Powdery mildew and arthropod pest management in strawberries

Surendra Dara

Strawberry and Vegetable Crops Advisor

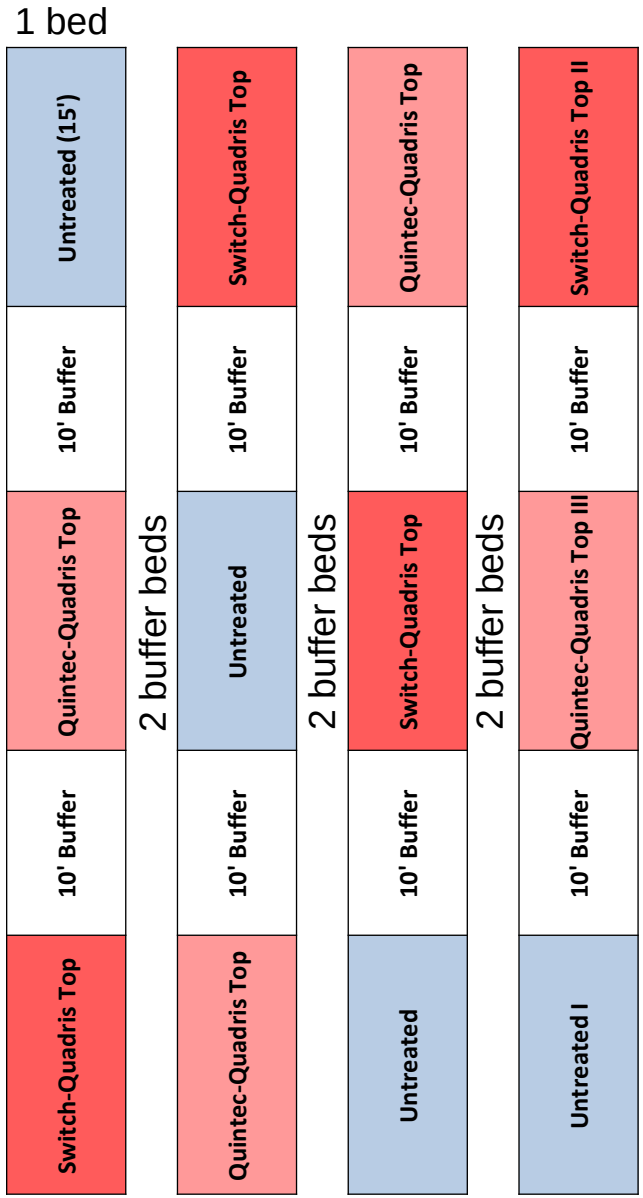
Santa Barbara and San Luis Obispo Counties

UC Cooperative Extension

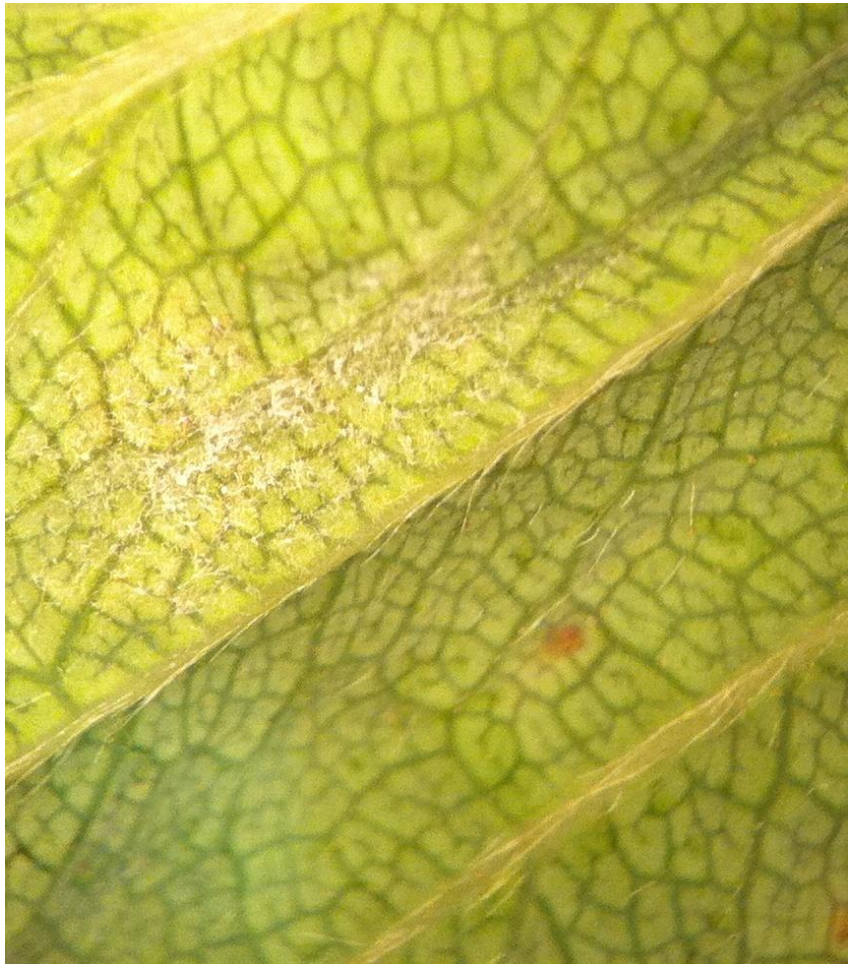
UC CE

Powdery mildew trial-2011

Treatments	1. Untreated control 2. Switch (14 oz) alternated with Quadris Top (14 fl oz) 3. Quintec (6 fl oz) alternated with Quadris Top
Spraying	40 gal/ac at 60 psi
Plot size	15’ bed replicated 4 times
Design	Randomized complete block
Cultivar	PSI 4634
Planted	11/15/2010
Trial duration	3/31 to 5/19/2011
Treated on	3/31, 4/10, 4/22, 5/4, 5/11
Sampling	One trifoliate leaf from every third plant in each plot on 5/19/11

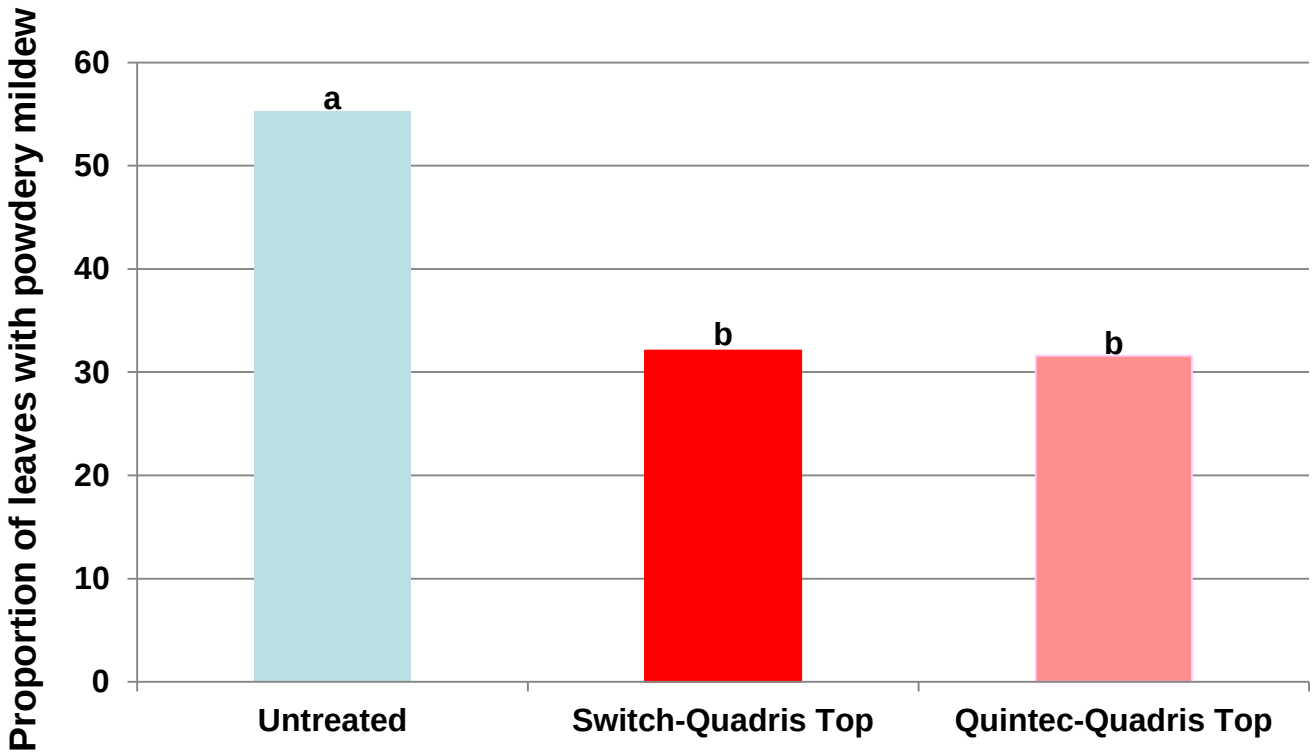


Powdery mildew incidence



UC CE

Powdery mildew incidence

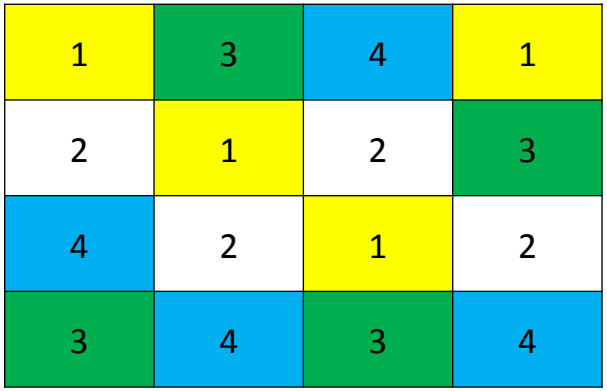


Severity of the infection was no more than 2-3% of the leaf surface

UC CE

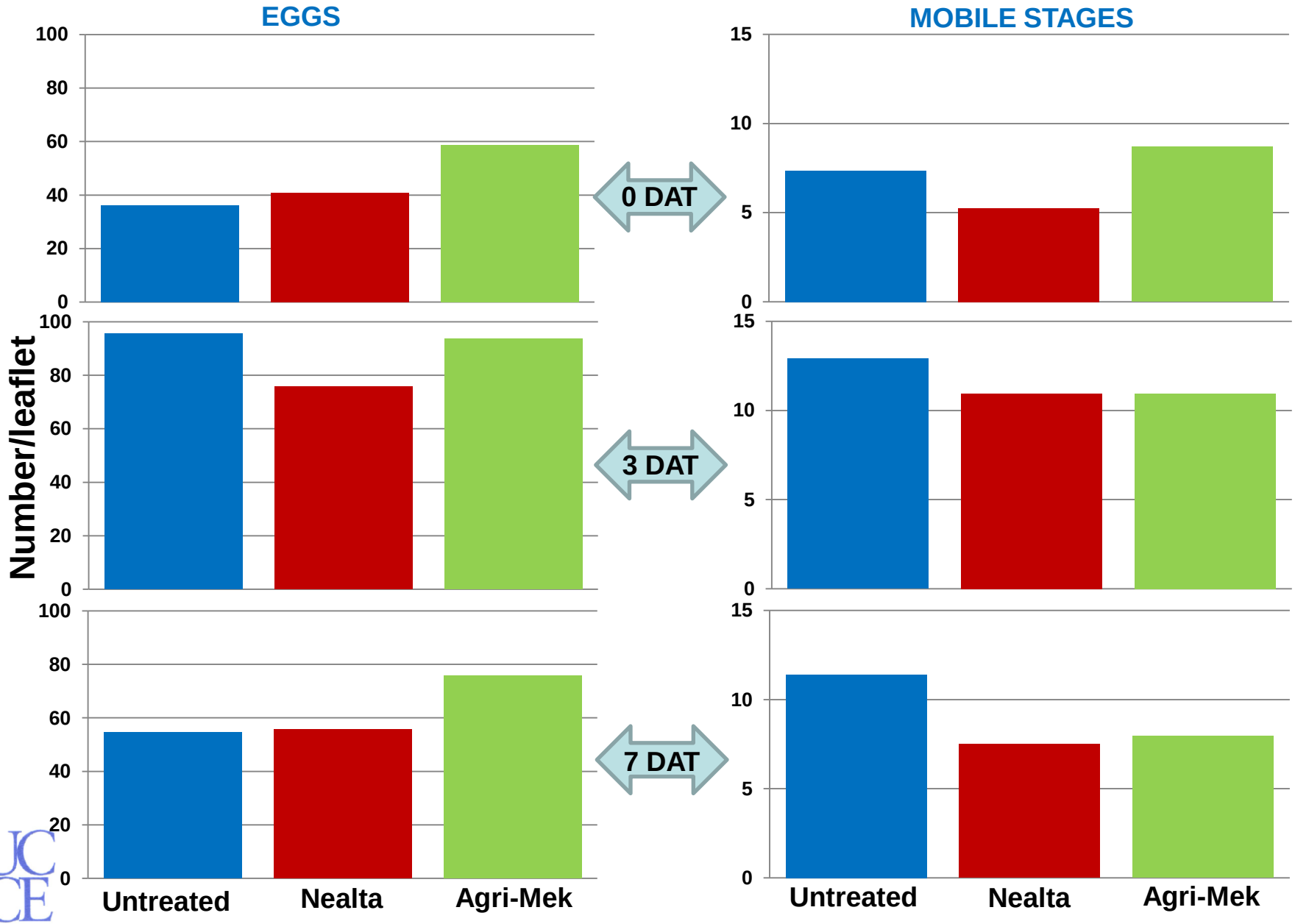
Miticide trial-2011

Treatments	1. Untreated control 2. Nealta (cyflumetofen, 13.7 fl oz) from BASF 3. Agri-Mek 0.15 EC (abamectin, 16 fl oz)
Spraying	100 gal/ac at 60 psi
Plot size	20’ long bed replicated 4 times
Design	Randomized complete block
Cultivar	San Andreas
Trial duration	7/6 to 8/25/11
Treated on	7/7 and 7/29/11
Sampling	10 mid-tier leaflets from each plot at 0, 3, 7, 14, 21 and 35 days after treatment. Mites counted using mite brushing machine

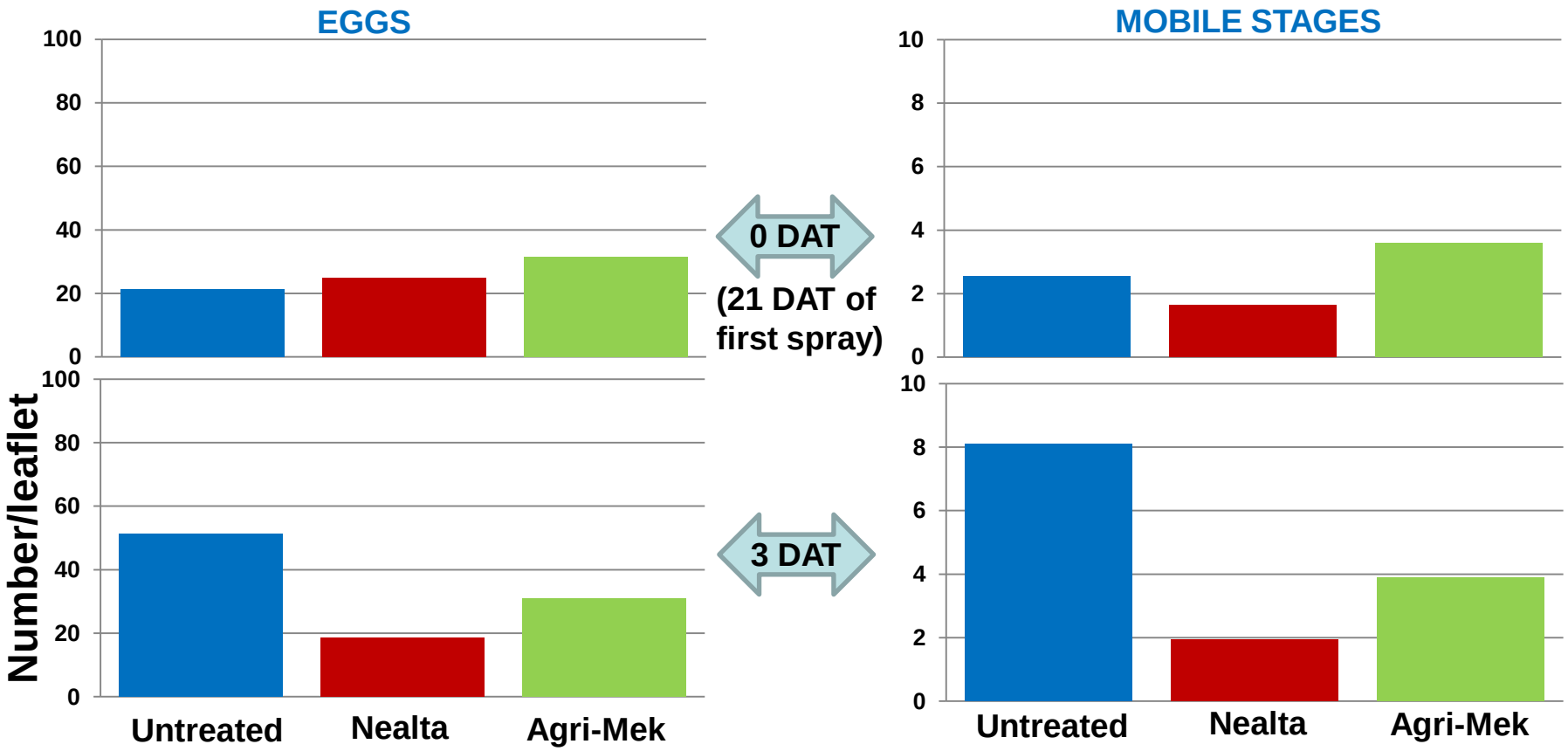


UC CE

Miticide trial-2011 First spray

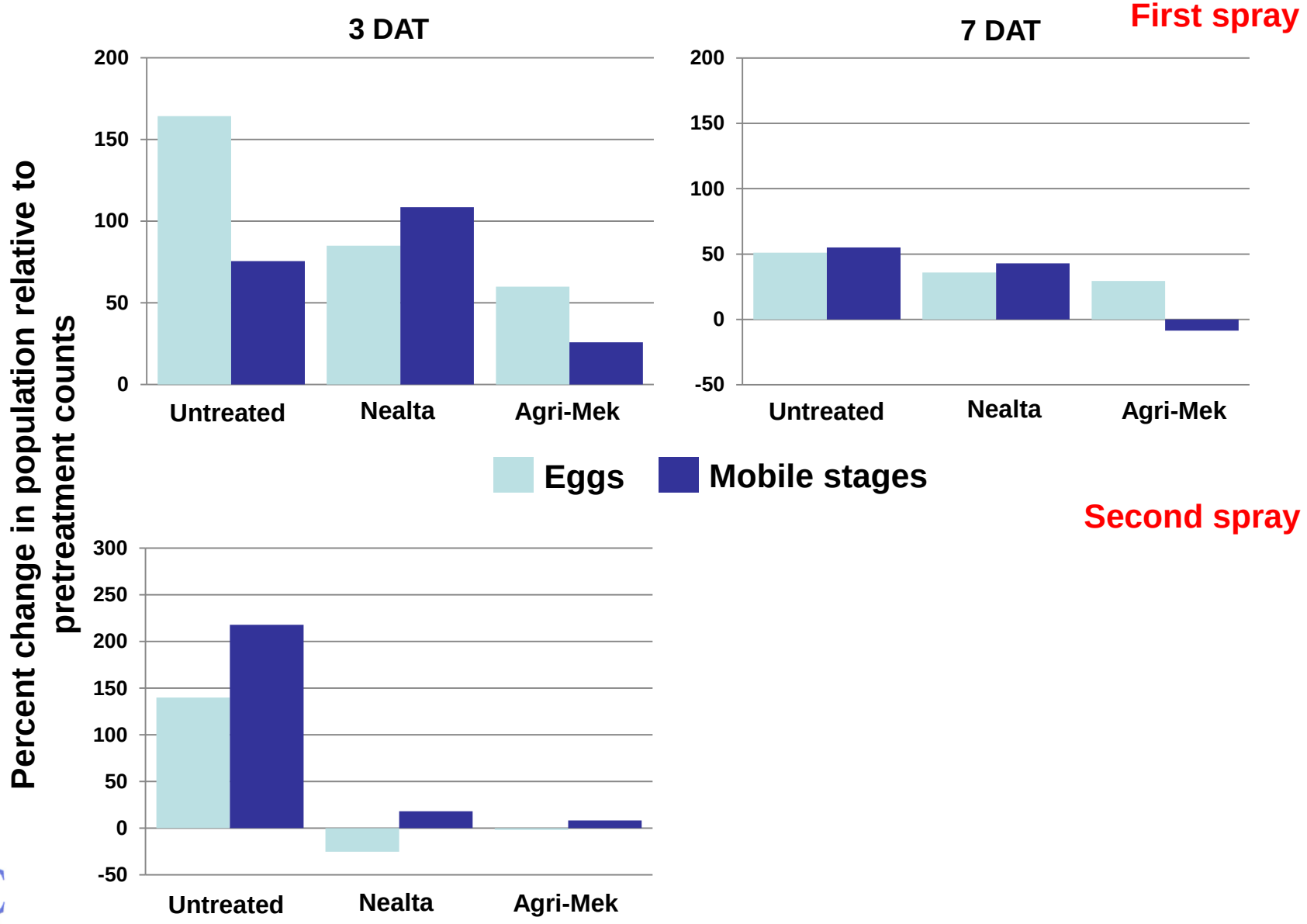


Miticide trial-2011 Second spray



Miticide trial-Population change

First spray



Second spray

Greenhouse trial-Aphids, thrips and whiteflies

Treatments

1. Untreated control
2. BotaniGard 22 WP *(Beauveria bassiana*, 1 lb/100 gal)
3. Spinosad
4. AzaSol (azadirachtin, 4 g/ gal)
5. Spinosad+AzaSol

Plot size 15’ long X 4 rows, replicated 4 times

Design Randomized complete block

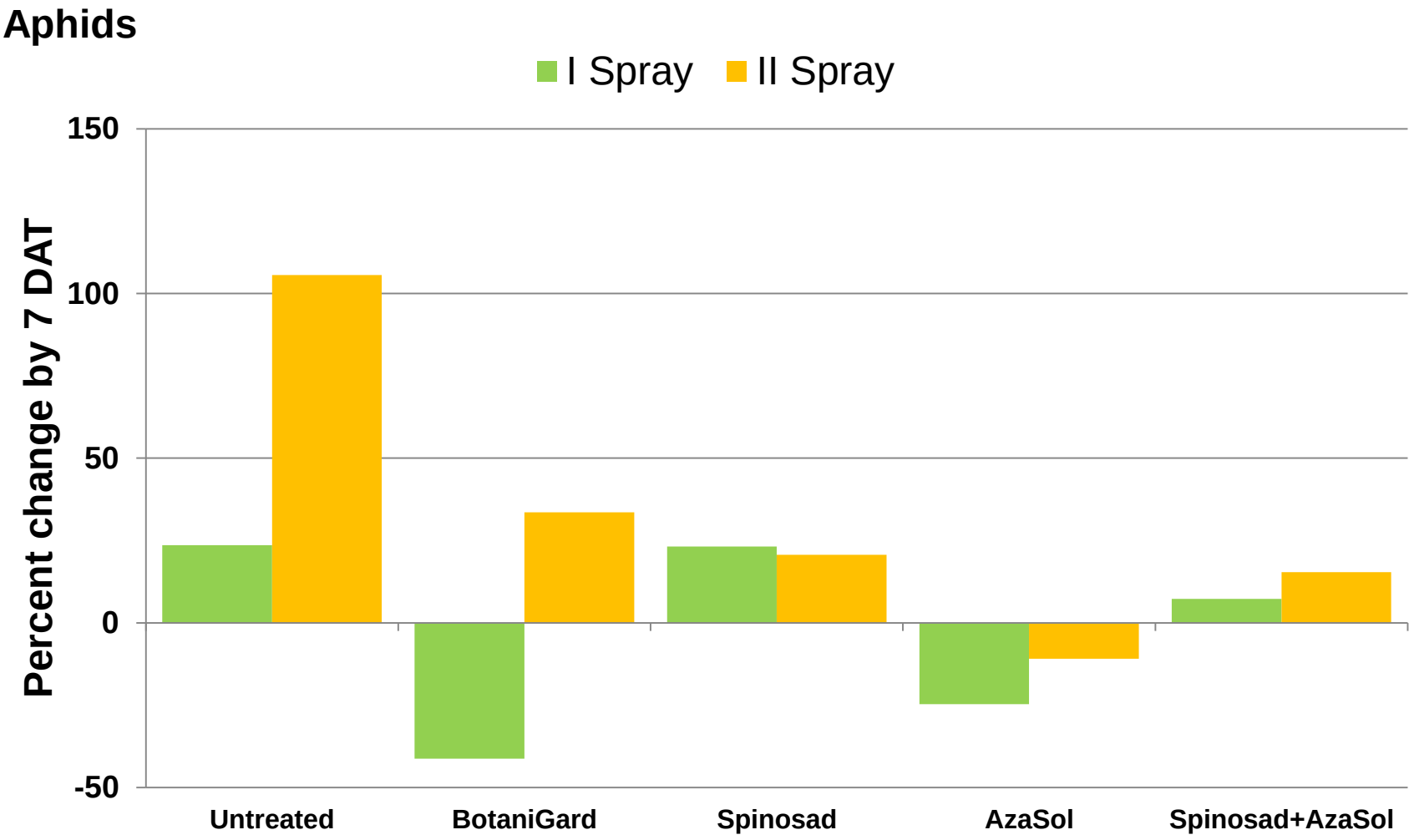
Cultivar Albion

Trial duration 10/19 to 11/22//11

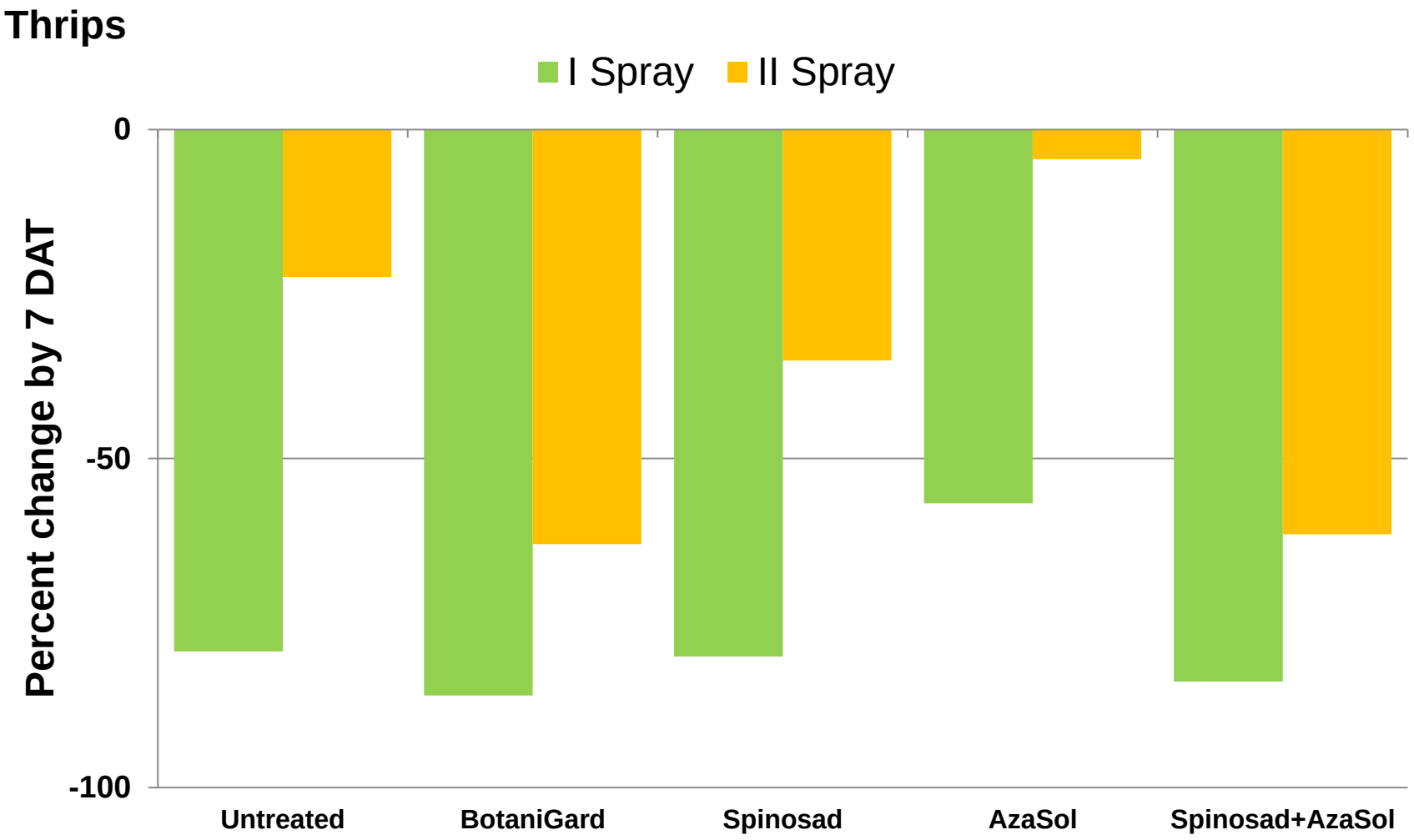
Treated on 10/27 and 11/15/11

Sampling From five plants by gently beating the plants to dislodge insects into a container

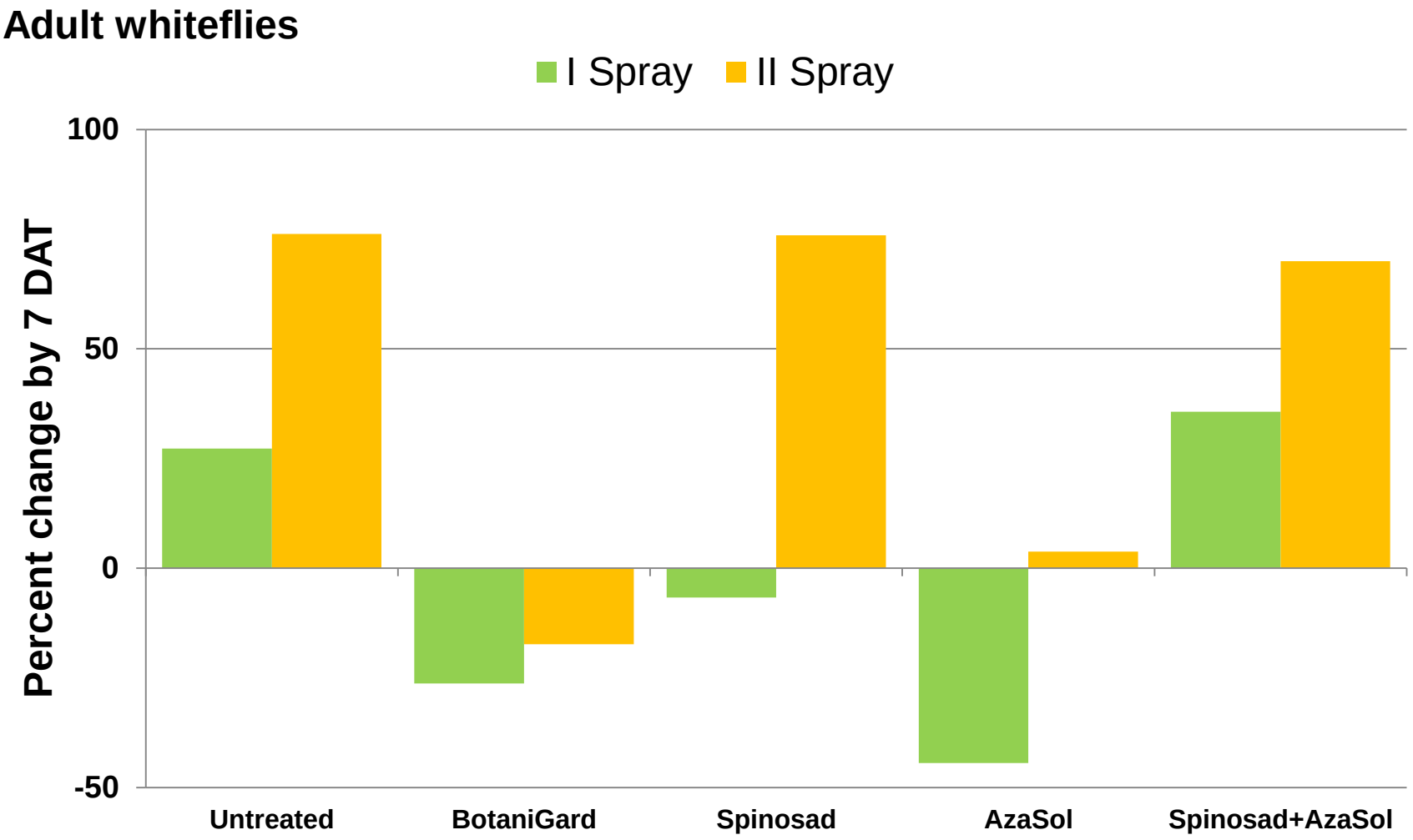
Greenhouse trial-Aphids, thrips and whiteflies



Greenhouse trial-Aphids, thrips and whiteflies



Greenhouse trial-Aphids, thrips and whiteflies



Spider mites

- Twospotted spider mite is a predominant species in the coastal areas.

- Lewis spider mite is found causing heavy infestations especially in organic strawberry fields in Ventura County.

UC CE

Twospotted and Lewis spider mites

UC CE

Twospotted and Lewis spider mites

Tetranychus urticae

Eotetranychus lewisi

	Twospotted spider mite	Lewis mite
Host range	Multiple hosts. Pest of field crops and greenhouse plants.	Multiple hosts. Mainly greenhouse pest. AKA Poinsettia spider mite
Male	Wedge-shaped, 0.3 mm	Wedge-shaped, mustard colored, 0.25 mm
Female	Oval, 0.4-0.5 mm Single dark spot on either side of the body	Oval, 0.36 mm Multiple small spots
Life stages	Egg, larva, protonymph, deutonymph, and adult	Egg, larva, protonymph, deutonymph, and adult. Males have only one nymphal stage.
Egg	Round, clear to whitish	Round, pale-greenish to light orange
Egg laying	About 100 eggs in 10 days	About 60-90 eggs in a month

UC CE

Twospotted and Lewis spider mites

Tetranychus urticae

Eotetranychus lewisi

	Twospotted spider mite	Lewis mite
Life cycle duration	5-20 days	12-14 days at 70^{o}F
Diapause	Ceases reproduction during cold winters	Continuously reproduces without diapause
Damage	Feeds undersurface of leaves. Causes yellow mottling, scarring, bronzing and leaf fall off	Similar, in general, but needs to be determined on strawberries
Webbing	Prominent	At high infestation levels
Predatory mites	*Phytoseiulus persimilis*, *Neoseiulus californicus, N. fallacis, Amblyseius andersoni,* etc.	*N. californicus, N. fallacis, A. andersoni,* etc.

UC CE

Spider mite damage

UC CE

Spider mite damage

UC CE

Management

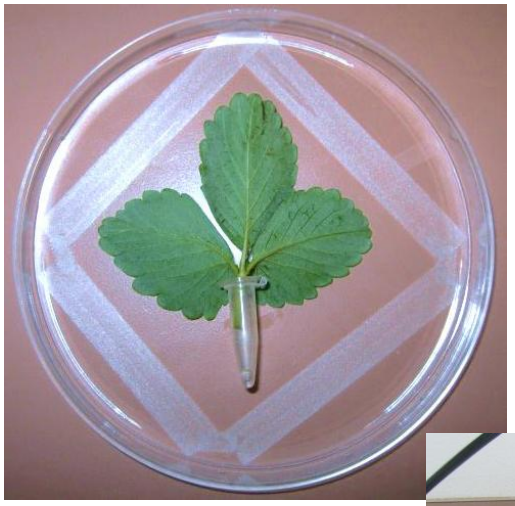
- Several commonly used miticides are effective against Lewis mite
- Rotate chemicals with different modes of action
- Test before spraying if resistance is suspected
- *Phytoseiulus persimilis* doesn't seem to be feeding on Lewis mites

UC CE

Predatory mite assays-Daugovish & Howell

10

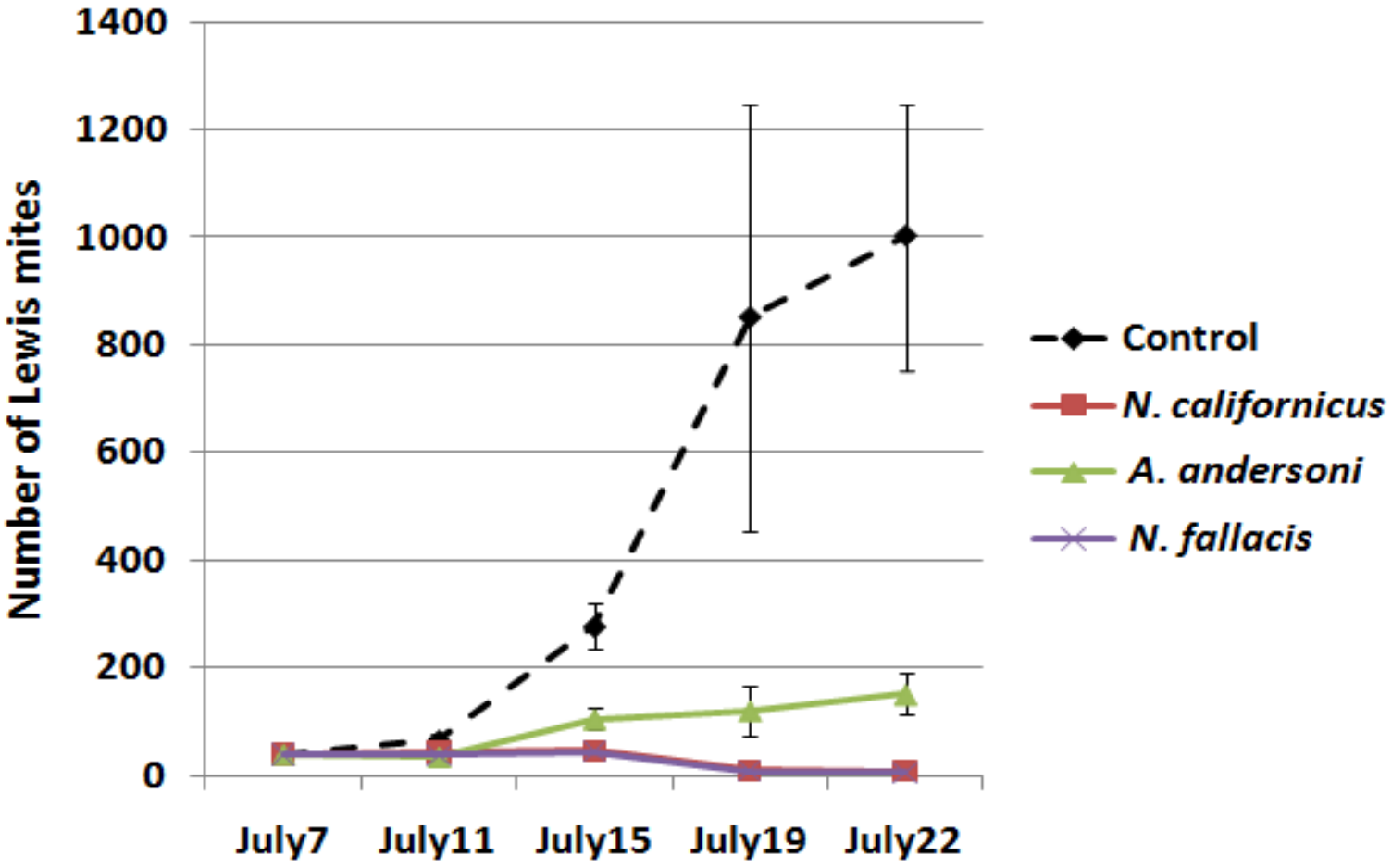
40



Neoseiulus californicus
N. fallacis
Amblyseius andersoni
Vs.
Lewis mite

UC CE

Predatory mite assays-Daugovish & Howell



UC CE

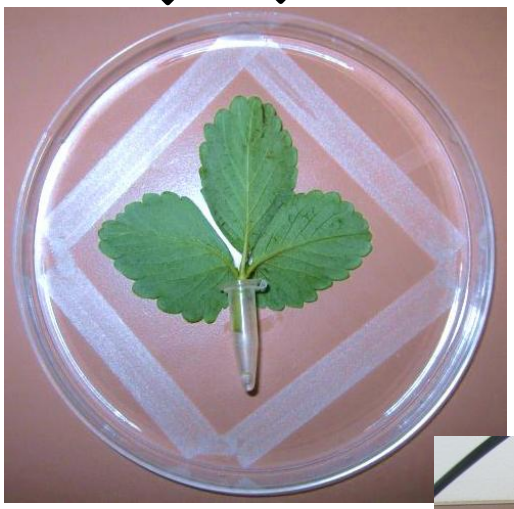
Predatory mite assays-Daugovish & Howell

Neoseiulus californicus, N. fallacis, and *Amblyseius andersoni* vs. Twospotted and Lewis mite

10

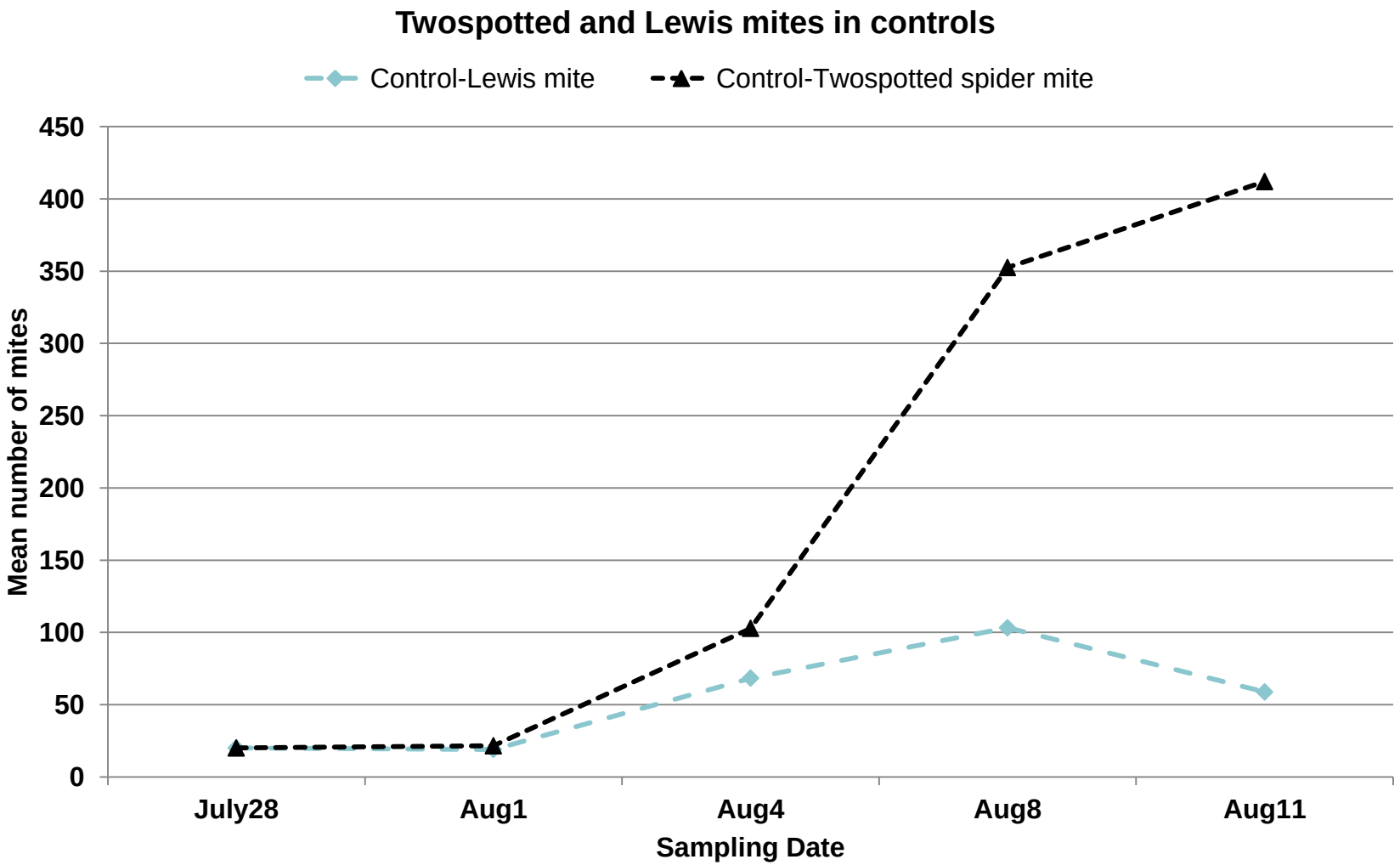
20

20

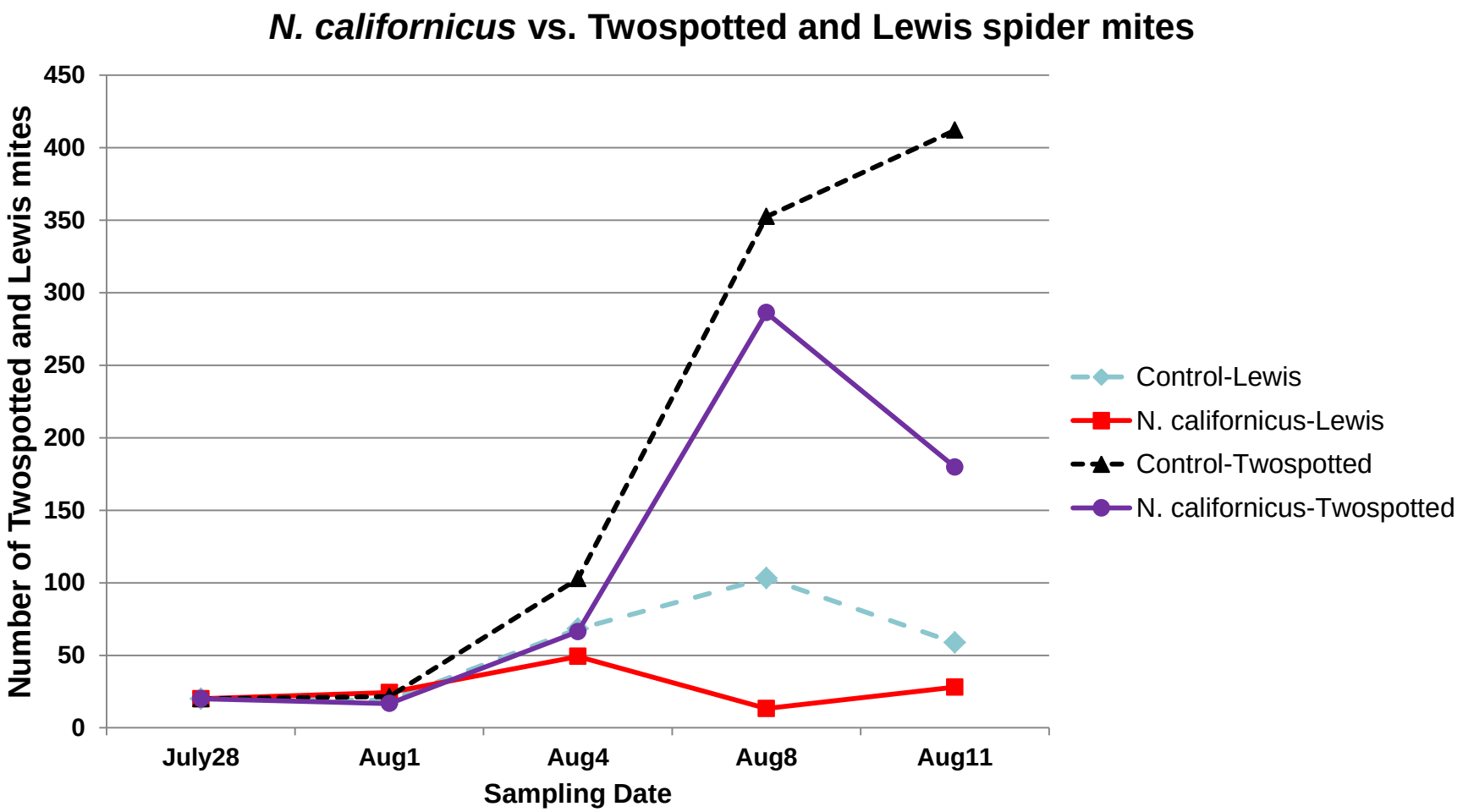


UC CE

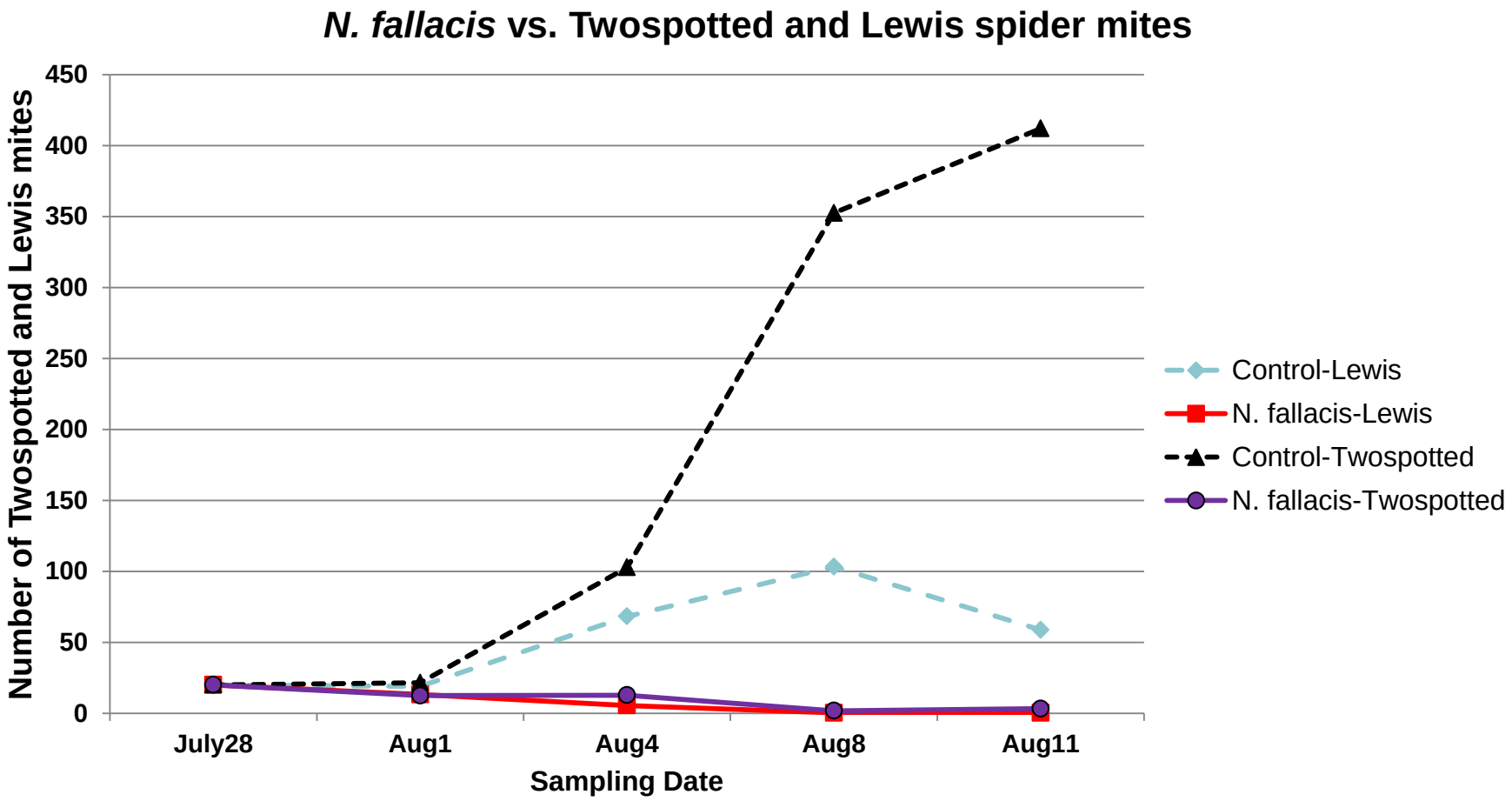
Predatory mite assays-Daugovish & Howell



Predatory mite assays-Daugovish & Howell

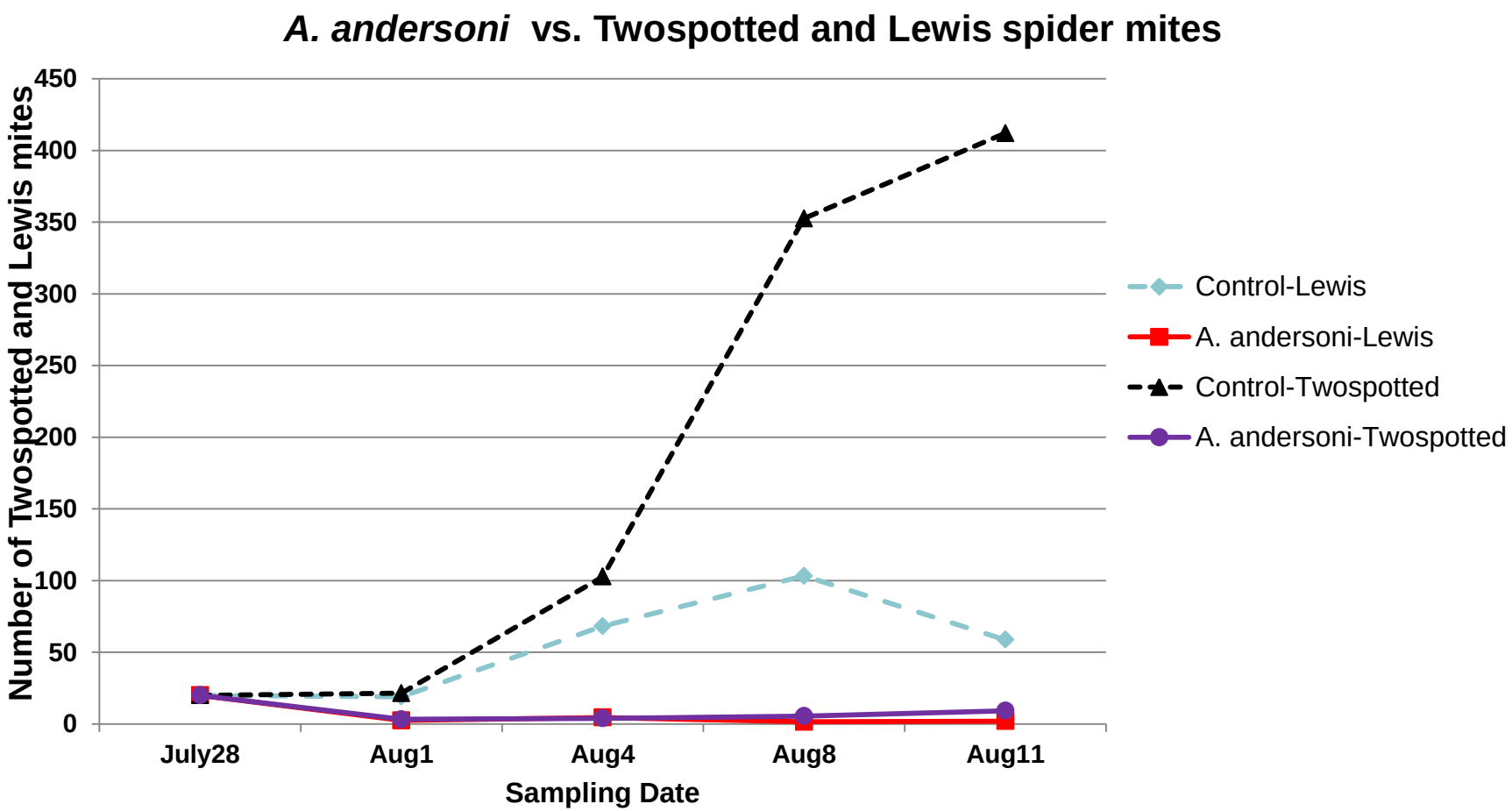


Predatory mite assays-Daugovish & Howell



UC CE

Predatory mite assays-Daugovish & Howell



Conclusions

- Quadris Top alternated with Switch or Quintec provided good control for powdery mildew
- Nealta and Agri-Mek provided comparable reduction in spider mite populations
- Twospotted spider mite seems to outcompete Lewis mite in laboratory conditions
- BotaniGard and AzaSol have some promise against aphids and whiteflies
- Commonly used predatory mites (except for *P. persimilis*) are effective against Lewis mite
- May have to watch for Lewis mite especially in sensitive areas

UC CE

Acknowledgments

- BASF
- Daren Gee and Joe Coelho, DB Specialty Farms
- Dave Peck, Manzanita Berry Farms
- Frank Laemmlen, UCCE
- Heather Scheck, SB Co Ag Commissioner Plant Pathologist
- Ivor Van Wingerden, Ocean Breeze Flowers
- Nichino America, Inc.
- Oleg Daugovish and Anna Howell, UCCE, Ventura Co
- Syngenta

UC CE