

Comparison of Three Pesticides for Managing San Jose Scale in New York Apple Orchards

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San Jose scale (SJS; *Quadraspidiotus perniciosus*) is a widely dispersed pest of tree fruits such as pome fruits, stone fruits, and tree nuts (Alston et al., 2011). Notably, SJS is the most damaging scale pest of apples, especially in high-density orchard system (Jentsch, 2017; Lentz, 2025). This crawler pest colonizes on woody tissues and fruits (reddish-purple ring spots), causing reduced plant growth, smaller fruits, and tree decline especially under heavy infestations (Alston et al., 2011; Lentz, 2025).

In the Northeast, SJS goes through two generations per growing season. SJS overwinters in the immature stage under scale covers on the tree surfaces (twigs and branches), with adults emerging in spring and mating occurring around petal fall (Lentz, 2025). In early to mid-June and early August, SJS crawlers emerge (Jentsch, 2020; Lentz, 2025).

SJS crawlers can be monitored using black electrical tape wrapped around infested limbs, while adults can be monitored using pheromone traps prior or during blooming (Alston et al., 2011; Lentz, 2025). Pruning, where possible, infested branches and suckers are recommended early in the season (Alston et al., 2011; Lentz, 2025). If scales are present, dormant or delayed dormant oil (sometimes in combination with insecticides) spray targeting overwintering SJSs (black cap stage) is recommended to reduce infestation later in the season (Alston et al., 2011; Jentsch, 2020; Lentz, 2025). For post-bloom phase, sprays can be applied at first and peak crawler activities (7-10 days after emergence) (Alston et al., 2011; Jentsch, 2017; Lentz, 2025;).

Heavy infestations of SJSs are difficult and costly to manage, making early prevention of colony establishment critical. We tested three pesticide treatments in this

study: (i) Esteem 35 WP, an insect growth regulator; (ii) Sil-MATRIX, a potassium silicate insecticide with barrier-forming activity; and (iii) a combination of Sil-MATRIX and JMS Stylet-Oil, a mineral oil pesticide. The aim of this study was to compare impact of three pesticide formulations applied at half-inch green on SJS mortality in apple orchards in NY.

Materials and Methods

The field trial was conducted in April when trees were in the half-inch green phenological stage. Trees were 27-year-old ‘Cortland’ apple trees, planted in a 16 × 10 ft spacing in Lyons, NY. Three pesticide treatments were evaluated for their effects on SJS mortality: Sil-MATRIX (29%), Sil-MATRIX (29%) with JMS Stylet-Oil (97.1%) (Sil-MATRIX + JMS Stylet-Oil), and Esteem 35 WP (35%). Untreated control (UTC) was used as a negative control.

Treatments were foliar sprayed with 100 gallons per acre, and a three-point hitch Maschio-Gaspardo tower airblast sprayer was used with a ground speed of 2.1 mph. At 168 days post-treatment, 400 apples per treatment were collected and evaluated for (i) severity of scale damages and (ii) presence of alive and dead SJSs for mortality assessment. Statistical analyses were conducted to find significant differences in means of alive and dead SJSs and SJS mortality across treatments using NB GLMM and binomial GLMM models, respectively, followed by pairwise comparisons.

Results

Assessment of SJS damage severity showed that all three pesticide treatments increased the proportion of

apples without scale damage and decreased the proportion of apples with moderate (6-30 scales) to high (>30 scales) severity compared to UTC, but the difference was not statistically significant (Table 1).

Conclusions

This first-year pesticide trial in NY apple orchard showed that application of Esteem 35 WP (35%) at

half-inch green significantly reduced number of alive SJSs and led to elevated mortality. It is important to note that effective spray coverage and proper timing remain critical for SJS management, and additional trials over multiple growing seasons are needed to confirm these findings.

Table 1. Assessment of San Jose scale (SJS) damage severity under different pesticide treatments.

Treatment	Apples examined	Percent apples with no damage ^a	Percent apples with low damage	Percent apples with moderate damage	Percent apples with high damage
Untreated control	400	81%	5.75%	10.5%	2.75%
Sil-MATRIX	400	88.75%	5.5%	4.25%	1.5%
Sil-MATRIX + JMS Stylet-Oil	400	84%	6.25%	8%	1.75%
Esteem 35WP	400	86%	7.25%	6.25%	0.5%

^aPercentage (%) of apples that exhibits no damage (clean/no infestation), low damage (1-5 scales), moderate damage (6-30 scales), and high damage (> 30 scales).

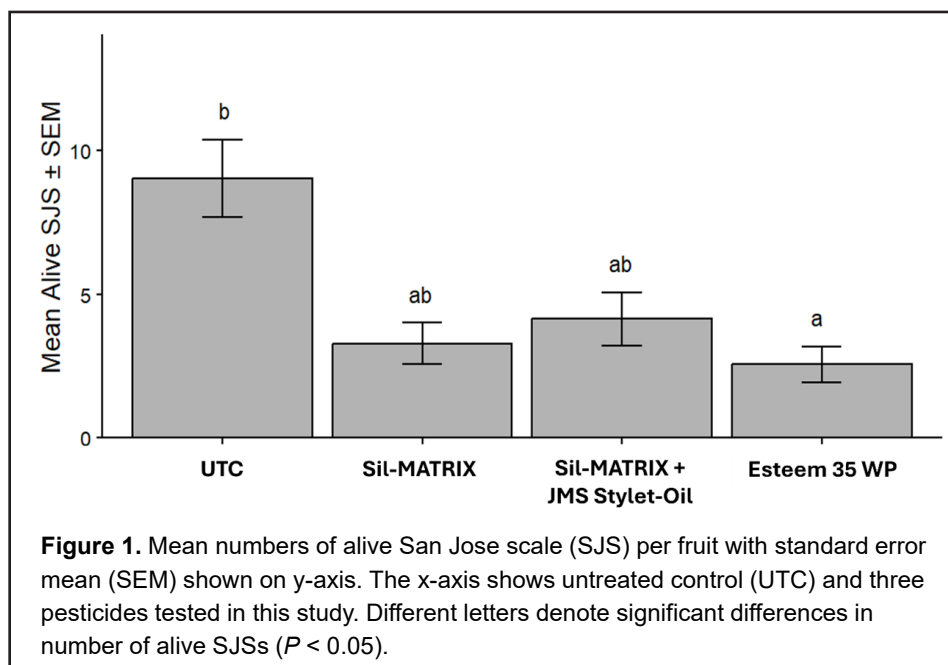
Of the 1,600 apples collected, infested apples with scale damages were assessed for the presence of alive or dead SJSs. Applying Esteem 35 WP significantly reduced mean numbers of alive SJSs compared with UTC (Figure 1). None of the pesticide treatments affected mean numbers of dead SJSs (Figure 2). Application of Sil-MATRIX + JMS Stylet-Oil and Esteem 35 WP significantly increased SJS mortality (Figure 3).

Acknowledgements

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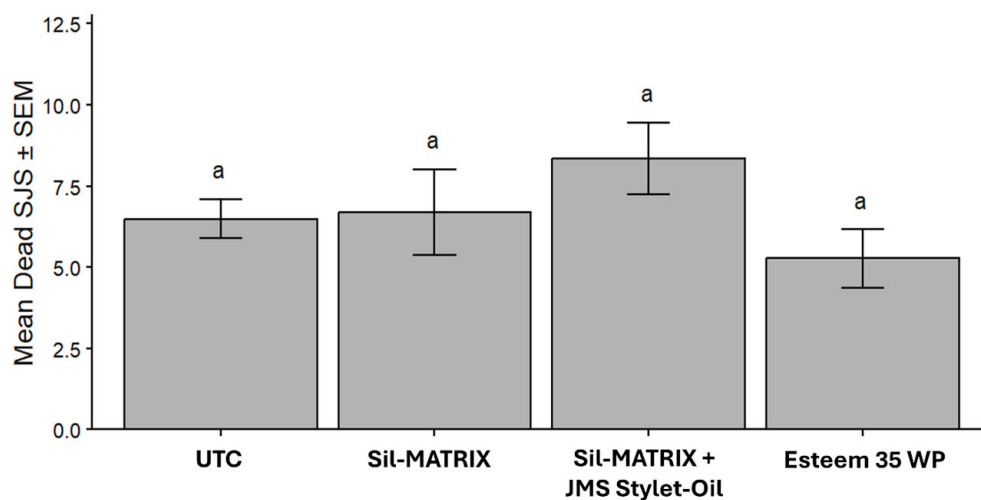


Figure 2. Mean numbers of dead San Jose scale (SJS) per fruit with standard error mean (SEM) shown on y-axis. The x-axis shows untreated control (UTC) and three pesticides tested in this study. Same letter denotes no statistical difference in number of dead SJSs ($P > 0.05$).

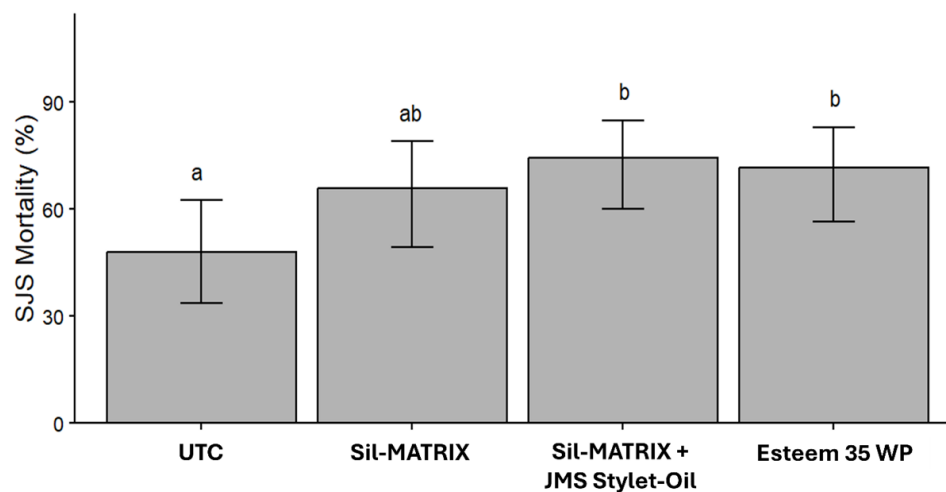


Figure 3. The impact of pesticides on San Jose scale (SJS) mortality. The y-axis shows percent (%) SJS mortality, and the x-axis shows untreated control (UTC) and three pesticides tested in this study. Different letters denote significant differences in SJS mortality ($P < 0.05$).



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