

## 2015 insecticide efficacy trial for lygus bug management in strawberry

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Strawberry: Western tarnish plant bug, *Lygus hesperus*

A trial comparing the efficacy of insecticide treatments against lygus bug was conducted in first-year strawberry 'Monterey' in Watsonville, CA.

Five replicates of each treatment were assigned to ten 65-foot long 52" bed (with two plant rows/bed) according to a completely randomized block design. The details on insecticide products, rates and application dates are shown in Table 1. First broadcast-spray application of insecticides was done on 13 June 2015 followed by a second broadcast-spray application on 20 June 2015. The insecticides were applied using commercial tractor mounted sprayer. The water volume used for both the applications was 200 gal/ acre. Dynamic (surfactant) was added at 0.25% v/v.

Beat-trays were used to sample insect populations. Twenty strawberry plants were sampled and the sampling consists of five strikes per plant with the lid of a regular sized Rubbermaid container. Sampling was done a day before application then at 3 and 7 days after first application then 3, 7, 14, 21, and 28 days after second application. The insect samples were bagged, transported to the laboratory and stored in the freezer for later evaluation in the laboratory. The samples were evaluated for all nymph stages and adult of lygus bug, thrips, predators (damselfly bug, minute pirate bug, bigeyed bug, rove beetle, and spiders) and parasitoids. In addition, 100 fruits were randomly sampled from each plot at 28-days after second insecticide application. The fruits were evaluated for lygus bug injury or "catface" and other unmarketable symptoms such as rot, spit strawberries etc.

Pre-count of lygus bug nymphs was similar in all plots (Table 1). The number of nymphs captured was numerically lower in higher rate of Sivanto than other treatments at 3 and 7 days after first application. After 3 days of second application, number of nymphs was significantly lower in the higher rate of Sivanto, Sequoia and Beleaf than in untreated check treatment.

Significantly lowest number of nymphs was found in higher rate of Sivanto than in the untreated check treatment. After 21 days of second application, the number of nymphs was significantly lower in Beleaf and higher rate of Sivanto than in untreated check. Similarly, after 28 days of second application, higher rate of Sivanto had significantly lower number of nymphs than in other treatments.

After 3 days of first application, number of lygus bug adults collected in higher rate of Sivanto was significantly lower than in Sequoia and Actara + Danitol treatments (Table 1b). After 3 days of second application, significantly lower number of adult lygus bugs was captured in higher rate of Sivanto and Beleaf than other treatments. There was no difference in adult lygus bug captures among treatments in any other sample dates.

The number of predacious bugs (damselfly bug, minute pirate bug and bigeyed bug) and other predators (rove beetles, and spiders), parasitic wasps, thrips were similar among the treatments in all sample dates. Thus, they were not presented in this report by sample date.

When all the data were combined, number of lygus bug nymphs were significantly lower in the higher rate of Sivanto and Sequoia than in untreated check treatment. Significantly lower number of lygus bug adult was captured in higher rate of Sivanto and Beleaf than in untreated check. Similarly, number of predatory bugs was significantly lower in the higher rate of Sivanto than in other treatments. Spiders captured were similar among treatments.

On fruit evaluation, there was no difference in number of fruits with catface injury or those marketable fruits among the insecticide treatments, although numerically, number of fruit with catface injury was lower in the higher rate of Sivanto treatment than in other treatments.

Overall, it appears that Sivanto at 14 fl oz per acre performed better than other treatments against lygus bug. Sequoia and Beleaf also showed evidence of lygus bug suppression. However, Sivanto at 10 fl oz per acre did not suppress lygus bug. The representative industry standard -- combined treatment of Actara and Danitol did not show any evidence of lygus bug suppression in this study.

**Table 1. Mean ( $\pm$  SE) of lygus bug nymphs on strawberry treated with various treatments.**

Treatment	Active ingredient	Amt formulated/ acre	Pre-count (6/12)	Days after first insecticide application (6/13)		Days after second insecticide application (6/20)				
				3 (6/16)	7 (6/19)	3 (6/24)	7 (6/26)	14 (7/3)	21 (7/10)	28 (7/17)
Actara + Danitol	Thiamethoxam + Fenpropathrin	4.0 oz + 21 fl oz	10.2 $\pm$ 4.3a	2.4 $\pm$ 1.3a	3.2 $\pm$ 0.8a	2.8 $\pm$ 0.6ab	2.6 $\pm$ 1.0a	5.4 $\pm$ 1.3a	19.4 $\pm$ 5.5abc	22.8 $\pm$ 4.7a
Beleaf	Flonicamid	2.85 oz	9.0 $\pm$ 2.2a	3.0 $\pm$ 0.9a	4.4 $\pm$ 1.7a	2.2 $\pm$ 1.2b	3.0 $\pm$ 0.8a	6.0 $\pm$ 1.1a	11.8 $\pm$ 2.6cd	22.6 $\pm$ 5.7a
Sequoia	Sulfoxaflor	2.88 fl oz	9.2 $\pm$ 3.6a	4.0 $\pm$ 0.8a	4.2 $\pm$ 1.3a	2.2 $\pm$ 0.9b	2.0 $\pm$ 0.8a	3.6 $\pm$ 1.0a	14.6 $\pm$ 2.9bc	15.8 $\pm$ 3.4a
Sivanto L	Flupyradifurone	10 fl oz	4.0 $\pm$ 0.7a	5.0 $\pm$ 0.6a	4.2 $\pm$ 0.5a	4.0 $\pm$ 0.4a	2.4 $\pm$ 0.8a	5.8 $\pm$ 2.4a	27.4 $\pm$ 2.4a	22.6 $\pm$ 4.7a
Sivanto H	Flupyradifurone	14 fl oz	8.8 $\pm$ 1.9a	1.0 $\pm$ 1.0a	1.4 $\pm$ 0.2a	0.2 $\pm$ 0.2c	2.8 $\pm$ 1.8a	3.2 $\pm$ 0.5a	7.2 $\pm$ 1.9d	6.8 $\pm$ 1.7b
UTC			7.4 $\pm$ 1.7a	4.6 $\pm$ 2.1a	3.8 $\pm$ 0.7a	5.2 $\pm$ 0.2a	4.4 $\pm$ 0.7a	7.4 $\pm$ 1.2a	24.4 $\pm$ 5.4ab	26.8 $\pm$ 6.4a

\*Dynamic (0.25% v/v) was added. Data were log transformed before analysis. Means within columns followed by the same letter are not significantly different according to ANOVA and LSD test at  $P < 0.05$ .

**Table 2. Mean ( $\pm$  SE) of lygus bug adult on strawberry treated with various treatments.**

Treatment	Active ingredient	Amt formulated/ acre	Pre-count (6/12)	Days after first insecticide application (6/13)		Days after second insecticide application (6/20)				
				3 (6/16)	7 (6/19)	3 (6/24)	7 (6/26)	14 (7/3)	21 (7/10)	28 (7/17)
Actara + Danitol	Thiamethoxam + Fenpropathrin	4.0 oz + 21 fl oz	3.4 $\pm$ 0.4a	2.0 $\pm$ 0.5a	2.0 $\pm$ 1.0a	1.6 $\pm$ 0.6ab	0.6 $\pm$ 0.4a	2.2 $\pm$ 0.7a	2.6 $\pm$ 0.8a	2.4 $\pm$ 0.7a
Beleaf	Flonicamid	2.85 oz	2.4 $\pm$ 0.4a	2.0 $\pm$ 1.0ab	0.8 $\pm$ 0.4a	0.8 $\pm$ 0.5bc	0.4 $\pm$ 0.4a	1.0 $\pm$ 0.5a	0.6 $\pm$ 0.2a	2.0 $\pm$ 0.4a
Sequoia	Sulfoxaflor	2.88 fl oz	4.6 $\pm$ 0.9a	1.6 $\pm$ 0.4a	2.2 $\pm$ 0.5a	1.4 $\pm$ 0.7ab	0.2 $\pm$ 0.2a	1.0 $\pm$ 0.6a	2.2 $\pm$ 1.0a	1.8 $\pm$ 0.7a
Sivanto L	Flupyradifurone	10 fl oz	3.0 $\pm$ 1.3a	1.8 $\pm$ 0.8ab	3.0 $\pm$ 0.8a	2.2 $\pm$ 0.9ab	1.6 $\pm$ 0.7a	0.8 $\pm$ 0.5a	1.4 $\pm$ 0.4a	2.0 $\pm$ 0.5a
Sivanto H	Flupyradifurone	14 fl oz	4.8 $\pm$ 0.9a	0.4 $\pm$ 0.4b	1.2 $\pm$ 0.5a	0.0 $\pm$ 0.0c	0.2 $\pm$ 0.2a	1.2 $\pm$ 0.5a	2.0 $\pm$ 0.6a	1.8 $\pm$ 0.5a
UTC			4.6 $\pm$ 0.8a	1.2 $\pm$ 0.5ab	2.8 $\pm$ 0.6a	3.2 $\pm$ 1.0a	2.4 $\pm$ 1.7a	1.2 $\pm$ 0.7a	2.2 $\pm$ 0.5a	2.2 $\pm$ 0.8a

\*Dynamic (0.25% v/v) was added. Data were log transformed before analysis. Means within columns followed by the same letter are not significantly different according to ANOVA and LSD test at  $P < 0.05$ .

**Table 3. Overall mean ( $\pm$  SE) number of lygus bug, predatory bugs and spiders collected on various insecticide treatment.**

Treatment	Lygus bug nymph	Lygus bug adult	Predatory bugs*	Spiders
Actara + Danitol	8.4 $\pm$ 1.7ab	1.9 $\pm$ 0.3a	1.6 $\pm$ 0.3a	5.7 $\pm$ 0.7a
Beleaf	7.6 $\pm$ 1.5ab	1.1 $\pm$ 0.2b	0.9 $\pm$ 0.2bc	7.0 $\pm$ 1.0a
Sequoia	6.6 $\pm$ 1.1b	1.5 $\pm$ 0.3ab	1.4 $\pm$ 0.2ab	8.1 $\pm$ 1.1a
Sivanto L	10.2 $\pm$ 1.8ab	1.8 $\pm$ 0.3a	1.3 $\pm$ 0.2ab	8.3 $\pm$ 2.2a
Sivanto H	3.2 $\pm$ 0.6c	0.9 $\pm$ 0.2b	0.5 $\pm$ 0.1c	4.6 $\pm$ 0.6a
UTC	10.9 $\pm$ 1.9a	2.2 $\pm$ 0.3a	1.6 $\pm$ 0.2a	7.9 $\pm$ 1.2a

Data were log transformed before analysis. Means within columns followed by the same letter are not significantly different according to ANOVA and LSD test at  $P < 0.05$ . \*includes damsel bug, minute pirate bug and bigeyed bug.

**Table 4. Mean ( $\pm$  SE) number of unmarketable strawberry fruits treated with various treatments.**

Treatment	Cat-faced fruit	Marketable fruit
Actara + Danitol	18.4 $\pm$ 3.9a	46.6 $\pm$ 5.7a
Beleaf	18.6 $\pm$ 2.5a	57.6 $\pm$ 6.9a
Sequoia	23.6 $\pm$ 3.1a	47.0 $\pm$ 10.2a
Sivanto L	23.3 $\pm$ 3.1a	46.5 $\pm$ 6.3a
Sivanto H	17.0 $\pm$ 4.2a	55.8 $\pm$ 3.4a
UTC	28.2 $\pm$ 4.7a	33.2 $\pm$ 10.4a

Means within columns followed by the same letter are not significantly different according to ANOVA and LSD test at  $P < 0.05$ .