

Evaluation of UV-C light for control of twospotted spider mite, Lewis mite, and *Lygus hesperus*

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Laboratory and field tests were conducted to evaluate the effects of UV-C on multiple stages of twospotted spider mites (TSSM), Lewis mite (LM), and *Lygus hesperus*. Applications of UV-C in the laboratory were performed in a square tent and dosages were measured using a radiometer. Field applications were performed by TRIC robotics after sunset. Dose response curves were generated for larva and adult TSSM and LM, and 1st, 3rd, and 5th instars of *Lygus* (Table 1). Mortality was evaluated 48 hours after application. A binomial generalized linear model with a logit function was used to determine the LD₅₀ and LD₉₀ for each life stage. Dose response curves revealed that field relevant dosages of UV-C (<1800 J/m²) do not provide substantial mortality for mobile stages of TSSM, LM, or *Lygus*.

Ovicidal effects on *Lygus* were evaluated by placing egg packs on top of the strawberry crown (Figure 1A). For TSSM and LM, leaf discs containing eggs were pinned to the underside of strawberry leaves (Fig. 1B). Laboratory ovicide tests positioned the egg packs and leaf discs with eggs facing up at the bottom of the UV-C tent. The percentage of egg hatch for *Lygus* was recorded 12 days after application, and 5 days for TSSM and LM. *Lygus* egg hatch in the lab and field showed a normal distribution, and a standard least squares ANOVA and Tukey HSD was performed. Egg hatch for TSSM and LM was not normally distributed, therefore, a non-parametric Kruskal–Wallis test was used to evaluate treatment effects, followed by Dunn's test with Holm correction for pairwise comparisons. Although the 350 J/m² treatment significantly reduced *Lygus* egg hatch compared to the control in the lab, no statistical differences were found in the field. UV-C demonstrated ovicidal effects on TSSM and LM in both the lab and field, with every UV-C treatment separating from the control in each test (Fig. 2). These results show that UV-C is a highly life-stage-specific tool for the management of arthropod pests in strawberries.

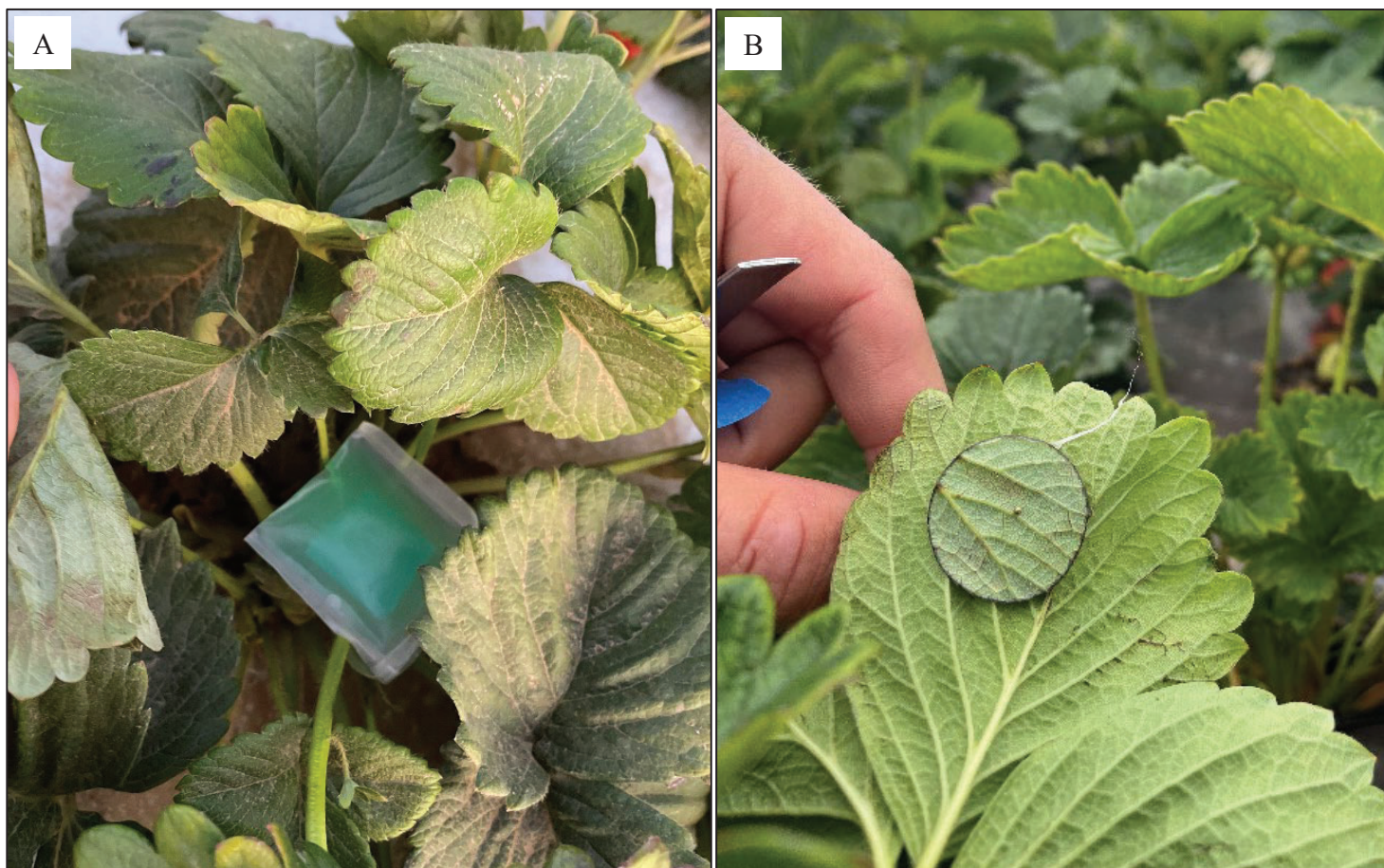


Figure 1. A) *Lygus* egg pack placed atop a strawberry crown B) egg leaf disc method used for twospotted spider mite and Lewis mite.

Table 1. Binomial generalized linear model with logit function dose response analyses for twospotted spider mite (TSSM) and Lewis mite (LM) adults and larvae, and first, third, and fifth instar lygus. LD50 = Lethal dose killing 50% of the population, LD90 = Lethal dose killing 90% of the population.

	Twospotted spider mite		Lewis mite	<i>Lygus hesperus</i>		
	Adult	Larva	Adult	1 st Instar	3 rd instar	5 th instar
LD50 (J/m²)	9,019	3,562	9,690	19,527	23,879	25,591
LD90(J/m²)	16,875	12,318	20,085	30,947	43,388	59,248

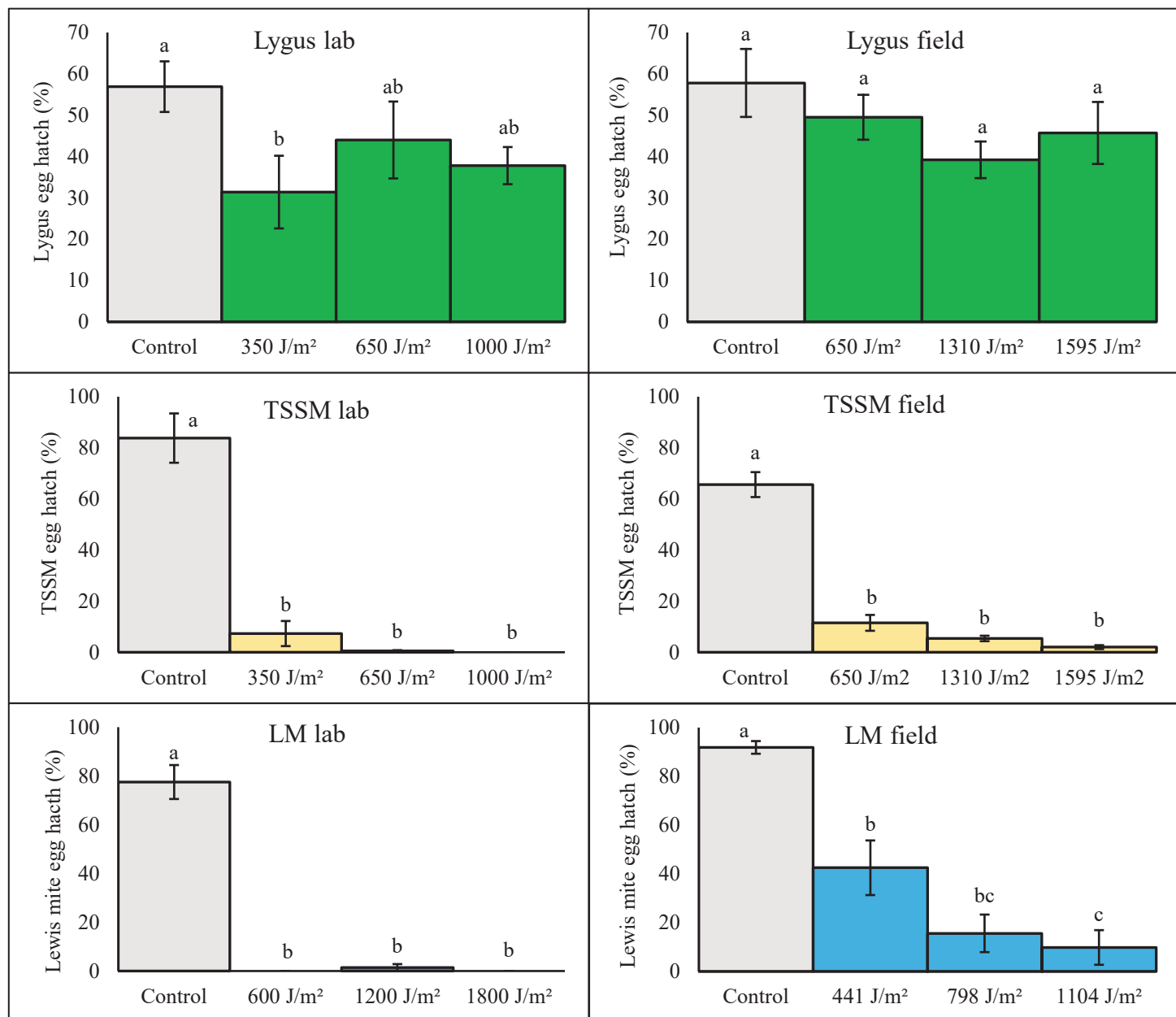


Figure 2. Lygus (green) ovicide lab (n=10) and field (n=6) results, separated using Tukey's HSD. Twospotted spider mite (TSSM; yellow) lab (n=10) and field (n=15) results, analyzed with Kruskal Wallis. Lewis mite (LM; blue) lab (n=10) and field (n=10) results, analyzed with Kruskal Wallis. Means that do not share a letter are statistically different ($\alpha = 0.05$).

