Aerosol mating disruption for the management of California Red Scale

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Introduction

California Red Scale (CRS *Aonidiella aurantii*) is an economic pest of citrus, where infested fruit may be downgraded or rejected by packers, and large or prolonged infestations can negatively affect tree health.

Aerosol mating disruption (Fig 1A), is a relatively new tool for the integrated pest management of CRS.

In this trial we used an automated CRS monitoring platform (Fig 1B), and manual assessments (Fig 2) to examine the phenology of CRS subjected to Semios CRS aerosol mating disruption and compare this to a reference hand-applied mating disruption product.

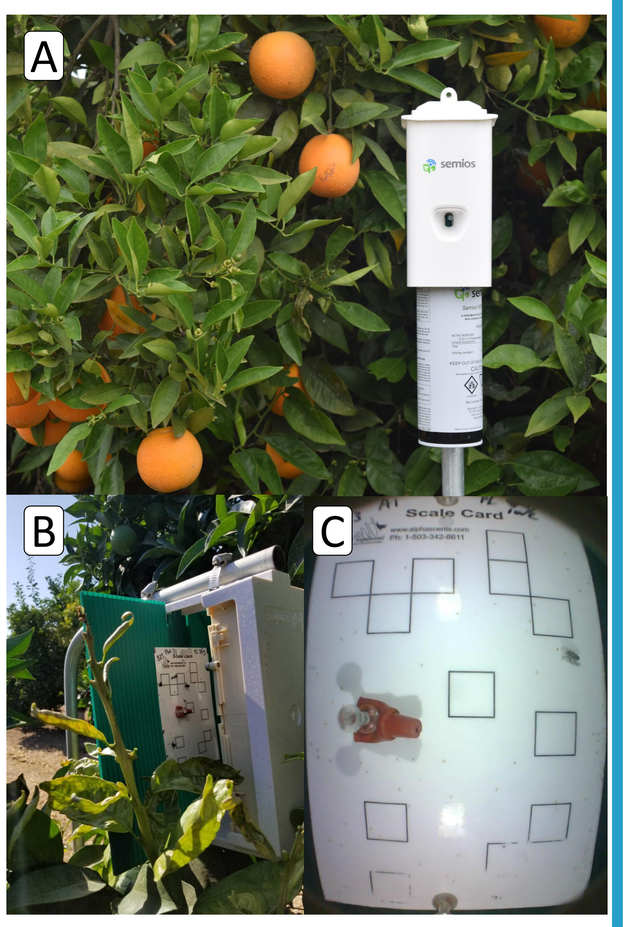


Figure 1: Semois Aerosol mating disruption unit (A), Automated CRS camera trap deployed in citrus (B), example of a CRS camera trap image (C)

Objective

Examine the efficacy of aerosol mating disruption at various rates and dispenser densities for the management of CRS.

Methods

This trial was conducted on a commercial orchard in Kern County, CA.

Mating disruption treatments (Table 1) were applied to grower blocks of between 120 – 240 total acres. Aerosol treatments were installed March 6, and the reference product April 1.

CRS was monitored with pheromone traps at approximately 1 per 20 ac. Traps were placed in previously identified CRS hotspots, counted weekly with a microscope (Fig. 2A), and counted daily using camera trap images (Fig 1C). Five trees with live CRS were associated with each pheromone trap and monitored, weekly for crawlers (Fig 2B), five times for the presence of CRS on young plant tissue (Fig 2C), twice for the presence of CRS on fruit (Fig 2D).

Data was analyzed in R using generalized linear mixed models.

Table 1: Mating disruption Rates and densities tested

MD format	g (a.i) /ac	Dispensers/ac
Aerosol	16	1
Aerosol	16	2
Aerosol	16	4
Aerosol	33	1
Aerosol	33	2
Passive release	Reference product grower applied at commercial rates	

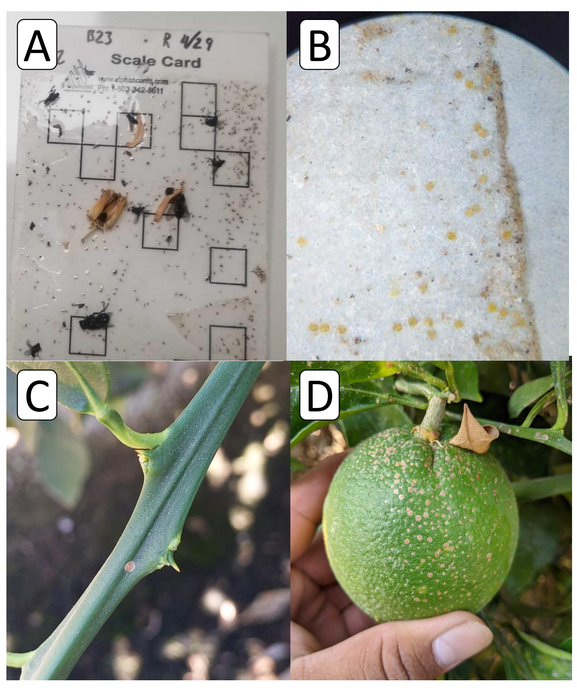
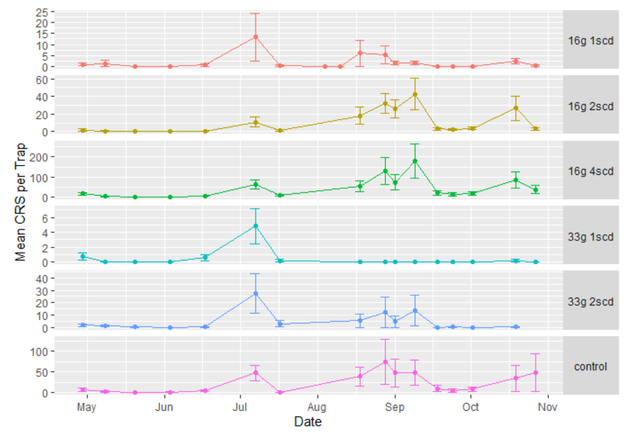


Figure 2: Examples of CRS monitoring endpoints. Liner with CRS A), sticky tape with CRS crawlers under microscope B), CRS on young plant tissue C), CRS on fruit.

Results

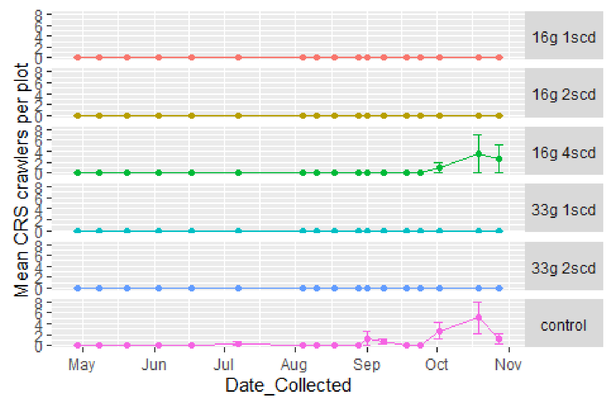
Pheromone Trap Captures

- Trap shutdown not observed in any treatment, CRS flight phenology clearly observable.
- Mean trap captures were influenced by block level effects.
- Trap images recovered 86% of CRS observed with microscope.



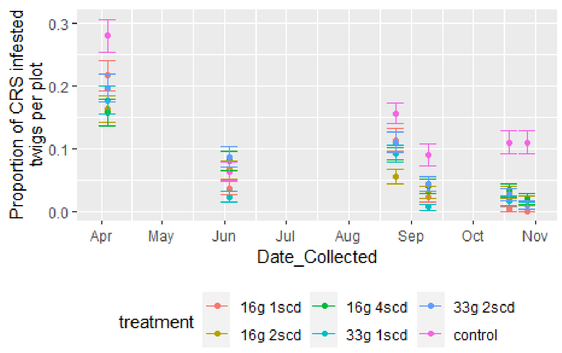
CRS Crawlers

- Crawlers, primarily observed in the fall were associated with blocks and traps with high CRS captures.
- Crawlers were observed earlier in the reference product (Sept) treatment compared to the aerosols (Oct).



CRS infested Twigs

- Infestations on young twigs initially decreased in all treatments to a similar level, but recovered more-so in the reference product compared to aerosols.



CRS infested Fruit

- Fruit infestations where low. 98% of fruit was free of CRS in the aerosol treatments compared to 96% in the reference product.

Discussion

- All rates and densities of CRS aerosols tested performed equally well under the commercial conditions of this trial.
- Trap shutdown was not observed in any treatment and CRS flight phenology was clearly visible, using either manual counts of traps or automated trap cameras. Therefore, under mating disruption CRS flight phenology data could inform in-season pest management decisions.
- The magnitude of trap captures was variable and influenced primary by block-level effects and not treatment. Similarly the magnitude of observed crawlers was influenced by block-level effects, however, the ratio of crawlers to adults was lower in all aerosol treatments. Which may indicate better mating disruption efficacy of aerosol treatments in the late summer/fall, when the majority of crawlers where observed.
- The time course of twig infestations data suggests that aerosol mating disruption lasts longer into the season than the reference product. Although overall fruit infestation was low, this data is also consistent with this hypothesis.

Acknowledgements

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