

Management and Damage Potential of Lygus Bugs to Black-eye Cowpeas

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Abstract. Lygus bugs are a severe pest of bean production in many parts of the Central Valley. Insecticides should be combined with other management approaches to provide cost-effective management of this pest. Registered and experimental insecticides were evaluated to determine their efficacy against lygus bugs (adults and nymphs) and impacts on bean yield and quality in blackeye cowpeas.

INTRODUCTION

Lygus bugs (*Lygus hesperus*) are a severe pest and hindrance to bean production in California. Several types of beans are potentially damaged by this pest including Blackeye cowpeas, large and baby limas, and common beans. Thresholds vary by bean type and growth stage and management plans have been developed for this pest on dry beans (UC IPM Pest Management Guidelines: Dry Beans, UC ANR Publication 3446). Lygus bugs may be present throughout the growing season although populations tend to be highest from mid-July to early Sept. Populations also vary based on field location, i.e., proximity to overwintering areas, distance from nearby crops that might build lygus bug populations, etc. and year variation due to winter conditions and abundance of native vegetation. Lygus bugs have some 300 plant hosts (crop and weed species). Lygus bugs have sucking mouthparts with which they pierce and consume plant tissue. The type of damage varies with plant age. During early bud and flowering stages, lygus bugs cause bud and flower loss resulting in reduced yields. Lygus bugs feeding on young, developing seed pods cause pitting and blemishes on table market beans, and reduce germination in seed beans. Research is ongoing on lygus bug movement among crops and the influence of cropping patterns on bug levels within large geographical areas. Promising research is also ongoing on breeding beans that have resistance to lygus bugs. However, presently, field sampling and timely use of insecticides are the primary means to manage lygus bug populations in the field. This strategy does not represent a stable management approach, however, because lygus bugs have the capacity to develop resistance to insecticides. Repeated applications of a product will select for a population of bugs that “resists” the toxicant. Therefore, there is the need to continue investigations on alternative insecticides that can be used and, importantly, on alternative management approaches. Secondly, regulatory actions can also influence the availability of insecticides.

PROCEDURES

In 2007, studies were conducted on blackeye cowpeas var. ‘CB-46’ grown on the UC Cotton Research and Extension Center near Shafter. Naturally-occurring populations of lygus bugs were allowed to develop and applications of registered and experimental insecticides were made as the bug levels approached threshold values. Registered insecticides evaluated included

Dimethoate, Warrior, and Mustang Max; experimental (unregistered) materials included BAS320, Carbine, Diamond, and Steward.

Blackeye Cowpeas. Treatments as detailed in Table 1 were evaluated. Applications were made with a trailer sprayer pulled behind a tractor using CO₂ as the propellant. The spray set-up used drop nozzles with 5 nozzles per row to insure good coverage. The plot size was 10 rows by 75 ft. long with 3 replications in a randomized complete block design. Treatment dates were 12 July and 26 July; the beans were in early bloom stage for the initial application. A third application was planned but the low lygus bug population and the advanced maturity of the beans prevented this. Six treatments utilized the same treatment on a given plot for both application timings so season-long control could be examined; this type of treatment regime would not be recommended for resistance management considerations. In addition, Warrior was examined with an application in the first-timing window compared with an application in only the second timing as well as duel application. Lygus bug populations were sampled using a standard sweep net (15 inch diameter) approximately twice per week. Ten sweeps were done in each plot and the samples were taken to the lab and adult lygus, nymph lygus, and predators were counted. In addition, high populations of spider mites and bean aphids developed in some plots so starting on 26 July leaf samples were collected and levels of these pests were quantified. Ten trifoliate leaves were randomly selected from the middle portion of the plant, bagged, and brought to the lab. Samples were soaked and agitated within a weak solution of bleach and the liquid was poured through sieves to collect the aphids and spider mites. Specimens were counted under magnification. The middle two rows of each plot were harvested on 19 Sept. and yields were estimated. Seed samples were taken at harvest from each plot and brought to the lab for seed quality evaluations. Approximately 250 seeds from each sample were evaluated for lygus stings (1 vs multiple stings/seed), fish mouth/skin cracking and other damage (mold, broken, etc.).

Similar studies were done in 2008 but data summaries, analyses, and interpretation are ongoing.

RESULTS

Blackeye cowpeas. Overall Lygus bug populations were low to moderate at this site. For the 2 weeks following the first application, populations averaged slightly over 1 lygus per sweep which exceeds the threshold of 0.5 per sweep. The population was approximately 70% nymphs and 30% adults during this period. Over this 2-week period, Steward, Warrior, and Diamond provided about 70-75% control; Carbine about 65% control, Dimethoate 50% control, and BAS320 30% control (Table 2). Activity of several products was maximized on lygus bug nymphs (such as Carbine which was equally effective as Steward, Warrior, and Diamond on nymphs) and there was greater activity of some products nearer the time of application. Following the second application, populations were too low to draw any strong conclusions. Yields ranged from 2650 in the Diamond treatment to 4255 lbs./A in the Warrior two application treatment (Table 3). In terms of lygus sting damage on the beans, values ranged from 4.1 to 8.3%. The highest level of damage was in the untreated plots (although the damage in the BAS320 treated pots was 8.2%) and the lowest level of damage was in the Steward treatment.

Table 1. Treatments evaluated in Lygus Bug management study on blackeye cowpeas.

Treatment	Rate (lbs. AI/A)	Product/A (oz.)	Timing (application) ^A
<i>Blackeye Cowpea Studies</i>			
1 BAS 32005 I*	0.25	29.6 fl. oz.	1,2
2 Carbine 50WG**	0.08	2.75 oz.	1,2
3 Diamond 0.83EC**	0.09	12 fl. oz.	1,2
4 untreated	---	---	---
5 Warrior**	0.03	3.84 fl. oz.	1,2
6 Steward EC**	0.11	11.3 fl. oz.	1,2
7 Warrior**	0.03	3.84 fl. oz.	1
8 Warrior**	0.03	3.84 fl. oz.	2
9 dimethoate**	0.75	24 fl. oz.	1,2

* add Penetrator Plus@0.5% v/v ** added Silwet @ 0.25% v/v

^A see Procedures section for explanation

Table 2. Lygus Bug populations in following application 1.

Lygus bugs per sweep			16 July			19 July		
Treatment	Rate/A ^A		adults	nymphs	total	adults	nymphs	Total
1 BAS 32005I*	29.6		0.13	0.00	0.13	0.50	0.67	1.17
2 Carbine 50WG**	2.75		0.37	0.13	0.50	0.23	0.13	0.37
3 Diamond 0.83EC**	12		0.27	0.03	0.30	0.17	0.03	0.20
4 untreated	---		0.43	0.27	0.70	0.37	0.80	1.17
5 Warrior**	3.84		0.03	0.03	0.07	0.03	0.03	0.07
6 Steward EC**	11.3		0.20	0.07	0.27	0.07	0.17	0.23
7 Warrior**	3.84		0.03	0.17	0.20	0.20	0.17	0.37
8 Warrior**	3.84		0.67	0.67	1.33	0.50	0.60	1.10
9 dimethoate**	24		0.37	0.13	0.50	0.37	0.30	0.67
	LSD value		0.47	0.27	0.64	0.30	0.73	0.83
			23 July			26 July		
Treatment	Rate/A ^A		adults	nymphs	total	adults	nymphs	Total
1 BAS 32005I*	29.6		0.23	0.23	0.47	0.20	1.37	1.57
2 Carbine 50WG**	2.75		0.10	0.27	0.37	0.07	0.17	0.23
3 Diamond 0.83EC**	12		0.03	0.23	0.27	0.00	0.10	0.10
4 untreated	---		0.23	0.53	0.77	0.23	1.17	1.40
5 Warrior**	3.84		0.03	0.20	0.23	0.23	0.37	0.60
6 Steward EC**	11.3		0.00	0.23	0.23	0.10	0.23	0.33
7 Warrior**	3.84		0.07	0.17	0.23	0.13	0.17	0.30
8 Warrior**	3.84		0.27	0.60	0.87	0.23	1.03	1.27
9 dimethoate**	24		0.10	0.30	0.40	0.07	0.37	0.43
	LSD value		0.41	0.48	0.77	0.34	0.98	1.20

Table 3. Yield and bean damage from Lygus bug management tests.

Treatment		Rate/A ^A	Yield (lbs./A	% Lygus Damage
<i>Blackeye Cowpea Studies</i>				
1	BAS 32005 I*	29.6	2745.7	8.2
2	Carbine 50WG**	2.75	2829.1	7.6
3	Diamond 0.83EC**	12	2650.4	5.6
4	Untreated	----	2779.9	8.3
5	Warrior**	3.84	4255.5	6.3
6	Steward EC**	11.3	2555.1	4.1
7	Warrior**	3.84	3865.4	6.9
8	Warrior**	3.84	3511.0	7.1
9	dimethoate**	24	3865.4	7.6
		LSD value	855	3.6