head moth which had fewer than 2 moths trapped for the season. Counts were low for all insects except corn earworm and pale western cutworm.

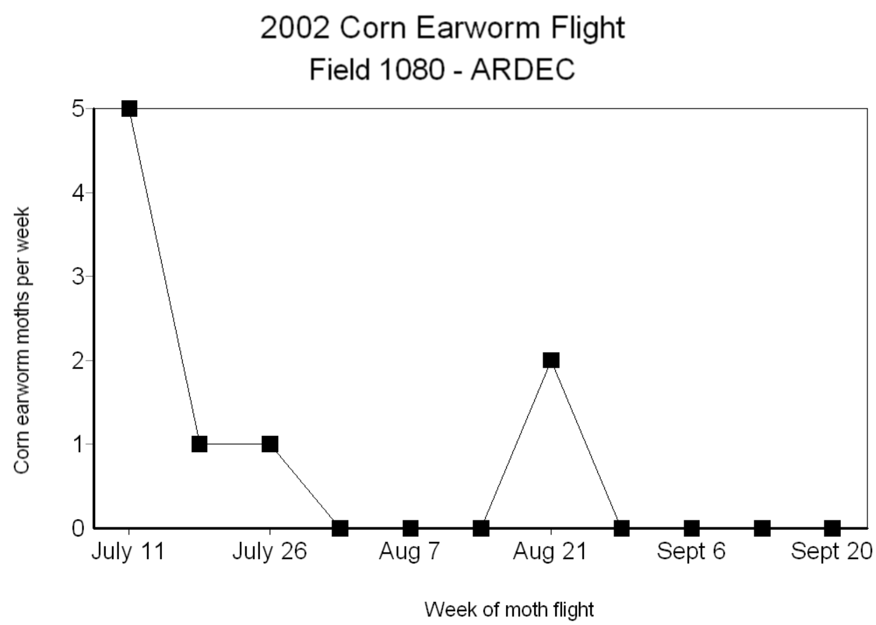
Note that the y-axis scale changes from graph to graph (number of moths caught per week).

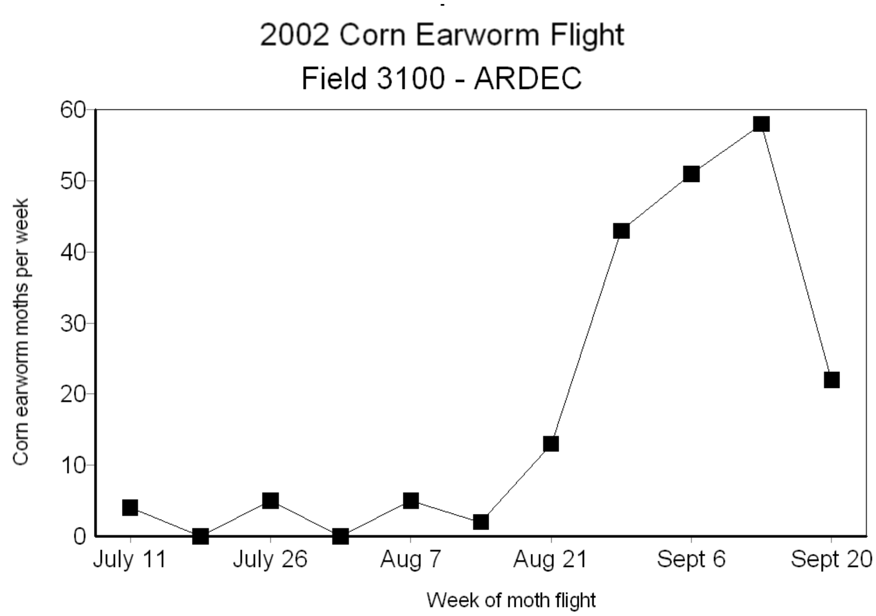


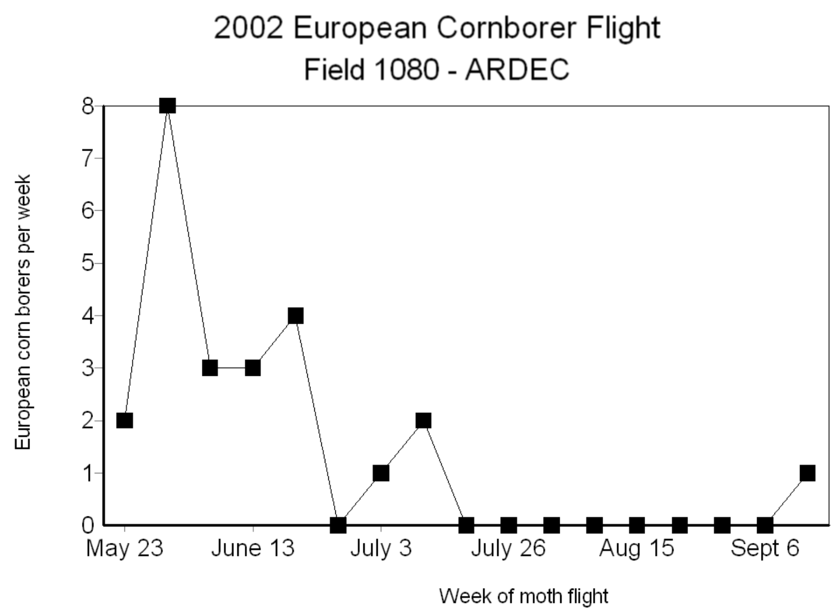


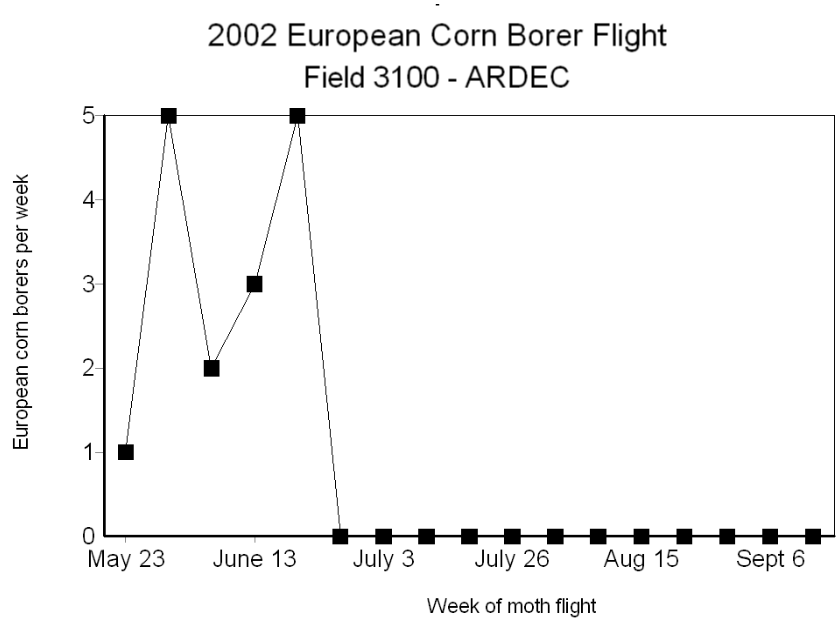

2002 Banded Sunflower Moth Flight
Field N100 - ARDEC
Banded sunflower moths per week
0
0.4
0.8
1.2
1.6
2
June 28
July 11
July 26
Aug 7
Aug 21
Sept 6
Week of moth flight

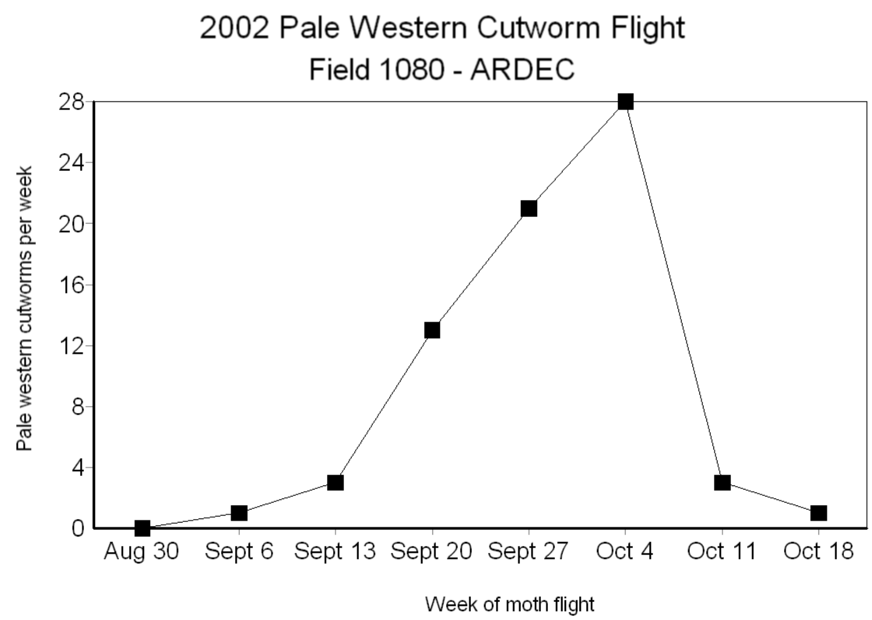

2002 Banded Sunflower Moth Flight
Field N100, east - ARDEC
Banded sunflower moths per week
0
0.4
0.8
1.2
1.6
2
June 28
July 11
July 26
Aug 7
Aug 21
Sept 6
Week of moth flight

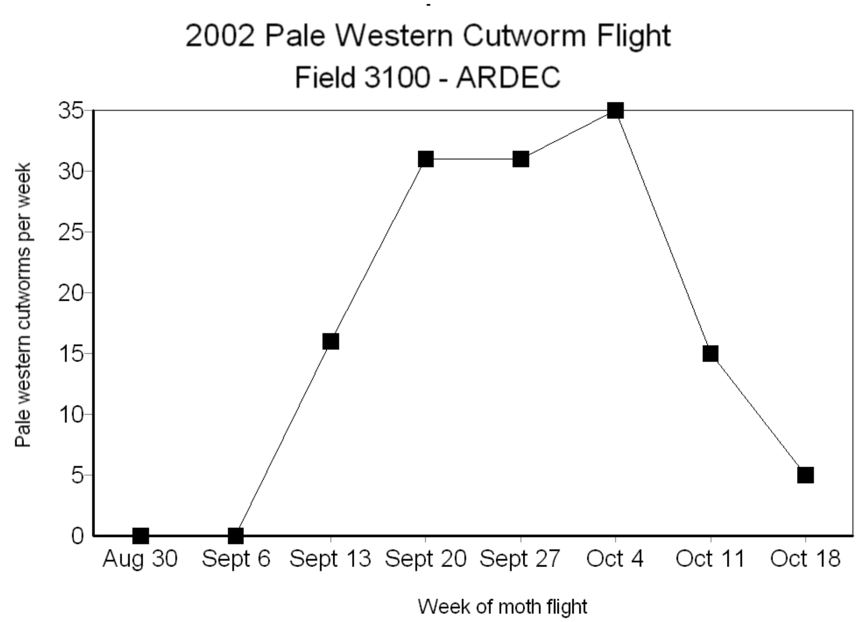

2002 Corn Earworm Flight
Field 1080 - ARDEC
Corn earworm moths per week
0
1
2
3
4
5
July 11
July 26
Aug 7
Aug 21
Sept 6
Sept 20
Week of moth flight

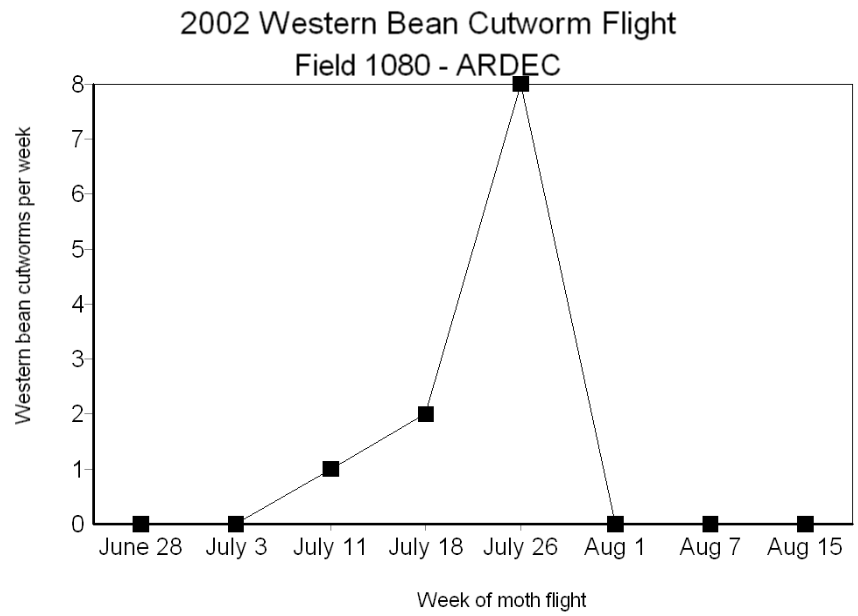

2002 Corn Earworm Flight
Field 3100 - ARDEC
Corn earworm moths per week
0
10
20
30
40
50
60
July 11
July 26
Aug 7
Aug 21
Sept 6
Sept 20
Week of moth flight

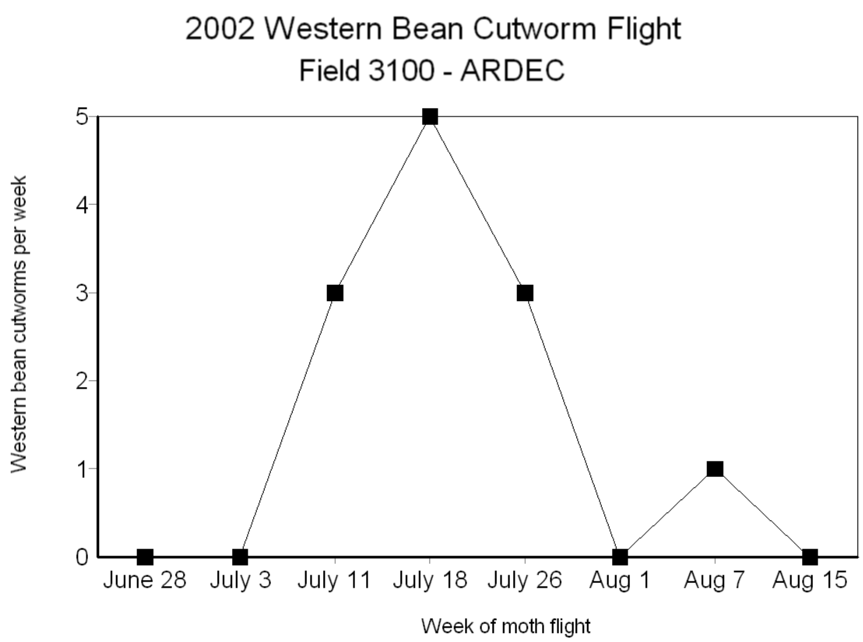

2002 European Cornborer Flight
Field 1080 - ARDEC
European corn borers per week
0
1
2
3
4
5
6
7
8
May 23
June 13
July 3
July 26
Aug 15
Sept 6
Week of moth flight


2002 European Corn Borer Flight
Field 3100 - ARDEC
European corn borers per week
0
1
2
3
4
5
May 23
June 13
July 3
July 26
Aug 15
Sept 6
Week of moth flight


2002 Pale Western Cutworm Flight
Field 1080 - ARDEC
Pale western cutworms per week
0
4
8
12
16
20
24
28
Aug 30
Sept 6
Sept 13
Sept 20
Sept 27
Oct 4
Oct 11
Oct 18
Week of moth flight


2002 Pale Western Cutworm Flight
Field 3100 - ARDEC
Pale western cutworms per week
0
5
10
15
20
25
30
35
Aug 30
Sept 6
Sept 13
Sept 20
Sept 27
Oct 4
Oct 11
Oct 18
Week of moth flight


2002 Western Bean Cutworm Flight
Field 1080 - ARDEC
Western bean cutworms per week
0
1
2
3
4
5
6
7
8
June 28
July 3
July 11
July 18
July 26
Aug 1
Aug 7
Aug 15
Week of moth flight


2002 Western Bean Cutworm Flight
Field 3100 - ARDEC
Western bean cutworms per week
0
1
2
3
4
5
June 28
July 3
July 11
July 18
July 26
Aug 1
Aug 7
Aug 15
Week of moth flight

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, 1987-2002, in northern Colorado

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
AZTEC 2.1G	2.6 (24)
COUNTER 15G	2.6 (26)
COUNTER 20CR	2.6 (38)
DYFONATE 20G	2.8 (12)
FORCE 1.5G (8 OZ) or 3G (4 OZ)	2.7 (28)
FORTRESS 5G	2.8 (14)
LORSBAN 15G	3.0 (20)
REGENT 4SC, 3-5 GPA	3.0 (5)
THIMET 20G	3.4 (15)
UNTREATED CONTROL	4.2 (29)

[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, 1987-2002, in northern Colorado.

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
COUNTER 15G	2.7 (18)
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 (14)
THIMET 20G	2.9 (18)
UNTREATED CONTROL	4.3 (22)

[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, 1984-2002, in northern Colorado.

PRODUCT	LB (AI)/ACRE	% CONTROL AT 2 WK[1]
BAYTHROID 2E	0.025	96 (10)
FURADAN 4F	0.25	85 (11)
FURADAN 4F	0.50	91 (24)
FURADAN 4F+DIMETHOATE 4E	0.50 + 0.25	84 (5)
LORSBAN 4E	0.75	93 (15)
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	74 (3)
STEWARD	0.110	83 (3)
WARRIOR 1E	0.02	97 (13)

[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, 1986-2002[1].

PRODUCT	LB (AI)/ACRE	TESTS WITH > 90% CONTROL	TOTAL TESTS	% TESTS
LORSBAN 4E	0.50	22	38	58
DI-SYSTON 8E	0.75	14	39	36
DIMETHOATE 4E	0.375	7	32	22
DI-SYSTON 8E	0.50	2	10	20
PENNCAP M	0.75	3	19	16
LORSBAN 4E	0.25	6	19	32
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, 1993-2002.

PRODUCT	LB (AI)/ACRE	% REDUCTION IN TOTAL MITE DAYS[1]
CAPTURE 2E	0.08	58 (9)
CAPTURE 2E + DIMETHOATE 4E	0.08 + 0.50	67 (9)
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	52 (9)
FURADAN 4F	1.00	42 (9)
FURADAN 4F + DIMETHOATE 4E	1.00 + 0.50	51 (4)

[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.

ACKNOWLEDGMENTS

2002 TEST PLOT COOPERATORS

ALFALFA	ARDEC	Fort Collins
BARLEY	Allen Matsuda, Coors	Berthoud
	ARDEC	Fort Collins
CORN	ARDEC	Fort Collins
SUNFLOWER	USDA Central Great Plains Research Station	Akron
WHEAT	ARDEC	Fort Collins

TEST PLOT ASSISTANCE

ARDEC, Reg Koll, Mike Matsuda, Chris Fryrear	Fort Collins

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