CONTROLING THE WORM COMPLEX IN ALFALFA

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ABSTRACT

Beet armyworm, *Spodoptera exigua* (Hübner), alfalfa caterpillar, *Colias eurytheme* Boisduval, and Granulate cutworm, *Agrotis subterranea* (Fabricius) are the three most economically important Lepidopterous worm pests in the low desert region of southern California and Arizona. These worm pests must be carefully managed for successful alfalfa hay production. Considerable progress has been in integrated pest management toward worm pest management through cultural practices, preservation of natural enemies, and proper sampling and establishment of treatment thresholds that take in to account the natural enemies of aforementioned worm pests. However, insecticide applications often still needed and are commonly used to maintain population densities of worm pests below damaging levels. Experiments were conducted at the University of California Desert Research and Extension Center in 2005, 2006 and 2007 to compare efficacy of registered and unregistered materials and combinations of insecticidal materials for worm pest control in alfalfa. The results of these three insecticide efficacy experiments indicate that beet armyworm and alfalfa caterpillar are susceptible to control by several different insecticides including insecticides that are environmentally friendly.

INTRODUCTION

Although integrated pest management (IPM) strategies have reduced the alfalfa grower's reliance on insecticides for control of worm pests, yet insecticides are still an important IPM tools. Beet armyworm, alfalfa caterpillars and granulate cutworms are commonly controlled in low desert alfalfa with indoxacarb or one of several pyrethroid insecticides registered for alfalfa hay production. Insecticides are applied to a large portion of the alfalfa acreage in the low desert region of the Southwestern United States each year for worm pest control.

Alfalfa caterpillar, *Colias eurytheme* is a warm weather pest with up to seven generations between May and October in the low desert. The adults are yellow butterflies with black spots and can become abundant begin in May; begin checking fields for caterpillars when butterflies are present. Alfalfa caterpillar butterflies flying over tall alfalfa have most likely emerged from that field and are migrating to regrowth in other fields, so treat is usually not warranted. The lifecycle or alfalfa caterpillar is synchronized to the cutting cycle of alfalfa; developing from egg to adult between cuttings. Football shaped eggs are laid singly, standing on end, on the upper surface of leaves in fields with regrowth under 6 inches. These fields need to be checked with a sweep net for caterpillars. Larvae hatch in 3 to 10 days, grow to about an inch long and pupate in approximately 2 weeks. Alfalfa caterpillars are green with white stripes down their sides and are

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distinguished from beet armyworm by their velvety appearance (Anonymous 1985).

Unlike armyworms that skeletonize leaves, alfalfa caterpillars consume entire leaves including the veins and midrib; large larvae are most destructive. *Cotesia medicaginis* is a small, black wasp parasitic about 0.25 inch long that attacks the alfalfa caterpillar. The wasp lays an egg inside very small caterpillars. The wasp egg hatches into larva that consume the body contents of the caterpillar. Parasitized larvae are lighter in color, swollen toward the rear and somewhat shiny rather than velvety on the surface like than normal healthy caterpillars. The wasp larva can be exposed by grasping the caterpillar at each end of the swelling and pulling it apart. A parasitized alfalfa caterpillar dies before it reaches 0.5 inch in length (Anonymous 1985).

Management guidelines. Damage may be avoided by cutting hay early. However, timing of early cutting is critical to obtain satisfactory yield and to avoid serious damage. Monitor fields weekly from June through October, checking 2 to 3 times per week during periods of heavy infestations, by taking 5 sweep counts in 4 to 5 field locations. Check for *Cotesia medicaginis* parasitism. Treatment with an insecticide when field counts average 10 non-parasitized caterpillars per sweep. *Bacillus thuringiensis* (Bt) may give satisfactory control of alfalfa caterpillars without adversely affecting beneficial species, and leaves no undesirable residue on the hay. When caterpillars ingest Bt, they cease feeding, but may remain on plants 3-4 days before dying (Anonymous 2006).

Beet armyworm is a common pests in desert alfalfa from June through September, occasionally damages alfalfa in April or May in the low desert valleys of Southern California. White cottony scales covered egg masses are deposit on the upper side of leaves. Eggs hatch in a few days and larvae reach full size in 2 to 3 weeks. Larvae pupate on or under the soil surface. Adults are brown nocturnal moths with a 1¼ wing span. Moths emerge to re-infest alfalfa or to infest other crops. There are at least 5 generations of beet armyworm per year in the low desert; the final generation overwinters as pupae in the soil. Beet armyworm larvae are smooth-skinned and are usually olive green, but color varies from bright green or purplish green. They have very fine dark stripes on their backs and pale yellow stripes on each side. An intense black spot on the lateral margins of the second thoracic segment above the second set of true legs is a distinguishing characteristic. First instar larvae web terminal leaves together and skeletonize the webbed leaves resembling a white. Later instar larvae dispersing throughout the crop canopy. Spiders and various species of predacious bugs prey on the armyworm larvae. *Hyposoter exigua* wasps prey beet armyworm by depositing an egg in the larvae. A *Hyposoter exigua* larva hatches from the egg and consumes the internal contents of the armyworm larva (Anonymous 1985).

Management guidelines. Monitor fields weekly by taking 5 sweep counts at each of 4 to 5 locations per field using a standard sweep net. To sample for parasitism by *Hyposoter exigua*, pull the heads from ½ inch long armyworms, squeeze the body contents out from the anal end toward the head end; larvae will be pushed out of parasitized armyworms. Check fields 2 to 3 times per week when heavy populations begin to develop. Treat with an insecticide when there are 15 non-parasitized ½ inch armyworms per sweep (Anonymous 2006).

Cutworms are frequent pests in low desert bed-planted alfalfa. Granulate cutworm, *Agrotis subterranea* (Fabricius), and the variegated cutworm, *Peridroma sausia* (Hübner), are the two

species that most commonly attack desert alfalfa. Cutworm adults are night-flying moths in the tan and brown colored moths. White to greenish eggs are laid in irregular masses, on alfalfa leaves or stems often near the base of the plant. Eggs darken as they approach hatching. Larvae can grow up to 2 inches long. The heavy-bodied larvae appear as smooth-skinned caterpillars of various colors and patterns and frequently roll into a C-shape when disturbed. Larvae hide under loose soil, in soil cracks or under duff during the day, move to the plants at night to feed (Anonymous 1985).

Variegated cutworm populations may develop in weedy areas and migrate into seedling stands or mature stands. Seedling alfalfa stands can be severely damaged by cutworms cutting the seedlings off at or just below the soil surface. Established fields are damaged when cutworms cut off new growth of feed on the alfalfa foliage (Anonymous 1985).

Granulate cutworm is a devastating pest of bed planted alfalfa, but can also be a pest of alfalfa planted between borders. Low desert alfalfa fields are attacked by granulate cutworm from May through October, but the pest is resident in fields throughout the year. Established alfalfa fields can be severely injured when cutworms cut off new shoots at or below ground level following hay harvest. The pest often goes undetected after cutting and hay removal. The problem becomes apparent when the field is watered back and there is little or no re-growth due to cutworms feeding. Cutworms feeding on shoots, thereby holding back re-growth, deplete starch reserves in the crowns, weakening the plants, making them susceptible to disease. Granulate cutworm is nocturnal, but will move from daytime hiding places and climb into the alfalfa canopy to feed in the evening.

Management guidelines. Cutworms are most injurious in fields with high plant residue. Pre-plant tillage and abatement of weedy refuge areas around fields help prevent cutworm infestations (Anonymous 2006). Flood irrigation will drown many cutworm larvae. Flood irrigation during daylight hours will attract Egrets, Ibis, gulls and other birds that prey on the cutworm as the advancing water forces the larvae from hiding. Cutworms can be detected by looking under duff and carefully digging to a depth of one inch deep in loose soil near alfalfa crowns. When cutworm numbers exceed one or two per foot of row or severe damage is apparent, treatment with an insecticide is usually warranted. Pyrethroid insecticides or indoxacarb have been efficacious for control granulate cutworm in the low deserts.

INSECTICIDE EFFICACY EXPERIMENTS FOR WORM PEST CONTROL

Insecticide efficacy studies were conducted during the summers of 2005, 2007 and 2008 at the UC Desert Research and Extension Center. A stand of alfalfa, var. CUF 101, was used for the experiment. Plots in each experiment were arranged in a randomized complete block design with four replications. Insecticide treatments and rates as fluid ounces of formulated product per acre for each experiment by year are listed in Table 1. Insecticide treatments were broadcast applied 28 July 2005, 11 September 2007 and 5 August 2008. Populations of worm pest species were measured in each plot with a standard 15 inch diameter insect sweep net consisting of ten 180^{o} sweeps. Sampling dates were 27 & 29 July, 1, 3 & 11 August 2005; 7, 12, 14, 18, 25 September and 5 October; and 5, 8, 12, 19 & 26 August 2008.

Table 1. Alfalfa Worm Control Insecticides Evaluated at Holtville, CA in 2005, 2007 and 2008.

2005		2007		2008	
Treatment	**oz/acre**	**Treatment**	**oz/acre**	**Treatment**	**oz/acre**
1. Check	**---------**	**1. Check**	**---------**	**1. Check**	**---------**
2. Intrepid 2SC	**6.0**	**2. Steward**	**6.7**	**2. Steward**	**6.7**
3. Intrepid 2SC	**8.0**	**3. Lorsban 4E**	**32.0**	**3. Lorsban Advanced**	**32.0**
4. Success	**6.0**	**4. Lorsban 4E**	**64.0**	**4. Intrepid**	**6.0**
5. Radiant	**5.8**	**5. Lorsban Advanced**	**34.0**	**5. Intrepid**	**7.0**
6. Lockon-2EC	**32.0**	**6. Lorsban Advanced**	**68.0**	**6. Baythroid XL**	**2.8**
7. Steward	**6.7**	**7. Belt 480 SC**	**2.0**	**7. Belt 480 SC**	**1.0**
		8. Belt 480 SC	**3.0**	**8. Belt 480 SC**	**2.0**
				9. Belt 480 SC	**3.0**

In 2005 all insecticide treatments controlled beet armyworm with post treatment means that were significantly less than the untreated control (LSD, $P<0.05$) (Table 2). Success and Radiant had post treatment means for beet armyworms that were significantly lower that the mean for Lockon-2EC. All insecticide treatments controlled alfalfa caterpillars with post treatment means that were significantly less than the untreated control (LSD, $P<0.05$) (Table 3) but there were no differences among the insecticide treatments. All insecticide treatments controlled alfalfa webworms with post treatment means that were significantly less than the untreated control (Table 4) but there were no differences among the insecticide treatments. Radiant provided control of worm pests in alfalfa at levels similar or superior to worm control insecticides registered for use on alfalfa in this experiment.

Table 2. Numbers[v] of Beet Armyworms per Ten Sweeps in Alfalfa, Holtville, CA, 2005.

Treatment	oz/acre	1 DPT[w]	1 DAT[x]	4 DAT	7 DAT	14 DAT[y]	PTA[z]
Check	**---------**	**5.25 a**	**2.00 a**	**2.00 a**	**5.75 a**	**2.50 a**	**3.06 a**
Intrepid 2SC	**6.0**	**3.75 a**	**0.75 a**	**0.00 b**	**0.25 bc**	**0.00 d**	**0.25 bc**
Intrepid 2SC	**8.0**	**3.50 a**	**1.75 a**	**0.00 b**	**0.00 c**	**0.75 bc**	**0.63 bc**
Success	**6.0**	**6.25 a**	**0.25 a**	**0.00 b**	**0.00 c**	**0.00 d**	**0.06 c**
Radiant	**5.8**	**2.25 a**	**0.25 a**	**0.00 b**	**0.25 bc**	**0.25 cd**	**0.19 c**
Lockon-2EC	**32.0**	**2.75 a**	**1.25 a**	**0.25 b**	**0.75 b**	**1.00 b**	**0.81 b**
Steward	**6.7**	**3.25 a**	**0.50 a**	**0.25 b**	**0.50 bc**	**0.00 d**	**0.31 bc**

[v] Mean separations within columns by $LSD_{0.05}$. [w] Days Pre-treatment. [x] Days after treatment. [y] Log transformed data used for analysis; actual means reported. [z] Post treatment average.

Table 3. Mean Numbers[w] of Alfalfa Caterpillar per Ten Sweeps in Alfalfa, Holtville, CA, 2005.

Treatment	oz/acre	1 DPT[x]	1 DAT[y]	4 DAT	7 DAT	14 DAT	PTA[z]
Check	---------	4.00 a	3.00 a	4.25 a	6.00 a	3.50 a	4.19 a
Intrepid 2SC	6.0	2.75 a	0.75 a	0.00 b	0.00 b	0.25 b	0.25 b
Intrepid 2SC	8.0	3.75 a	0.25 a	0.25 b	0.00 b	0.00 b	0.13 b
Success	6.0	4.75 a	0.50 a	0.00 b	0.00 b	0.00 b	0.13 b
Radiant	5.8	4.25 a	0.50 a	0.00 b	0.00 b	0.25 b	0.19 b
Lockon-2EC	32.0	3.75 a	0.25 a	0.00 b	0.00 b	0.00 b	0.06 b
Steward	6.7	2.50 a	0.25 a	0.00 b	0.00 b	0.25 b	0.13 b

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

Table 4. Mean Numbers[w] of Alfalfa Webworms per Ten Sweeps in Alfalfa, Holtville, CA, 2005.

Treatment	oz/acre	1 DPT[x]	1 DAT[y]	4 DAT	7 DAT	14 DAT	PTA[z]
Check	---------	4.00 a	1.00 a	3.25 a	3.50 a	3.50 a	2.81 a
Intrepid 2SC	6.0	1.75 a	0.50 a	0.00 b	0.50 b	0.50 b	0.38 b
Intrepid 2SC	8.0	3.00 a	0.25 a	0.00 b	0.00 b	0.25 b	0.13 b
Success	6.0	2.50 a	0.25 a	0.50 b	0.50 b	0.25 b	0.38 b
Radiant	5.8	2.75 a	0.25 a	0.00 b	0.50 b	0.00 b	0.19 b
Lockon-2EC	32.0	2.75 a	0.50 a	0.00 b	0.00 b	0.00 b	0.13 b
Steward	6.7	2.00 a	0.00 a	0.00 b	0.00 b	0.25 b	0.06 b

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

Pre-treatment numbers of all worm pests in the 2007 experiment were similar (P=0.05) among treatments (Table 5-7). All insecticide treatments had means for beet armyworm that were significantly lower than the means for the untreated control 1 and 14 DAT (Table 5) but there were no differences among the means and the untreated control 24 DAT. All but Lorsban 4E @ 32 fl oz/acre had means for beet armyworm that were significantly lower than the means for the untreated control 3 DAT and all but Lorsban 4E @ 32 fl/acre and Lorsban Advanced @ 64 fl oz/acre had means for beet armyworm that were significantly lower than the untreated control 7 DAT. The numbers of alfalfa caterpillar and webworms were low on all sampling dates and there were no differences among the insecticide treatments and the untreated control (Tables 6 and 7); however, the post treatment averages for alfalfa caterpillar were lower than the untreated control for all insecticide treatments except Lorsban 4E @ 32 fl oz/acre. In conclusion, all insecticide

treatments provided some level of control for beet armyworm and alfalfa caterpillar, but Lorsban at the low rate was appeared to be the least efficacious.

Table 5. Numbers of Beet Armyworms per Ten Sweeps in Alfalfa, Holtville, CA, 2007.

Treatment	oz/acre	4 DPT[x]	1 DAT[y]	3 DAT	7 DAT	14 DAT	24 DAT	PTA[z]
Check	---------	7.00	7.00 a	2.25 a	3.00 a	5.00 a	0.75	3.60 a
Steward	6.7	7.00	2.25 b	0.50 b	0.75 bc	1.25 b	0.25	1.00 b
Lorsban 4E	32.0	6.25	1.75 b	1.00 ab	1.50 abc	0.50 b	0.25	1.00 b
Lorsban 4E	64.0	5.25	1.50 b	0.50 b	1.00 bc	0.75 b	0.00	0.75 bc
Lorsban Advanced	34.0	5.75	0.75 b	0.25 b	0.00 c	1.50 b	1.00	0.70 bcd
Lorsban Advanced	68.0	6.00	0.50 b	0.00 b	1.75 ab	2.00 b	0.25	0.90 bc
Belt 480 SC	2.0	8.75	0.75 b	0.00 b	0.00 c	0.50 b	0.25	0.30 d
Belt 480 SC	3.0	9.75	1.00 b	0.25 b	0.00 c	1.00 b	0.25	0.50 cd

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

Table 6. Mean Numbers of Alfalfa Caterpillar per Ten Sweeps in Alfalfa, Holtville, CA, 2007.

Treatment	oz/acre	4 DPT[x]	1 DAT[y]	3 DAT	7 DAT	14 DAT	24 DAT	PTA[z]
Check	---------	2.50	1.00	0.50	0.25	0.50	0.50	0.55 a
Steward	6.7	2.00	0.75	0.00	0.00	0.00	0.00	0.15 c
Lorsban 4E	32.0	3.00	1.25	0.25	0.00	0.00	0.75	0.45 ab
Lorsban 4E	64.0	1.00	0.00	0.00	0.25	0.00	0.00	0.05 c
Lorsban Advanced	34.0	1.50	0.00	0.00	0.25	0.00	0.00	0.05 c
Lorsban Advanced	68.0	1.50	0.00	0.00	0.00	0.00	0.25	0.05 c
Belt 480 SC	2.0	2.75	0.75	0.00	0.00	0.00	0.00	0.15 c
Belt 480 SC	3.0	1.50	0.75	0.00	0.00	0.00	0.25	0.20 bc

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

In 2008, all pre-treatment worm pest means were similar (Table 8-10). Beet armyworm means for all insecticide treatments were significantly lower (P=0.05) than the untreated check 3 and 7 DAT (Table 8). All insecticide treatments, except Intrepid at 6 ounces and Baythroid, had significantly lower beet armyworm means than the untreated check 14DAT, and only the three

rates of Belt 480 SC had means significantly lower than the untreated check 21DAT. Beet armyworm post treatments averages for all treatments bur Baythroid were lower than the check.

Table 7. Mean Numbers of Alfalfa Webworms per Ten Sweeps in Alfalfa, Holtville, CA, 2007.

Treatment	oz/acre	4 DPT[x]	1 DAT[y]	3 DAT	7 DAT	14 DAT	24 DAT	PTA[z]
Check	---------	1.25	0.75	0.25	0.50	0.00	0.00	0.30
Steward	6.7	0.50	1.25	0.00	0.50	0.00	0.00	0.35
Lorsban 4E	32.0	1.00	0.25	0.00	0.00	0.00	0.00	0.05
Lorsban 4E	64.0	0.50	0.50	0.00	0.25	0.00	0.00	0.15
Lorsban Advanced	34.0	0.50	0.75	0.00	0.25	0.00	0.00	0.20
Lorsban Advanced	68.0	0.25	0.00	0.00	0.00	0.25	0.00	0.05
Belt 480 SC	2.0	1.25	0.25	0.00	0.00	0.00	0.00	0.05
Belt 480 SC	3.0	1.75	0.75	0.00	0.00	0.00	0.00	0.15

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

Table 8. Means[y] of Beet Armyworms per Sweeps in Alfalfa, Holtville, CA, 2008.

Treatment	oz/acre	PT[x]	3DAT[y]	7DAT	14DAT	21DAT	PTA[z]
Check	---------	1.05	0.85 a	1.20 a	5.25 a	4.63 ab	2.98 a
Steward	6.7	0.60	0.00 c	0.01 c	3.10 bc	4.55 ab	1.94 b
Lorsban Advanced	32.0	1.05	0.05 c	0.08 c	3.00 bc	3.30 bcde	1.61 b
Intrepid	6.0	1.35	0.03 c	0.18 c	3.98 ab	3.98 abcd	2.04 b
Intrepid	7.0	0.45	0.05 c	0.05 c	2.43 bcd	4.13 abc	1.66 b
Baythroid XL	2.8	0.45	0.50 b	0.88 b	5.33 a	5.33 a	3.01 a
Belt 480 SC	1.0	0.60	0.00 c	0.13 c	1.38 cd	2.28 cde	0.94 c
Belt 480 SC	2.0	0.65	0.00 c	0.00 c	0.78 d	2.13 de	0.73 c
Belt 480 SC	3.0	0.85	0.03 c	0.05 c	0.55 d	1.43 e	0.51 c

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

In 2008, alfalfa caterpillar means were significantly lower (P=0.05) in all insecticide treatments compared to the untreated control 3 and 7 DAT (Table 9). All insecticide treatments, except the 6 ounce rate of Intrepid, had significantly lower alfalfa caterpillar means than the untreated check 14DAT. None of the insecticide treatments had means for alfalfa caterpillar that were

significantly lower than the mean for the untreated check 21DAT. All insecticide treatments had post treatment averages for alfalfa cater pillar that were significantly lower than the check.

Table 9. Mean Numbers of Alfalfa Caterpillar per Sweeps in Alfalfa, Holtville, CA, 2008

Treatment	oz/acre	PT[x]	3DAT[y]	7DAT	14DAT	21DAT	PTA[z]
Check	---------	**7.75**	**0.95 a**	**0.25 a**	**0.75 a**	**0.28 ab**	**0.56 a**
Steward	**6.7**	**6.70**	**0.03 c**	**0.00 b**	**0.33 b**	**0.20 ab**	**0.14 cd**
Lorsban Advanced	**32.0**	**6.90**	**0.10 bc**	**0.00 b**	**0.25 b**	**0.43 a**	**0.19 bc**
Intrepid	**6.0**	**6.40**	**0.13 bc**	**0.00 b**	**0.40 ab**	**0.23 ab**	**0.19 bc**
Intrepid	**7.0**	**6.55**	**0.13 bc**	**0.00 b**	**0.10 b**	**0.10 b**	**0.08 de**
Baythroid XL	**2.8**	**6.85**	**0.38 b**	**0.03 b**	**0.23 b**	**0.43 a**	**0.26 b**
Belt 480 SC	**1.0**	**6.15**	**0.00 c**	**0.00 b**	**0.15 b**	**0.05 b**	**0.05 e**
Belt 480 SC	**2.0**	**7.85**	**0.00 c**	**0.00 b**	**0.10 b**	**0.18 b**	**0.09 de**
Belt 480 SC	**3.0**	**7.15**	**0.10 bc**	**0.00 b**	**0.13 b**	**0.08 b**	**0.08 de**

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

In 2008, none of the insecticide treatments had alfalfa webworm means that were significantly lower (P=0.05) than the untreated check until 7 DAT when all but Lorsban Advanced were lower than the check (Table 9). All insecticide treatments alfalfa webworm means significantly lower than the untreated check 14DAT. None of the insecticide treatments had means that were significantly lower than the mean for the untreated check 21DAT, but all insecticide treatments had post treatment averages that were significantly lower than the check.

Table 10. Mean[w] Numbers of Alfalfa Webworms per Sweeps in Alfalfa, Holtville, CA, 2008

Treatment	oz/acre	PT[x]	3DAT[y]	7DAT	14DAT	21DAT	PTA[z]
Check	---------	**0.45**	**0.25**	**0.28 a**	**0.33 a**	**0.10**	**0.24 a**
Steward	**6.7**	**0.25**	**0.13**	**0.05 c**	**0.00 b**	**0.05**	**0.06 bc**
Lorsban Advanced	**32.0**	**0.55**	**0.18**	**0.18 ab**	**0.05 b**	**0.05**	**0.11 b**
Intrepid	**6.0**	**0.35**	**0.08**	**0.05 c**	**0.05 b**	**0.10**	**0.07 bc**
Intrepid	**7.0**	**0.05**	**0.05**	**0.03 c**	**0.05 b**	**0.10**	**0.06 bc**
Baythroid XL	**2.8**	**0.25**	**0.03**	**0.10 bc**	**0.08 b**	**0.23**	**0.11 bc**
Belt 480 SC	**1.0**	**0.45**	**0.08**	**0.03 c**	**0.00 b**	**0.03**	**0.03 bc**
Belt 480 SC	**2.0**	**0.30**	**0.05**	**0.00 c**	**0.03 b**	**0.03**	**0.03 c**
Belt 480 SC	**3.0**	**0.25**	**0.08**	**0.03 c**	**0.00 b**	**0.05**	**0.04 bc**

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days Pre-treatment. [y] Days after treatment. [z] Post treatment average.

Belt 480 SC provided superior alfalfa worm pest control, but is not currently registered for this use. Baythroid and other pyrethroid insecticides evaluated in separate studies have not perform well against beet armyworm.

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