

**LTB01-1**

**2000 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, 2000

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**CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000:** Treatments were applied on 12 April 2000 with a 'rickshaw-type' CO<sub>2</sub> 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 cloudy with winds from the northeast at 0-5 mph and 42EF temperature at the time of treatment. Plots were 4 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 14 March 2000.

Treatments were evaluated by collecting 20 symptomatic tillers along the middle rows of each plot one day 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 209 ± 24 Russian wheat aphids per 20 symptomatic tillers. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test ( $\alpha=0.05$ ). 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 ( $\alpha=0.05$ ) with original means presented in the tables.

Aphid pressure was as severe as in past artificially-infested winter wheat experiments, about 20 aphids/tiller in the untreated control. Di-Syston 8E, Lorsban 4E-SG, 0.5 and Lorsban 4E-SG, 0.25 treatments had fewer aphids than the untreated control at 1, 2 and 3 weeks after treatment. All treatments except Capture 2E, Warrior + Supercharge, Penncap M 2FM and Fulfil 50 WP had fewer aphid days than the untreated control over the course of the experiment. There were no differences among treatments in terms of reduced aphid days. Di-Syston 8E and Lorsban 4E-SG, 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: 13 September 1999  
Irrigation: Once post planting, furrow irrigated  
Crop History: Pinto beans in 1999  
Herbicide: None  
Insecticide: None prior to experiment  
Fertilization: None  
Soil Type: Clay, OM 2.0%, pH 7.9  
Location: ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (southeast side of Block 800)

Table 1. Control of Russian wheat aphid in winter wheat, ARDEC, Fort Collins, CO, 2000.

PRODUCT, LB (AI)/ACRE	APHIDS PER 20 TILLERS $\pm$ SEM <sup>1</sup>			TOTAL APHID DAYS $\pm$ SEM <sup>1</sup>	% REDUCTION <sup>2</sup>
	1 WEEK	2 WEEKS	3 WEEKS		
DI-SYSTON 8E, 0.75	8.0 $\pm$ 3.2 D	24.7 $\pm$ 6.1 E	60.8 $\pm$ 32.1 D	413.6 $\pm$ 92.4 D	93
LORSBAN 4E-SG, 0.50	10.2 $\pm$ 6.6 D	44.8 $\pm$ 23.2 DE	63.8 $\pm$ 22.3 CD	572.8 $\pm$ 174.2 CD	90
LORSBAN 4E-SG, 0.38	10.8 $\pm$ 3.6 D	46.3 $\pm$ 21.4 DE	87.7 $\pm$ 15.5 BCD	669.1 $\pm$ 190.5 CD	88
LORSBAN 4E-SG, 0.25	14.0 $\pm$ 4.2 D	62.5 $\pm$ 20.1 CDE	55.2 $\pm$ 23.0 D	679.6 $\pm$ 160.3 CD	88
DIMETHOATE 4E, 0.38	47.7 $\pm$ 14.8 CD	102.0 $\pm$ 24.4 BCDE	146.8 $\pm$ 48.9 ABCD	1394.8 $\pm$ 321.4 BCD	75
CGA293343 25 QP, 0.044	74.0 $\pm$ 19.2 BC	172.0 $\pm$ 27.7 BCD	292.2 $\pm$ 35.5 AB	2485.6 $\pm$ 231.9 BCD	56
WARRIOR T, 0.03	87.5 $\pm$ 18.6 BC	101.7 $\pm$ 18.8 BCDE	221.5 $\pm$ 40.9 ABCD	1793.2 $\pm$ 238.7 BCD	68
CAPTURE 2E, 0.03	147.8 $\pm$ 88.8 BC	281.0 $\pm$ 156.3 BC	441.5 $\pm$ 169.3 A	4029.7 $\pm$ 1978.5 AB	28
WARRIOR T, 0.03 + SUPERCHARGE (0.5% v/v)	116.2 $\pm$ 15.6 ABC	233.8 $\pm$ 65.9 BC	188.0 $\pm$ 60.9 ABCD	2701.4 $\pm$ 659.5 ABCD	52
PENNCAP M 2FM, 0.75	132.0 $\pm$ 25.0 AB	318.8 $\pm$ 74.7 AB	307.5 $\pm$ 94.8 ABC	3770.1 $\pm$ 651.5 ABC	33
UNTREATED CONTROL	219.0 $\pm$ 39.3 A	501.2 $\pm$ 106.1 A	377.5 $\pm$ 121.6 AB	5595.9 $\pm$ 1124.2 A	---
FULFILL 50 WP, 0.086	221.2 $\pm$ 30.6 A	261.0 $\pm$ 59.5 B	429.0 $\pm$ 173.1 A	4102.6 $\pm$ 1030.9 AB	27
F Value	16.32	8.87	5.14	5.56	
p > F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>2</sup>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, 2000

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**CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000:** The early treatment was applied on 27 April 2000 with a 'rickshaw-type' CO<sub>2</sub> 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. All other treatments were applied on 4 May 2000. Conditions were calm and overcast and temperature was 48EF at the time of the early treatment. Conditions were partly cloudy with winds from the southwest at 0-3 mph and temperature was 65EF at the time of late treatments. Plots were 2 beds (5.0 ft) by 25.0 ft and were arranged in eight replicates of a randomized, complete block design. Crop stage at the early application date was tillering (Zadoks 26-27). Crop stage at the late application date was stem elongation (Zadoks 32-33). The crop had been infested at the 2 leaf stage (Zadoks 12) with greenhouse-reared aphids on 13 and 14 April 2000.

Treatments were evaluated by collecting 20 symptomatic tillers per plot one day 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 153 ± 8 Russian wheat aphids per 20 symptomatic tillers. Aphid counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test ( $\alpha=0.05$ ). Original means are presented in the tables. Total insect days for each treatment were calculated according to 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 ( $\alpha=0.05$ ) with original means presented in the tables. Yields were taken on 26 July 2000 with a Wintersteiger plot combine. Yields were converted to bushels per acre adjusted by subsample moisture. Plot yields were compared by analysis of variance and the Student-Neuman-Keul test ( $\alpha=0.05$ ).

Aphid pressure was as severe as observed in past artificially-infested spring barley experiments. All treatments had fewer aphids than the untreated control at each sampling date. All treatments 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 winter wheat experiments. All treatments yielded more than the untreated control. No phytotoxicity was observed with any treatment.

### Field History

Pest: Russian wheat aphid, *Diuraphis noxia* (Mordvilko)  
Cultivar: Moravian 37  
Planting Date: 24 March 2000  
Irrigation: Furrow  
Crop History: Pinto beans in 1999  
Herbicide: Harmony Extra, 0.3 oz/acre on 27 April 2000  
Insecticide: None prior to experiment  
Fertilization: None  
Location: ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (center of Block 200B)

Table 1. Control of Russian wheat aphid in spring barley, ARDEC, Fort Collins, CO, 2000.

PRODUCT, LB(AI)/ACRE	APHIDS PER 20 TILLERS $\pm$ SEM <sup>1</sup>			TOTAL APHID DAYS $\pm$ SEM <sup>1</sup>	% REDUCTION <sup>2</sup>	YIELD <sup>3</sup>
	1 WEEK	2 WEEKS	3 WEEKS			
LORSBAN 4E-SG, 0.50	24.3 $\pm$ 9.1 C	40.6 $\pm$ 9.6 B	93.9 $\pm$ 16.8 C	697.8 $\pm$ 105.3 B	88	63 AB
WARRIOR T, 0.03 + HARMONY EXTRA (0.3oz.ac)+ STARANE SALVO (2/3 pt/acre) + SUPERCHARGE (0.5% v/v)	94.8 $\pm$ 13.1 B	97.6 $\pm$ 17.6 B	121.8 $\pm$ 14.1 BC	1441.13 $\pm$ 134.8 B	76	58 AB
WARRIOR T, 0.03	107.4 $\pm$ 23.0 B	100.4 $\pm$ 27.0 B	174.0 $\pm$ 11.1 BC	1687.4 $\pm$ 163.0 B	72	67 A
WARRIOR T, 0.02	114.4 $\pm$ 26.1 B	107.3 $\pm$ 23.5 B	238.6 $\pm$ 32.8 B	1986.3 $\pm$ 343.4 B	67	55 AB
WARRIOR T, 0.03 + SUPERCHARGE (0.5% v/v)	136.0 $\pm$ 20.5 B	110.3 $\pm$ 25.7 B	216.9 $\pm$ 48.4 B	2006.81 $\pm$ 398.3 B	66	51 B
UNTREATED CONTROL	314.1 $\pm$ 21.1 A	333.4 $\pm$ 49.6 A	724.3 $\pm$ 129.5 A	5967.9 $\pm$ 812.7 A	---	21 C
F Value	18.40	12.42	25.51	23.40		22.41
p > F	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not significantly different, SNK ( $\alpha=0.05$ ).

<sup>2</sup>Percent reduction in total aphid days, calculated by the Ruppel method.

<sup>3</sup>Yield presented in bushels/acre adjusted to 12% moisture.

**EFFECT OF TREATMENT TIMING OF DIMETHOATE 4E ON BROWN WHEAT MITE IN WINTER WHEAT, ARDEC, FORT COLLINS, CO, 2000**

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**EFFECT OF TREATMENT TIMING OF DIMETHOATE 4E ON BROWN WHEAT MITE IN WINTER WHEAT, ARDEC, FORT COLLINS, CO, 2000:** Dimethoate 4E, 0.38 was applied with a 'rickshaw-type' CO<sub>2</sub> sprayer calibrated to deliver 20 gal/acre at 30 psi through six 8004 (LF4) nozzles mounted on a 10 ft boom. Plots were 10 ft by 50 ft and arranged in six replicates of a randomized complete block design. Crop stage for each application was tillering (Zadoks 26), jointing (Zadoks 32) and boot (Zadoks 47) respectively.

Treatments were evaluated by extracting mites in two 8 inch diameter areas per plot with a Vortis Suction Sampler. Samples were collected before the first application (tillering, Zadoks 26), before the second application (jointing, Zadoks 32), before the third application (boot, Zadoks 47) and two weeks after the third application (anthesis, Zadoks 69). Samples were placed on paper plates in Berlese funnels for 72 hours to extract the mites into alcohol for counting. Precounts averaged 1075 ± 187 mites per two-8 inch diameter suction samples. Mite 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 table. Yields were taken on 13 July 2000 with a Wintersteiger plot combine. Yields were converted to bushels per acre adjusted by subsample moisture. Mean bushels per acre were compared by analysis of variance and means separated by Student-Neuman-Keul test (α=0.05).

Mite pressure was high. The first treatment had fewer mites than the untreated control. Treatment yields were higher than the untreated yields. The differences in yield may have been due to a high infestation of Russian wheat aphid rather than brown wheat mite since differences also occurred after the mite populations had declined. Phytotoxicity was not observed with any treatment.

**Field History**

Pest: Brown wheat mite, *Petrobia latens* (Müller)  
 Cultivar: 'TAM 107'  
 Planting Date: 13 September 1999  
 Irrigation: None  
 Crop History: Fallow 1999  
 Herbicide: None  
 Insecticide: None prior to experiment  
 Fertilization: None  
 Location: ARDEC, 4616 North Frontage Road, Fort Collins, CO 80524 (west side of blocks 1010 and 1050)

Table 1. Effect of treatment timing of dimethoate 4E on brown wheat mite, ARDEC, Fort Collins, CO, 2000.

TREATMENT	MITES PER SAMPLE ± SEM <sup>1</sup>			YIELD <sup>2</sup>
	AFTER FIRST TREATMENT	AFTER SECOND TREATMENT	AFTER THIRD TREATMENT	
DIMETHOATE 4E, TILLERING	47 ± 18 B	3 ± 1 B	2 ± 1 A	13.0 B
DIMETHOATE 4E, JOINTING	641 ± 173 A	4 ± 1 AB	2 ± 1 A	11.7 B
DIMETHOATE 4E, BOOT	---	17 ± 7 A	1 ± 0 A	11.6 B
UNTREATED	443 ± 110 A	12 ± 4 A	2 ± 1 A	7.5 A
F value	16.19	4.95	0.71	11.89
p > F	0.0007	0.0138	0.5635	0.0003

<sup>1</sup>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).

<sup>2</sup>Yield in bushels/acre adjusted to 12% moisture.

## CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000

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**CONTROL OF ALFALFA INSECTS IN ALFALFA WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000:** Early treatments were applied on 6 April 2000 with a 'rickshaw-type' CO<sub>2</sub> 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 on 24 April 2000. Conditions were overcast with winds from the north at 0-2 mph and temperature was 42EF at the time of early treatments. Conditions were partly cloudy with winds from the southwest at 4-6 mph and temperature was 70EF at the time of late treatments. Plots were 10.0 ft by 30.0 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 ft.

Treatments were evaluated by taking 10, 180<sup>n</sup> 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<sup>n</sup> sweeps per replication. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Precounts averaged 205 ± 56 alfalfa weevil larvae, 3 ± 1 alfalfa weevil adults and 3 ± 1 pea aphids per 10 sweeps. Insect counts transformed by the square root + ½ method were used for analysis of variance and mean separation by the Student-Neuman-Keul test ( $\alpha=0.05$ ). Original means are presented in the tables. Yields 4 ft wide by 30 ft long, were taken in the Furadan 4F, 0.50 lb(AI)/acre and untreated control plots on 21 June 2000 with a Carter forage harvester, which cuts and weighs a 4 ft wide swath of alfalfa. 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 ( $\alpha=0.05$ ).

Alfalfa weevil pressure was high and pea aphid pressure was low. Due to problems with the irrigation system, crop condition was poor. 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. No treatment had fewer pea aphids than the untreated control at three weeks after treatment. No phytotoxicity was observed with any treatment. The plots treated with Furadan 4F, 0.50 lb(AI)/acre yielded 15.7% more than the untreated plots. The difference was significant (two-tailed t-test,  $t=3.2469$ ,  $df=14$ ,  $p(t>t_{0.05})=0.0058$ ). Yield reduction measured since 1995 has averaged 8.3%, with a range of 2.3% to 15.7%.

### Field History

Pests:	Alfalfa weevil, <i>Hypera postica</i> (Gyllenhal) Pea aphid, <i>Acyrtosiphon pisum</i> (Harris)
Cultivar:	Unknown
Plant Stand:	Thin but uniform, drought stressed, few weeds
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Alfalfa since 1994
Herbicide:	None
Insecticide:	None prior to experiment
Fertilization:	None
Soil Type:	Sandy Clay, OM 2.2%, pH 7.8
Location:	ARDEC, 4616 North Frontage Road, Fort Collins, CO, 80524 (Block 1030)



Table 1. Control of alfalfa weevil larvae, ARDEC, Fort Collins, CO, 2000.

PRODUCT, LB (AI)/ACRE	ALFALFA WEEVIL LARVAE PER 10 SWEEPS $\pm$ SEM <sup>1</sup>		
	1 WEEK	2 WEEKS	3 WEEKS
WARRIOR 1E, 0.025	1.0 $\pm$ 0.7 F	3.3 $\pm$ 1.0 D	1.3 $\pm$ 1.3 E
LORSBAN 4E, 0.75	1.0 $\pm$ 0.4 F	10.0 $\pm$ 2.7 D	12.3 $\pm$ 4.0 AB
WARRIOR 1E, 0.03	3.0 $\pm$ 2.1 F	4.0 $\pm$ 0.9 D	0.5 $\pm$ 0.5 E
FURADAN 4F + DIMETHOATE, 0.50 + 0.25	2.8 $\pm$ 0.9 EF	18.0 $\pm$ 4.3 CD	9.5 $\pm$ 5.3 ABCD
STEWARD, 0.110	3.0 $\pm$ 1.1 EF	5.3 $\pm$ 1.7 D	6.8 $\pm$ 3.0 ABCDE
STEWARD, 0.065	3.5 $\pm$ 1.2 EF	16.3 $\pm$ 7.3 CD	7.3 $\pm$ 3.0 ABCDE
FURADAN 4F, 0.50 <sup>2</sup>	4.9 $\pm$ 1.5 EF	7.9 $\pm$ 2.4 D	8.8 $\pm$ 1.7 ABCD
WARRIOR 1E, 0.02	5.8 $\pm$ 1.1 DEF	5.8 $\pm$ 2.3 D	1.8 $\pm$ 0.9 DE
MUSTANG 1.5E, 0.0375	7.5 $\pm$ 1.6 DEF	9.0 $\pm$ 1.9 D	1.8 $\pm$ 0.5 CDE
FURADAN 4F, 0.25	8.0 $\pm$ 2.6 DEF	12.3 $\pm$ 1.6 CD	12.3 $\pm$ 4.6 AB
MUSTANG 1.5E, 0.044	8.3 $\pm$ 1.2 DEF	12.5 $\pm$ 5.5 D	3.3 $\pm$ 0.9 BCDE
BAYTHROID 2E, 0.025	9.3 $\pm$ 4.0 DEF	5.3 $\pm$ 2.6 D	1.5 $\pm$ 0.7 DE
LANNATE LV, 0.90	10.5 $\pm$ 2.3 DEF	23.5 $\pm$ 7.8 BCD	15.8 $\pm$ 4.1 A
MUSTANG 1.5E, 0.05	28.3 $\pm$ 20.1 CDEF	9.3 $\pm$ 2.6 D	6.5 $\pm$ 4.2 ABCDE
PENNCAP M 2FM, 0.75	22.5 $\pm$ 6.6 BCDEF	15.8 $\pm$ 4.9 CD	12.8 $\pm$ 4.0 AB
WARRIOR 1E, 0.025 EARLY	28.5 $\pm$ 10.1 BCDE	37.3 $\pm$ 7.0 ABC	9.0 $\pm$ 2.0 ABCD
WARRIOR 1E, 0.03 EARLY	31.5 $\pm$ 6.5 BCD	34.8 $\pm$ 3.3 ABC	11.8 $\pm$ 3.2 AB
WARRIOR 1E, 0.02 EARLY	39.8 $\pm$ 5.2 BC	53.5 $\pm$ 9.2 A	18.5 $\pm$ 4.7 A
MUSTANG 1.5E, 0.05 EARLY	54.3 $\pm$ 7.7 BC	37.0 $\pm$ 10.5 ABC	11.8 $\pm$ 1.5 AB
MUSTANG 1.5E, 0.044 EARLY	58.8 $\pm$ 14.1 BC	55.5 $\pm$ 16.3 A	9.3 $\pm$ 2.3 ABCD
MUSTANG 1.5E, 0.0375 EARLY	62.0 $\pm$ 19.0 B	51.0 $\pm$ 18.4 AB	15.8 $\pm$ 3.1 A
UNTREATED CONTROL <sup>2</sup>	116.5 $\pm$ 20.9 A	53.0 $\pm$ 12.9 AB	11.0 $\pm$ 2.0 ABC
F Value	16.47	10.95	6.33
p > F	< 0.0001	< 0.0001	< 0.0001

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ )

<sup>2</sup>Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

Table 2. Control of alfalfa weevil adults, ARDEC, Fort Collins, CO, 2000.

PRODUCT, LB(AI)/ACRE	ALFALFA WEEVIL ADULTS PER 10 SWEEPS $\pm$ SEM <sup>1</sup>		
	1 WEEK	2 WEEKS	3 WEEKS
LANNATE LV, 0.90	1.5 $\pm$ 1.0 BCDE	3.0 $\pm$ 1.5 D	1.0 $\pm$ 0.7 ABC
STEWARD, 0.110	0.5 $\pm$ 0.3 DE	3.0 $\pm$ 0.4 CD	0.3 $\pm$ 0.3 C
WARRIOR 1E, 0.025 EARLY	3.3 $\pm$ 2.9 BCDE	3.8 $\pm$ 1.4 CD	3.3 $\pm$ 0.5 ABC
PENNCAP M 2FM, 0.75	1.0 $\pm$ 0.4 CDE	4.0 $\pm$ 1.8 CD	0.8 $\pm$ 0.5 BC
FURADAN 4F, 0.50 <sup>2</sup>	1.5 $\pm$ 0.5 BCDE	4.3 $\pm$ 1.5 CD	2.3 $\pm$ 0.4 ABC
STEWARD, 0.065	0.3 $\pm$ 0.3 E	3.5 $\pm$ 0.9 CD	2.0 $\pm$ 1.1 ABC
WARRIOR 1E, 0.03 EARLY	0.8 $\pm$ 0.8 DE	4.0 $\pm$ 0.4 CD	2.8 $\pm$ 1.5 ABC
LORSBAN 4E, 0.75	0.8 $\pm$ 0.3 DE	4.3 $\pm$ 0.6 CD	1.8 $\pm$ 1.0 ABC
FURADAN 4F, 0.25	3.3 $\pm$ 0.5 ABCDE	4.5 $\pm$ 0.9 CD	1.5 $\pm$ 0.9 ABC
MUSTANG 1.5E, 0.044 EARLY	2.0 $\pm$ 0.7 BCDE	4.8 $\pm$ 1.5 CD	1.3 $\pm$ 0.8 ABC
WARRIOR 1E, 0.02 EARLY	4.0 $\pm$ 1.1 ABCDE	6.5 $\pm$ 1.7 BCD	1.5 $\pm$ 0.5 ABC
MUSTANG 1.5E, 0.05 EARLY	4.0 $\pm$ 1.5 ABCDE	8.0 $\pm$ 3.3 BCD	1.8 $\pm$ 0.8 ABC
FURADAN 4F + DIMETHOATE, 0.50 + 0.25	2.8 $\pm$ 0.6 ABCDE	7.5 $\pm$ 1.8 BCD	2.0 $\pm$ 0.7 ABC
MUSTANG 1.5E, 0.0375 EARLY	4.5 $\pm$ 2.1 ABCDE	8.0 $\pm$ 3.1 BCD	2.5 $\pm$ 1.0 ABC
UNTREATED CONTROL <sup>2</sup>	2.0 $\pm$ 0.5 BCDE	8.0 $\pm$ 1.4 BCD	3.1 $\pm$ 0.8 ABC
MUSTANG 1.5E, 0.05	7.3 $\pm$ 2.5 AB	10.0 $\pm$ 3.7 ABCD	2.0 $\pm$ 0.4 ABC
MUSTANG 1.5E, 0.0375	6.5 $\pm$ 1.3 ABC	11.3 $\pm$ 3.2 ABC	4.3 $\pm$ 2.0 ABC
BAYTHROID 2E, 0.025	3.3 $\pm$ 1.0 ABCDE	11.8 $\pm$ 3.2 ABC	3.5 $\pm$ 1.0 ABC
WARRIOR 1E, 0.025	5.5 $\pm$ 2.3 ABCD	14.0 $\pm$ 3.7 AB	4.3 $\pm$ 0.8 ABC
WARRIOR 1E, 0.02	5.5 $\pm$ 1.4 ABCD	14.8 $\pm$ 5.6 AB	3.5 $\pm$ 2.2 ABC
MUSTANG 1.5E, 0.044	10.0 $\pm$ 5.1 A	21.3 $\pm$ 9.5 A	5.8 $\pm$ 0.8 A
WARRIOR 1E, 0.03	6.5 $\pm$ 1.2 ABC	18.5 $\pm$ 5.0 A	4.8 $\pm$ 1.0 AB
F Value	4.68	6.47	2.34
p > F	< 0.0001	< 0.0001	0.0042

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ )

<sup>2</sup>Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

Table 3. Control of pea aphids, ARDEC, Fort Collins, CO, 2000.

PRODUCT, LB(AI)/ACRE	PEA APHIDS PER 10 SWEEPS $\pm$ SEM <sup>1</sup>		
	1 WEEK	2 WEEKS	3 WEEKS
WARRIOR 1E, 0.025	0.0 $\pm$ 0.0 C	0.0 $\pm$ 0.0 D	0.8 $\pm$ 0.5
LORSBAN 4E, 0.75	0.0 $\pm$ 0.0 C	0.3 $\pm$ 0.3 CD	1.8 $\pm$ 0.6
WARRIOR 1E, 0.02	0.0 $\pm$ 0.0 C	0.0 $\pm$ 0.0 D	1.5 $\pm$ 1.5
WARRIOR 1E, 0.03	0.3 $\pm$ 0.3 C	0.5 $\pm$ 0.3 CD	0.0 $\pm$ 0.0
FURADAN 4F + DIMETHOATE, 0.50 + 0.25	0.3 $\pm$ 0.3 C	1.3 $\pm$ 1.0 BCD	2.3 $\pm$ 0.6
MUSTANG 1.5E, 0.05	1.5 $\pm$ 1.5 C	0.8 $\pm$ 0.5 BCD	1.5 $\pm$ 1.0
BAYTHROID 2E, 0.025	1.0 $\pm$ 0.4 C	1.0 $\pm$ 0.4 BCD	1.5 $\pm$ 0.7
LANNATE LV, 0.90	1.8 $\pm$ 1.8 C	0.8 $\pm$ 0.5 BCD	1.8 $\pm$ 1.2
MUSTANG 1.5E, 0.0375	1.3 $\pm$ 0.5 C	1.0 $\pm$ 0.7 BCD	1.3 $\pm$ 0.6
MUSTANG 1.5E, 0.044	2.0 $\pm$ 1.4 C	1.0 $\pm$ 0.6 BCD	1.8 $\pm$ 1.4
FURADAN 4F, 0.50 <sup>2</sup>	2.0 $\pm$ 0.7 C	1.4 $\pm$ 0.5 BCD	2.5 $\pm$ 1.4
FURADAN 4F, 0.25	2.0 $\pm$ 0.7 C	1.3 $\pm$ 1.0 BCD	1.0 $\pm$ 1.0
PENNCAP M 2FM, 0.75	2.8 $\pm$ 0.9 C	1.3 $\pm$ 0.5 BCD	1.3 $\pm$ 0.5
UNTREATED CONTROL <sup>2</sup>	4.3 $\pm$ 0.8 C	1.8 $\pm$ 0.5 BCD	1.8 $\pm$ 0.4
STEWARD, 0.110	6.5 $\pm$ 2.3 BC	2.8 $\pm$ 2.1 BCD	1.5 $\pm$ 1.0
STEWARD, 0.065	7.0 $\pm$ 2.2 BC	1.0 $\pm$ 0.4 BCD	1.0 $\pm$ 1.0
MUSTANG 1.5E, 0.0375 EARLY	14.0 $\pm$ 0.8 AB	6.3 $\pm$ 1.8 ABC	2.0 $\pm$ 0.4
WARRIOR 1E, 0.03 EARLY	17.8 $\pm$ 6.4 AB	8.0 $\pm$ 5.1 ABC	3.8 $\pm$ 2.2
MUSTANG 1.5E, 0.044 EARLY	23.3 $\pm$ 7.7 A	3.3 $\pm$ 1.3 ABCD	4.0 $\pm$ 2.4
MUSTANG 1.5E, 0.05 EARLY	18.5 $\pm$ 4.7 A	7.3 $\pm$ 1.7 AB	2.0 $\pm$ 1.7
WARRIOR 1E, 0.025 EARLY	26.0 $\pm$ 5.3 A	6.0 $\pm$ 1.7 ABC	1.0 $\pm$ 0.4
WARRIOR 1E, 0.02 EARLY	28.5 $\pm$ 8.8 A	12.0 $\pm$ 6.7 A	5.8 $\pm$ 3.5
F Value	13.81	4.01	0.79
p > F	< 0.0001	< 0.0001	0.7182

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ )

<sup>2</sup>Treatment repeated (8 replicates rather than 4) for purposes of measuring yield.

## CONTROL OF ALFALFA INSECTS IN ALFALFA WITH PROPANE FLAMING AT TWO LOCATIONS IN NORTHEAST COLORADO, 2000

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**CONTROL OF ALFALFA INSECTS IN ALFALFA WITH PROPANE FLAMING AT THREE LOCATIONS IN NORTHEAST COLORADO, 2000:** Propane flaming was performed on 14 March 2000 at three locations near Brighton, CO. Alfalfa was flamed using the Red Dragon TD-12 LPS Alfalfa Flamer using approximately 20 gallons of propane per acre. Baythroid 2 was applied aerially at a rate of 1 oz/acre with an effective spray solution of 1 gal/acre on 13 May 2000. Plots were 40 ft by 300 ft and unreplicated. The remainder of the field which was not in the study area was treated with Baythroid.

Treatments were evaluated by extracting insects for 5 seconds in five 8 inch diameter areas with a Vortis Suction Sampler. Samples were collected every 10 ft along two transects perpendicular to the plots. Plots were sampled four times between 13 March and 30 May 2000. Alfalfa weevil larvae, alfalfa weevil adults and pea aphids were counted. Each location's counts from treated plots were compared to the untreated control using a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ). Yields were taken on 2 June 2000 with a Carter forage harvester which cuts and weighs a 4 ft swath of alfalfa. Swaths 4 ft wide and 10-20 ft long were collected at 6 locations within each treatment and 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 ( $\alpha=0.05$ ).

Yields were higher in the flamed plots than in the untreated control at all 3 locations (Table 1). Propane flaming did not reduce the total number of alfalfa weevils or pea aphids compared to the untreated control at any location (Figures 1-3).

### Field History

Pests:	Alfalfa weevil, <i>Hypera postica</i> (Gyllenhal) Pea aphid, <i>Acyrtosiphon pisum</i> (Harris)
Cultivar:	Unknown
Insecticide:	None prior to experiment
Soil Type:	Unknown
Location:	120 <sup>th</sup> and Havana St, Brighton, CO

Table 1. Effect of propane flaming on alfalfa yield at three locations in northeast Colorado, 2000.

LOCATION	TREATMENT	YIELD <sup>1,2</sup>
FIELD 1	UNTREATED CONTROL	1.3 ± 0.1
FIELD 1	BAYTHROID	1.8 ± 0.1 (0.0039)
FIELD 1	PROPANE FLAMING	1.8 ± 0.1 (0.0036)
FIELD 2 EAST	UNTREATED CONTROL	1.9 ± 0.0
FIELD 2 EAST	BAYTHROID	1.9 ± 0.0 (0.3126)
FIELD 2 EAST	PROPANE FLAMING	2.0 ± 0.0 (0.0477)
FIELD 2 WEST	UNTREATED CONTROL	0.9 ± 0.0
FIELD 2 WEST	BAYTHROID	1.2 ± 0.0 (< 0.0001)
FIELD 2 WEST	PROPANE FLAMING	1.0 ± 0.0 (0.0002)

<sup>1</sup>Yield in tons per acre adjusted by subsample moisture.

<sup>2</sup>p-value indicates probability of treatment mean being similar to the untreated control, calculated with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).

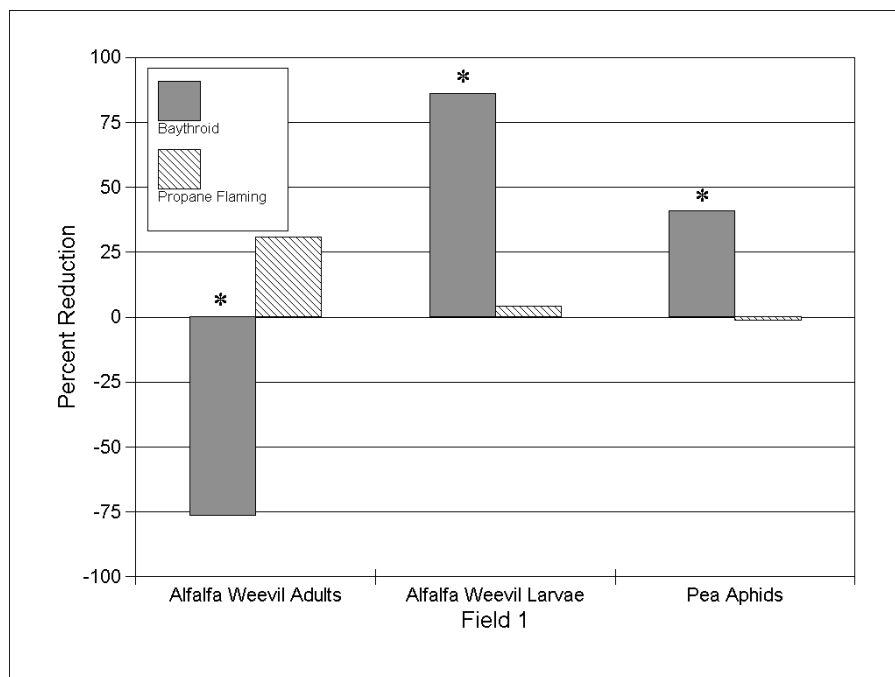


Figure 1. Percent reduction in pest abundance for each treatment as relative to the untreated control, Field 1, Brighton, CO, 2000.

\*Indicates mean is different than the untreated control, calculated with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).

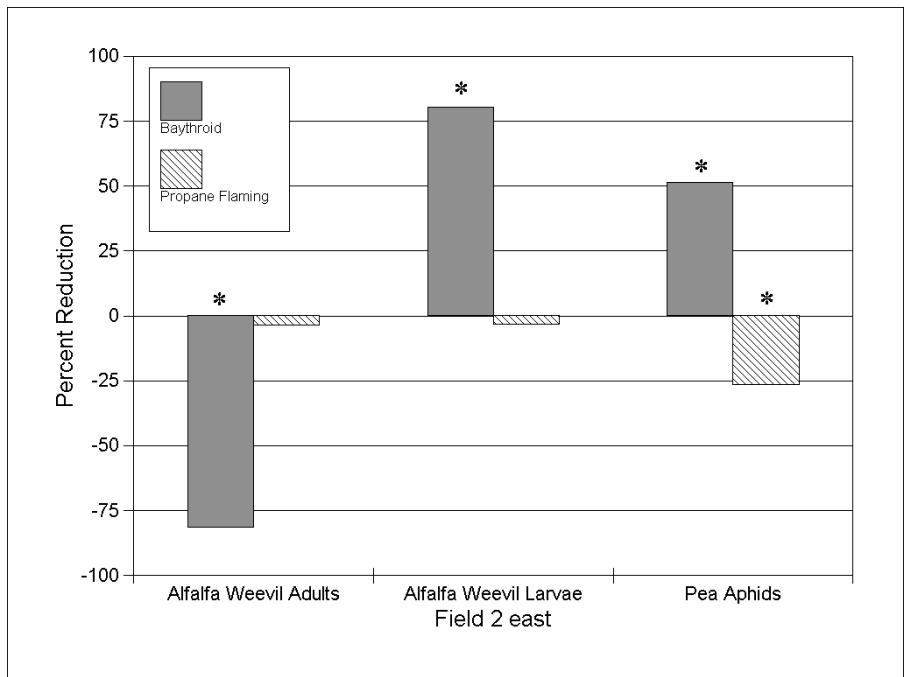


Figure 2. Percent reduction in pest abundance for each treatment as relative to the untreated control, Field 2 east, Brighton, CO, 2000.  
 \*Indicates mean is different than the untreated control, calculated with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).

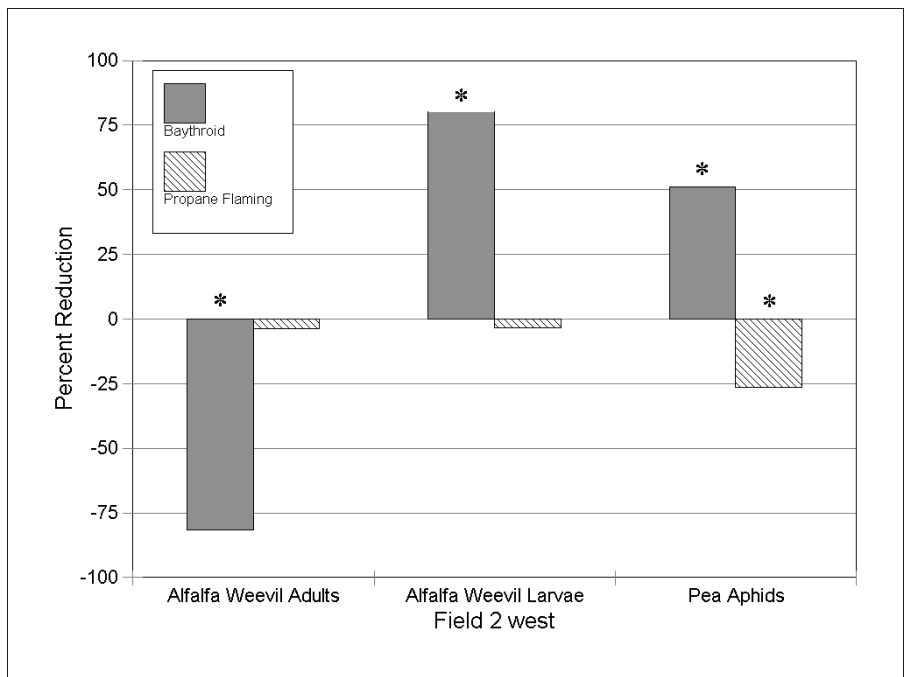


Figure 3. Percent reduction in pest abundance for each treatment as relative to the untreated control, Field 2 west, Brighton, CO, 2000.  
 \*Indicates mean is different than the untreated control, calculated with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).

**CONTROL OF FLOWER THRIPS IN DRY BEANS WITH HAND-APPLIED INSECTICIDES, LENZ FARM, WRAY, CO,  
2000**

Shawn Walter, Jeff Rudolph, Hilary Freeman Spriggs, Hayley Miller, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

**CONTROL OF FLOWER THRIPS IN DRY BEANS WITH HAND-APPLIED INSECTICIDES, LENZ FARM, WRAY, CO, 2000:** Treatments were applied on 30 June 2000 with a 'rickshaw-type' CO<sub>2</sub> 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. Conditions were clear and calm and temperature at 78EF at the time of treatment. Plots were 4 rows by 30.0 ft and were arranged in four replicates of a randomized, complete block design. Crop height at the time of application was 1.0 ft.

Treatments were evaluated by collecting 10 plants from each plot prior to treatment and three and seven days after treatment. Plant samples were placed in Berlese funnels for 24 hours to extract thrips into alcohol for counting. Precounts averaged 2819 ± 1169 thrips per 10 plants. Thrips 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.

Thrips pressure was heavy. Thrips were predominately flower thrips with few onion thrips present. Orthene 90S and Lannate LV treatments had fewer thrips than the untreated control at 3 and 7 days after treatment. No phytotoxicity was observed with any treatment.

**Field History**

Pest: Western flower thrips, *Frankliniella occidentalis* (Pergande).  
 Cultivar: Pinto beans  
 Planting Date: 26 May 2000  
 Irrigation: Sprinkler  
 Location: Yuma County, 5 miles east of Hwy 385 and County road 54

Table 1. Control of thrips in dry beans, Lenz Farm, Wray, CO, 2000.

PRODUCT, LB(AI)/ACRE	THRIPS PER 10 PLANTS ± SEM <sup>1,2</sup>	
	3 DAYS POST TRT	7 DAYS POST TRT
ORTHENE 90S, 0.5	157.5 ± 65.2 BC	355.3 ± 69.5 C
LANNATE LV, 0.5	44.0 ± 10.7 C	419.8 ± 107.5 BC
DIMETHOATE, 0.25	676.0 ± 246.2 ABC	634.0 ± 163.1 ABC
ASANA, 0.05	1697.8 ± 933.4 ABC	851.5 ± 256.8 ABC
SEVIN XLR, 1.0	1071.8 ± 538.0 ABC	883.3 ± 179.6 ABC
THIODAN 3EC, 0.5	2095.8 ± 701.1 AB	1399.0 ± 297.4 AB
UNTREATED CONTROL	2709.0 ± 1267.8 A	1655.0 ± 609.9 A
F Value	3.98	3.85
p > F	0.0104	0.0120

<sup>1</sup>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)

<sup>2</sup>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 table.

## CONTROL OF WESTERN CORN ROOTWORM IN CORN, BOHM FARM, ECKLEY, CO, 2000

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**CONTROL OF WESTERN CORN ROOTWORM IN CORN, BOHM FARM, ECKLEY, CO, 2000:** Planting time treatments were applied on 25 April 2000. 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<sub>2</sub> powered applicator mounted on the planter. In-furrow liquid applications were applied through microtubes directed into the seed furrow ½ inch above the seed. T-band liquid applications were applied with a 80E nozzle 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 22 May 2000. Broadcast cultivation treatments were applied with a CO<sub>2</sub> powered hand-held sprayer calibrated to deliver 23 gal/acre at 30 psi through four 80015 TJ VS nozzles. All other cultivation treatments were applied with 6 inch Gandy spreaders held 2 inches above the plant, incorporated with an Orthman cultivator. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Seed treatments were planted on 25 April 2000 at a plant population of 32,000 per acre using a Kincaid cone planting system mounted on a two-row John Deere Maxi-Merge planter. Plots were one 50-ft row arranged in six replicates of a randomized complete block design.

Treatments were evaluated by digging three plants per plot on 11 July 2000. Plants were removed at three-plant intervals starting at 20 ft into the plot. 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 ( $\alpha=0.05$ ). Treatment efficiency was determined as the percentage of samples with a root rating of 3.0 or lower.

Western corn rootworm pressure was moderate and highly variable. Substantial regrowth had occurred by the time of evaluation which likely affected the accuracy of root ratings. No planting or cultivation time treatments had less damage than the untreated control (Table 1 and 2). No seed treatments had less damage than the untreated control (Table 3). No phytotoxicity was observed with any treatment.

Yields could not be determined in 2000 due to hail damage. Yield reduction measured between 1987-1999 have averaged 15%, 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, <i>Diabrotica virgifera virgifera</i> LeConte
Cultivar:	
Seed Treatments:	Provided by company
Other Treatments:	Pioneer '34K77'
Planting Date:	25 April 2000
Plant Population:	32,000
Irrigation:	Sprinkler
Crop History:	Field corn since 1996
Insecticide:	None prior to experiment
Fertilization:	180 N, 15 P, 8 S
Soil Type:	Haxtun sandy loam, OM 1.1%, pH 6.5
Location:	Yuma County, NE ¼, Section 17, 4N-46W

Table 1. Control of western corn rootworm with planting treatments, Bohm Farm, Eckley, CO, 2000



PRODUCT	RATE	VOLUME	PLACEMENT <sup>1</sup>	ROOT RATING <sup>2</sup>	EFFICIENCY <sup>3</sup>
CAPTURE 2E	0.35 fl oz	—	IF	2.6	89
LORSBAN 15G	8 oz	—	TB	2.7	89
CAPTURE 2E	0.30 fl oz	—	IF	2.7	83
FORCE 3G	4 oz	—	IF	2.9	78
REGENT 4SC	0.13 lb (ai)/ac	3-5 GPA	IF	2.9	67
CAPTURE 2E	0.30 fl oz	—	TB	3.0	61
COUNTER 20CR	6 oz	—	TB	3.0	69
CAPTURE 2E	0.35 fl oz	—	TB	3.0	67
FORCE 3G	4 oz	—	TB	3.2	72
UNTREATED	—	—	—	3.2	63
AZTEC 2.1G	6.7 oz	—	TB	3.2	61
REGENT 4SC <sup>4</sup>	0.13 lb (ai)/ac	3-5 GPA	IF	3.4	50
F Value				0.67	—
p > F				0.7644	—

<sup>1</sup>IF, in furrow; TB, t-band.

<sup>2</sup>Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>3</sup>Percentage of 18 plants (total in 6 replicates of a treatment) with a rating of 3.0 or less.

<sup>4</sup>10-34-0 fertilizer used instead of water.

Table 2. Control of western corn rootworm with cultivation treatments, Bohm Farm, Eckley, CO, 2000

PRODUCT	RATE	PLACEMENT	ROOT RATING <sup>1</sup>	EFFICIENCY <sup>2</sup>
COUNTER 15G	8 oz	BANDED	2.7	89
FURADAN 4F	1.0 lb	BROADCAST	2.8	78
LORSBAN 15G	8 oz	BANDED	2.8	89
THIMET 20G	6 oz	BANDED	3.0	56
UNTREATED	—	—	3.3	56
F Value			2.28	—
p > F			0.0985	—

<sup>1</sup>Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>2</sup>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, Bohm Farm, Eckley, CO, 2000

PRODUCT	RATE	PLACEMENT <sup>1</sup>	ROOT RATING <sup>2</sup>	EFFICIENCY <sup>3</sup>
FORCE 3G	4 oz	TB	3.4	61
COUNTER 20CR	6 oz	TB	3.4	44
LORSBAN 15G	8 oz	TB	3.7	39
UNTREATED	—	—	4.0	39
FORCE SST	4 oz	SEED	4.2	17
AZTEC 2.1G	6.7 oz	TB	4.5	17
F Value			1.71	—
p > F			0.1683	—

<sup>1</sup>TB, t-band.

<sup>2</sup>Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>3</sup>Percentage of 18 plants (total in 6 replicates of a treatment) with a rating of 3.0 or less.

### CONTROL OF WESTERN CORN ROOTWORM WITH Bt CORN ROOTWORM RESISTANT HYBRIDS AND PLANTING TIME INSECTICIDES, BAUCKE FARM, YUMA, CO, 2000

Stan Pilcher, Dave Kennedy, Assefa Gebre-Amlak Golden Plains Area Cooperative Extension; Dave Poss, Central Great Plains Research Station; Shawn Walter, Jeff Rudolph, Terri Randolph, Aaron Spriggs, Hilary Freeman Spriggs, Mary Donohue, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

#### CONTROL OF WESTERN CORN ROOTWORM WITH Bt CORN ROOTWORM RESISTANT HYBRIDS AND PLANTING TIME INSECTICIDES, BAUCKE FARM, YUMA, CO, 2000:

Planting time treatments were applied on 22 May 2000. Treatments 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 four, 25-ft rows arranged in four replicates of a randomized complete block design.

Bt hybrids with and without seed treatment were planted on 22 May 2000 at a plant population of 32,000 per acre using a Kincaid cone planting system mounted on a two-row John Deere Maxi-Merge planter. Seed treatments were used to control wireworms and seed corn maggots in the event that these insects were a problem and is not known to affect western corn rootworm larvae populations. Plots were four, 25-ft rows arranged in four replicates of a randomized complete block design.

Treatments were evaluated by digging three plants per plot on 11 July 2000. Plants were removed at three-plant intervals. 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-Keul test ( $\alpha=0.05$ ).

Western corn rootworm pressure was heavy in the study area. All Bt corn rootworm resistant hybrids and insecticide treatments had less damage than the non-Bt untreated controls. No phytotoxicity was observed with any treatment.

## Field History

Pest: Western corn rootworm, *Diabrotica virgifera virgifera* LeConte  
 Cultivars: Proprietary hybrids  
 Planting Date: 22 May 2000  
 Plant Population: 28,500  
 Irrigation: Sprinkler  
 Crop History: Field corn since 1995  
 Herbicide: Pre - plant: Roundup 32 oz/acre  
 Post - plant: Dual II Magnum 1.5 pt/acre  
 Insecticide: None prior to experiment  
 Fertilization: 150 N, 15 P, 8 S  
 Soil Type: Haxton Sandy Loam, OM 1.1%, pH 6.5  
 Location: Yuma County SW ¼, Section 14, 3N 48W

Table 1. Control of western corn rootworm, Baucke Farm, Yuma, CO, 2000

HYBRID	EVENT	INSECTICIDE <sup>2</sup>	RATE	ROOT RATING <sup>1</sup>
CRW0582Z	MON 863	—	—	1.9 F
CRW0582L1	MON 863	SEED TREATMENT	—	1.9 F
CRW0585L1	MON 863 + YIELDGARD	SEED TREATMENT	—	2.0 EF
CRW0604Z	MON 853	—	—	2.2 DEF
CRW0604L1	MON 853	SEED TREATMENT	—	2.3 DEF
CRW0589Z	—	COUNTER 20CR	6.0 oz	2.9 DEF
CRW0589Z	—	AZTEC 2.1G	6.7 oz	2.8 DE
CRW0589Z	—	FORCE 3G	5.0 oz	2.9 D
CRW0589Z	—	LORSBAN 15G	8.0 oz	3.5 C
CRW0589Z	ISOLINE	—	—	4.3 B
CTW0609Z	ISOLINE	—	—	4.9 A
F Value				26.88
p > F				< 0.0001

<sup>1</sup>Iowa 1-6 rootworm damage scale. Means followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>2</sup>Seed Treatment intended for wireworm and seed corn maggot control.

## CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000

Mary Donohue, Shawn Walter, Hayley Miller, Aaron Spriggs, Hilary Freeman Spriggs, Terri Randolph, Jeff Rudolph, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

**CONTROL OF CORN SPIDER MITES IN CORN WITH HAND-APPLIED INSECTICIDES, ARDEC, FORT COLLINS, CO, 2000:** The early treatment was applied on 1 August 2000 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 overcast with calm winds and air temperature of 72EF. All other treatments were applied on 8 August 2000 with the same sprayer. Conditions were clear with calm winds and air temperature of 84EF. 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 13 July 2000 by laying mite infested corn leaves, which had been collected that morning in Fruita, CO, across the corn plants on which mites were to be counted. On 15 July 2000, the experimental area was treated by aircraft with Asana, 0.2 lb(AI)/acre to control beneficial insects and to encourage buildup of spider mite densities.

Treatments were evaluated by counting all mites on three leaves (ear leaf, 2<sup>nd</sup> leaf above the ear, 2<sup>nd</sup> leaf below the ear) from each of five infested plants per plot for a total of 15 leaves per plot. Precounts made on 31 July 2000 averaged  $62.3 \pm 14.9$  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 +  $\frac{1}{2}$  method prior to analysis of variance and means separation by the Student-Neuman-Keul method ( $\alpha=0.05$ ). Reductions in mite days were calculated by Abbott's (1925) formula: (percent reduction =  $((\text{untreated}-\text{treated})/\text{untreated}) \times 100$ ). 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. Capture 2E + dimethoate 4E, Capture 2E + Lorsban 4E and Capture 2E treatments had fewer mites than the untreated control at 1, 2 and 3 weeks after treatment. Capture 2E + dimethoate 4E, Capture 2E + Lorsban 4E, Capture 2E, Agri-mek 0.15EC 10oz/acre and Comite II 6E + dimethoate 4E had fewer mite days than the untreated control. No phytotoxicity was observed with any treatment.

### Field History

Pest:	Banks grass mite, <i>Oligonychus pratensis</i> (Banks)
Cultivar:	Pioneer '38B22'
Planting Date:	16 May 2000
Plant Population:	40,000
Irrigation:	Linear move sprinkler with drop nozzles
Crop History:	Continuous corn 10 years
Herbicide:	Roundup Ultra, 32 oz/acre on 22 May 2000; Banvel, 1.0 pt/acre + Aatrex-Nine-O, 2.2 lb(AI)/acre + NIS, 0.25% on 6 June 2000; Accent, 1.0 oz + NIS, 0.25% on 12 June 2000; Liberty, 20 fl oz + ammonium sulfate, 3 lbs on 23 June and 18 August 2000
Insecticide:	Assna at 0.2 lbs(AI)/acre on 15 July 2000
Fertilization:	150 N
Soil Type:	Clay, OM 1.8%, pH 7.8
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, 2000.

PRODUCT, LB (AI)/ACRE	MITES PER 3 LEAVES $\pm$ SEM <sup>1</sup>			TOTAL MITE DAYS	% REDUCTION <sup>2</sup>
	1 WEEK	2 WEEKS	3 WEEKS		
CAPTURE 2E + DIMETHOATE 4E, 0.08 + 0.50	56.3 $\pm$ 43.3 B	2.5 $\pm$ 1.6 C	93.5 $\pm$ 39.8 C	3132.3 $\pm$ 350.7 B	81
CAPTURE 2E + LORSBAN 4E, 0.08 + 0.50	79.5 $\pm$ 52.0 B	15.3 $\pm$ 11.9 BC	30.8 $\pm$ 8.2 C	3375.6 $\pm$ 664.2 B	79
CAPTURE 2E, 0.08	73.5 $\pm$ 54.8 B	5.8 $\pm$ 5.0 BC	192.8 $\pm$ 120.8 C	4060.8 $\pm$ 989.2 B	75
AGRI-MEK 0.15EC, 10 OZ PRODUCT/ACRE	266.3 $\pm$ 110.1 AB	18.5 $\pm$ 5.5 BC	199.3 $\pm$ 124.3 C	5229.3 $\pm$ 1365.0 B	68
COMITE II 6E + DIMETHOATE 4E, 1.69 + 0.50	394.0 $\pm$ 259.6 AB	80.5 $\pm$ 63.4 ABC	411.5 $\pm$ 240.4 BC	6592.3 $\pm$ 3419.4 B	60
AGRI-MEK 0.15EC, 20 OZ PRODUCT/ACRE	435.5 $\pm$ 113.1 AB	159.8 $\pm$ 93.5 ABC	150.5 $\pm$ 113.6 C	7274.6 $\pm$ 1845.6 AB	55
COMITE II 6E, 2.53	273.5 $\pm$ 215.5 AB	200.0 $\pm$ 198.3 ABC	619.5 $\pm$ 587.7 BC	7967.1 $\pm$ 4672.1 AB	51
COMITE II 6E, 1.69 EARLY	466.8 $\pm$ 301.0 AB	172.8 $\pm$ 78.8 ABC	554.5 $\pm$ 291.1 BC	7937.0 $\pm$ 4013.0 AB	51
FURADAN 4F + DIMETHOATE 4E, 1.00 + 0.50	245.3 $\pm$ 89.1 AB	367.3 $\pm$ 176.3 ABC	507.0 $\pm$ 154.4 BC	9103.0 $\pm$ 2034.1 AB	44
DIMETHOATE 4E, 0.50	213.0 $\pm$ 45.4 AB	421.3 $\pm$ 103.6 AB	898.3 $\pm$ 128.5 AB	9706.8 $\pm$ 314.8 AB	40
FURADAN 4F, 1.00	437.5 $\pm$ 161.3 AB	436.8 $\pm$ 163.4 AB	857.3 $\pm$ 213.5 AB	11669.1 $\pm$ 2106.6 AB	28
UNTREATED	591.8 $\pm$ 66.0 A	585.0 $\pm$ 169.3 A	1463.3 $\pm$ 282 A	16282.0 $\pm$ 2088.3 A	—
F Value	5.59	3.59	7.12	4.15	
p > F	< 0.0001	0.0013	< 0.0001	0.0004	

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

<sup>2</sup>Percent reduction in total mite days, calculated by the Ruppel method.

## CONTROL OF SUNFLOWER STEM WEEVIL IN SUNFLOWERS WITH PLANTING AND CULTIVATION TREATMENTS, CENTRAL GREAT PLAINS RESEARCH STATION, AKRON, CO, 2000

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

### CONTROL OF SUNFLOWER STEM WEEVIL IN SUNFLOWERS WITH PLANTING AND CULTIVATION TREATMENTS, CENTRAL GREAT PLAINS RESEARCH STATION, AKRON, CO, 2000:

The planting time treatment was applied on 23 May 2000 with a John Deere Maxi-Merge planter equipped with a CO<sub>2</sub> powered micro-tube directed into the seed furrow ½ inch above the seed. Cultivation treatments were applied on 10 July 2000 in a 12 inch band with a CO<sub>2</sub> powered sprayer at 17 psi with an over-whorl nozzle (11001 VS-TJ) positioned 6 inches above the whorl and mounted on an Orthman cultivator. Plots were 50 ft by two rows (30 inch centers) and arranged in four replicates of a randomized complete block design. Crop stage at cultivation application was V4 to V10. Stem weevil densities at cultivation averaged one adult per five plants.

Treatments were evaluated on 2 September 2000 by dissecting 5 plants per plot and counting the number of sunflower stem weevil larvae in the lowest 18 inches of stalk. Frost conditions forced stalks to be broken off ½ inch below the soil surface. Inspection of the broken roots showed more than 90 percent of the weevils were recovered and counted in the portion above this break. Drought caused the stalk diameter average to be 2.1 centimeters and height 118 centimeters. Weevil counts were subjected to analysis of variance and mean separation by the Student-Neuman-Keul test ( $\alpha=0.05$ ).

All treatments except Asana, 0.03 lb(AI)/acre had fewer sunflower stem weevil than the untreated control (Table 1). Cultivation and planting Furadan 4F, 1.0 treatments had fewer sunflower stem weevil than other treatments. No phytotoxicity was observed with any treatment.

### Field History

Pest:	Sunflower stem weevil, <i>Cylindrocopturus adspersus</i> (LeConte)
Cultivar:	Cargill SF187 oil seed
Planting Date:	23 May 2000
Plant Population:	18,000
Irrigation:	None
Crop History:	Corn in 1999
Herbicide:	Sonalan 10G - 13.5 lb/acre
Insecticide:	None prior to experiment
Fertilization:	20 N
Soil Type:	Weld Silt Loam and Platner Loam, OM 1%, pH 7.0
Location:	USDA Central Great Plains Research Station, Akron, CO.

Table 1. Control of sunflower stem weevil with planting and cultivation timed treatments, Central Great Plains Research Station, Akron, CO, 2000.

PRODUCT, LB(AI)/ACRE	TIMING	LARVAE/PLANT $\pm$ SEM <sup>1</sup>	% CONTROL	% LODGING
FURADAN 4F, 1.0	PLANTING	1.3 $\pm$ 0.2 D	91	7.3
FURADAN 4F, 1.0	CULTIVATION	1.6 $\pm$ 0.4 D	89	10.6
MUSTANG 1.5E, 0.03	CULTIVATION	5.0 $\pm$ 0.5 C	66	8.0
WARRIOR 1E, 0.02	CULTIVATION	5.5 $\pm$ 0.4 C	63	11.4
WARRIOR 1E, 0.03	CULTIVATION	5.8 $\pm$ 0.5 C	61	9.4
FURADAN 4F, 0.75	CULTIVATION	5.8 $\pm$ 0.2 C	61	7.7
MUSTANG 1.5E, 0.045	CULTIVATION	6.4 $\pm$ 0.4 C	57	12.4
BAYTHROID 2E, 0.02	CULTIVATION	6.4 $\pm$ 0.8 C	57	6.3
BAYTHROID 2E, 0.03	CULTIVATION	7.1 $\pm$ 0.8 C	52	14.2
ASANA, 0.05	CULTIVATION	12.9 $\pm$ 0.7 B	13	53.9
ASANA, 0.03	CULTIVATION	14.8 $\pm$ 0.3 A	1	55.6
UNTREATED	---	14.9 $\pm$ 0.5 A	---	53.2
F value		88.91		
p > F		< 0.0001		

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

### CONTROL OF COLORADO POTATO BEETLE IN POTATO WITH HAND APPLIED INSECTICIDES, IRRIGATION RESEARCH FOUNDATION FARM, YUMA, CO, 2000

Assefa Gebre-Amlak, Stan Pilcher, Dave Kennedy, Golden Plains Area Cooperative Extension; Shawn Walter, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

**CONTROL OF COLORADO POTATO BEETLE IN POTATO WITH HAND APPLIED INSECTICIDES, IRRIGATION RESEARCH FOUNDATION FARM, YUMA, CO, 2000:** Treatments were applied on 12 September 2000 with a CO<sub>2</sub> powered backpack sprayer calibrated to apply 24 gal/acre at 30 psi through six 11002VS TeeJet nozzles mounted on an 8 ft boom held at 18 to 24 inches above canopy during application. Plots were 3 rows by 25 ft separated by a single buffer row arranged in four replicates of a randomized complete block design.

The field received a severe hailstorm on 20 July 2000 resulting in two potato sets with a second bloom period occurring in late August and early September. At the time of application Colorado potato beetle population consisted of 3<sup>rd</sup> through 5<sup>th</sup> instars, pupae and adults.

Treatments were evaluated by counting the number of Colorado potato beetle larvae, pupae and adults in one 10 ft row in each plot prior to and one week after treatment. Precounts averaged 13  $\pm$  1 total Colorado potato beetles per plot. Insect counts were used for analysis of variance and mean separation by the Student-Neuman-Keul test ( $\alpha=0.05$ ).

No treatment had fewer Colorado potato beetles than the untreated control. No phytotoxicity was observed with any treatment.

## Field History

Pest: Colorado potato beetle, *Leptinotarsa decimlineata* (Say)  
Cultivar: Norkotah (Selection 8)  
Planting Date: 17 April 2000  
Irrigation type: Sprinkler  
Crop history: Continuous corn 5 years  
Herbicide: 1 May 2000, Dual II - 1.5 pt/acre + Prowl - 1.5 pt/acre; 22 June 2000, Matrix - 1.5 oz/acre + 20 oz COC/acre  
Fungicide: 9 July 2000, Bravo Zn - 1.0 pt/acre; 21 July 2000, Quadris - 6.1 oz/acre  
Insecticide: None prior to experiment  
Fertilization: Starter - 35 gal/acre (15 N, 15 P, 0.5 S, 5 Zn)  
Pre-plant - 434 lb/acre (46-0-0)  
Soil Type: Haxton Sandy Loam, OM 1.1%, pH 7.0  
Location: Yuma County NW ¼ of SE ¼, Section 34, 3N 46W

Table 1. Control of Colorado potato beetle with hand applied insecticides, Irrigation Research Foundation Farm, Yuma, CO, 2000.

TREATMENT	COLORADO POTATO BEETLE/10FT ROW <sup>1</sup>
LEVERAGE 1.6F, 3.75 OZ/ACRE	0.3 ± 0.3 A
BAYTHROID 2E, 1.40 OZ/ACRE	0.3 ± 0.3 A
POUNCE 3.2E, 4.06 OZ/ACRE	0.3 ± 0.3 A
PROVADO 1.6F, 3.75 OZ/ACRE	1.0 ± 0.6 A
UNTREATED CONTROL	2.8 ± 1.7 A
F Value	1.81
p > F	0.1922

<sup>1</sup>SEM, standard error of the mean. Means in the same column followed by the same letter(s) are not statistically different, SNK ( $\alpha=0.05$ ).

## CONTROL OF COLORADO POTATO BEETLE IN POTATO WITH CHEMIGATED INSECTICIDES, IRRIGATION RESEARCH FOUNDATION FARM, YUMA, CO, 2000

Assefa Gebre-Amlak, Stan Pilcher, Dave Kennedy, Golden Plains Area Cooperative Extension; Shawn Walter, Frank Peairs, Department of Bioagricultural Sciences and Pest Management

**CONTROL OF COLORADO POTATO BEETLE IN POTATO WITH CHEMIGATED INSECTICIDES, IRRIGATION RESEARCH FOUNDATION FARM, YUMA, CO, 2000:** Treatments were applied on 5 September 2000 with a Milton Roy-Model B chemigation pump through a Valley sprinkler equipped with Nelson Lo-Flo nozzles operated at 10 psi on 52 inch drops equipped with on-off valves. Treatments were 100 ft by 350 ft and unreplicated.

The field received a severe hailstorm on 20 July 2000 resulting in two potato sets with a second bloom period occurring in late August and early September. At the time of application Colorado potato beetle population consisted of 3<sup>rd</sup> through 5<sup>th</sup> instars, pupae and adults.

Treatments were evaluated by counting the number of Colorado potato beetle larvae, pupae and adults in four, 10 ft rows in each plot prior to and one week after treatment. Precounts averaged 15 ± 3 total Colorado potato beetles per plot. Insect counts in treated plots were compared to the untreated control with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).



Actara 25WG, 3.00 oz/acre and Fulfill 50WG had fewer Colorado potato beetles than the untreated control (Table 1). No phytotoxicity was observed with any treatment.

### Field History

Pest: Colorado potato beetle, *Leptinotarsa decimlineata* (Say)  
 Cultivar: Norkotah (Selection 8)  
 Planting Date: 17 April 2000  
 Planting Rate: 2200 lb/acre  
 Irrigation type: Sprinkler  
     Nozzles: Nelson Lo-Flo # D-3000 on 52 inch drops  
 Crop history: Continuous corn 5 years  
 Herbicide: 1 May 2000, Dual II - 1.5 pt/acre + Prowl 1.5 pt/acre; 22 June 2000, Matrix - 1.5 oz/acre + 20 oz COC/acre  
 Fungicide: 9 July 2000, Bravo Zn - 1.0 pt/acre  
             21 July 2000, Quadris - 6.1 oz/acre  
 Insecticide: None prior to experiment  
 Fertilization: Starter - 35 gal/acre (15 N, 15 P, 0.5 S, 5 Zn)  
                 Preplant - 434 lb/acre (46-0-0)  
 Soil Type: Haxton Sandy Loam, OM 1.1%, pH 7.0  
 Location: Yuma County NW ¼ of SE ¼, Section 34, 3N 46W

Table 1. Control of Colorado potato beetle with chemigated insecticides, Irrigation Research Foundation Farm, Yuma, CO, 2000.

TREATMENT	COLORADO POTATO BEETLE/4-10FT ROWS <sup>1</sup>
FULFILL 50WG, 2.75 OZ/ACRE	1.0 (0.0086)
ACTARA 25WG, 3.00 OZ/ACRE	1.2 (0.0188)
ACTARA 25WG, 1.50 OZ/ACRE	6.7 (0.4123)
UNTREATED CONTROL	6.2

<sup>1</sup>Number in parenthesis indicates probability of mean being similar to the untreated control, calculated with a two-tailed t-test with assumed equal variance ( $\alpha=0.05$ ).

## THE 2000 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:

<b>2000 Light Trap Operators</b>		<b>2000 Pest Survey Committee</b>	
Bonny Dam	Bill Cody Jr. and Family	Allan Brax	Mike Fecht
Burlington	Stratton Equity COOP	Bill Brown	Merlin Van Deraa
Eckley	Merle and Hazel Gardner	Frank Peairs	Mike Ferrari
Holyoke	Scott Korte	Jack Rhodes	John Kreidler
Kirk	Gene Nelson	Dave Green	Ron Meyer
Wauneta	Clark Lenz	Gene Kleve	Randy Haarberg
Wray	Gleason Dryden		
Yuma	Irrigated Research Farm		

## Contributors to the 2000 Golden Plains Pest Survey Program

<b>Akron:</b>	Birdsall Young, Jr., Lyle A. Foutz, Earl Jesse, Glenn Baker, Robert L. Schenk, Vale Blessing, John Hickert, Rob Pachner, Charles Callahan, John Wright, (Akron Flying Service Inc.), Gary and Shirley Brandt, Birdsall Young, Jr., Earl Jesse, John Hickert, Hickert Land Company, Glen Baker
<b>Anton:</b>	Chester Kenney (Anton Co-op Assn.), Newell A. Herron
<b>Amherst:</b>	Jim Tomky
<b>Arapahoe:</b>	Pat Hornung
<b>Arriba:</b>	Darrel Lehrkamp (Tri-Me Spraying Service)
<b>Atwood:</b>	Kevin Blome (Agrevo USA CO.)
<b>Aurora:</b>	Todd Frazier (American Cyanamid), Cris Wagner (American Cyanamid)
<b>Bayard, NE:</b>	Larry Kildow
<b>Benkelman, NE:</b>	Doran Jessee (D & D Jessee Farm, Inc.)
<b>Bethune:</b>	Ken Hildenbrandt (Warrior Aviation), Jack Lowe
<b>Brush:</b>	David Wagers
<b>Burlington:</b>	Dan Slinger (Stratton Equity Coop), Schutte Farms, Louis Nider (Nider Farms), Bill D. Hinkhouse, Dale Hansen, Larry Feldhousen, Gerald Cody, William Cody, Kane Cody, Jeff Nitsch (Servi-Tech), Berry Hinkhouse, Carlyle James (C & C James Ranch, Inc.), John Mauch (Wilcox Oil & Chemical, Inc.), Clayton Smith, Gary Mulch, Mulch Farms, Ryan Weaver, Clay Smith (High Plains Ag Service, Inc.), Allen Schulte, Schulte Farms
<b>Bushnell, NE:</b>	Bill Booker (Mycogen Seeds)
<b>Colby, KS:</b>	Chad Fabrizius (American Cyanamid), Darren Rubottom (American Cyanamid)
<b>Columbus, NE:</b>	Gary Schaneman (FMC Corporation)
<b>Cope:</b>	Ed Cecil (Cecil Ranch), Jim Cecil, Sackett's Inc
<b>Dalton, NE:</b>	Ted, Kyle and Kathy Watachorn
<b>Des Moines, IA:</b>	Asgrow Seed Co.
<b>Eckley:</b>	Ted Tuell (Tuellland Inc.), Max Schafer, Merle & Hazel Gardner (Spittoon Ranch), Kathy Wenger
<b>Elsie, NE:</b>	Don Langmacher, Dick Leonard
<b>Enders, NE:</b>	Terry Bilka
<b>Flagler:</b>	Leroy Loutzenhiser, Dallas Saffer (Flagler Aerial Spraying Inc), E. Leroy Loutzenhiser (LKF Partnership), Rex Loutzenhiser, Randy & Linda Loutzenhiser (RLF Partnerships), Wes Pollart, Flaglers Farmers Co-op
<b>Fleming:</b>	Jim Atkin (Atkin Seed)
<b>Fort Collins:</b>	Jim Ed Beach, CCA (Rhone Poulenc), Larry Schild (American Cyanamid), Kelly Darland

**Fort Morgan:** Tim Carpenter (Centennial Ag Supply), Leland Brockman (Novartis Crop Protection), James O'Bannon (Helena Chemical)

**Gering, NE:** Tim Wolf.

**Goodland, KS:** Bill Shields (Pueblo Chemical & Supply Co.)

**Grand Junction:** Grand Valley Hybrids, Inc

**Grant, NE:** Mark McGreer, Clinton Fuchs (Golden Harvest), Larry Appel. M.S., Appel Crop Consulting, Inc

**Greeley:** Calvin Nolke (Bayer, Inc.), Tom Farris (Pueblo Chemical & Supply Co.), Bob Leisy (Asgrow), James E. Anderson (Bayer, Inc), Calvin Heimbauch, Bob Zellmer (Colorado Farm Network), Bill Curran

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

**Haxtun:** Dennis Eckman, Dave Green (Servi-Tech), Garretson Inc., Larry McConnell (Pioneer Seeds), Larry Anderson (Zion Farms), Ken Kurtzer (Kurtzer Grain & Landscaping), Jared Anderson (Servi-Tech), Dick Fryrear (Triumph Seed), Steve Firme, Quentin and Brian Biesemeier, Grainland Coop, Dora Gregory, Gregory Ag Consulting, LLC, Lauren Heermann

**Hays Springs, NE:** Steve Sandberg

**Hemingford, NE:** Dave Engel

**Holyoke:** Elwin Poe (E. Poe Farms), Mike Einspahr, Lenz Farms, KBC Trading and Processing, Jack Rhodes, Shawn Dalton, Erik Vieselmeyer (American Cyanamid), Allen and Amy Einspahr, Gary and Angie Korte, Raymond Korte, Holyoke Coop Association, Dale Haynes (Haynes Cattle Co), Mike Einspahr, Gale Haynes (Haynes Cattle Co.)

**Idalia:** Larry Allen (Allen Grain), Ken Penzing

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**Indianola, NE:** Stan Stockhaus (Mycogen Seeds)

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**Kearney, NE:** Ted Warfield (FMC Corporation)

**Kimball, NE:** Jack Cochran

**Kirk:** Darrell Idler (Idler Brothers), James Idler (Idler Brothers), Eugene & Frank Nelson, Ervin Frank (Frank Farms), Todd Frank (Frank & Nelson), Kent Ficken, Lesley C. Lewis

**Lamar, NE:** Kent Miller, (Kee-Nan Farms)

**Limon:** Don Wardlaw (American Cyanamid)

**Lincoln, NE:** Pioneer Hi-Bred International Inc

**Lodgepole, NE:** Mike Behrends

<b>Longmont:</b>	Lyle Fagala (Zeneca Ag Products), Paul Joe Ogg (American Cyanamid Co), Warren Smith (Mycogen Seeds)
<b>Loveland:</b>	John Person (FMC), Claude Ross (FMC), Scott Inman (Elf Atochem No. America, Inc.), Paul H. Koehler (Garst Seed Co.), Ken Schwalm (Grand Valley Hybirds)
<b>McDonald, KS:</b>	C.W. Antholz
<b>Melbeta, NE:</b>	Don Dillman
<b>Monument:</b>	John T. Doyle (Rhone Poulenc)
<b>Morrill, NE:</b>	Gordon Strauch, Jerry Dillman
<b>North Platte, NE:</b>	Mike Sughroue (American Cyanamid), Corby Jensen (Monsanto Globe Seed Group), Jerry Nelson (American Cyanamid), Matt Hasenauer
<b>Ogallala, NE:</b>	David DeVries (Platte Valley Crop Consulting), Allan Brax, Guy Jones
<b>Otis:</b>	Steve Perry, Gene Perry, Perry Bros. Seed, Ken Kuntz, Ken Melendy, Richard Lewton (Lewton Farms), Harlan & Donita Schaffert, Calvin Schaffert, Schaffert Farms
<b>Ovid:</b>	Rick Haynes
<b>Scottsbluff, NE:</b>	Bill Rexus
<b>Sterling:</b>	Darrel W. Mertens (Aero Applicators, Inc.), Frank Molinaro (Ag. Crop Services)
<b>Stratton:</b>	Timothy and Gary Pautler, Mike Livingston, Stratton Equity Co-op, Bryon Foose, Cop Quest, The 1st National Bank of Stratton
<b>Torrington, WY:</b>	Steven Nighswonger (American Cyanamid)
<b>Vernon:</b>	Duaine and Wanda Dodsworth
<b>Wheatland, WY:</b>	Dan Melcher
<b>Woodrow:</b>	Arven Vondy (Vondy Ranch)
<b>Wray:</b>	Lance Russell (Asgrow), Dick Yearous (Simplot Soilbuilders), KRDZ, Jim Soehner, Dennis Atwell, Dwight and Nancy Rockwell, Alan Welp (Welp Farms), Marc Cartwright (Servi-Tech), Jim Bowman, Dave Wilson (Stalk, Inc), Durad and Darus Fix (D & D Farms), John Kreidler (Ag Aviation, Inc.), Robert L. Sitzman (Slash Diamond Farms, LLC), Daryl Monasmith, Larry Gardner (Covenant Farms), Kyle Domsh, Eldon and Sue Dryden, Gleason Dryden, Will Moyer (Centennial Ag Supply Co.), Phil Osmus, Greg Skoglund (Ag Aviation, Inc.), Dean Larson, Wray Feed and Bean Co, Don & Peggy Brown, David DiPippo, Great Plains Cooperative
<b>Yuma:</b>	Merlin S. Van Deraa (Terra Firma Ag Consulting), Jerry McPherson (Ag. Service, Inc.), Mike Ferrari (Servi-Tech), Brett Mermis (Servi-Tech), Carroll D. Josh, Stephen Monk, Jennie Brown, Kevin Koenig (Koenig Inc.), James Lengel, Craig Michael, (Aero Spray), Gary Newton (Agri-Inject, Inc), Farm Credit of Yuma, J. R. Unger, Scott Wall

#### **SUMMARY OF 2000 LIGHT AND SUCTION TRAP CATCHES**

The following graphs compare the 2000 European corn borer and western bean cutworm moth flights with the historical average moth flight (including 2000) 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 14.

#### **European Corn Borer Moth Flight**

First generation moth flight began at the end of May and peaked the second week of June. Second generation flight peaked between 8 and 15 August. There were some differences between years and locations in terms of moth population.

Light trap locations were grouped as high, intermediate and low moth activity. High moth populations were noted in Eckley, Holyoke, Kirk and Wauneta. Bonny Dam and Wray had intermediate moth populations. Burlington and Yuma had low populations of corn borer moth.

### **Western Bean Cutworm**

Western bean cutworm moth flight activity began the first week of July and peaked between 11 and 18 July in most locations. All light trap locations had high populations 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, 1987-2000.

	<b>AKRON</b>	<b>BRIGGSDALE<sup>1</sup></b>	<b>FRUITA</b>	<b>WALSH</b>
1987	—	1832	—	392
1988	172	92	2132	4636
1989	177	102	2497	5003
1990	1234	1353	2318	1275
1991	79	1679	1054	883
1992	186	1685	1032	789
1993	7	2	336	374
1994	496	867	327	3216
1995	73	322	224	361
1996	66	502	1064	—
1997	301	216	648	2501
1998	36	550	1330	31
1999	1257	573	508	257
2000	121	430	—	140

<sup>1</sup>Trap moved to ARDEC (Agricultural Research, Development and Education Center, Colorado State University, Fort Collins, CO) from Briggsdale in 1990. Trap moved back to Briggsdale in 1999.

## 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 2000.

Table 1. Performance of planting-time insecticides against western corn rootworm, 1987-2000, in northern Colorado

INSECTICIDE	IOWA 1-6 ROOT RATING <sup>1</sup>
AZTEC 2.1G	2.6 (21)
COUNTER 15G	2.6 (25)
COUNTER 20CR	2.6 (34)
DYFONATE 20G	2.8 (12)
FORCE 1.5G (8 OZ) or 3G (4 OZ)	2.7 (24)
FORTRESS 5G	2.8 (14)
LORSBAN 15G	3.1 (18)
REGENT 4SC, 3-5 GPA	3.0(5)
THIMET 20G	3.4 (15)
UNTREATED CONTROL	4.2 (24)

<sup>1</sup>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, 1987-2000, in northern Colorado.

INSECTICIDE	IOWA 1-6 ROOT RATING <sup>1</sup>
COUNTER 15G	2.7 (16)
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	3.2 (12)
THIMET 20G	2.9 (16)
UNTREATED CONTROL	4.4 (20)

<sup>1</sup>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, 1982-2000, in northeast Colorado.

<b>MATERIAL</b>	<b>LB/ACRE</b>	<b>METHOD<sup>1</sup></b>	<b>% CONTROL<sup>2</sup></b>
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)

<sup>1</sup>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.

<sup>2</sup>Numbers in ( ) indicate that percent control is the average of that many trials.

Table 4. Insecticide performance against western bean cutworm, 1982-2000, in northeast Colorado.

<b>MATERIAL</b>	<b>LB (AI)/ACRE</b>	<b>METHOD<sup>1</sup></b>	<b>% CONTROL<sup>2</sup></b>
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)

<sup>1</sup>A = Aerial, I = Center Pivot Injection

<sup>2</sup>Numbers in ( ) indicated that percent control is average of that many trials.

Table 5. Insecticide performance against second generation European corn borer, 1982-2000, in northeast Colorado.

<b>MATERIAL</b>	<b>LB (AI)/ACRE</b>	<b>METHOD<sup>1</sup></b>	<b>% CONTROL<sup>2</sup></b>
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)

<sup>1</sup>A = Aerial, I = Center Pivot Injection

<sup>2</sup>Numbers in ( ) indicate how many trials are averaged.

Table 6. Performance of hand-applied insecticides against alfalfa weevil larvae, 1984-2000, in northern Colorado.

<b>PRODUCT</b>	<b>LB (AI)/ACRE</b>	<b>% CONTROL AT 2 WK<sup>1</sup></b>
BAYTHROID 2E	0.025	96 (7)
FURADAN 4F	0.25	86 (11)
FURADAN 4F	0.50	91 (20)
LORSBAN 4E	0.75	93 (14)
LORSBAN 4E	1.00	96 (6)
LORSBAN 4E	0.50	83 (10)
PENNCAP M	0.75	84 (11)
PERMETHRIN <sup>2</sup>	0.10	67 (7)
PERMETHRIN <sup>2</sup>	0.20	80 (4)
WARRIOR 1E	0.02	97 (11)

<sup>1</sup>Number in ( ) indicates number of years included in average.

<sup>2</sup>Includes both Ambush 2E and Pounce 3.2E.

Table 7. Control of Russian wheat aphid with hand-applied insecticides in winter wheat, 1986-2000<sup>1</sup>.

<b>PRODUCT</b>	<b>LB (AI)/ACRE</b>	<b>TESTS WITH &gt; 90% CONTROL</b>	<b>TOTAL TESTS</b>	<b>% TESTS</b>
LORSBAN 4E	0.50	20	37	54
DI-SYSTON 8E	0.75	14	39	36
DIMETHOATE 4E	0.375	6	31	19
DI-SYSTON 8E	0.50	2	10	20
PENNCAP M	0.75	3	19	16
LORSBAN 4E	0.25	4	18	22
THIODAN 3E	0.50	1	4	25
WARRIOR 1E	0.03	1	11	9

<sup>1</sup>Includes data from several states.

Table 8. Control of spider mites in artificially-infested corn with hand-applied insecticides, ARDEC, 1993-2000.

<b>PRODUCT</b>	<b>LB (AI)/ACRE</b>	<b>% REDUCTION IN TOTAL MITE DAYS<sup>1</sup></b>
CAPTURE 2E	0.08	60 (8)
CAPTURE 2E + DIMETHOATE	0.08 + 0.50	70 (8)
CAPTURE 2E + FURADAN 4F	0.08 + 0.50	66 (4)
COMITE II	1.64	27 (8)
COMITE II	2.53	56 (3)
COMITE II + DIMETHOATE 4E	1.64 + 0.50	61 (5)
DIMETHOATE 4E	0.50	55 (8)
FURADAN 4F	1.00	44 (8)
FURADAN 4F + DIMETHOATE	1.00 + 0.50	58 (3)

<sup>1</sup>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, 1998-2000.

<b>PRODUCT</b>	<b>LB (AI)/ACRE</b>	<b>TIMING</b>	<b>% CONTROL<sup>1</sup></b>
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	61 (3)

<sup>1</sup>Number in () indicates number of tests represented in average.

## ACKNOWLEDGMENTS

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## PRODUCT INDEX

### ACTARA 25WG

Manufacturer: Novartis

EPA Registration Number: pending

Active ingredient(s) (common name): thiamethoxam ..... 22, 23

### AGRI-MEK Manufacturer: Novartis

EPA Registration Number: 100-898

Active ingredient(s) (common name): abamectin ..... 18, 19

### ASANA XL

Manufacturer: DuPont

EPA Registration Number: 352-515

Active ingredient(s) (common name): Esfenvalerate ..... 13, 20, 21

### AZTEC 2.1G

Manufacturer: Bayer

EPA Registration Number: 3125-412

Active ingredient(s) (common name): 2% BAY NAT 7484, 0.1% cyfluthrin ..... 15-17, 38

### BAYTHROID 2E

Manufacturer: Bayer

EPA Registration Number: 3125-351

Active ingredient(s) (common name): cyfluthrin ..... 7-11, 21, 22, 40, 42

### CAPTURE 2E

Manufacturer: FMC

EPA Registration Number: 279-3069

Active ingredient(s) (common name): bifenthrin ..... 1, 2, 15, 18, 19, 39-41

### CGA293343

Manufacturer: Novartis

EPA Registration Number: experimental

Active ingredient(s) (common name): thiamethoxam ..... 2

### COMITE II

Manufacturer: Uniroyal

EPA Registration Number: 400-154

Active ingredient(s) (common name): propargite ..... 18, 19, 41

### COUNTER 15G

Manufacturer: Cyanamid

EPA Registration Number: 241-238

Active ingredient(s) (common name): terbufos ..... 15, 38

### COUNTER 20CR

Manufacturer: Cyanamid

EPA Registration Number: 241-314

Active ingredient(s) (common name): terbufos ..... 15-17, 38

### DIMETHOATE 4E

Manufacturer: generic

EPA Registration Number: generic

Active ingredient(s) (common name): dimethoate ..... 2, 5, 7-9, 13, 18, 19, 41

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Manufacturer: Bayer	
EPA Registration Number: 3125-307	
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Manufacturer: Zeneca	
EPA Registration Number: 10182-373	
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EPA Registration Number:	
Active ingredient(s) (common name): tefluthrin	16
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Manufacturer: Novartis	
EPA Registration Number: 100-912	
Active ingredient(s) (common name): pymetrozine	2, 22, 23
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Manufacturer: FMC	
EPA Registration Number: 279-2876	
Active ingredient(s) (common name): Carbofuran	6-9, 15, 19-21, 38, 40-42
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Manufacturer: DuPont	
EPA Registration Number: 352-384	
Active ingredient(s) (common name): Methomyl (S-methyl-N{(methylcarbonyl)oxy}thioacetimidate)	7-9, 13
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Manufacturer: Bayer	
EPA Registration Number: 3125-524	
Active ingredient(s) (common name): 17.0% imidacloprid, 12% cyfluthrin	22
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Manufacturer: Dow Agrosiences	
EPA Registration Number: 62719-34	
Active ingredient(s) (common name): chlorpyrifos	15-17, 38, 39
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Manufacturer: Dow Agrosiences	
EPA Registration Number: 62719-220	
Active ingredient(s) (common name): chlorpyrifos	1, 2, 4, 7-9, 18, 19, 39-41
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Manufacturer: FMC	
EPA Registration Number: 279-3126	
Active ingredient(s) (common name): s-cypermethrin	7-9, 21, 42
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Manufacturer: Valent	
EPA Registration Number: 59639-33	
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Manufacturer: Elf Atochem

EPA Registration Number: 4581-292

Active ingredient(s) (common name): methyl parathion . . . . . 1, 2, 7-9, 40, 41

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Manufacturer: FMC

EPA Registration Number: 279-3014

Active ingredient(s) (common name): permethrin . . . . . 22, 39, 40

PROVADO 1.6F

Manufacturer: Bayer

EPA Registration Number: 3125-457

Active ingredient(s) (common name): imidacloprid . . . . . 22

REGENT 4SC

Manufacturer: Rhone Poulenc

EPA Registration Number: 264-582

Active ingredient(s) (common name): fipronil . . . . . 15, 38

SEVIN XLR

Manufacturer: Rhone Poulenc

EPA Registration Number: 264-333

Active ingredient(s) (common name): carbaryl . . . . . 13

STEWARD

Manufacturer: Dupont

EPA Registration Number: 352-598

Active ingredient(s) (common name): indoxacarb . . . . . 7-9

THIMET 20G

Manufacturer: American Cyanamid

EPA Registration Number: 241-257

Active ingredient(s) (common name): phorate . . . . . 15, 38, 39

THIODAN 3EC

Manufacturer: FMC

EPA Registration Number: 279-2924

Active ingredient(s) (common name): endosulfan . . . . . 13, 41

WARRIOR 1E

Manufacturer: Zeneca

EPA Registration Number: 10182-96

Active ingredient(s) (common name): lambda-cyhalothrin . . . . . 7-9, 21, 39-42

WARRIOR T

Manufacturer: Zeneca

EPA Registration Number: 10182-434

Active ingredient(s) (common name): lambda-cyhalothrin . . . . . 1, 2, 4