2003 Colorado Field Crop Insect Management Research and Demonstration Trials

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CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003

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CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003: Treatments were applied on 15 April 2003 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 slightly overcast with northwest winds of 4 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 late tillering (Zadoks 26-27). The crop had been infested with greenhouse-reared aphids on 10-11 March 2003.

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 4 ± 1 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 not severe as in past artificially-infested winter wheat experiments, with about 9 aphids/tiller in the untreated control at 3 weeks post treatment. The wheat was healthy due to an abundance of moisture and cool temperatures in the spring. All treatments except F1785-03-01, 0.054 had fewer aphids than the untreated control at 1 week after treatment. All treatments had fewer aphid days than the untreated control at 2 and 3 weeks after treatment. All treatments except F1785-03-01, 0.054 and dimethoate 4E, 0.38 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:	17 September 2002
Irrigation:	Post planting, linear move sprinkler with drop nozzles
Crop History:	Fallow in 2002
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 3.5%, pH 7.6
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, 2003.

PRODUCT, LB (AI)/ACRE	APHIDS PER TILLER ± SEM[1] 1 WEEK	2 WEEKS	3 WEEKS	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]
XR-225 60g/l, 0.005	0.1 ± 0.0 B	0.1 ± 0.0 C	0.1 ± 0.1 D	24.3 ± 6.4 C	99
Di-Syston 8E, 0.75	0.1 ± 0.1 B	0.1 ± 0.1 C	0.1 ± 0.1 CD	34.0 ± 16.3 C	98
Lorsban 4E-SG, 0.25	0.4 ± 0.2 B	0.2 ± 0.2 C	0.1 ± 0.1 CD	63.2 ± 20.0 C	97
Lorsban 4E-SG, 0.50	0.5 ± 0.2 B	0.1 ± 0.1 C	0.4 ± 0.3 CD	67.2 ± 29.5 C	96
Warrior T, 0.03	0.8 ± 0.7 B	0.1 ± 0.0 C	0.2 ± 0.1 CD	73.0 ± 37.3 C	96
Lorsban 4E-SG, 0.38	0.2 ± 0.1 B	0.2 ± 0.1 C	0.6 ± 0.2 CD	74.7 ± 26.8 C	96
XR-225 60g/l, 0.015	0.3 ± 0.1 B	0.3 ± 0.1 C	0.6 ± 0.3 CD	99.8 ± 20.0 C	94
Warrior T, 0.01	0.3 ± 0.1 B	0.4 ± 0.2 C	0.3 ± 0.1 CD	102.3 ± 40.6 C	94
Capture 2E, 0.03	0.4 ± 0.1 B	0.2 ± 0.1 C	1.0 ± 0.8 CD	130.0 ± 58.1 C	93
Mustang Max 0.8EC, 0.025	0.8 ± 0.3 B	0.4 ± 0.1C	0.7 ± 0.4 CD	160.8 ± 49.1 C	91
Dimethoate 4E, 0.38	0.7 ± 0.3 B	0.6 ± 0.2 C	2.1 ± 0.5 BC	293.7 ± 65.9 C	84
F1785-03-01, 0.054	4.4 ± 1.5 A	3.0 ± 0.9 B	4.3 ± 1.9 B	1027.3 ± 292.5 B	43
Untreated Control	5.1 ± 1.4 A	5.5 ± 0.8 A	9.1 ± 0.6 A	1806.5 ± 185.4 A	—
F Value	8.95	20.46	15.60	26.86	—
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, ARDEC, FORT COLLINS, CO, 2003

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CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH CRUISER SEED TREATMENTS, ARDEC, FORT COLLINS, CO, 2003: Treatments were planted on 17 September 2002 with a 6 row test plot drill at a rate of 60 lbs of seed/acre. 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 tillering (Zadoks 26-27) with greenhouse-reared aphids on 10-11 March 2003.

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. Yields were taken on 16 July 2003 by hand harvesting 1m row. Plot yields were compared by analysis of variance and the Student-Neuman-Keul test (α=0.05).

Aphid pressure was less severe than observed in past artificially-infested spring barley experiments, 6 aphids per tiller in the untreated control at the third sample date. The wheat was healthy due to an abundance of moisture and cool temperatures in the spring. Gaucho, 8.3 fl oz/100 lb seed had fewer aphids than the untreated control at the first and second sample date. Gaucho, 8.3 fl oz/100 lb seed had fewer aphid days than the untreated control. Gaucho, 8.3 fl oz/100 lb seed 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. No treatment yielded more than the untreated control (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:	TAM 107
Planting Date:	17 September 2002
Irrigation:	Post planting, linear move sprinkler with drop nozzles
Crop History:	Fallow in 2002, wheat in 2001
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy clay loam, OM 3.5%, pH 7.6
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (northwest corner of Block 1030)

Table 1. Control of Russian wheat aphid in winter wheat with Cruiser seed treatments, ARDEC, Fort Collins, CO, 2003

TREATMENT	APHIDS PER TILLER ± SEM[1] 1st WEEK	3rd WEEK	5th WEEK	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
Gaucho, 8.3fl oz/100 lb sd	0.2 ± 0.1 B	0.0 ± 0.0 C	1.1 ± 0.7 B	247.6 ± 132.5 B	91	144.7
Cruiser 5fs, 1.33 fl oz/100 lb sd	0.7 ± 0.2 AB	0.8 ± 0.4 BC	3.3 ± 0.6 AB	842.8 ± 125.6 AB	63	138.0
Dividend xtreme 0.96fs, 15.0GA/100kg sd + Cruiser 5fs, 5.0GA/100kg sd	0.6 ± 0.3 AB	0.6 ± 0.4 BC	3.6 ± 1.4 AB	906.2 ± 426.9 AB	65	140.6
Dividend xtreme 0.96fs, 15.0GA/100kg sd + Cruiser 5fs, 39.0GA/100kg sd	0.9 ± 0.3 AB	0.6 ± 0.2 BC	5.0 ± 1.5 AB	1226.4 ± 255.0 AB	54	126.5
Cruiser 5fs, 0.75 fl oz/100 lb sd	0.8 ± 0.2 AB	1.3 ± 0.3 ABC	9.8 ± 3.4 A	1509.0 ± 274.1 AB	12	124.9
Raxil-Thiram 1.77fs, 52.0GA/100kg sd + Gaucho480fs, 48.0GA/100kg sd	0.8 ± 0.2 AB	1.6 ± 0.7 ABC	6.0 ± 1.7 AB	1544.0 ± 407.8 AB	35	117.4
Dividend xtreme 0.96fs, 15.0GA/100kg sd	1.3 ± 0.3 A	2.8 ± 0.9 AB	8.3 ± 1.7 A	2383.8 ± 574.8 A	2	123.2
Untreated Control	1.0 ± 0.2 AB	4.6 ± 1.6 A	5.8 ± 0.6 AB	2420.7 ± 524.9 A	—	121.2
Dividend xtreme 0.96fs, 15.0GA/100kg sd + Cruiser 5fs, 7.5GA/100kg sd	1.1 ± 0.3 AB	3.2 ± 1.1 AB	8.4 ± 2.0 A	2464.0 ± 461.9 A	-3	118.5
F Value	2.20	3.81	3.41	3.24	—	1.12
p > F	0.0476	0.0027	0.0044	0.0075	—	0.3692

[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 total seed weight in grams.

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH SEED TREATMENTS AND HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003

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CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH SEED TREATMENTS AND HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003: The foliar treatment was applied on 16 May 2003 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 with winds from the northwest at less than 4 mph and a temperature of 65°F at the time of treatment. Crop stage at application date was tillering (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 11 April 2003.

Treatments were evaluated by collecting 20 random tillers along the middle four rows of each plot three days prior and one, three and five weeks after the foliar treatment. Tiller samples were placed in Berlese funnels for 24 hours to extract aphids into alcohol for counting. Precounts in the untreated plots averaged 5 ± 1 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 1 August 2004 with a Hage 125 Harvester. 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 as severe as observed in past artificially-infested spring barley experiments, 80 aphids/tiller in the untreated control at 3 weeks after treatment. All treatments had fewer aphids than the untreated control at one, two and three weeks after treatment. All treatments had fewer aphid days than the untreated control. All treatments 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). All treatments yielded more than the untreated control (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
Planting Date:	12 March 2003
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Corn in 2002
Herbicide:	Bronate, 0.5 pt/acre, Harmony Extra, 0.3 oz/acre on 7 June 2002
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Clay loam, OM 3.1%, pH 7.8
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (middle of Block 1080)

Table 1. Control of Russian wheat aphid in spring barley, ARDEC, Fort Collins, CO, 2003.

	APHIDS PER TILLER ± SEM[1]					
PRODUCT, LB(AI)/ACRE	1 WEEK	2 WEEKS	3 WEEKS	TOTAL APHID DAYS ± SEM[1]	% REDUCTION[2]	YIELD[3]
Gaucho, 8.3fl oz/100lb sd	0.1 ± 0.1 B	0.4 ± 0.2 B	0.6 ± 0.2 C	165.4 ± 31.4 B	99	86 A
Cruiser, 1.33 fl oz/100 lb sd	0.3 ± 0.1 B	0.7 ± 0.2 B	1.2 ± 0.3 C	324.1 ± 59.4 B	99	77 AB
Cruiser, 0.75 fl oz/100 lb sd	0.2 ± 0.0 B	1.9 ± 0.4 B	4.9 ± 1.9 BC	979.3 ± 263.5 B	97	77 AB
Warrior T, 0.03	0.8 ± 0.2 B	3.2 ± 0.6 B	9.6 ± 3.0 B	1988.3 ± 452.7 B	94	73 B
Untreated Control	14.8 ± 2.5 A	90.0 ± 34.5 A	80.2 ± 14.0 A	26932.7 ± 5079.2 A	—	33 C
F Value	69.29	15.32	56.03	27.50	—	51.82
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.

CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003

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CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003: Early treatments were applied on 15 April 2003 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 16 May 2003. Conditions were clear with northwest 4 mph winds and temperature of 60°F at the time of early treatments. Conditions were partly cloudy with winds from the northwest at less than 4 mph and a temperature of 65°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 4E 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 1.0 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 25, 180° sweeps per replication. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Precounts averaged 13 ± 1 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 Lorsban 4E, 0.75(AI)/acre and untreated control plots on 9 June 2003 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. All treatments had fewer alfalfa weevil adults than the untreated control at one week after treatment. No treatment 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 Lorsban 4E, 0.75(AI)/acre yielded 3.0 tons/acre, 13.2% more than the untreated plots which yielded 2.3 tons/acre. The difference was not significant (two-tailed t-test, t=1.58, df=13, $p(t>t_{0.05})$=0.1371). Yield reduction measured since 1995 has averaged 9.5%, 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, weeds
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Alfalfa in 2002
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, 2003.

	ALFALFA WEEVIL LARVAE PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
Baythroid 2E, 0.0312	1.6 ± 0.5 C	1.5 ± 0.4 B	0.4 ± 0.2 B
Furadan 4F, 0.50 + dimethoate 4E, 0.25	1.0 ± 0.3 C	0.6 ± 0.1 B	1.0 ± 0.4 B
Mustang Max 0.8EC, 0.025	1.9 ± 0.6 BC	30.9 ± 29.5 B	1.4 ± 0.6 B
Furadan 4F, 0.50	0.9 ± 0.5 C	1.2 ± 0.7 B	4.2 ± 2.6 B
Furadan 4F, 0.25	0.7 ± 0.5 C	2.4 ± 0.6 B	4.6 ± 1.6 B
Baythroid 2E, 0.025 (early)	1.4 ± 0.5 C	7.7 ± 3.8 B	5.8 ± 3.0 B
Warrior T, 0.03	3.1 ± 1.8 BC	30.2 ± 28.4 B	11.8 ± 11.4 B
Warrior T, 0.02 (early)	1.5 ± 1.2 C	4.0 ± 0.6 B	6.5 ± 1.9 B
Mustang Max 0.8EC, 0.025 (early)	1.3 ± 0.4 C	4.7 ± 0.9 B	7.3 ± 2.0 B
Steward, 0.110	2.1 ± 0.6 BC	15.6 ± 2.1 B	14.0 ± 3.4 B
Warrior T, 0.02	16.0 ± 9.7 AB	52.2 ± 28.7 B	24.0 ± 13.5 B
Lorsban 4E, 0.75[2]	3.0 ± 1.5 BC	14.6 ± 7.9 B	20.1 ± 8.5 B
Steward, 0.065	4.3 ± 1.8 BC	19.8 ± 1.5 B	17.0 ± 2.5 B
Mustang Max 0.8EC, 0.02 (early)	3.2 ± 1.7 BC	18.0 ± 8.0 B	24.0 ± 12.5 B
Untreated Control[2]	18.1 ± 2.9 A	90.7 ± 10.3 A	58.2 ± 6.4 A
F Value	6.45	5.91	8.08
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, 2003.

	ALFALFA WEEVIL ADULTS PER SWEEP ± SEM[1]		
PRODUCT, LB(AI)/ACRE	**1 WEEK**	**2 WEEKS**	**3 WEEKS**
Furadan 4F, 0.50	0.2 ± 0.1 B	0.5 ± 0.1	1.5 ± 0.2
Furadan 4F, 0.25	0.3 ± 0.2 B	0.8 ± 0.3	1.6 ± 0.5
Warrior T, 0.03	0.3 ± 0.1 B	1.1 ± 0.3	2.2 ± 0.6
Warrior T, 0.02	0.4 ± 0.1 B	0.6 ± 0.2	1.9 ± 0.7
Mustang Max 0.8EC, 0.025	0.4 ± 0.1 B	0.9 ± 0.5	2.5 ± 0.8
Furadan 4F, 0.50 + dimethoate 4E, 0.25	0.4 ± 0.3 B	0.2 ± 0.0	1.2 ± 0.3
Steward, 0.065	0.5 ± 0.3 B	0.9 ± 0.5	1.6 ± 0.7
Baythroid 2E, 0.0312	0.4 ± 0.1 B	1.0 ± 0.1	2.1 ± 0.5
Steward, 0.110	0.7 ± 0.6 B	0.3 ± 0.2	1.7 ± 0.7
Lorsban 4E, 0.75[2]	0.6 ± 0.2 B	1.0 ± 0.2	1.4 ± 0.5
Untreated Control[2]	0.6 ± 0.2 B	0.9 ± 0.1	1.4 ± 0.2
Mustang Max 0.8EC, 0.02 (early)	0.6 ± 0.2 B	0.8 ± 0.2	0.9 ± 0.2
Mustang Max 0.8EC, 0.025 (early)	0.8 ± 0.2 B	0.9 ± 0.4	1.0 ± 0.5
Warrior T, 0.02 (early)	1.7 ± 0.3 A	1.4 ± 0.4	1.0 ± 0.1
Baythroid 2E, 0.025 (early)	2.0 ± 0.6 A	1.2 ± 0.2	0.9 ± 0.4
F Value	4.31	1.75	1.44
p > F	< 0.0001	0.0756	0.1701

[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, 2003.

PRODUCT, LB(AI)/ACRE	PEA APHIDS PER SWEEP ± SEM[1]		
	1 WEEK	2 WEEKS	3 WEEKS
Furadan 4F, 0.50 + dimethoate 4E, 0.25	1.0 ± 0.1 B	4.2 ± 0.9 E	5.7 ± 1.5 D
Mustang Max 0.8EC, 0.025	2.8 ± 1.9 B	6.9 ± 1.7 DE	9.0 ± 2.2 CD
Baythroid 2E, 0.0312	1.6 ± 0.5 B	8.7 ± 2.4 DE	13.2 ± 3.5 BCD
Lorsban 4E, 0.75[2]	2.2 ± 0.6 B	11.9 ± 2.5 CDE	10.2 ± 2.3 BCD
Furadan 4F, 0.25	3.3 ± 0.5 AB	15.1 ± 5.2 BCDE	9.1 ± 3.4 CD
Furadan 4F, 0.50	2.8 ± 0.7 B	15.4 ± 2.1 ABCDE	19.1 ± 4.1 ABCD
Warrior T, 0.02	5.3 ± 1.6 AB	17.1 ± 3.2 ABCDE	5.3 ± 1.4 D
Untreated Control[2]	6.0 ± 0.6 AB	19.4 ± 3.9 ABCDE	8.8 ± 1.8 CD
Mustang Max 0.8EC, 0.025 (early)	4.8 ± 0.7 AB	22.3 ± 6.0 ABCD	24.4 ± 8.7 ABCD
Warrior T, 0.03	2.1 ± 1.2 B	22.7 ± 5.4 ABCD	11.1 ± 4.9 BCD
Warrior T, 0.02 (early)	4.6 ± 0.7 AB	28.9 ± 3.0 ABC	20.2 ± 4.4 ABCD
Mustang Max 0.8EC, 0.02 (early)	6.1 ± 2.5 AB	34.9 ± 8.7 AB	38.6 ± 7.3 A
Steward, 0.065	9.6 ± 2.7 A	38.5 ± 2.3 A	28.7 ± 7.1 ABC
Baythroid 2E, 0.025 (early)	3.7 ± 0.8 AB	38.2 ± 8.0 A	31.1 ± 7.5 AB
Steward, 0.110	9.9 ± 2.5 A	39.4 ± 7.3 A	26.9 ± 12.0 ABC
F Value	4.90	6.55	5.63
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.

CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2003

Shawn Walter, Jeff Rudolph, Terri Randolph, Laurie Kerzicnik, Hayley Miller, Silas Davidson, Dan Natan, Aubrey Sloat, Jesse Stubbs, Mahesh Venkataraman, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF WESTERN CORN ROOTWORM IN CORN, ARDEC, FORT COLLINS, CO, 2003: Planting time and seed treatments were planted on 23 May 2003. 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 20 June 2003. All cultivation treatments were applied with modified Wintersteiger meters held 2 inches above the plant, 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 consecutive plants per plot on 10 July 2003. 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 to low. The previous year's dry weather combined with soil compaction may have affected fall egg laying. No planting time or cultivation treatments had less damage than the untreated control. No phytotoxicity was observed with any treatment.

Planting time Counter 20CR treatments yielded 101 bushels/acre, 5.7% less than the untreated plots which yielded 113 bushels/acre but the difference was not significant (two-tailed t-test, t=-1.44, df=26, $p(t>t_{0.05})$ =0.1605). Yield reduction measured between 1987-2003 have averaged 12.8%, 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:	23 May 2003
Irrigation:	furrow
Crop History:	Corn in 2001, 2002
Herbicide:	Mirage, 1.25 qt/acre, Spray grade ammonium sulfate, 20 gal/acre on 18 June 2003
Insecticide:	None prior to experiment
Fertilization:	50 N
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 and seed treatments, ARDEC, Fort Collins, 2003

PRODUCT	RATE	ROOT RATING[1]	EFFICIENCY[2]
Poncho, Seed treatment[5]	1.25	2.1	100
Cruiser, Seed treatment[5]	0.25	2.3	100
Counter 15G[4]	8.0 oz	2.3	94
Aztec 2.1G[4]	6.7 oz	2.3	94
Untreated Control[3]	—	2.5	89
Counter 20CR[3,4]	6 oz	2.6	89
Cruiser, Seed treatment[5]	1.25	2.6	75
Lorsban 15G[4]	8 oz	2.7	83
Cruiser, Seed treatment[5]	0.125	2.7	75
Force 3G[4]	5 oz	2.9	61
F Value		1.11	—
p > F		0.3727	—

[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.
[4]Oz of product/1000 row ft
[5]4 mg a.i./kernel

Table 2. Control of western corn rootworm with cultivation treatments, ARDEC, Fort Collins, 2003

PRODUCT	RATE[3]	ROOT RATING[1]	EFFICIENCY[2]
Lorsban 15G	8 oz	2.1	100
Force 3G	5 oz	2.4	100
Untreated Control	—	2.5	89
Thimet 20G	6 oz	2.5	94
Counter 15G	8 oz	2.6	94
Counter 20CR	6 oz	2.6	89
F Value		1.84	—
p > F		0.1405	—

[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, 2003

Shawn Walter, Terri Randolph, Jeff Rudolph, Jesse Stubs, Aubrey Sloat, Dan Natan, Emily Talmich, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

CONTROL OF BANKS GRASS MITE IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2003: Treatments were applied on 12 August 2003 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, calm and 65°F temperature at the time of treatment. 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 9 July 2003 by laying mite infested corn leaves across the corn plants on which mites were to be counted. On 15 July 2003, 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 11 August 2003 averaged 15 ± 2 mites per leaf. Mite counts and mite days (calculated by the method of Ruppel, J. Econ. Entomol. 76: 375-377) were transformed by the log + 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 moderate. No treatments had fewer mites than the untreated control at 1, 2 and 3 weeks after treatment. 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:	Pioneer ‘38P05'
Planting Date:	6 May 2003
Plant Population:	32,000
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Barley in 2002
Herbicide:	Accent, 2/3 oz/acre + NIS, 0.25% on 12 June 2003
Fertilization:	120 N, 80 P
Soil Type:	Clay loam, OM 3.3%, pH 7.7
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (south side of Block 1080)

Table 1. Control of corn spider mites with hand-applied insecticides, ARDEC, Fort Collins, CO, 2003.

PRODUCT, LB (AI)/ACRE	MITES PER LEAF ± SEM [1]			TOTAL MITE DAYS	% REDUCTION[2]
	1 WEEK	2 WEEKS	3 WEEKS		
Furadan 4F + dimethoate 4E, 1.00+0.50	16.0 ± 8.4	6.5 ± 3.0	45.8 ± 13.5	1700.1 ± 367.4	79
Capture 2E, 0.08	10.6 ± 3.6	15.9 ± 3.1	34.6 ± 16.9	2419.6 ± 477.1	70
Dimethoate 4E, 0.50	17.0 ± 8.8	24.5 ± 11.3	55.2 ± 7.3	2781.0 ± 594.6	66
Capture 2E + dimethoate 4E, 0.08+0.50	11.9 ± 2.0	31.8 ± 20.9	45.3 ± 16.3	2958.3 ± 1373.5	64
Furadan 4F, 1.00	9.3 ± 2.7	12.4 ± 7.9	93.5 ± 31.3	3149.4 ± 1084.4	62
Comite II 6E + dimethoate 4E, 2.53+0.50	17.8 ± 4.0	16.0 ± 5.5	94.0 ± 25.2	3413.6 ± 877.6	58
Comite II 6E, 2.53	24.4 ± 12.1	30.6 ± 17.1	108.7 ± 35.6	4974.5 ± 1727.3	39
Untreated Control	9.1 ± 5.5	66.8 ± 23.8	157.8 ± 64.3	8181.5 ± 2499.8	—
F Value	0.35	1.74	1.45	2.25	—
p > F	0.9219	0.1545	0.2380	0.0709	—

[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.

THE 2003 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:

2003 Light Trap Operators		2003 Pest Survey Committee	
Bonny Dam	Bill Cody Jr. and Family	Allan Brax	Frank Peairs
Burlington	Dale Hansen	Mike Ferrari	Jack Rhodes
Eckley	Merle and Hazel Gardner	Pete Forster	Clay Smith
Holyoke	Scott Korte	Dave Green	Merlin Van Deraa
Kirk	Gene Nelson	Gene Kleve	Kathryn Wenger
Wauneta	Kylie Lenz	Ron Meyer	
Wray	Randy Doke		
Yuma	Irrigated Research Farm		

Contributors to the 2003 Golden Plains Pest Survey Program

Akron:	Birdsall Young, Jr., Hickert Brothers, Lynn Shook (CSAC Member)
Amherst:	Jim Tomky, Keith Rodeman
Anton:	Anton Coop, Newell & John Herron
Arriba:	Darrel Lehrkamp (Tri-Me Spraying Service)
Bethune:	Ken Hildenbrandt (Warrior Aviation), Tim Stahlecket (CSAC Member)
Brush:	David Wagers
Burlington:	Western Fertilizer Co, LaVern Hoskins (Stratton Equity Coop), Ron Meyer (CSAC Interim Director), John Fortmeyer (3 JF Inc), Dale Hansen, Bill & Billie Hinkhouse, Barry Hinkhouse, Gary Mulch (Mulch Farms), Louis Nider (Nider Farms), Clay Smith (High Plains Ag Service Inc), Ryan Weaver, Jim Whitmore (CSAC Alternate)
Cheyenne Wells:	Scott Scheimer (CSAC Member/Atlernate)
Cope:	Ed and Ellen Cecil (Cecil Ranch), Sackett's Inc
Eads:	Jeff Uhland (CSAC Alternate)
Eaton:	Pete Forster (Syngenta Crop Protection), David Barnes (CSAC Alternate)
Eckley:	Max Schafer, Merle and Hazel Gardner (Spittoon Ranch), Kathy Wenger
Flagler:	Dallas Saffer (Flagler Aerial Spraying Inc), Wes Pollart (Flagler Coop), Garrett Mitchek (CSAC Member)
Fleming:	Dean Sonnenberg (CSAC Member)
Fort Morgan:	Steve Norberg (Morgan County Extension Center)
Genoa:	Robert Boyd (CSAC Member/Alternate)
Grant, NE:	Larry Appel (Appel Crop Consulting, Inc)
Greeley:	Tom Farris (UAP Pueblo)
Haigler, NE:	Jerry Olsen (Dundy Ag Service, Inc)
Haxtun:	Quentin Biesemeier (Biesemeier Farms Inc), Cal Birkhofer (Grainland Coop), Dora Gregory (Gregory Ag Consulting LLC), Larry McConnell (Pioneer Seed), Anderson Alfalfa Co Inc, Larry Anderson (Zion Farms), Roland Barkey (CSAC Alternate)
Holyoke:	Roger Gordon (Holyoke Coop), Mike Einspahr, Gary Korte, Lenz Farms, Jack Rhodes
Idalia:	Ken Penzing (Vision Seed & Supply/Pioneer), Randy Boden (Stratton Equity Coop)
Joes:	Richard Schneider (Schneider Farms Inc)
Julesburg:	Gary Lancaster (Sedgwick County Extension)
Kearney, NE:	Rick Reinsch (Field Goal Agronomics Inc)
Keenesburg:	Leon Zimbelman (CSAC Member)

Kirk:	Doug, Darrell and James Idler (Idler Brothers), First National Bank of Kirk, Gene Nelson
McDonald, KS:	C. W. Antholz
Otis:	Gene Perry (Perry Brothers Seed), Steve Perry (High Prairie Ag Inc)
Sterling:	Frank Molinaro (Ag Crop Services)
Stratton:	Paul Barr (Stratton Equity Coop), Mike Livingston
Stromsburg, NE:	Gail Stratman (FMC)
Sutherland, NE:	John Flynn (J. C. Robinson Seeds)
Walsh:	James Hume (CSAC Member)
Watkins:	David Kissler (CSAC Alternate)
Wray:	Don Godsey, Y-W Well Testing, Durand Fix (D&D Farms), Larry Gardner (Covenant Farms), Steve & Ronda Hays, Dwight & Nancy Rockwell, Alan Welp (Welp Farms), Dave Wilson (STALK Inc), Jim Bowman, Randy Doke, Daryl Monasmith (PMC West Crop Consulting)
Yuma:	Merlin Van Deraa (Terra Firma Ag Consulting), Carroll Josh, Irrigation Research Foundation, Bartlett Grain, Don and Peggy Brown, Yuma Ag Service

SUMMARY OF 2003 LIGHT AND SUCTION TRAP CATCHES

The following graphs compare the 2003 European corn borer and western bean cutworm moth flights with the historical average moth flight (including 2003) 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

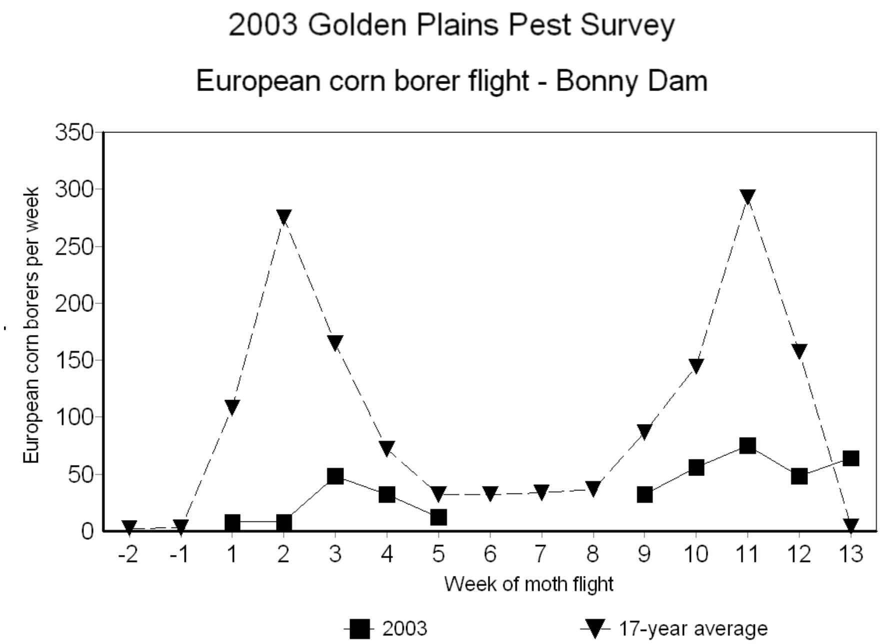
First generation European corn borer moth flight began on or before the week of 5 June and peaked the week of 19 June. All locations had lower trap captures of first generation moths compared to the historical average.

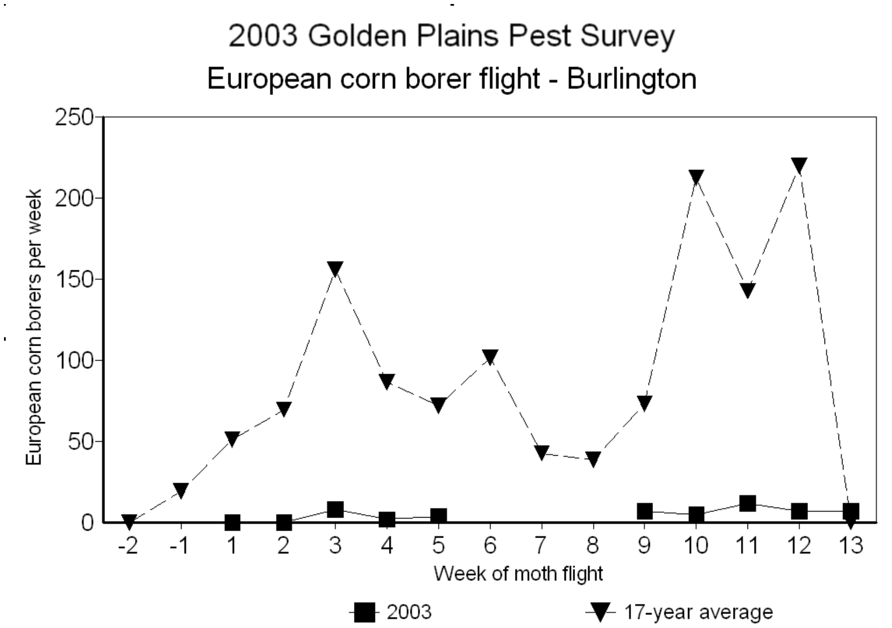
Second generation flight peaked the week of 14 August in most locations. All locations had lower trap captures of first generation moths compared to the historical average.

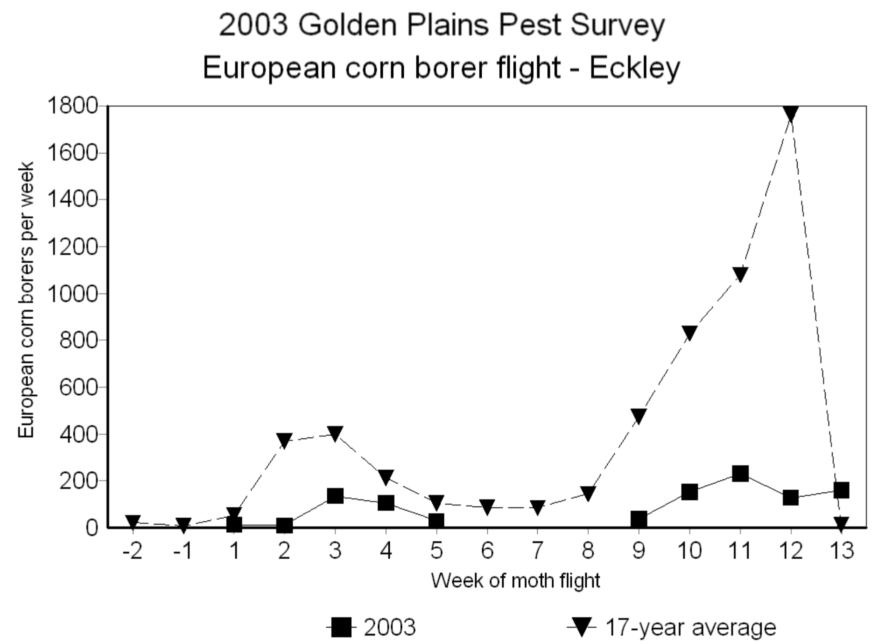
Western Bean Cutworm

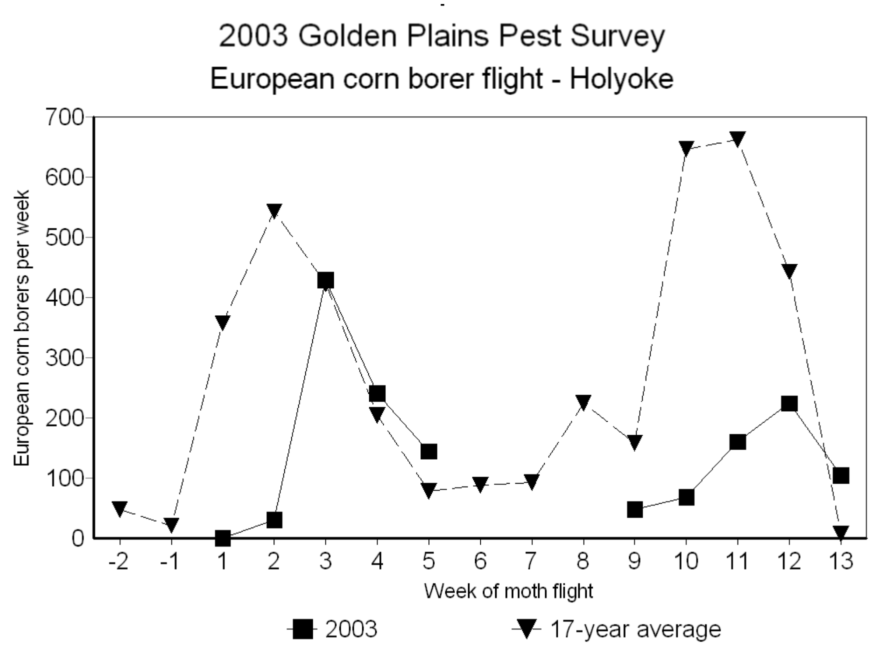
Western bean cutworm moth flight activity began the week of 26 June and peaked the week of 24 July in most locations. Holyoke and Wauneta had high trap captures of western bean cutworm moths compared to the historical average.

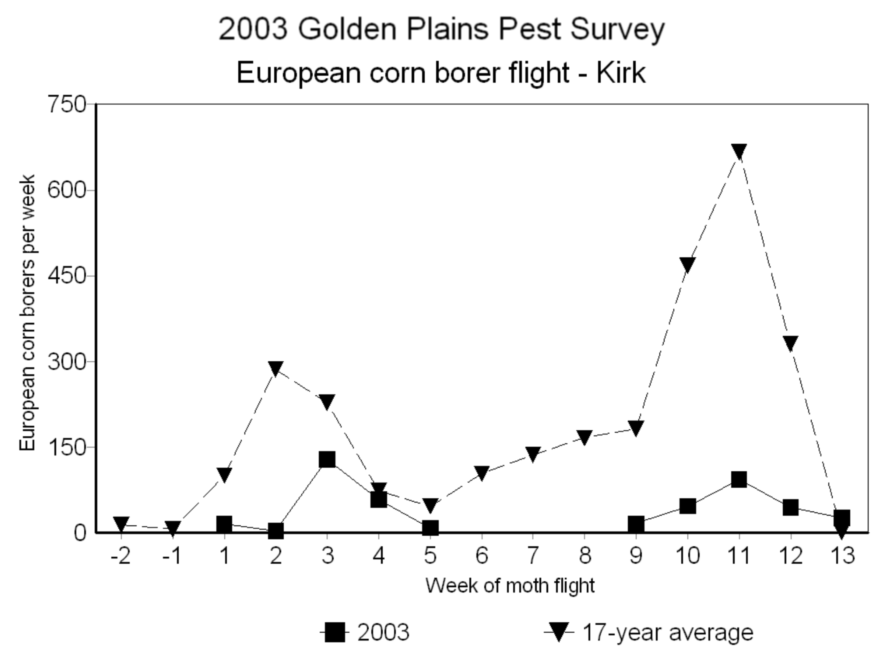
Note that the y-axis scale changes from graph to graph (number of moths caught per week).

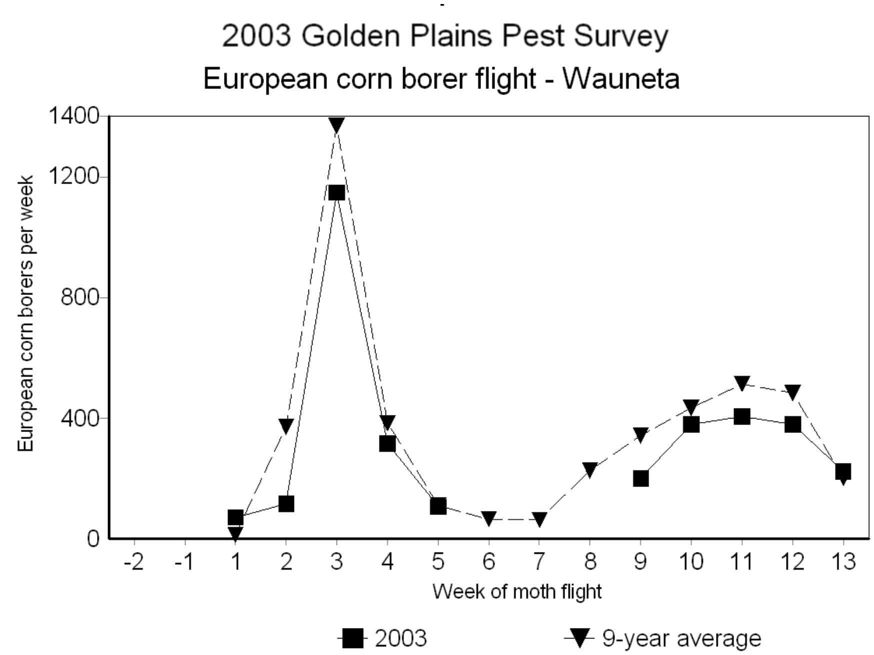

2003 Golden Plains Pest Survey
European corn borer flight - Bonny Dam
European corn borers per week
350
300
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
17-year average

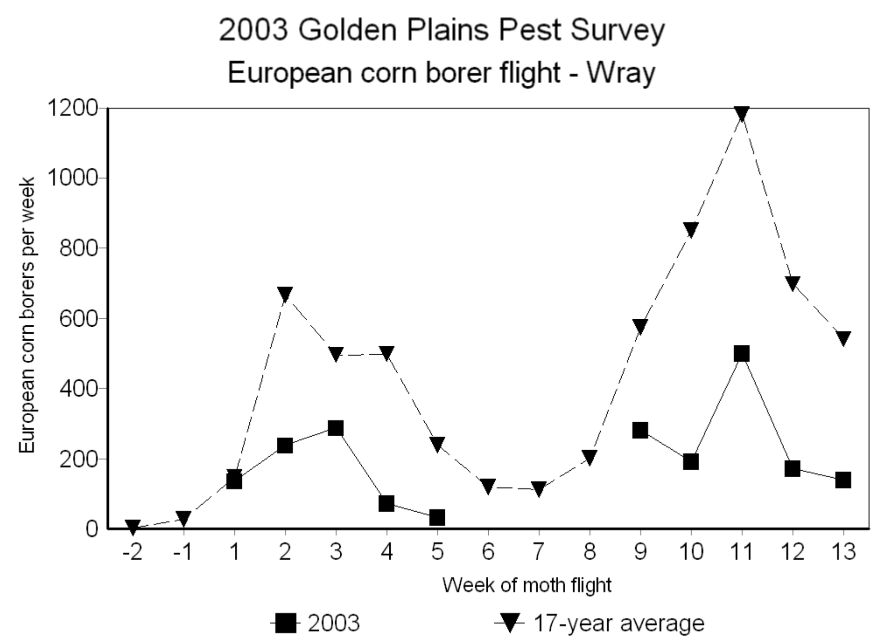

2003 Golden Plains Pest Survey
European corn borer flight - Burlington
European corn borers per week
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
17-year average

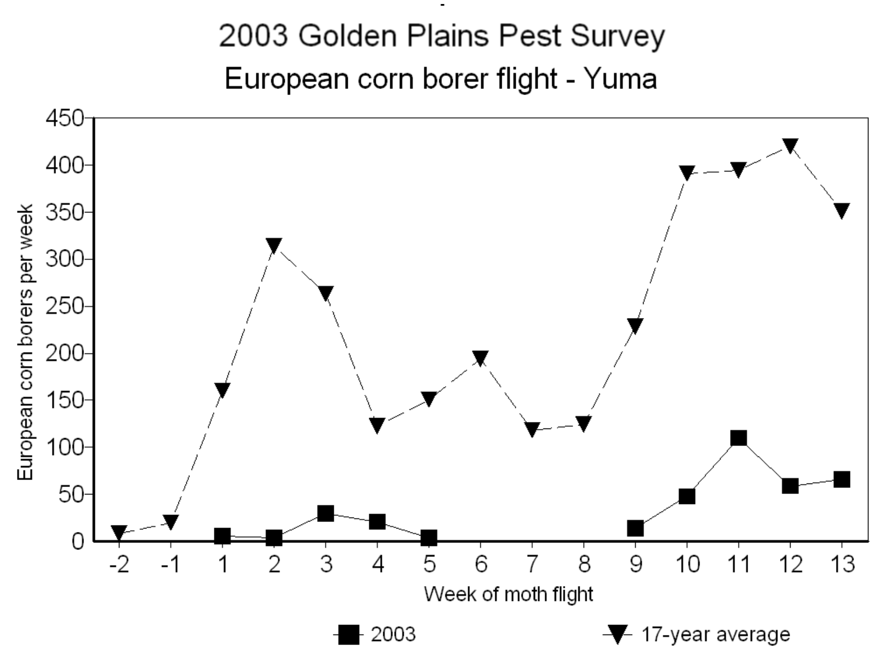

2003 Golden Plains Pest Survey
European corn borer flight - Eckley
European corn borers per week
1800
1600
1400
1200
1000
800
600
400
200
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2003
17-year average

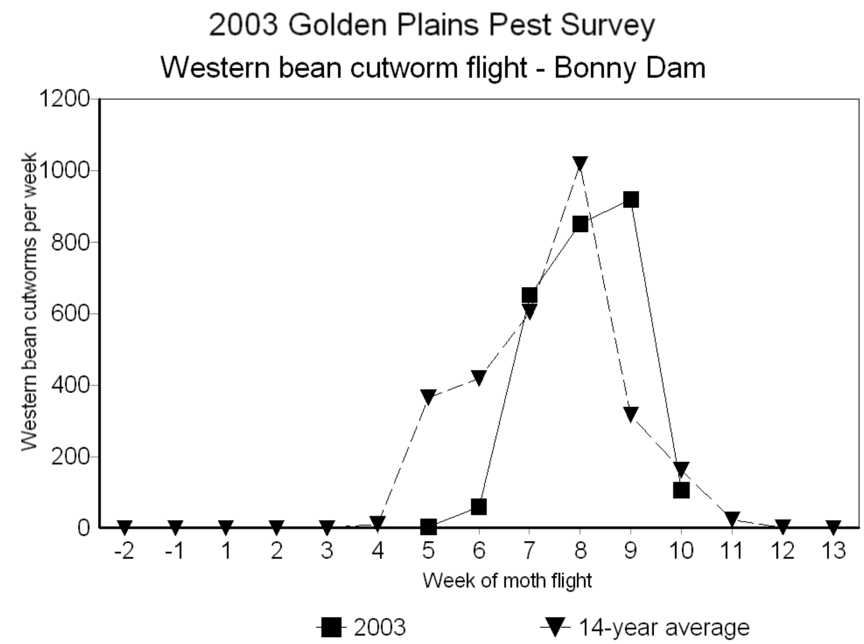

2003 Golden Plains Pest Survey
European corn borer flight - Holyoke
European corn borers per week
700
600
500
400
300
200
100
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2003
17-year average

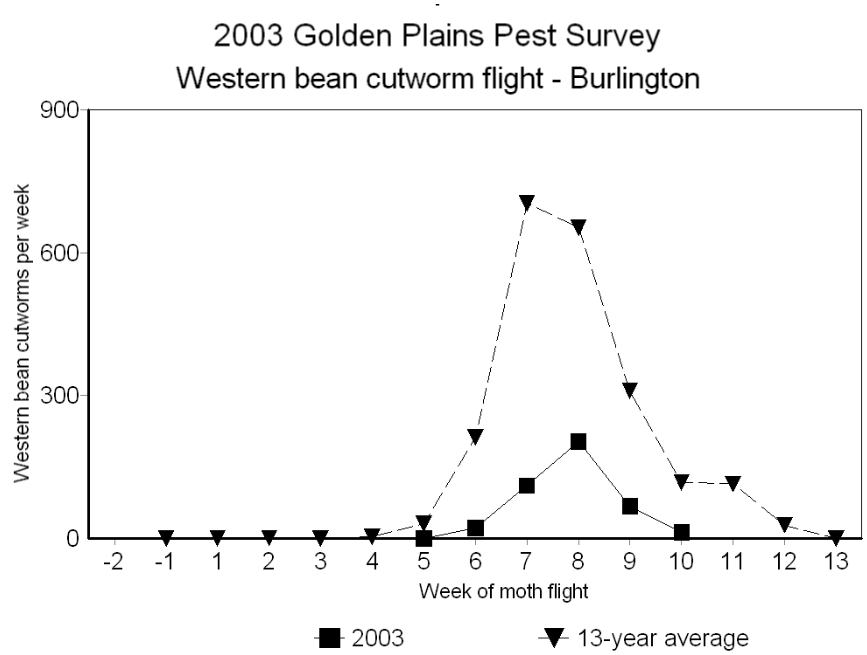

2003 Golden Plains Pest Survey
European corn borer flight - Kirk
European corn borers per week
750
600
450
300
150
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
17-year average

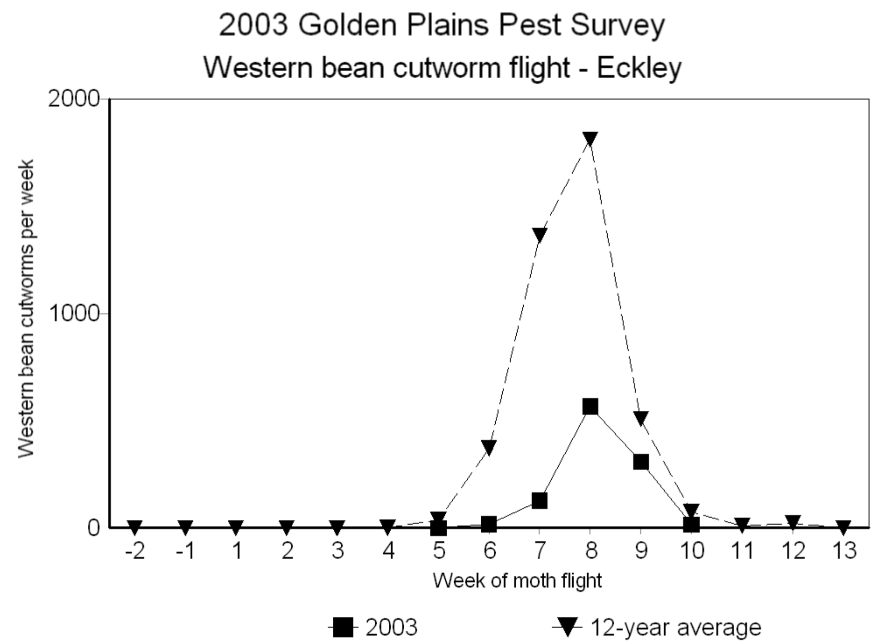

2003 Golden Plains Pest Survey
European corn borer flight - Wauneta
European corn borers per week
1400
1200
800
400
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
9-year average


2003 Golden Plains Pest Survey
European corn borer flight - Wray
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
2003
17-year average

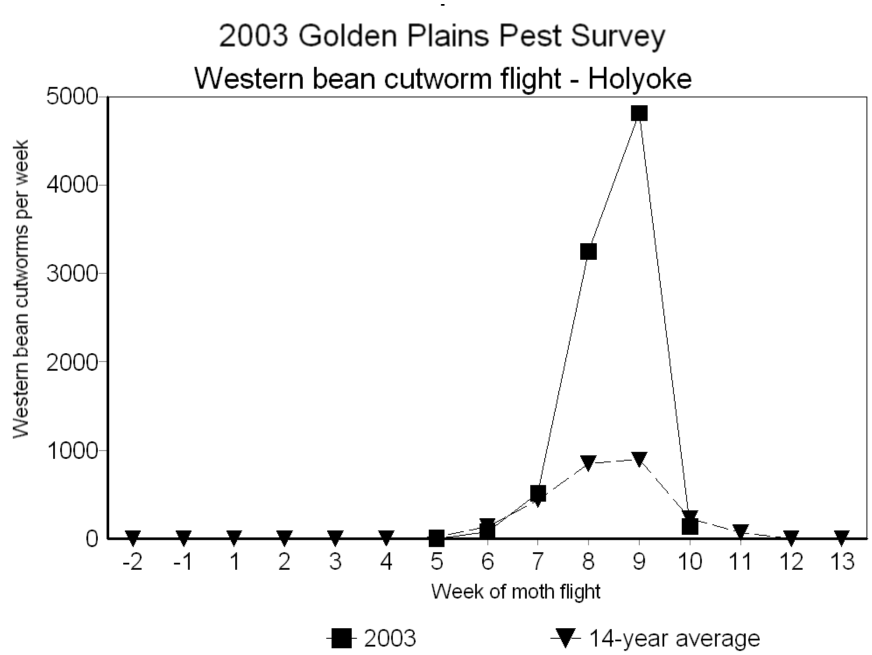

2003 Golden Plains Pest Survey
European corn borer flight - Yuma
European corn borers per week
450
400
350
300
250
200
150
100
50
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
17-year average


2003 Golden Plains Pest Survey
Western bean cutworm flight - Bonny Dam
Western bean cutworms 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
2003
14-year average

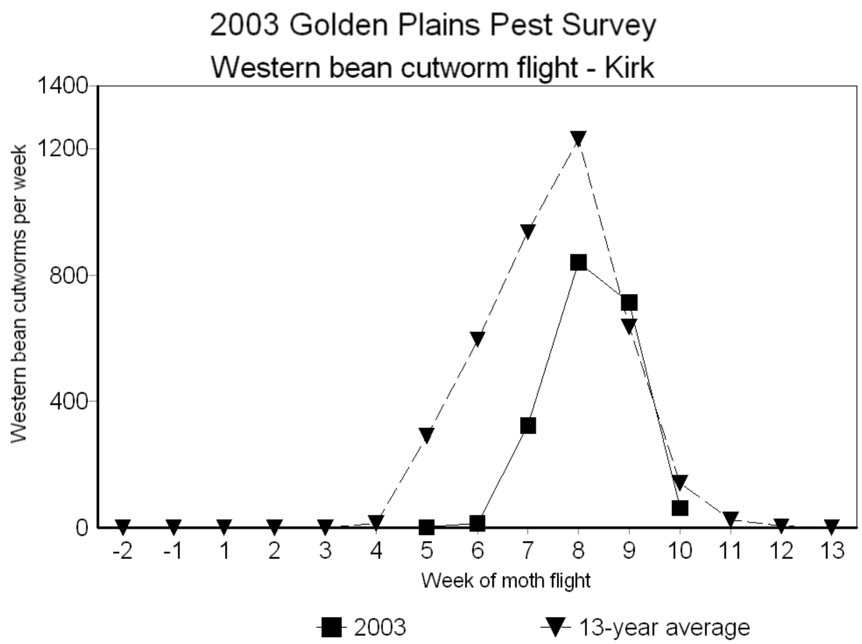

2003 Golden Plains Pest Survey
Western bean cutworm flight - Burlington
Western bean cutworms per week
900
600
300
0
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
13-year average



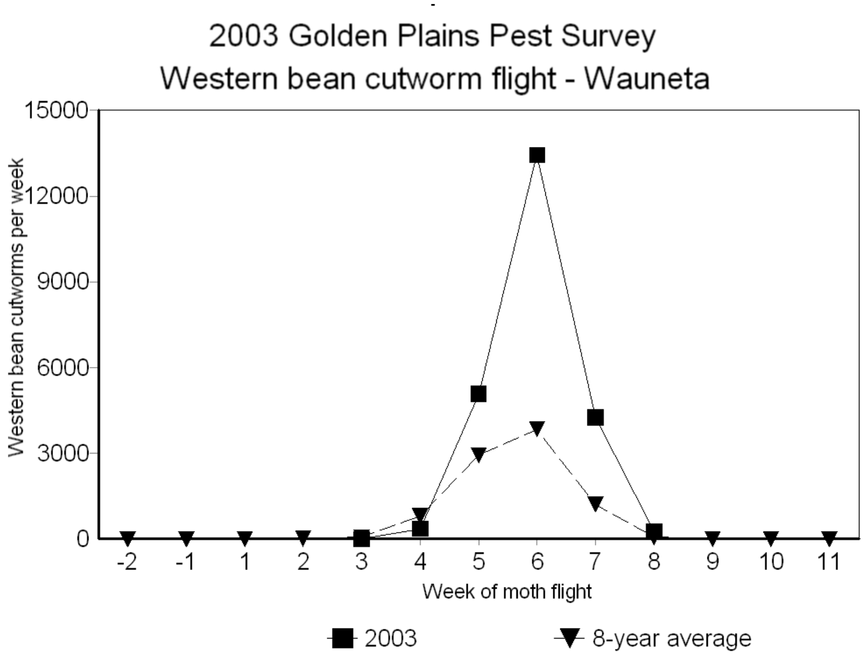
2003 Golden Plains Pest Survey
Western bean cutworm flight - Eckley
Western bean cutworms per week
2000
1000
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2003
12-year average



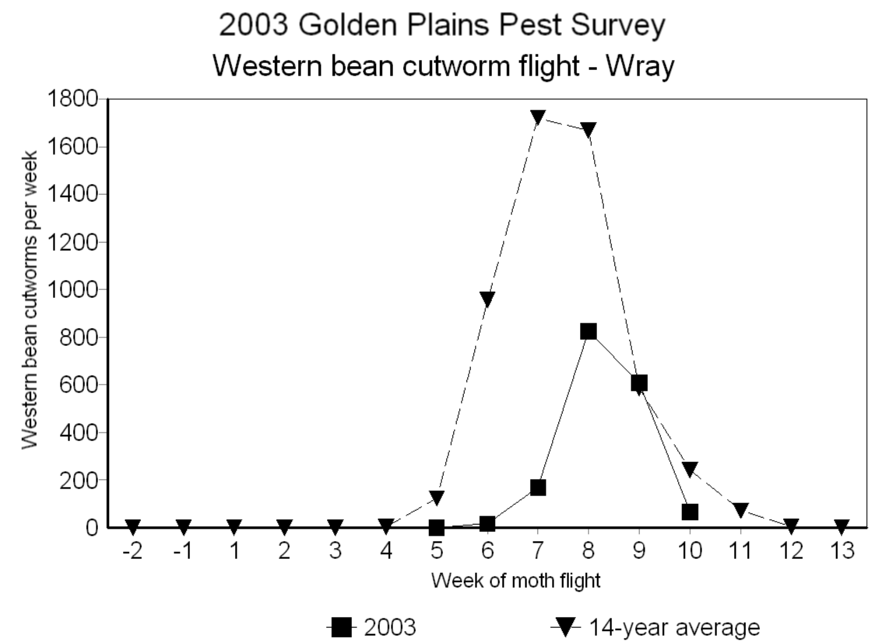
2003 Golden Plains Pest Survey
Western bean cutworm flight - Holyoke
Western bean cutworms per week
5000
4000
3000
2000
1000
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13
Week of moth flight
2003
14-year average



2003 Golden Plains Pest Survey
Western bean cutworm flight - Kirk
Western bean cutworms 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
2003
13-year average



2003 Golden Plains Pest Survey
Western bean cutworm flight - Wauneta
Western bean cutworms per week
15000
12000
9000
6000
3000
0
-2 -1 1 2 3 4 5 6 7 8 9 10 11
Week of moth flight
2003
8-year average


2003 Golden Plains Pest Survey
Western bean cutworm flight - Wray
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
2003
14-year average

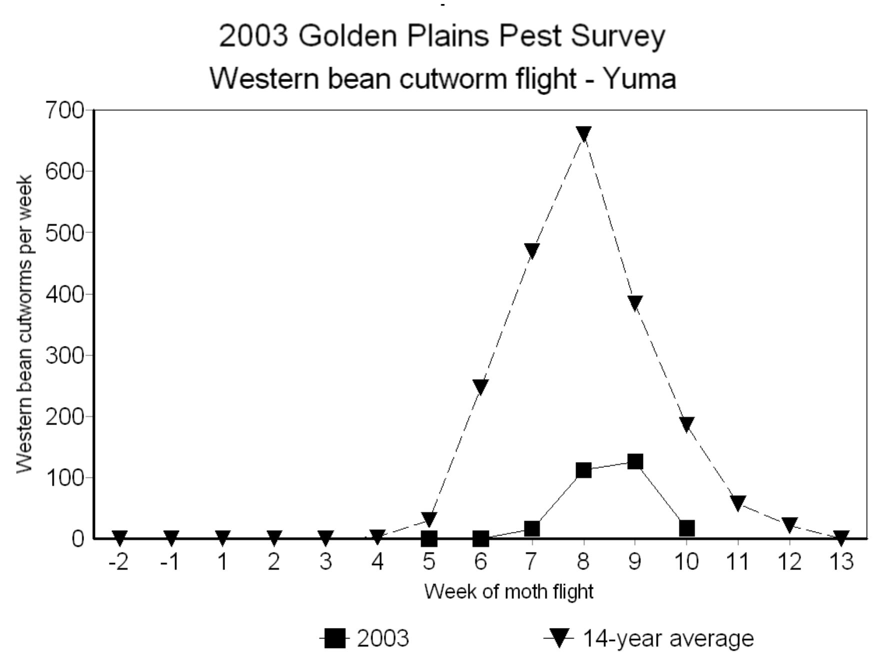

2003 Golden Plains Pest Survey
Western bean cutworm flight - Yuma
Western bean cutworms per week
0
100
200
300
400
500
600
700
-2
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
Week of moth flight
2003
14-year average

Table 1. Russian wheat aphid suction trap results at four Colorado locations, 1987-2003.

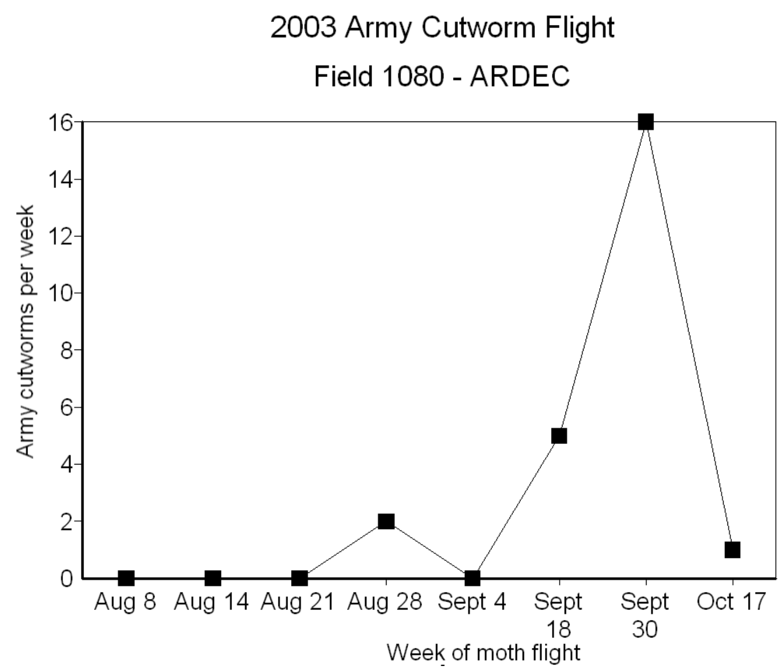
	AKRON	BRIGGSDALE[1]	LAMAR	WALSH
1987	—	1832	—	392
1988	172	92	0	4636
1989	177	102	112	5003
1990	1234	1353	1315	1275
1991	79	1679	703	883
1992	186	1685	0	789
1993	7	2	69	374
1994	496	867	84	3216
1995	73	322	700	361
1996	66	502	1	—
1997	301	216	1775	2501
1998	36	550	—	31
1999	1257	573	—	257
2000	121	430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

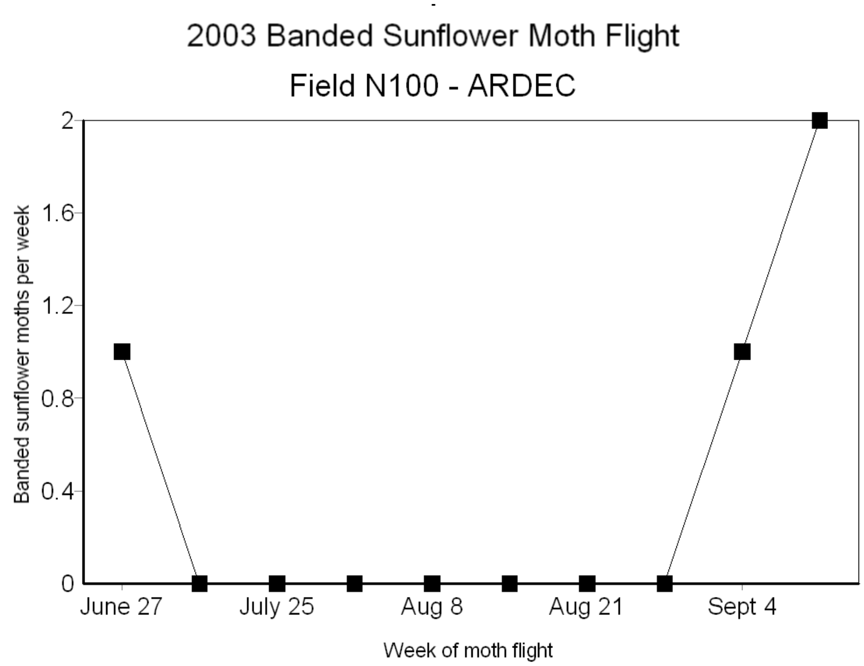
[1]Trap moved to ARDEC (Agricultural Research, Development and Education Center, Colorado State University, Fort Collins, CO) from Briggsdale in 1990. Trap moved back to another location near Briggsdale in 1999.
[2]Trap was non-functional June-August 2002.
[3]Trap was non-functional April-May 2003.

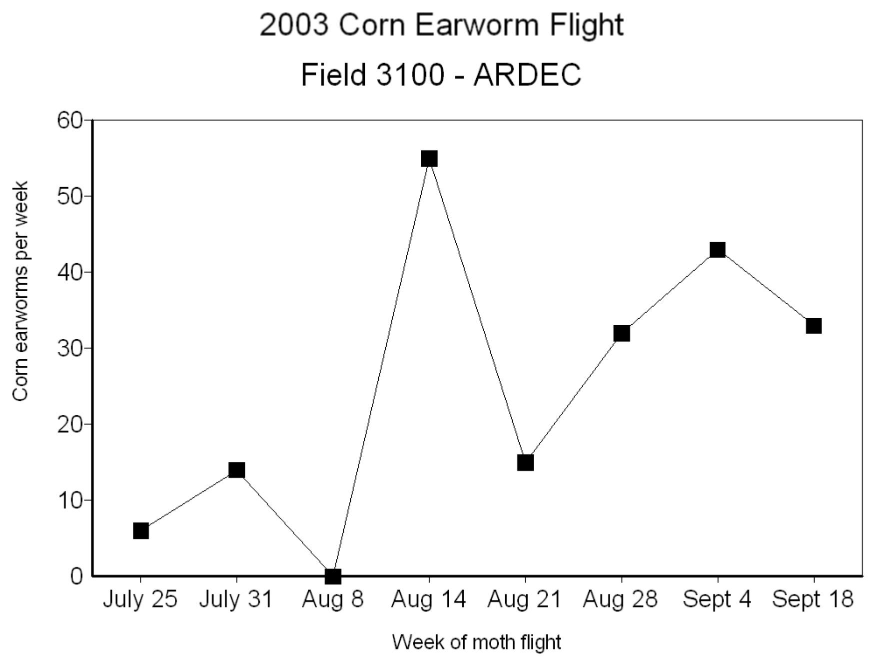
PHEROMONE TRAPS, ARDEC, 2003

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 no moths trapped for the season. Counts were low for all insects except corn earworm. This year's pheromone trapping was coordinated by Jesse Stubbs.

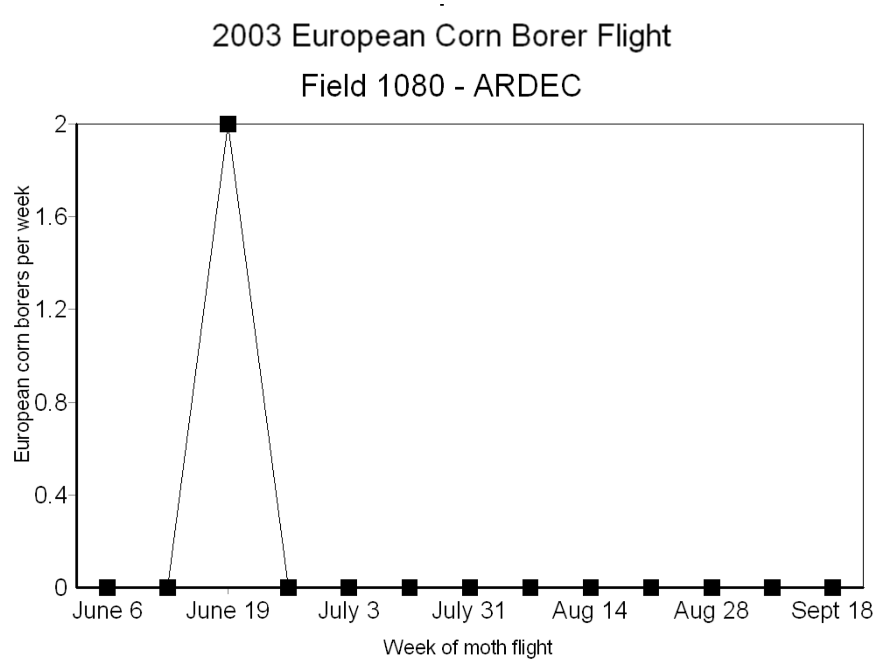
Note that the y-axis scale changes from graph to graph (number of moths caught per week).



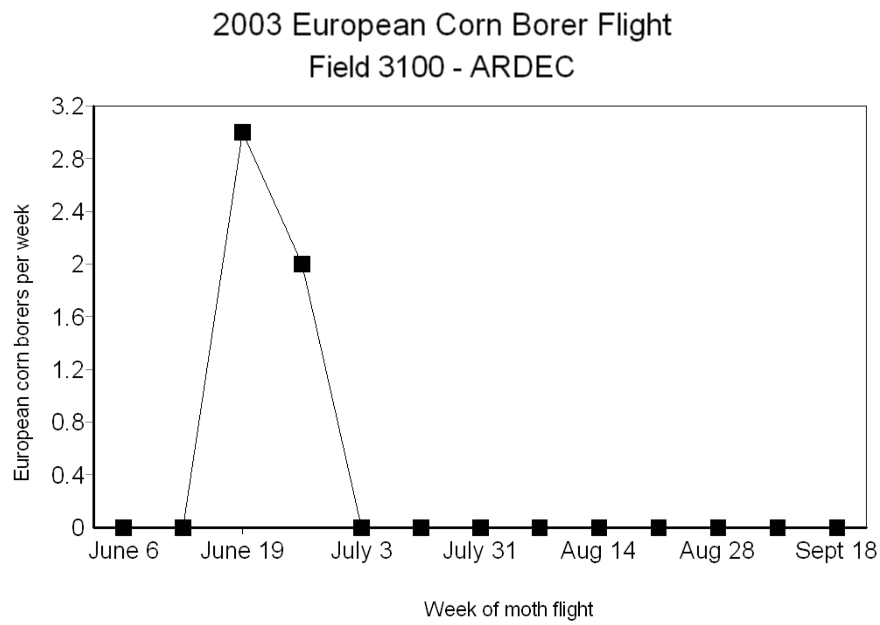


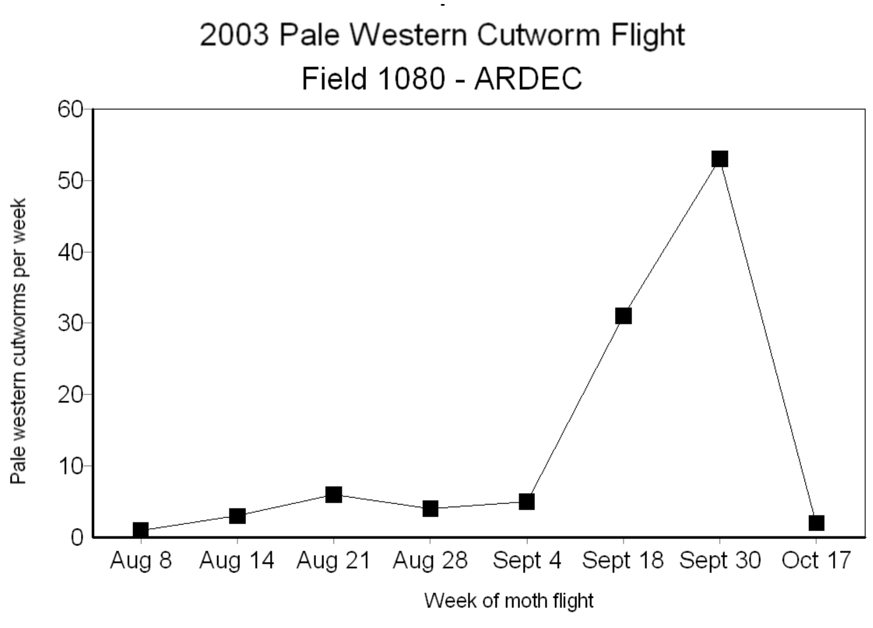


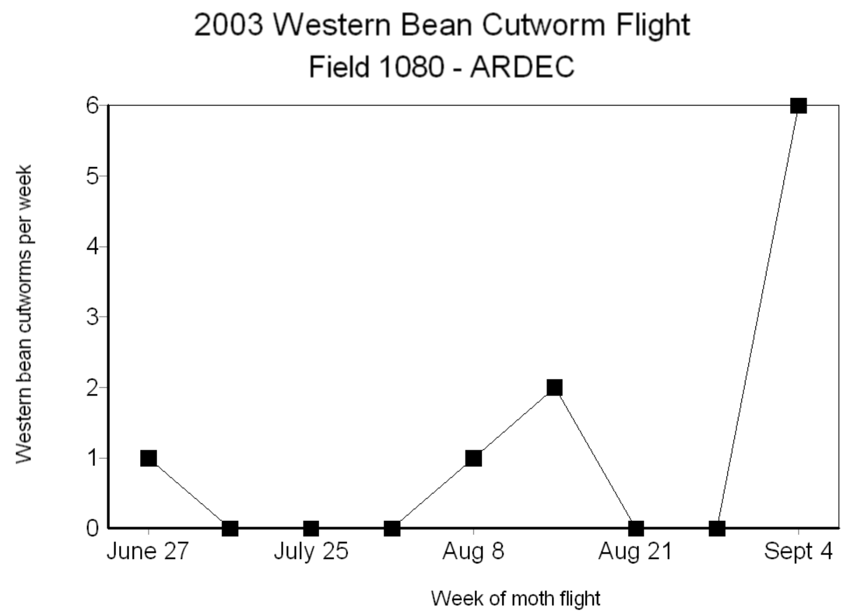
2003 Corn Earworm Flight
Field 3100 - ARDEC
Corn earworms per week
60
50
40
30
20
10
0
July 25
July 31
Aug 8
Aug 14
Aug 21
Aug 28
Sept 4
Sept 18
Week of moth flight

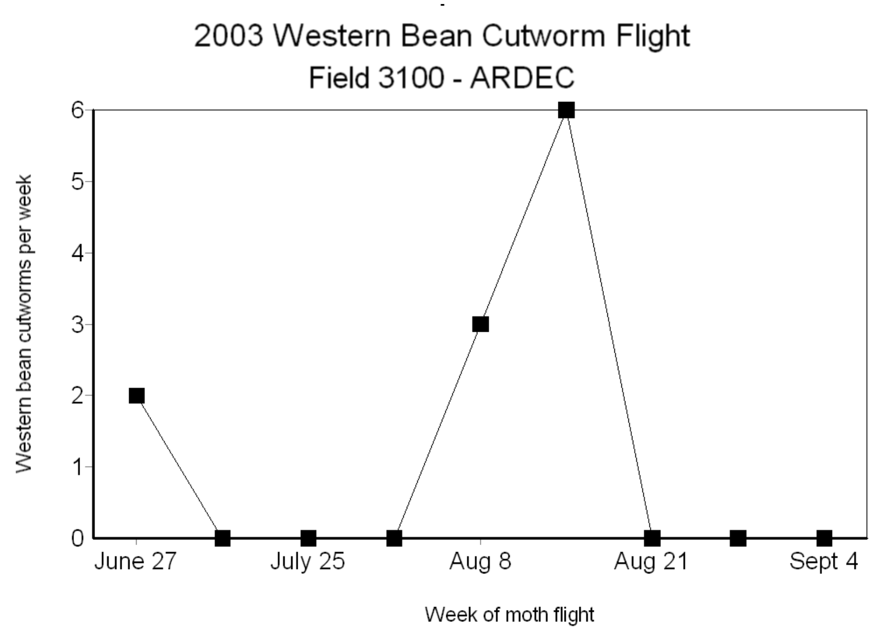


2003 European Corn Borer Flight
Field 1080 - ARDEC
European corn borers per week
2
1.6
1.2
0.8
0.4
0
June 6
June 19
July 3
July 31
Aug 14
Aug 28
Sept 18
Week of moth flight


2003 European Corn Borer Flight
Field 3100 - ARDEC
European corn borers per week
3.2
2.8
2.4
2
1.6
1.2
0.8
0.4
0
June 6
June 19
July 3
July 31
Aug 14
Aug 28
Sept 18
Week of moth flight


2003 Pale Western Cutworm Flight
Field 1080 - ARDEC
Pale western cutworms per week
60
50
40
30
20
10
0
Aug 8
Aug 14
Aug 21
Aug 28
Sept 4
Sept 18
Sept 30
Oct 17
Week of moth flight


2003 Western Bean Cutworm Flight
Field 1080 - ARDEC
Western bean cutworms per week
0
1
2
3
4
5
6
June 27
July 25
Aug 8
Aug 21
Sept 4
Week of moth flight


2003 Western Bean Cutworm Flight
Field 3100 - ARDEC
Western bean cutworms per week
0
1
2
3
4
5
6
June 27
July 25
Aug 8
Aug 21
Sept 4
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, 1987-2003, in northern Colorado

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
AZTEC 2.1G	2.6 (25)
COUNTER 15G	2.6 (27)
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 (3)
FORTRESS 5G	2.8 (14)
LORSBAN 15G	3.0 (21)
REGENT 4SC, 3-5 GPA	3.0 (5)
THIMET 20G	3.4 (15)
UNTREATED CONTROL	4.1 (31)

[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, 1987-2003, in northern Colorado.

INSECTICIDE	IOWA 1-6 ROOT RATING[1]
COUNTER 15G	2.7 (19)
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 (15)
THIMET 20G	2.9 (19)
UNTREATED CONTROL	4.2 (23)

[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, 1984-2003, in northern Colorado.

PRODUCT	LB (AI)/ACRE	% CONTROL AT 2 WK[1]
BAYTHROID 2E	0.025	96 (10)
FURADAN 4F	0.25	86 (12)
FURADAN 4F	0.50	91 (25)
FURADAN 4F+DIMETHOATE 4E	0.50 + 0.25	86 (6)
LORSBAN 4E	0.75	93 (17)
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 (14)
WARRIOR 1E or T	0.02 (early)	61 (4)
WARRIOR 1E or T	0.03	86 (3)

[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, 1986-2003[1].

PRODUCT	LB (AI)/ACRE	TESTS WITH > 90% CONTROL	TOTAL TESTS	% TESTS
LORSBAN 4E	0.50	23	39	59
DI-SYSTON 8E	0.75	16	41	39
DIMETHOATE 4E	0.375	7	33	21
DI-SYSTON 8E	0.50	2	10	20
PENNCAP M	0.75	3	19	17
LORSBAN 4E	0.25	7	21	33
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, 1993-2003.

PRODUCT	LB (AI)/ACRE	% REDUCTION IN TOTAL MITE DAYS[1]
CAPTURE 2E	0.08	59 (10)
CAPTURE 2E + DIMETHOATE 4E	0.08 + 0.50	67 (10)
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	44 (10)
FURADAN 4F + DIMETHOATE 4E	1.00 + 0.50	51 (5)

[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

2003 TEST PLOT COOPERATORS

ALFALFA	ARDEC	Fort Collins
BARLEY	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

INDEX

AGRI-MEK 0.15EC
Manufacturer: Novartis
EPA Registration Number: 100-898
Active ingredient(s) (common name) : abamectin 13

AZTEC 2.1G
Manufacturer: Bayer
EPA Registration Number:3125-412
Active ingredient(s) (common name): 2% BAY NAT 7484, 0.1% cyfluthrin 12

BAYTHROID 2E
Manufacturer: Bayer
EPA Registration Number: 3125-351
Active ingredient(s) (common name): cyfluthrin 8-10

CAPTURE 2E
Manufacturer: FMC
EPA Registration Number: 279-3069
Active ingredient(s) (common name): bifenthrin 2, 13, 14

COMITE II
Manufacturer: Uniroyal
EPA Registration Number: 400-154
Active ingredient(s) (common name): propargite 14

COUNTER 15G
Manufacturer: Cyanamid
EPA Registration Number: 241-238
Active ingredient(s) (common name): terbufos 12

COUNTER 20CR
Manufacturer: Cyanamid
EPA Registration Number: 241-314
Active ingredient(s) (common name): terbufos 11, 12

CRUISER
Manufacturer: Syngenta
EPA Registration Number: 100-941
Active ingredient(s) (common name): thiamethoxam 3-6, 12

DIMETHOATE 4E
Manufacturer: generic
EPA Registration Number: 5905-493
Active ingredient(s) (common name): dimethoate 1, 2, 8-10, 13, 14

DI-SYSTON 8E
Manufacturer: Bayer
EPA Registration Number: 3125-307
Active ingredient(s) (common name): disulfoton 2

F1785
Manufacturer: FMC
EPA Registration Number: experimental
Active ingredient(s) (common name): experimental 1, 2

FORCE 3G
Manufacturer: Zeneca
EPA Registration Number: 10182-373
Active ingredient(s) (common name): tefluthrin 12, 13

FURADAN 4F
Manufacturer: FMC
EPA Registration Number: 279-2876
Active ingredient(s) (common name): carbofuran 8-10, 13, 14

GAUCHO
Manufacturer: Gustafson
EPA Registration Number: 7501-155
Active ingredient(s) (common name): imidaclorprid 3-6

LORSBAN 15G
Manufacturer: Dow Agrosciences
EPA Registration Number: 62719-34
Active ingredient(s) (common name): chlorpyrifos 12

LORSBAN 4E
Manufacturer: Dow Agrosciences
EPA Registration Number: 62719-220
Active ingredient(s) (common name): chlorpyrifos 2, 7-10, 13

PONCHO
Manufacturer: Bayer
EPA Registration Number: experimental
Active ingredient(s) (common name) : clothianidin 12

STEWARD
Manufacturer: Dupont
EPA Registration Number: 352-598
Active ingredient(s) (common name): indoxacarb 8-10

THIMET 20G
Manufacturer: American Cyanamid
EPA Registration Number: 241-257
Active ingredient(s) (common name): phorate 12

WARRIOR T
Manufacturer: Zeneca
EPA Registration Number: 10182-434
Active ingredient(s) (common name): lambda-cyhalothrin 2, 6, 8-10