

## 2013 Evaluation of Insecticides for Lygus Bug Control in Blackeye Cowpeas

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Lygus bugs (*Lygus spp.*) are the most important insect pest of blackeye cowpeas (*Vigna unguiculata*) in the San Joaquin Valley of California. Lygus bug feeding causes abortion of flower buds, flowers and developing seeds within pods, resulting in a yield reduction. Feeding on larger seeds results in blemishes or “lygus stings” on seeds, decreasing quality. USDA grading standards allow limited numbers of blemished seeds before reducing the grade and thereby the price for a given seed lot. Growers expect to spray for lygus bugs at least once per season and, in most years, more than one application is necessary. Current treatment thresholds recommended by UC IPM guidelines are 0.5 lygus per sweep (5 per 10 sweeps) at bloom and 1 lygus per sweep (10 per 10 sweeps) during podfill. For threshold purposes, adults and nymphs of any size are counted the same.

Conducting trials for lygus bugs is challenging because these insects are very mobile and require large plots. Insecticides were applied using the UC Kearney Research and Extension Center’s tractor-pulled sprayer in order to make applications after row closure.

### METHODS

The trial was conducted at the UC Kearney Research and Extension Center (KREC) in Parlier, CA. Blackeye cowpea variety CB 46 was planted into pre-irrigated 30-inch beds on June 11, 2013, with a seeding rate of 35 lbs/A. Individual plots were 16 rows wide and 52 feet long. The exterior 4 rows on each side of each plot served as drive rows, leaving the middle 8 rows without tractor traffic damage. Four of the interior 8 rows were sampled with sweep nets to assess lygus bug populations through the course of the trial. The center two rows of the remaining 4 rows were harvested for yield data.

Lygus bug populations were evaluated by taking 10 sweeps per plot with standard insect sweep net. Lygus bugs and beneficial insects were sorted and counted. Lygus counts were divided into three categories: adults, large nymphs having wing pads, and small nymphs without wing pads.

The trial was a randomized complete block design having 5 replications with the exception that one of the insecticide treatments was replicated only 4 times. Missing data analysis for that plot was used for statistics. Rates for 8 insecticide treatments are listed in Table 1. Warrior II is a pyrethroid that affects the nervous system. Rimon is a growth regulator that interferes with insect development. Belay also affects insect nerves but with a different mode of action from the pyrethroids. Leverage is a neonicotinoid material. Transform (called Closer in last year’s trial) is similar to but not a nicotinoid and has no cross resistance with the neonicotinoid or pyrethroid classes of insecticides. Steward also affects nerves but again is in a different class of insecticides.

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than the other materials tested. Sivanto is a very new material that has activity on sucking-type insects and is reported to have anti-feeding impact. Grandevo is a bio pesticide made from fermentation products of a bacterium. The surfactant Dyne-Amic was added to each treatment, with the exception of the Warrior II+Rimon treatment, at a rate of 3 pt/100gal.

Table 1. Treatments for the 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA

Material	Active ingredient	Rate Product/A	Rate a.i. lbs/A	Dates applied	Company
Untreated	-	-	-	-	-
Warrior II + Rimon 0.83EC	lambda-cyhalothrin + novaluron	1.92 fl oz 12 fl oz	0.03 + 0.08	Aug 13, Aug 29	Syngenta Crop Protection, LLC + Chemtura Corporation
Leverage 360	imidacloprid	2.8 fl oz	0.07	Aug 13, Aug 29	Bayer CropScience
*Sivanto	flupyradifurone	14 fl oz	0.18	Aug 13, Aug 29	Bayer CropScience
*Transform WG	sulfoxaflor	2.25 oz	0.07	Aug 13, Aug 29	Dow AgroSciences LLC
*Steward EC	indoxacarb	11.3 fl oz	0.11	Aug 13, Aug 29	DuPont Crop Protection
*Belay 50 WDG	clothianidin	6 oz	0.19	Aug 13, Aug 29	Valent U.S.A. Corporation Agricultural Products
Grandevo	Chromobacterium subtsugae strain PRAA4-1	3 lb	0.90	Aug 13, Aug 29	Marrone Bio Innovations
*Transform WG	sulfoxaflor	1.5 oz	0.05	Aug 13, Aug 29	Dow AgroSciences LLC

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Treatments were applied with an 8-row sprayer at a volume of 50 gpa with 8004 nozzles, 30 psi pressure, and speed of 2 mph. The 8-row spray rig covered 4 rows under the tractor and 4 rows to one side of the tractor. The first application date was August 13 when pods were visible and plants were still blooming. The second application occurred August 29 even though counts did not exceed the podfill threshold of 10 lygus bugs/10 sweeps.

On September 18, harvest rows were cut and covered with nets to protect pods from birds. Beans were threshed on October 24. Yield data were based on the weight of seed per plot after sifting twice to remove large debris. A seed splitter was used to obtain 2 – 2.5 lb sub-samples that were then passed through several screens. All seeds passed through the 22/64 screen; all but a very few went through the 20/64. Most of the seed did not pass through the 11/64 x 3/4 oblong screen but dirt and peewees fell through. A 100 gram subsample of the seed caught on the 11/64 x 3/4 oblong screen was evaluated for lygus damage, splits, and trash. Each blackeye seed in the 100 gram sample was evaluated and sorted into one of six categories; no damage, 1 lygus sting, 2 or more lygus stings, worm damage, stained or split, or trash. After the blackeyes were sorted each category was weighed and beans were counted.

## RESULTS

### Insect Populations

There were no cowpea aphids, as there had been in 2012, or other insect pests to complicate the results in the trial this year. Lygus counts, shown in Table 2, remained below the treatment threshold of 5 lygus/10 sweeps for flower bud and early bloom in all plots until August 9. Because the field had just been irrigated it was too wet to treat immediately. By August 12, the threshold was exceeded in all treatments. The first application was on the next day. Plants were still blooming and pods had started filling by this date. By 2 days after treatment (DAT), lygus bug counts declined in all the insecticide treatments but increased in the untreated control (UTC). Six days after treatment, all the insecticide treatments except for Leverage, Sivanto, and Belay had significantly fewer lygus bugs than the check. Counts remained relatively low for the remainder of the season and after a second application of treatments in late August, there were no statistically significant differences in counts.

Table 2. Lygus bug (adults, large and small nymphs) counts in 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

Material	Average Number of Lygus (Adults and Nymphs) per 10 Sweeps							
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT
Untreated	5.6	8.0	6.8 e	5.4	3.2	1.8	5.0	1.4
Warrior II + Rimon 0.83EC	7.2	1.0	1.8 ab	2.4	2.4	2.4	1.4	2.6
Leverage 360	6.4	4.4	4.4 bcde	4.2	5.0	1.6	5.0	1.4
*Sivanto	7.2	3.0	6.6 de	4.4	4.6	2.2	4.4	2.0
*Transform WG	9.2	0.4	1.0 a	2.6	3.0	1.6	2.6	1.2
*Steward EC	8.8	2.2	3.0 abcd	4.8	4.4	2.4	2.0	0.4
*Belay 50 WDG	6.4	2.2	5.4 cde	3.2	2.4	0.6	3.2	1.8
Grandevo	9.8	4.4	3.0 abcd	8.0	5.0	5.0	5.8	1.4
*Transform WG	6.5	1.3	2.5 abc	4.5	4.3	1.0	1.8	1.5
P- Value	0.323	0.062	0.016	0.469	0.510	0.062	0.060	0.357
LSD (0.05)	NS	NS	3.36	NS	NS	NS	NS	NS
CV (%)	55.0	105.7	67.0	86.3	71.7	93.4	68.5	87.6

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

As commonly happens in lygus bug trials, counts varied greatly among treatments and dates but the untreated control, Grandevo, Sivanto and Leverage tended to have higher counts while Transform, Warrior II+Rimon, followed by Steward, and Belay had lower counts. Adding up the counts from 3 days after the first application to 18 days after the second application demonstrates this trend (Table 3). Additional tables (Table 10, 11, 12) and figures (Fig 1, 2, 3, and 4) with counts separated as adults, large nymphs, and small nymphs are located at the end of this report.

Table 3. Total lygus bug counts (adults, large and small nymphs) from August 15 to September 16, 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

Material	Total Lygus Counts (Adults and Nymphs)	
	Aug 15- Sept 16	
Untreated	31.6	c
Warrior II + Rimon 0.83EC	14.0	a
Leverage 360	26.0	bc
*Sivanto	27.2	bc
*Transform WG	12.4	a
*Steward EC	19.2	ab
*Belay 50 WDG	18.8	ab
Grandevo	32.6	c
*Transform WG	16.8	ab
P-Value	0.001	
LSD (0.05)	9.74	
CV (%)	34.1	

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

### **Beneficial insects**

Counts of beneficial insects were generally low, even in the untreated check, making it hard to determine any impact of sprays on their populations. Low populations of lady beetles (Table 4) are probably due to the lack of aphids, one of their prime food sources. Lacewing (Table 5) and Big Eyed Bug (Table 6) numbers were also very low. Minute pirate bug (Table 7) populations were more numerous but variable and with no obvious trends.

Table 4. Lady beetle adults and larvae counts, 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

Material	Average Number of Lady Beetles (adults and larvae) per 10 Sweeps							
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT
Untreated	0.8	0.4	0.6	0.0	0.0	0.0	0.0	0.4
Warrior II + Rimon 0.83EC	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0
Leverage 360	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
*Sivanto	0.0	0.0	0.0	0.2	0.2	0.0	0.4	0.4
*Transform WG	0.2	0.0	0.4	0.2	0.2	0.2	0.0	0.8
*Steward EC	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.2
*Belay 50 WDG	0.6	0.0	0.0	0.4	0.0	0.0	0.2	0.2
Grandevo	1.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0
*Transform WG	0.8	0.3	0.3	0.3	0.3	0.5	0.3	0.0

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Table 5. Lacewing adults and larvae counts, 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA.

Material	Average Number of Lacewings (adults and larvae) per 10 Sweeps							
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT
Untreated	0.0	0.8	0.0	0.0	0.8	0.0	1.4	0.4
Warrior II + Rimon 0.83EC	0.0	0.0	0.2	0.2	0.4	0.2	0.4	0.4
Leverage 360	0.0	0.0	0.0	0.2	0.6	0.2	0.6	1.0
*Sivanto	0.0	0.4	0.4	0.2	0.6	0.0	1.8	0.0
*Transform WG	0.0	0.0	0.0	0.0	0.4	0.4	0.8	0.2
*Steward EC	0.0	0.0	0.0	0.2	0.6	0.0	0.8	0.8
*Belay 50 WDG	0.0	0.0	0.2	0.2	0.4	0.0	0.2	0.4
Grandevo	0.2	1.0	0.0	0.0	0.4	0.2	2.0	0.8
*Transform WG	0.3	0.5	0.3	0.0	0.3	0.0	0.0	0.5

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Table 6. Big Eyed Bug counts, 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA.

Material	Average Number of Big Eye Bugs per 10 Sweeps							
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT
Untreated	0.0	0.0	0.2	0.0	0.2	0.0	0.2	0.0
Warrior II + Rimon 0.83EC	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Leverage 360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*Sivanto	1.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2
*Transform WG	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0
*Steward EC	0.6	0.0	0.0	0.0	0.0	0.0	0.4	0.0
*Belay 50 WDG	0.2	0.2	0.0	0.0	0.2	0.0	0.6	0.0
Grandevo	0.0	0.0	0.2	0.0	0.2	0.0	0.8	0.0
*Transform WG	2.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Table 7. Minute pirate bug counts, 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA.

Material	Average Number of Minute Pirate Bugs per 10 Sweeps							
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT
Untreated	3.0	0.4	1.6	2.4	4.2	1.4	1.6	0.4
Warrior II + Rimon 0.83EC	1.2	0.0	2.0	2.6	0.0	0.4	0.2	0.0
Leverage 360	4.0	0.4	1.6	1.0	0.8	0.0	0.8	0.0
*Sivanto	2.4	0.0	2.4	2.0	2.0	1.6	0.4	0.0
*Transform WG	4.0	0.0	1.2	1.2	0.0	0.8	0.6	0.2
*Steward EC	1.6	0.0	1.4	4.0	0.6	1.2	0.8	0.0
*Belay 50 WDG	0.8	0.0	1.0	1.6	1.0	0.0	0.4	0.0
Grandevo	6.6	0.0	1.0	1.8	1.0	0.6	0.4	0.0
*Transform WG	3.8	0.0	1.3	1.3	0.3	0.8	0.5	0.0

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

### Yield

A summary of the yield data is found in Table 8. Treatments with higher lygus bug counts, (the untreated control, Grandevo, and Leverage) had significantly lower yields than treatments with fewer lygus bugs, specifically the low and high rates of Transform, Steward and WarriorII+Rimon.

Table 8. Blackeye yield based on 2 rows x 52 foot from the trafficed portion of each plot, 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

Material	Rate/A	Yield (lbs/A)
Untreated	---	1,951 e
Warrior II + Rimon 0.83EC	1.92 fl oz 12 fl oz	2,602 abc
Leverage 360	2.8 fl oz	2,429 cd
*Sivanto	14 fl oz	2,106 de
*Transform WG	2.25 oz	2,923 a
*Steward EC	11.3 fl oz	2,700 abc
*Belay 50 WDG	6 oz	2,560 bc
Grandevo	3 lb	1,973 e
*Transform WG	1.5 oz	2,900 ab
P-Value		0.000
LSD (0.05)		347.96
CV (%)		11.0

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

## Quality

Essentially all beans in each treatment passed through the 20/64 screen but not the 11/64 x 3/4 oblong screen, indicating no size differences among treatments. Quality data, shown in Table 5, indicate no differences among treatments for the amount of worm damage, splits or stains, and trash. There were significant differences among treatments for several parameters concerning lygus damage. Sivanto, the untreated check and Grandeveo had fewer unblemished beans and more beans with one or more stings than Steward, Transform and WarriorII+Rimon.

Table 9. Seed damage data from 2013blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

Material	Grams/ Bean	% by Number of Seeds				
		No Damage	1 lygus sting	2 or more lygus stings	worm damage	stained or split
Untreated	0.20	86.6 c	4.1 bc	6.7 c	1.3	1.3
Warrior II + Rimon 0.83EC	0.21	94.4 a	1.8 a	1.9 ab	0.7	1.2
Leverage 360	0.21	91.4 b	2.7 ab	3.4 b	1.1	1.4
*Sivanto	0.21	83.3 d	7.8 d	6.8 c	1.4	0.8
*Transform WG	0.21	94.7 a	2.3 ab	1.5 a	0.6	0.9
*Steward EC	0.21	94.4 a	1.9 a	2.1 ab	0.7	1.0
*Belay 50 WDG	0.22	92.4 ab	3.7 abc	2.6 ab	0.5	0.7
Grandeveo	0.21	86.5 c	5.1 c	6.1 c	1.2	1.0
*Transform WG	0.21	93.4 ab	2.9 ab	1.8 ab	0.7	1.1
P-Value	0.771	0.000	0.000	0.000	0.380	0.779
LSD (0.05)	NS	2.55	1.95	1.58	NS	NS
CV (%)	4.9	2.2	42.0	33.6	76.0	65.2

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Percent number of seed is based on the number in the 100 gram sample for each treatment.

## SUMMARY

The advantage in this year's trial, unlike 2012, is that cowpea aphid populations were extremely low and interpretation of results is directly applicable to lygus bug control. Lygus bug pressure in this trial was moderate and numbers increased relatively late in the season. There were not enough lygus bugs at the initiation of bloom to justify treatment at that time. The first application occurred during mid-to-late bloom when pods were also present. The second spray date was two weeks later when lygus counts had risen but were not yet to the threshold of 10 lygus/10 sweeps. Applications of Transform, Steward, Warrior II+Rimon, and Belay reduced lygus bug counts and resulted in significantly higher yields than the untreated check. Although Leverage and Sivanto treatments appeared to reduce lygus bugs counts somewhat compared to the control, yields in these treatments were no higher than the untreated check. There could be resistance in the lygus bug population to the neonicotinoid Leverage based on its failure to have much impact on lygus bug numbers and its relatively low yield. Grandeveo might have reduced lygus bugs immediately after treatment but counts quickly increased and the yield was no higher than the untreated check.



Of the treatments that resulted in increased yields, only Warrior and Rimon are registered for use on cowpeas in CA. These two materials were used in combination because Warrior II provides a quick kill and Rimon impairs development of lygus nymphs to adulthood. Registration of Transform and Steward may occur in 2014 but that is not a certainty. If Steward becomes registered it is important to remember that it has no activity on aphids (2012 data). The dry bean industry would benefit from registration of additional insecticides to improve control of lygus bugs and provide more opportunity to rotate insecticides with different modes of action in order to reduce the risk of developing resistance in lygus bug populations.

In terms of seed quality, Steward, Transform, and Warrior II + Rimon appeared to produce the least damaged beans while Sivanto and Grandevo provided the least protection.

Results discussed above are based on using a ground sprayer with a volume of 50 gpa which was the only way to make the applications in small plots with the equipment available. However this is not the commercial norm. Most field applications are by air to avoid damaging the crop after lay-by and with a volume of 5-10 gpa. Results in this trial may be more effective than those achieved in commercial fields.

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We would like to acknowledge the invaluable assistance from the UC Kearney REC field staff, in particular Dale Pattigan and Bryan Heyano. We also thank Cal-Bean & Grain for donating CB 46 seed and Rhizobia inoculum.

Table 10. Counts of lygus bug adults, 2013 blackeye lygus bug trial, UC KREC, Parlier, CA.

Material	Average Number of Adult Lygus per 10 Sweeps								Total Post-Treatment
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT	
Untreated	2.2	3.8	3.6 d	4.2	2.6	1.4 a	1.0 ab	0.4	17.0 bc
Warrior II + Rimon 0.83EC	4.0	0.6	1.0 ab	1.4	2.2	1.0 a	0.6 a	1.2	8.0 a
Leverage 360	2.6	1.2	2.0 abcd	3.6	2.8	1.2 a	2.8 bc	0.4	14.0 abc
*Sivanto	1.8	1.8	3.4 cd	3.0	2.6	2.2 ab	3.4 c	0.6	17.0 bc
*Transform WG	4.6	0.2	0.4 a	1.4	2.0	1.0 a	1.2 ab	0.6	6.8 a
*Steward EC	4.0	1.0	1.2 ab	3.2	3.0	1.6 a	0.8 a	0.2	11.0 ab
*Belay 50 WDG	2.4	1.2	3.0 bcd	2.2	2.2	0.6 a	1.4 ab	1.0	11.6 ab
Grandevo	4.0	2.8	1.4 abc	6.0	2.6	3.8 b	3.6 c	0.8	21.0 c
*Transform WG	2.8	0.5	1.5 abcd	2.8	1.8	0.8 a	1.0 ab	0.8	9.0 ab
P-Value	0.385	0.115	0.043	0.397	0.988	0.039	0.011	0.671	0.006
LSD (0.05)	NS	NS	2.12	NS	NS	1.81	1.90	NS	7.25
CV (%)	67.5	130.8	83.6	99.6	81.1	92.8	83.4	126.4	43.7

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.



Table 11. Counts of large lygus bug nymphs, 2013blackkeyelygus bug trial, UC KREC, Parlier, CA.

Material	Average Number of Large Lygus Nymphs (wing pads) per 10 Sweeps								
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT	Total Post-Treatment
Untreated	1.8	2.4 c	2.2	0.8	0.4	0.0	1.6	0.6	8.0 d
Warrior II + Rimon 0.83EC	1.4	0.2 a	0.4	0.4	0.0	0.6	0.2	0.8	2.6 a
Leverage 360	1.0	1.8 bc	2.6	0.4	0.6	0.0	1.2	0.4	7.0 cd
*Sivanto	2.6	0.2 a	2.4	0.8	1.4	0.0	0.2	0.0	5.0 abcd
*Transform WG	2.0	0.2 a	0.6	0.8	0.4	0.0	0.6	0.6	3.2 ab
*Steward EC	1.8	0.6 ab	1.0	1.0	0.6	0.0	0.8	0.0	4.0 abc
*Belay 50 WDG	1.4	0.2 a	1.2	0.6	0.0	0.0	0.8	0.0	2.8 ab
Grandevo	3.0	0.4 ab	1.6	1.6	0.8	0.2	1.0	0.4	6.0 bcd
*Transform WG	2.0	0.8 abc	0.8	0.8	1.0	0.0	0.5	0.3	4.0 abc
P-Value	0.843	0.034	0.124	0.601	0.681	0.539	0.305	0.401	0.019
LSD (0.05)	NS	1.48	NS	NS	NS	NS	NS	NS	3.29
CV (%)	103.7	150.7	95.2	113.9	205.3	561.0	120.5	193.5	53.8

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Table 12. Counts of small lygus bug nymphs, 2013blackkeyelygus bug trial, UC KREC, Parlier, CA.

Material	Average Number of Small Lygus Nymphs (no wing pads) per 10 Sweeps								
	8/12/2013 Pre-Treat	8/15/2013 2 DAT	8/19/2013 6 DAT	8/22/2013 9 DAT	8/28/2013 15 DAT	9/3/2013 5 DAT	9/5/2013 7 DAT	9/16/2013 18 DAT	Total Post-Treatment
Untreated	1.6	1.8	1.0	0.4	0.2	0.4	2.4	0.4	6.6
Warrior II + Rimon 0.83EC	1.8	0.2	0.6	0.6	0.2	0.8	0.6	0.6	3.6
Leverage 360	2.8	1.4	0.6	0.2	1.6	0.4	1.0	0.6	5.8
*Sivanto	2.8	1.0	0.8	0.6	0.6	0.0	0.8	1.4	5.2
*Transform WG	2.6	0.0	0.0	0.4	0.6	0.6	0.8	0.0	2.4
*Steward EC	3.0	0.6	0.8	0.6	0.8	0.8	0.4	0.2	4.2
*Belay 50 WDG	2.6	0.8	1.4	0.4	0.2	0.0	1.0	0.8	4.6
Grandevo	2.8	1.2	0.0	0.4	1.6	1.0	1.2	0.2	5.6
*Transform WG	1.8	0.0	0.3	1.0	1.5	0.3	0.3	0.5	3.8
P-Value	0.918	0.231	0.318	0.982	0.261	0.320	0.188	0.191	0.236
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV (%)	70.6	134.3	161.4	177.9	141.5	156.1	118.6	145.4	52.5

\*Not registered on blackeye cowpeas in CA.

Applied broadcast by ground in 50 gal/A with 8004 nozzles, 30 psi, 2 mph on August 13 and August 29.

Dyne-Amic was included in all insecticide treatments except Warrior II + Rimon 0.83EC at rate of 3 pt/100 gallons.

Figure 1. Lygus adults and nymphs counts per 10 sweeps, 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

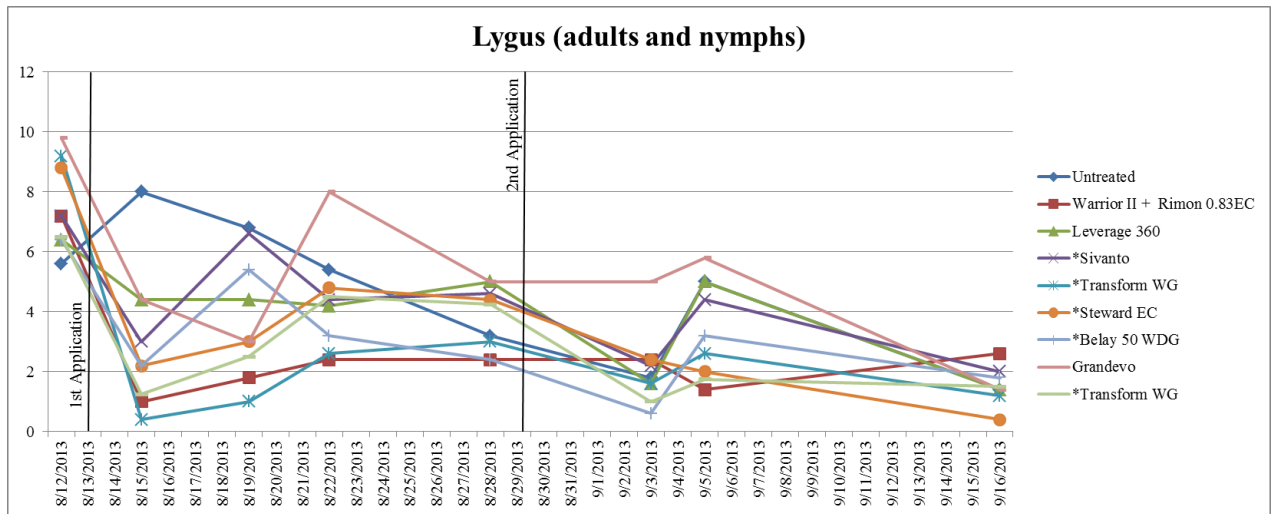


Figure 2. Adult lygus counts per 10 sweeps, 2013 blackeye lygus bug trial, UC Kearney REC, Parlier, CA.

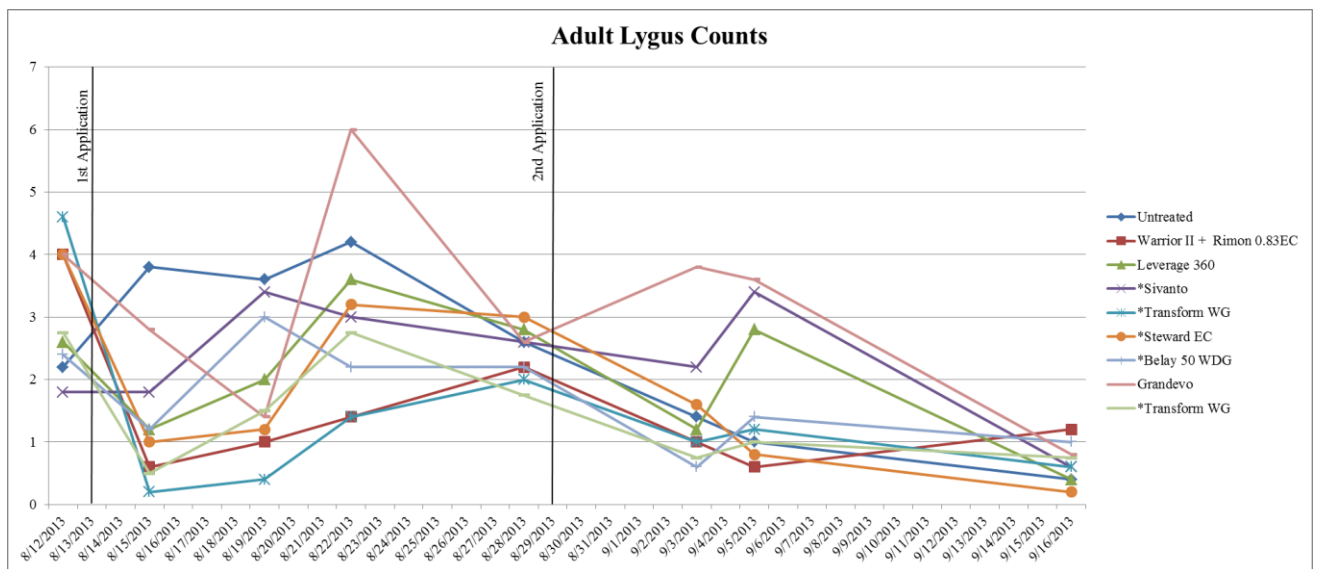


Figure3. Largelygus nymphs (with wing pad) counts per 10 sweeps, 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA.

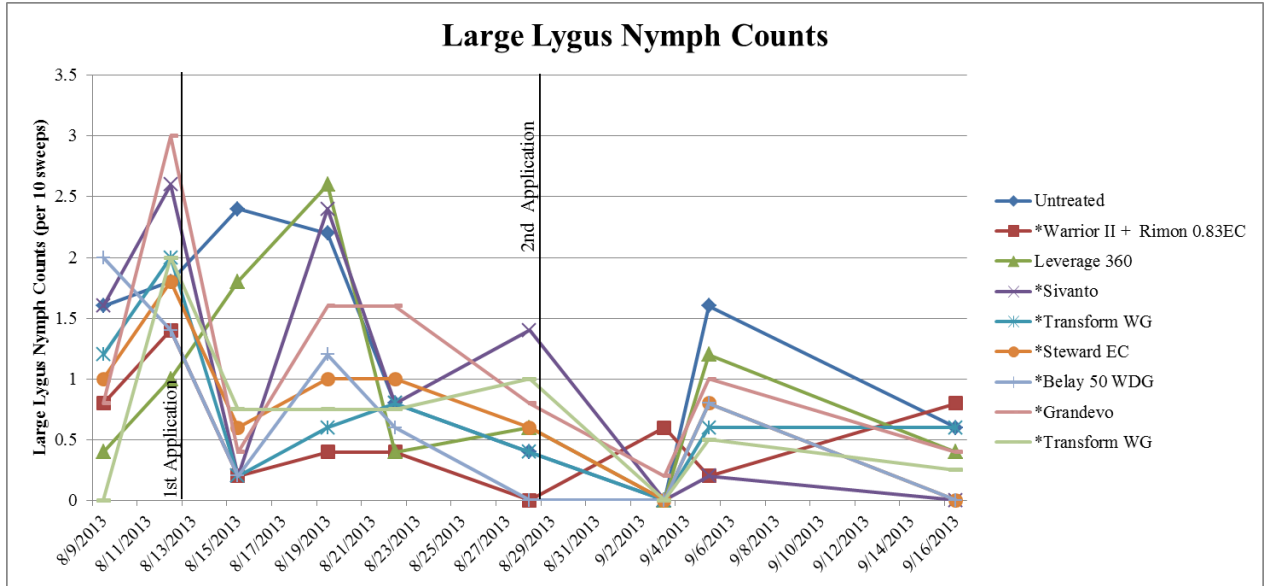


Figure4. Small lygus nymph (no wing pads) per 10 sweeps of an insect sweep net, 2013blackeyelygus bug trial, UC Kearney REC, Parlier, CA.

