



# Melon production issues, biology and management options

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**Fresno County**

 **UNIVERSITY OF CALIFORNIA**  
Agriculture and Natural Resources

# Pest Management

- Virus issue
- Whitefly management studies
- Melon vine decline

# Virus diseases of melon

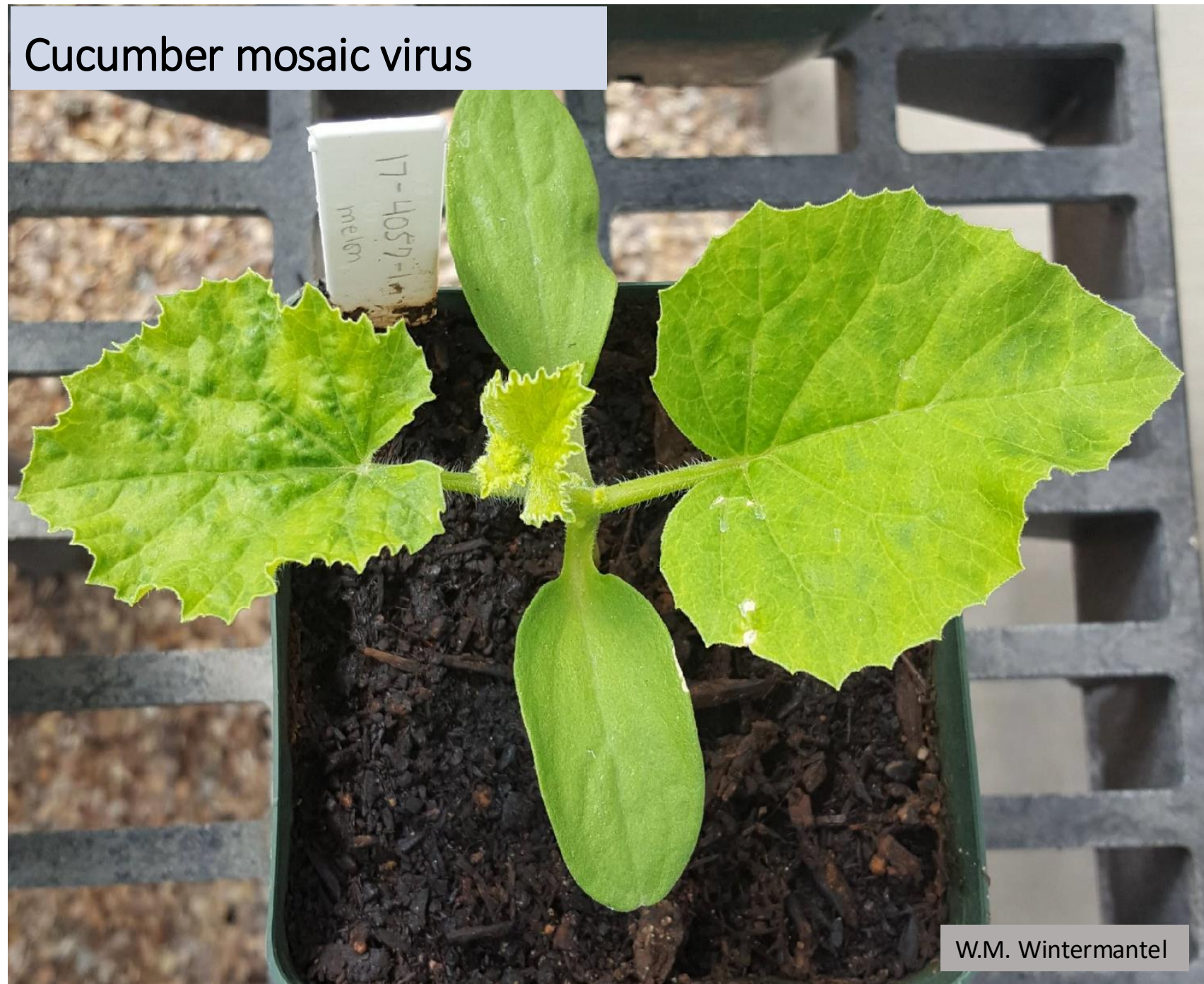


Watermelon  
mosaic virus

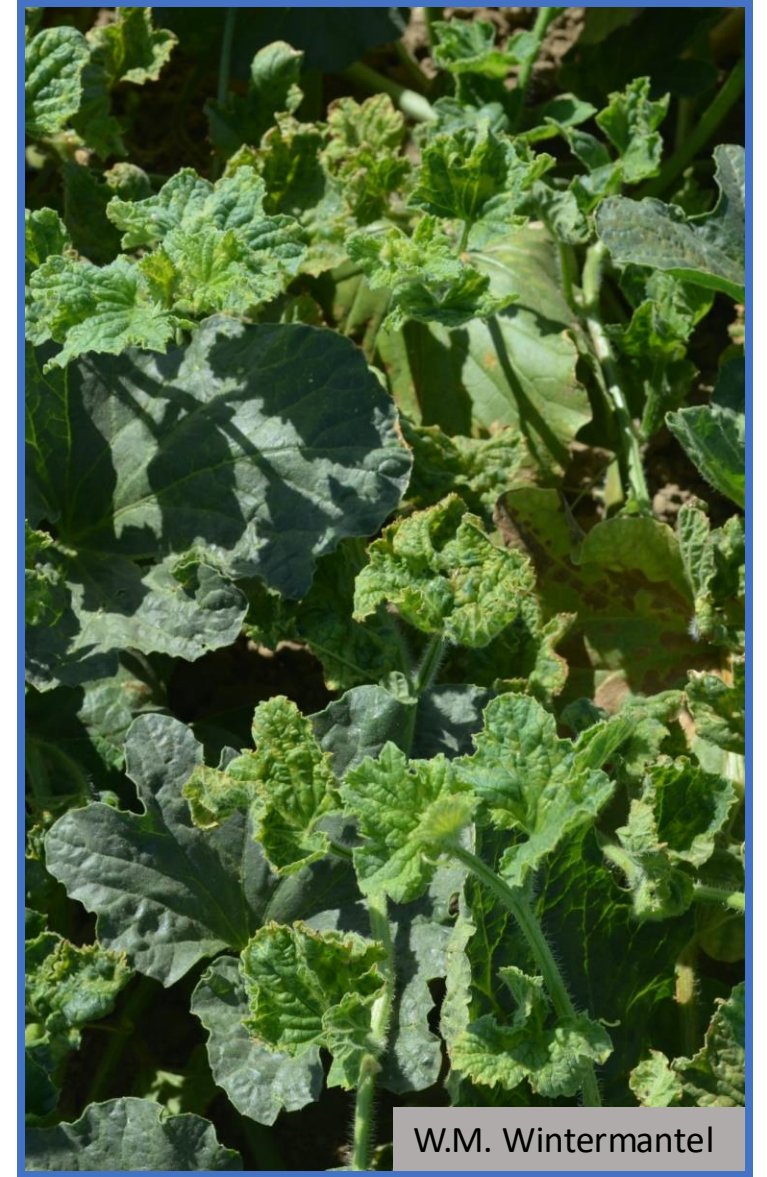
Cucurbit types/  
varieties differ in  
symptom  
expression on fruit.

# Virus diseases of melon

Cucumber mosaic virus



# Virus diseases of melon



*watermelon mosaic virus with  
cucumber mosaic virus*

# Virus diseases of melon



W.M. Wintermantel



UC Statewide IPM Project  
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# Partial List of Cucurbit Viruses in the United States

## Insect

### Whiteflies

Vector: Sweetpotato whitefly  
(*Bemisia tabaci*)

#### Begomovirus

Cucurbit leaf crumple virus (CuLCrV) ⓘ  
Squash leaf curl virus (SLCuV)  
Watermelon chlorotic stunt virus (WmCSV)

#### Crinivirus

Cucurbit chlorotic yellows virus (CCYV) ⓘ  
Cucurbit yellow stunting disorder virus (CYSDV) ⓘ  
Lettuce infectious yellows virus (LIYV) [historic]

#### Ipomovirus

Squash vein yellowing virus (SqVYV)

Vector: Greenhouse whitefly  
(*Trialeurodes vaporariorum*)

#### Crinivirus

Beet pseudoyellows virus (BPYV)

### Aphids

Vectors: Multiple aphid species,  
including melon (cotton) aphid (*Aphis  
gossypii*) and green peach aphid  
(*Myzus persicae*)

#### Cucumovirus

Cucumber mosaic virus (CMV)

#### Polerovirus

Cucurbit aphid-borne yellows virus  
(CABYV)

#### Potyvirus

Papaya ringspot virus (PRSV)  
Watermelon mosaic virus (WMV)  
Zucchini yellows mosaic virus (ZYMV)

### Beetles

Vectors: Cucumber beetles, including the spotted cucumber  
beetle (*Diabrotica undecimpunctata howardi*) and striped  
cucumber beetle (*Acalymma vittatum*)

#### Comovirus

Squash mosaic virus (SqMV)

### Beet Leafhopper

Vector: Beet leafhopper, *Neoalitarsus tenellus*  
(formerly *Circulifer tenellus*)

#### Curtovirus

Beet curly top virus (BCTV)

## Seed

#### Comovirus

SqMV

#### Tobamovirus

Cucumber green mottle mosaic virus  
(CGMMV) [transient] ⓘ  
Watermelon green mottle mosaic  
virus (WGMMV) [transient]

## Mechanical

#### Comovirus

SqMV

#### Cucumovirus

CMV

#### Ipomovirus

SqVYV

#### Potyvirus

PRSV, WMV,  
ZYMV

#### Tobamovirus

CGMMV [transient]  
WGMMV [transient]

Rebecca A. Melanson. (2024) EVCWG  
Publication 2401.Cucurbit viruses in  
the United States.

[https://ecucurbitviruses.org/wp-  
content/uploads/2024/07/EVCWG240  
1-Cucurbit-Viruses-in-the-United-  
States\\_FINAL-07-2024-SECURED.pdf](https://ecucurbitviruses.org/wp-content/uploads/2024/07/EVCWG2401-Cucurbit-Viruses-in-the-United-States_FINAL-07-2024-SECURED.pdf)



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SqMV

#### Cucumovirus

CMV

#### Ipomovirus

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# Aphid-borne Viruses



Multiple species of aphid transmit Cucumber mosaic virus and the potyviruses (including watermelon mosaic virus)

## TRANSMITS VIRUS VERY QUICKLY

CMV – **extremely** wide host range (>1200 host plants), **extremely** wide vector range (>80 aphid species)

WMV – wide host range (>170 host plant species), wide vector range (~29 aphid species)

ZYMV – moderate host range (~11 plant families), moderate vector range (~14 aphid species)



# Management options for cucumber mosaic virus and potyviruses

- Sanitation
- Strategic placement of plantings.
  - Adjacent successive plantings increases risk of loss in later-planted blocks
  - Avoid placement of varieties/types with greater susceptibility to damage in vicinity of earlier-planted cucurbits
- Monitor for virus symptoms during vegetative stages of development
- Reflective mulches
- Insecticide applications are rarely effective against cucumber mosaic virus or potyviruses

# Whitefly

*Sweetpotato  
whitefly: Bemisia  
tabaci* Biotype B



# Whitefly

Other whitefly  
have lower  
reproductive  
potential than *B.  
tabaci*



Greenhouse whitefly  
(*Trialeurodes  
vaporariorum*)

Bandedwinged whitefly  
(*Trialeurodes  
abutlonea*)



Iris whitefly  
(*Aleyrodes spiraeoides*)

*Sweetpotato  
whitefly: Bemisia  
tabaci*



Key whitefly hosts: broccoli, cabbage, cotton, alfalfa, bindweed, groundcherry, nightshade

Optimum temperature for reproduction: (72.5° to 86°F)

Damage: Through direct feeding (desiccation at moderate populations, honeydew, sooty mold, delayed maturity, reduced fruit size and quality)



***Sweetpotato  
whitefly: Bemisia  
tabaci***

## **Specific insecticides will be discussed**

There may be materials mentioned that are not currently registered in California or in your specific situation. The mention of an insecticide here does not constitute a recommendation. Read all current applicable labels before writing a recommendation or making an application.

# Neonicotinoid limitations on rates and timing in cucurbit vegetables

## Section 6990.5. Neonicotinoid Use on **Cucurbit Vegetables** (Crop Group 9).

- (a) Application of a neonicotinoid is prohibited during bloom, with the exception of soil applications of dinotefuran. Soil applications of dinotefuran may be applied during bloom.
- (b) If both soil and foliar application methods are used on the same crop, or if multiple neonicotinoid active ingredients are applied to the same crop, a total maximum combined application rate of 0.736 lbs. ai/A/season may be applied, provided that: (1) Soil application rate must not exceed 0.536 lbs. ai/A/season; and (2) Foliar application rate must not exceed 0.2 lbs. ai/A/season.
- (c) Except as provided in subsection (d), if managed pollinators will be used within the growing season, the application rate and timing restrictions listed in the following table apply in addition to the limitations in subsections (a) and (b): A

From: California Dept. of Pesticide Regulation, 22-001, Final

[https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid\\_regulations.htm](https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid_regulations.htm)

# Neonicotinoid limitations on rates and timing in cucurbit vegetables

## Application Rate and Timing Restrictions for Crops in the Cucurbit Vegetables Crop Groups

| Active ingredient   | Soil Application          |                                                                             | Foliar Application        |                                       |
|---------------------|---------------------------|-----------------------------------------------------------------------------|---------------------------|---------------------------------------|
|                     | Maximum application rate  | Required timing                                                             | Maximum application rate  | Required timing                       |
| <b>Clothianidin</b> | 0.2 lbs ai/acre /season   | Apply only from planting to primary side-shoot formation                    | 0.2 lbs ai/acre/season    | Apply only from pre-planting to bloom |
| <b>Dinotefuran</b>  | 0.536 lbs ai/acre /season | None                                                                        | 0.172 lbs ai/acre /season | Apply only from pre-planting to bloom |
| <b>Imidacloprid</b> | 0.172 lbs ai/acre /season | Apply only from planting to 5 <sup>th</sup> true leaf on main stem unfolded | 0.172 lbs ai/acre /season | Apply only from pre-planting to bloom |
| <b>Thiamethoxam</b> | 0.172 lbs ai/acre /season | Apply only from planting to 5 <sup>th</sup> true leaf on main stem unfolded | 0.172 lbs ai/acre /season | Apply only from pre-planting to bloom |

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[https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid\\_regulations.htm](https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid_regulations.htm)

## Neonicotinoid limitations on rates and timing in melons

(d) Exceptions:

(1) Cucumbers. If managed pollinators will be used for cucumbers during the growing season, then foliar applications of dinotefuran, imidacloprid, or thiamethoxam are prohibited. For foliar applications of clothianidin and soil applications of all neonicotinoids, the rates and timing restrictions listed in subsection (c) apply.

From: California Dept. of Pesticide Regulation, 22-001, Final

[https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid\\_regulations.htm](https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid_regulations.htm)

## Neonicotinoid limitations on rates and timing in melons

(d) Exceptions:

(2) Melons. If managed pollinators will be used for melons during the growing season, then soil applications of clothianidin are prohibited. For soil applications of dinotefuran, imidacloprid, or thiamethoxam and foliar applications of all neonicotinoids, the rates and timing restrictions listed in subsection (c) apply.

From: California Dept. of Pesticide Regulation, 22-001, Final

[https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid\\_regulations.htm](https://www.cdpr.ca.gov/docs/enforce/neonicotinoid/neonicotinoid_regulations.htm)

# Treatments Evaluated, Fresno County

## **Plant Dates:**

4 Aug 2023, 13 Aug 2024

## **Applications**

Tractor mounted sprayer hollow cone nozzles

## **Drip injections**

electric metering pumps 30 min fb 1 hour irrigation



# Whitefly Insecticide Program Comparisons

## UC West Side Research Extension Center

### Drip-Applied treatments 9/11/24

1. Sivanto 28 fl oz
2. Beleaf 4.2 oz
3. Untreated Control

Drip applied treatments were injected into subsurface drip 20 to 40 min with water run for 60 min post-application.

### Foliar treatments

| <u>26 SEP 2024</u>       | <u>10 OCT 2024</u>  |
|--------------------------|---------------------|
| 1. Control               |                     |
| 2. Sefina 14 fl oz       | Anarchy 70WP 2.3 oz |
| 2. Exirel 20.5 fl oz     | Beleaf 4.2 oz       |
| 3. <u>Knack 10 fl oz</u> | Sefina 14 fl oz     |

All foliar treatments were applied with a tractor mounted sprayer 30 gal/acre @ 30 psi

Casba melon cv. Golden Beauty: First water 8/13/24

Insecticide  
Resistance  
Action  
Committee  
Mode of  
Action Main  
and sub-  
group  
classifications

IRAC: MoA-  
classification,  
2025

**4 Nicotinic acetylcholine receptor (nAChR) competitive modulators Nerve action {Strong evidence that action at one or more of this class of protein is responsible for insecticidal effects}**

|                   |                                                                                             |                                         |
|-------------------|---------------------------------------------------------------------------------------------|-----------------------------------------|
| 4A Neonicotinoids | Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, Nitenpyram, Thiacloprid, Thiamethoxam | Anarchy, Belay, Venom, Admire, Platinum |
| 4B Nicotine       | Nicotine                                                                                    |                                         |
| 4C Sulfoximines   | Sulfoxaflor                                                                                 |                                         |
| 4D Butenolides    | Flupyradifurone                                                                             | Sivanto                                 |
| 4F Pyridylidenes  | Flupyrimin                                                                                  |                                         |

**9 Chordotonal organ TRPV channel modulators Nerve action {Strong evidence that action at one or more of this class...}**

|                                    |                              |        |
|------------------------------------|------------------------------|--------|
| 9B Pyridine azomethine derivatives | Pymetrozine, Pyrifluquinazon |        |
| 9D Pyropenes                       | Afidopyropen                 | Sefina |

**28 Ryanodine receptor modulators Nerve and muscle action {Strong evidence that action at this protein complex is responsible for effect}**

|                 |                                                                       |        |
|-----------------|-----------------------------------------------------------------------|--------|
| <b>Diamides</b> | Chlorantraniliprole, Cyantraniliprole, Cyclaniliprole, Flubendiamide, | Exirel |
|-----------------|-----------------------------------------------------------------------|--------|

**29 Chordotonal organ nicotinamidase inhibitors Nerve action**

|                   |            |        |
|-------------------|------------|--------|
| <b>Flonicamid</b> | Flonicamid | Beleaf |
|-------------------|------------|--------|

**7 Juvenile hormone receptor modulator**

|              |              |       |
|--------------|--------------|-------|
| Pyriproxyfen | Pyriproxyfen | Knack |
|--------------|--------------|-------|

# Materials for Sweetpotato Whitefly Management

## Applied through buried drip

- Venom-dinotefuran (4A) Neonicotinoid
- Admire Pro-imidacloprid (4A) Neonicotinoid
- Platinum-thiamethoxam (4A) Neonicotinoid
- Verimark-cyantraniliprole (28) Diamide

## Applied to foliage

- Brigade/Capture-bifenthrin (3A) Pyrethroid
- Assail-acetamiprid (4A) Neonicotinoid
- Courier-buprofezin (16) Buprofezin chitin synthesis inhibition
- Oberon-spiromesifen (23) Tetrone acid derivative
- Knack-pyriproxyfen (7C) Pyriproxyfen juvenal hormone mimic
- Exirel-cyantraniliprole (28) Diamide
- Voliam Flexi-chlorantraniliprole & thiamethoxam (28 & 4A)

# Four Replication Split-Plot Design

[illegible]

# Whitefly Insecticide Program Comparisons

## UC West Side Research Extension Center

Whitefly nymphs/ three 3 cm-diameter discs

| Drip applications<br>(11 Sep) | 13-Sep          | 16-Sep | 23-Sep | 30-Sep     | 7-Oct      | 14-Oct      |
|-------------------------------|-----------------|--------|--------|------------|------------|-------------|
| Sivanto 28 fl oz              | 0.00            | 25.83  | 29.13  | 24.08    b | 19.11      | 11.30       |
| Beleaf 4.2 oz                 | 0.25            | 27.31  | 70.55  | 28.66   ab | 27.30      | 14.68       |
| Untreated<br>Control          | 15.30           | 25.32  | 49.58  | 35.29    a | 30.41      | 16.03       |
| main plot P                   | 0.4288          | 0.9900 | 0.0800 | 0.0482     | 0.0706     | 0.2346      |
| Foliar Applications*          |                 |        |        |            |            |             |
| (26 Sep)                      | (10 Oct)        |        |        | 30-Sep     | 7-Oct      | 14-Oct      |
| Sefina 14 fl oz               | Anarchy 70WP    |        |        | 33.96      | 28.09    b | 10.87    b  |
| Exirel 20.5 fl oz             | Beleaf 4.2 oz   |        |        | 25.33      | 10.92    b | 7.09      b |
| Knack 10 fl oz                | Sefina 14 fl oz |        |        | 50.56      | 23.12    b | 19.14    ab |
| Untreated Control             |                 |        |        | 53.03      | 51.62    a | 26.68    a  |
| sub-plot P                    |                 |        |        | 0.2647     | 0.0001     | 0.0060      |
| Main- x sub-plot P            |                 |        |        | 0.6604     | 0.0652     | 0.8074      |

\* Tractor mounted sprayer at 30 gal/a w/ Dyne-Amic 0.25% by volume

# Whitefly Insecticide Program Comarisons

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# 2023 Whitefly Efficacy Comparison

UC West Side  
Research  
Extension Center

## Drip treatments 15 Aug

1. Sivanto 28 fl oz
2. Belaf 4.2 oz
3. Admire 4.7 fl oz
4. Control

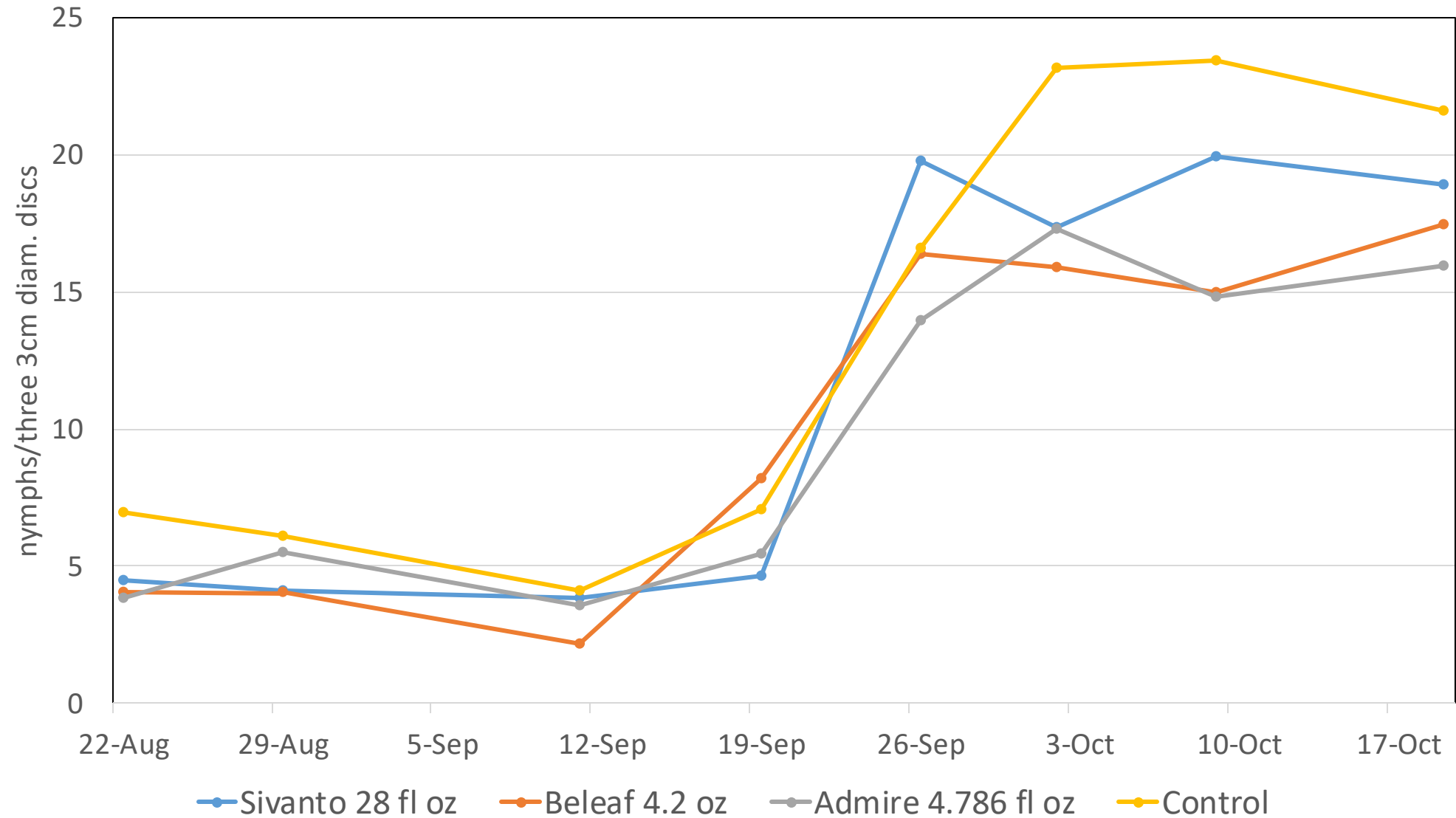
## Foliar Applications

|   | 1 Sep             | 12 Sep           |
|---|-------------------|------------------|
| 1 | Assail 70 2.3 oz  | Oberon 8.5 fl oz |
| 2 | Sefina 14 fl oz   | Oberon 8.5 fl oz |
| 3 | Exirel 20.5 fl oz | Sefina 14 fl oz  |
| 4 | Control           |                  |

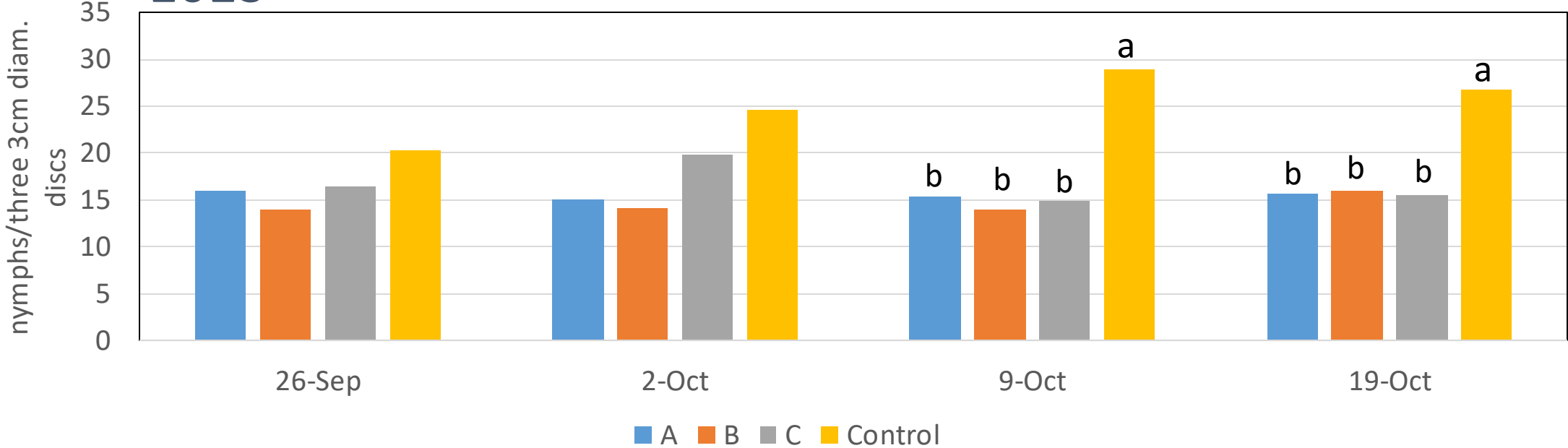
Casba Golden Beauty direct seeded 4 Aug

All foliar materials were applied with a tractor-mounted sprayer at 30 gal/a with Dyne-Amic 0.25%

# Drip-injected insecticide efficacy against nymphs, 2023



# Foliar insecticide efficacy against *B. tabaci* nymphs, 2023



|   | 21 Sep             | 3 Oct            |
|---|--------------------|------------------|
| 1 | Sefina 14 fl oz    | Oberon 8.5 fl oz |
| 2 | Exirel 20.5 fl oz  | Oberon 8.5 fl oz |
| 3 | PQZ 3.2 fl oz/acre | Oberon 8.5 fl oz |
| 4 | Control            |                  |

# 2022 Whitefly Efficacy Comparison

UC West  
Side  
Research  
Extension  
Center

## Drip treatments

1. Sivanto 28 oz on 5 Aug
2. Sivanto 14 oz on 5 Aug and another 14 oz on 24 Aug
3. Admire 10.5 on 5 Aug
4. Control

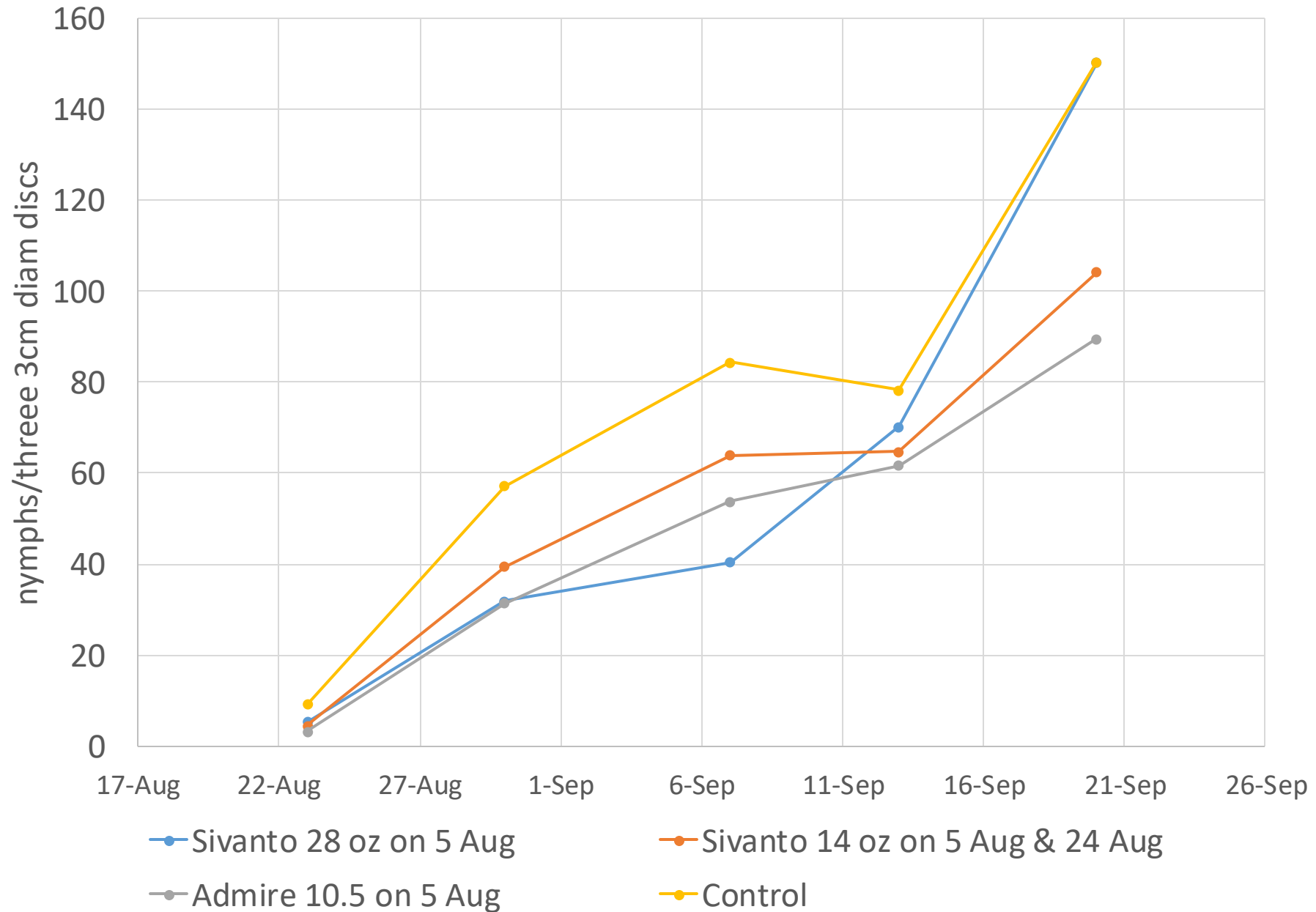
## Foliar Applications

|   | 1 Sep             | 12 Sep           | 23 Sep                                       |
|---|-------------------|------------------|----------------------------------------------|
| 1 | Assail 70 2.3 oz  | Oberon 8.5 fl oz | Brigade 2EC 5.12 fl oz +<br>Oberon 8.5 fl oz |
| 2 | Sefina 14 fl oz   | Oberon 8.5 fl oz | Brigade 2EC 5.12 fl oz +<br>Oberon 8.5 fl oz |
| 3 | Exirel 20.5 fl oz | Sefina 14 fl oz  | Brigade 2EC 5.12 fl oz +<br>Oberon 8.5 fl oz |
| 4 | Control           |                  |                                              |

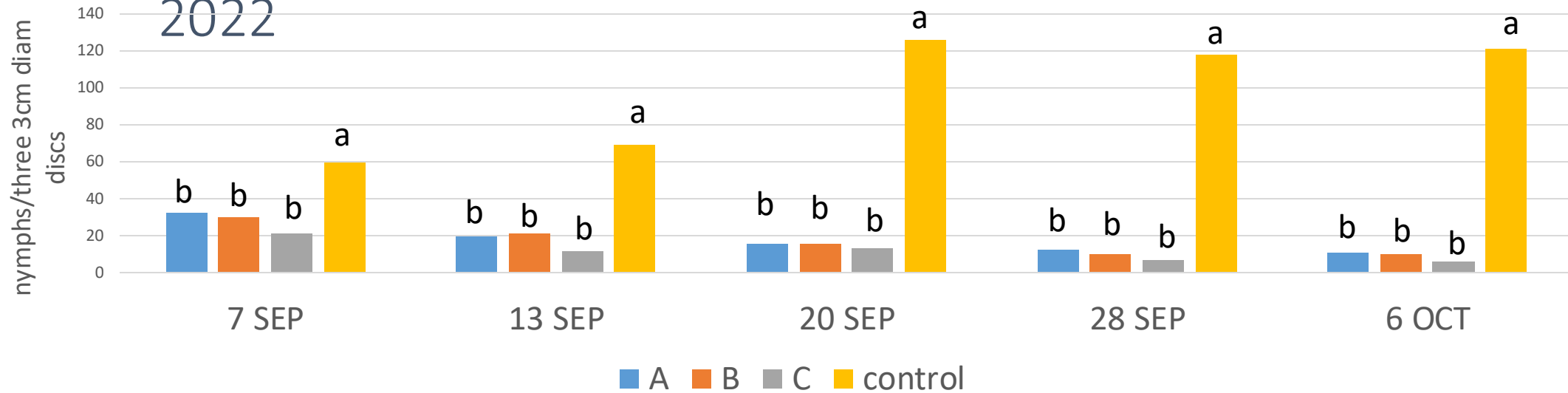
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# Drip-injected insecticide efficacy against nymphs, 2022



# Foliar insecticide efficacy against *B. tabaci* nymphs, 2022



|   | 1 Sep             | 12 Sep           | 23 Sep                                      |
|---|-------------------|------------------|---------------------------------------------|
| A | Assail 70 2.3 oz  | Oberon 8.5 fl oz | Brigade 2EC 5.12 fl oz + Oberon 8.5 fl oz   |
| B | Sefina 14 fl oz   | Oberon 8.5 fl oz | Brigade 2EC 5.12 fl oz + Oberon 8.5 fl oz   |
| C | Exirel 20.5 fl oz | Sefina 14 fl oz  | Brigade 2EC 5.12 fl oz + Oberon 8.5 fl oz + |
|   | Control           |                  |                                             |

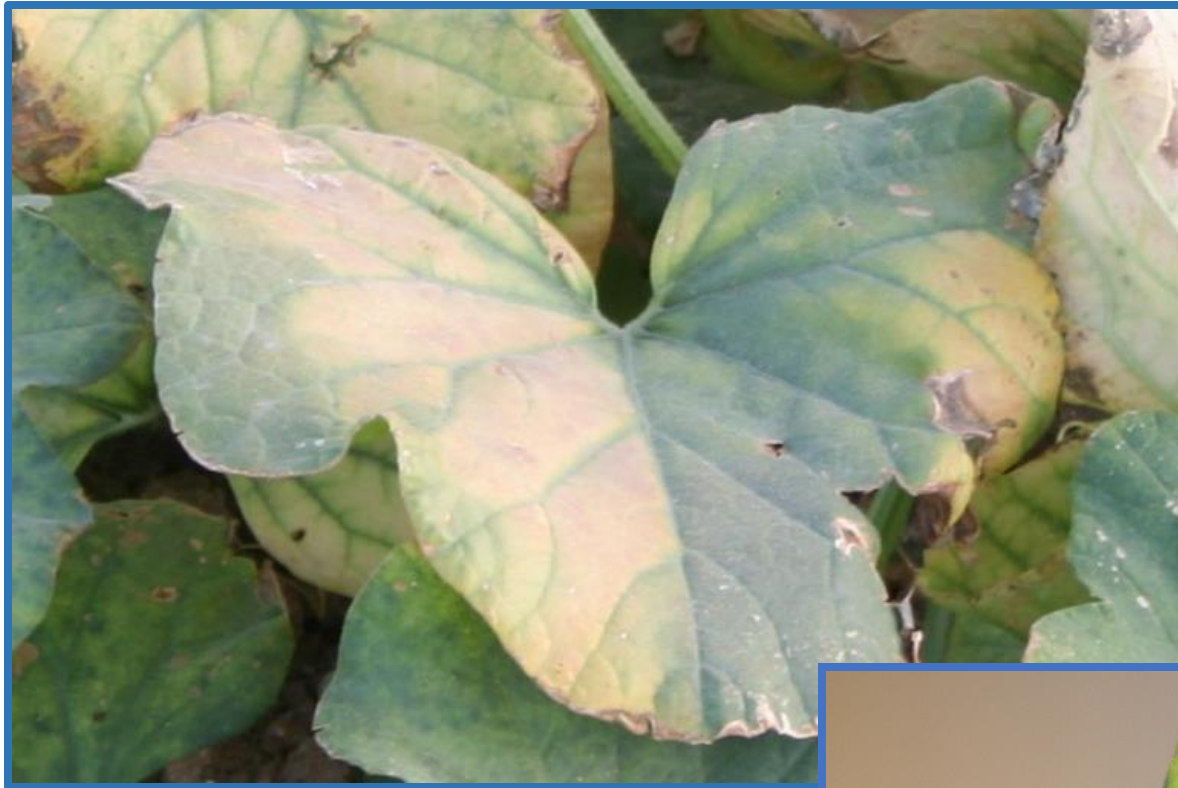
All foliar materials were applied with Dyne-Amic 0.25%

| Product9     | IRAC MOA              | Adult | Nymph |                                                                                            |
|--------------|-----------------------|-------|-------|--------------------------------------------------------------------------------------------|
| Lannate      | 1A                    |       |       | 1-3 days control w/ pyrethroid                                                             |
| Pyrethroids  | 3                     |       |       | Tank mix for best control                                                                  |
| Imidacloprid | 4A                    |       |       | Soil: Use high rate for residual                                                           |
| Platinum     | 4A                    |       |       | Soil: Use high rate                                                                        |
| Assail       | 4A                    |       |       | Use high rates; tank mix with pyrethroid                                                   |
| Venom        | 4A                    |       |       | Use high rates; tank mix with pyrethroid, Soil                                             |
| Sivanto      | 4D                    |       |       | Soil use only on cantaloupes, honeydews                                                    |
| Durivo       | 4A 28                 |       |       | Soil at planting but marginal residual                                                     |
| Knack        | 7                     |       |       | Slow acting, high rates for longer residual                                                |
| Fulfill      | 9B                    |       |       | Slow acting, apply at low adult densities mix                                              |
| Courier      | 16                    |       |       | Apply at high rates, slow acting                                                           |
| Oberon       | 23                    |       |       | Apply at high rates, slow acting                                                           |
| Exirel       | 28                    |       |       | High rates, good nymph control, delayed adult knockdown                                    |
|              | Good residual control |       |       | Modified from Palumbo, J. (2018) Whitefly management in Spring melons. Veg IPM Update. 9:8 |
|              | Fair residual control |       |       |                                                                                            |
|              | Poor control          |       |       |                                                                                            |

## Whitefly management

- Whitefly-free transplants
- When possible, plant cucurbits at least one-half mile upwind from other key whitefly hosts such as cole crops and cotton. Mai
- Sanitation
  - Manage winter/spring host plants and weeds.
  - Remove bindweed and other weeds in and adjacent to the crop field as well as crop residues.
- Produce the crop in the shortest season possible

# Whitefly-transmitted virus diseases of melon



*Cucurbit yellow stunting disorder virus*

*Cucurbit chlorotic yellows virus*



W.M. Wintermantel

Mondal, S., Jenkins Hladky, L.L., Fashing, P.L., McCreight, J.D., Turini, T.A., Wintermantel, W.M. (2021) First report of cucurbit yellow stunting disorder virus and cucurbit chlorotic yellows virus in melon in the Central Valley of California. Plant Disease.

*Cucurbit yellow  
stunting disorder  
virus*



# Squash vein yellowing virus



Monica Macedo



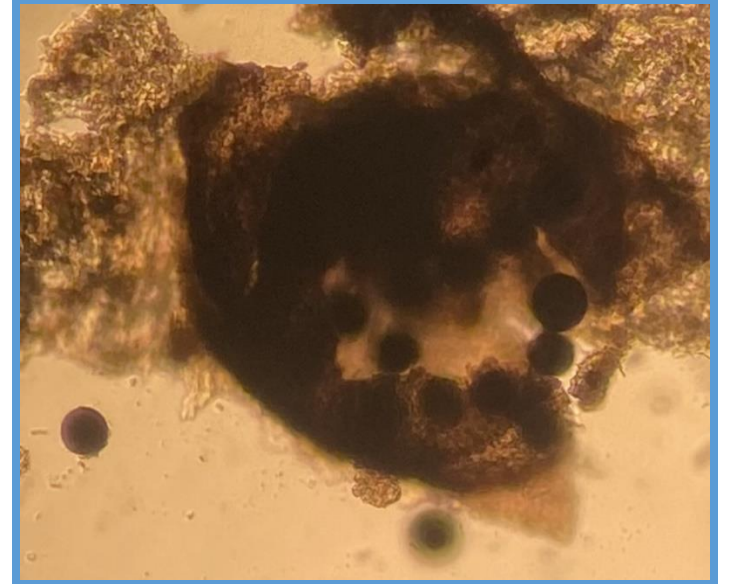
Monica Macedo

Macedo, M., Melgarejo, T., Vasquez, M., Cespedes, K., & Rojas, M., Turini, T., Batuman, O., Wintermantel, W. & Gilbertson, R. (2024). Squash vein yellowing virus from California emerged in the Middle East via intragenic and intergeneric recombination events in the hypervariable potyvirus P1 and ipomovirus P1a genes. The Journal of general virology. <https://doi.org/10.1099/jgv.0.002033>

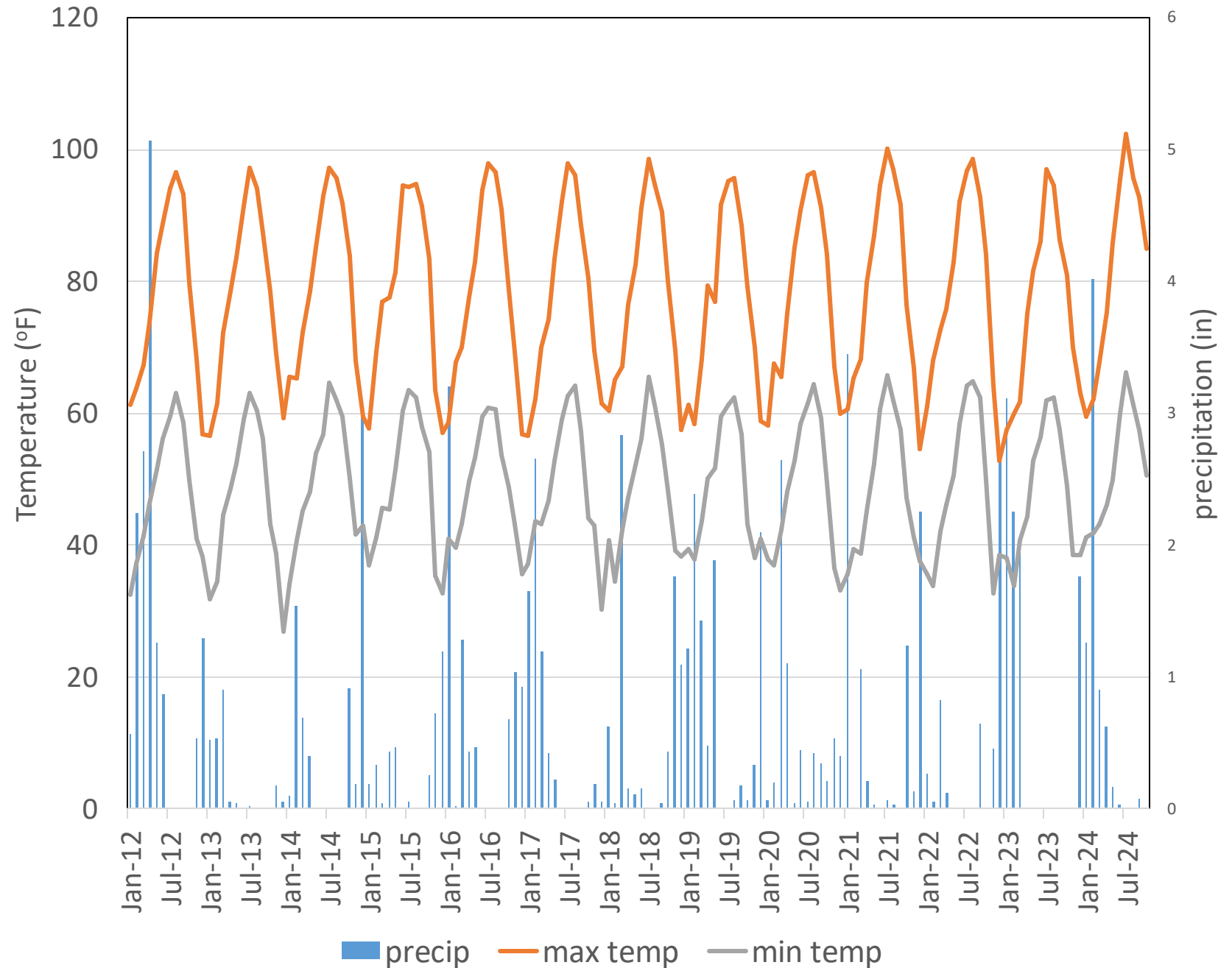
# Vine Decline in cantaloupe (mid-Aug to mid-Oct)



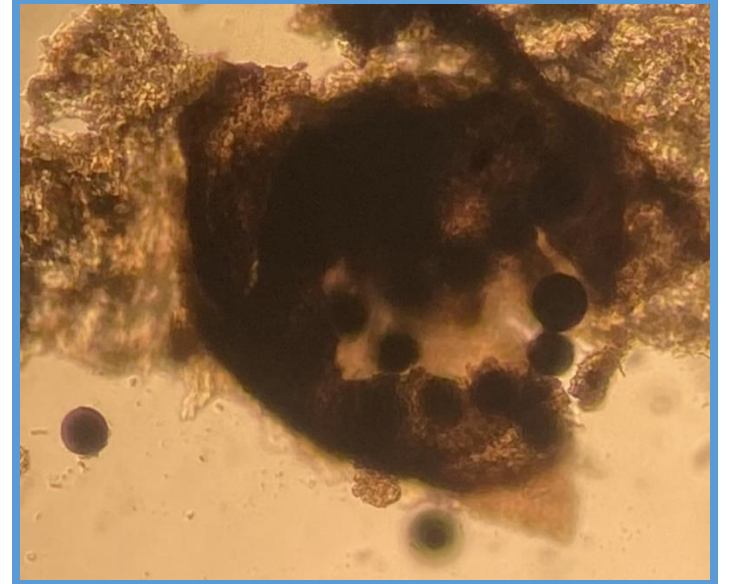
Monosporascus  
root rot vine  
decline, a soil-  
borne melon  
disease favored  
by high  
temperatures  
was detected  
within Fresno  
County



# Vine Decline in cantaloupe (mid-Aug to mid-Oct)



Monosporascus  
root rot vine  
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County



# ***Monosporascus cannonballus* Perithecia**



# ***Monosporascus cannonballus* Perithecia**



***Monosporascus cannonballus***  
**Perithecium and ascospores**



***Monosporascus  
cannonballus*  
ascospores and  
asci**



# ***Monosporascus cannonballus***

## **Environmental Requirements**

- Optimum temperatures for fungal growth: 77° to 95°F
- Plant stress is required for vine decline:
  - High temperatures, insufficient or excessive water, heavy fruit load, insect pressure or a combination of these factors.
  - In response to the infection by this fungus and environmental stress, the plant produces blockages in the xylem, which leads to vine decline.

# Acknowledgements

- California Melon Research Board

## UC DAVIS

- Dr. Robert Gilbertson
- Dr. Maria Rojas
- Dr. Mônica Macedo
- Dr. Tomas Melgarejo
- Dr. Neil McRoberts

## UC Coop. Ext.

- Scott Stoddard

## USDA ARS - Salinas

- Dr. William Wintermantel

## Agrochem industry

- BASF
- Bayer
- Corteva
- FMC
- Syngenta

## University of California West Side Research Center Staff

- Jime Solorio
- Abigale Frolli

## CDFA Beet Curly Top Control Board



# California Garlic and Onion Symposium, 2025

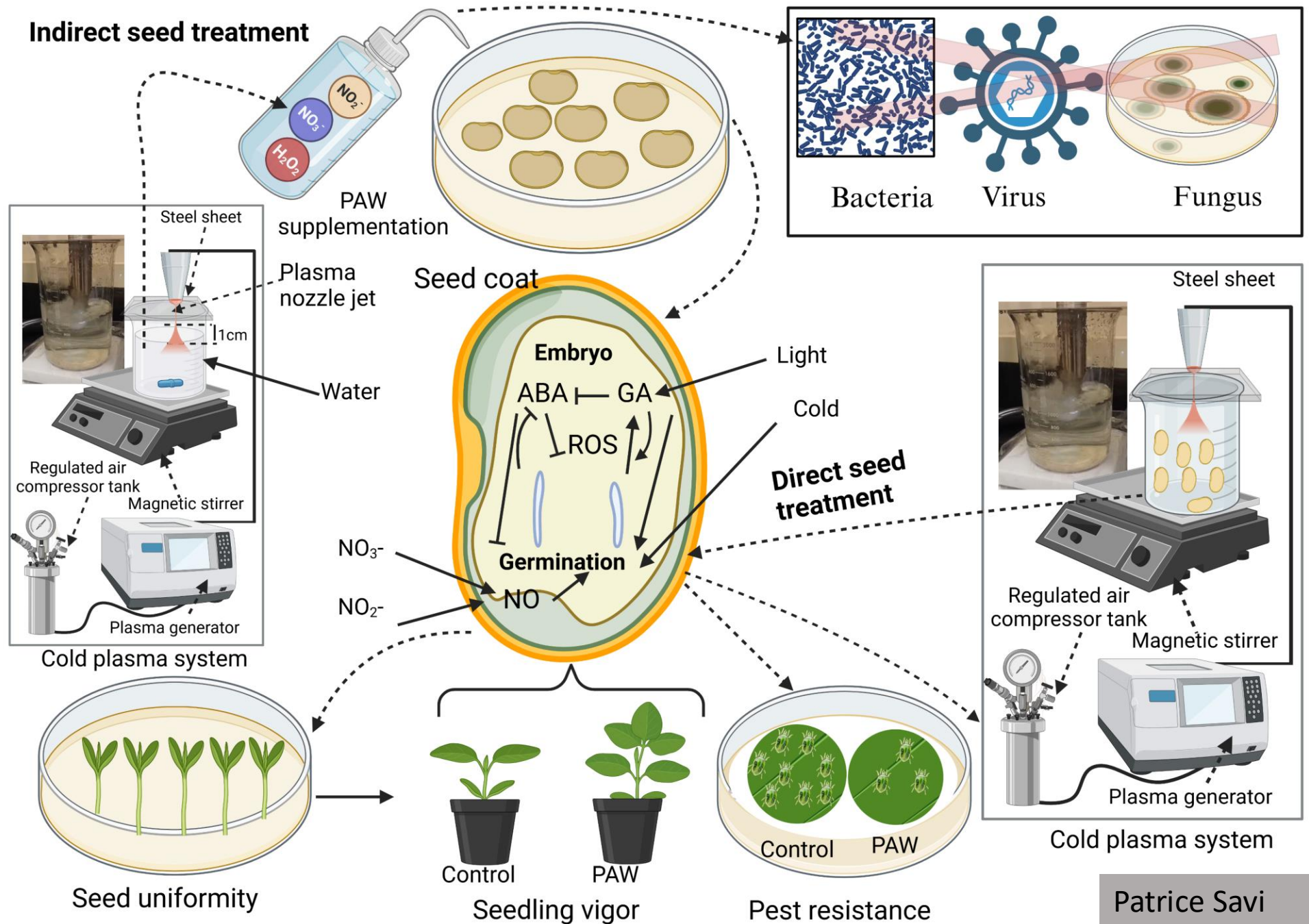
UC Cooperative  
Extension,  
Tulare County,  
Agriculture  
Building  
Auditorium

**9:00 am through 3:00 pm**  
**Monday, February 10**

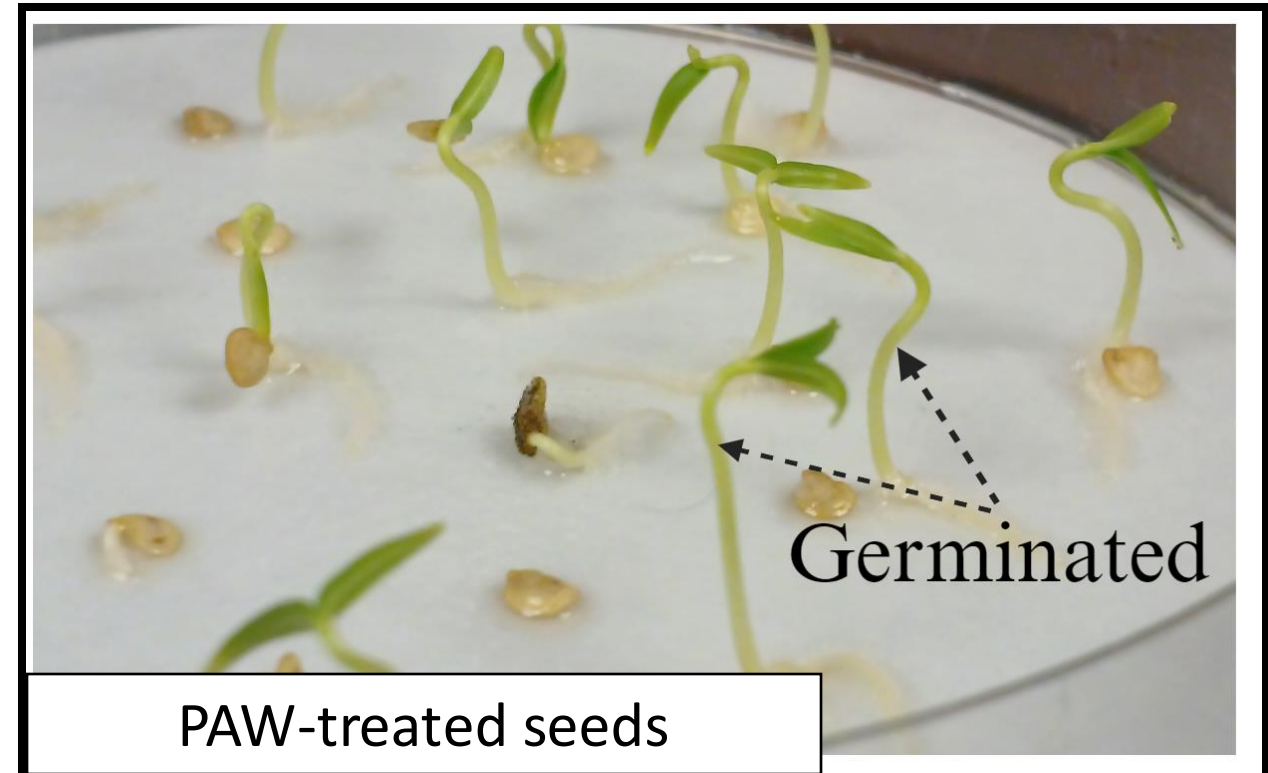
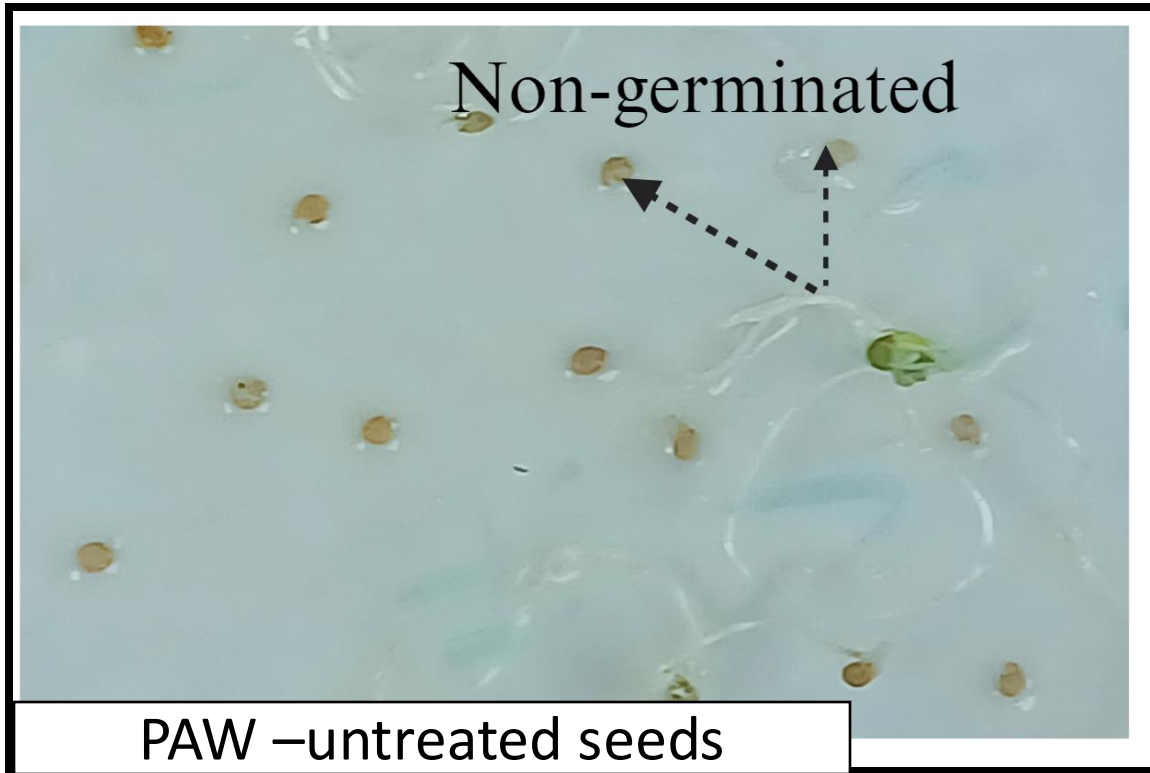
Continuing Education Credits  
from CCA and CA DPR were  
requested

- 9:00**      **California Garlic and Onion Research Advisory Board**  
Tom Turini - Cooperative Extension (UCCE), Fresno County
- 9:20**      **Research on garlic nematode, maggot and downy mildew**  
Mary Ruth McDonald - University of Guelph, Canada
- 9:50**      **Alternate herbicide options for processing onion**  
Rob Wilson - UCCE, Intermountain REC
- 10:20**      **BREAK**
- 10:50**      **Bacterial bulb rot management in onion**  
Lindsey du Toit - Washington State University
- 11:20**      **Industry updates**
- 12:00**      **Lunch**
- 1:00**      **Industry updates**
- 1:30**      **Recent changes in endangered species regulations TBD**
- 2:00**      **Recent investigations into Fusarium diseases of garlic and  
onions**      Cassandra Swett - UC Davis
- 3:00**      **Adjourn**

# Plasma Activated Water (PAW)



PAW enhances seed germination.



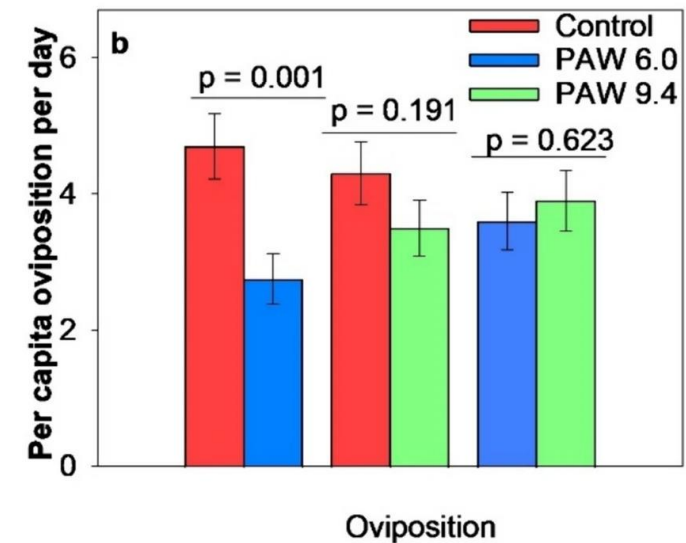
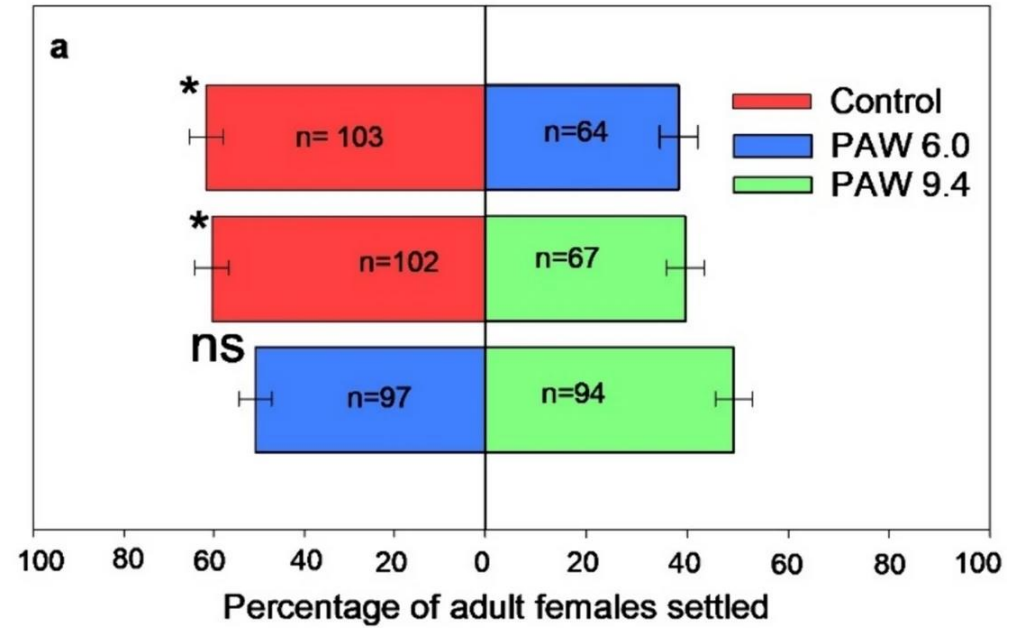
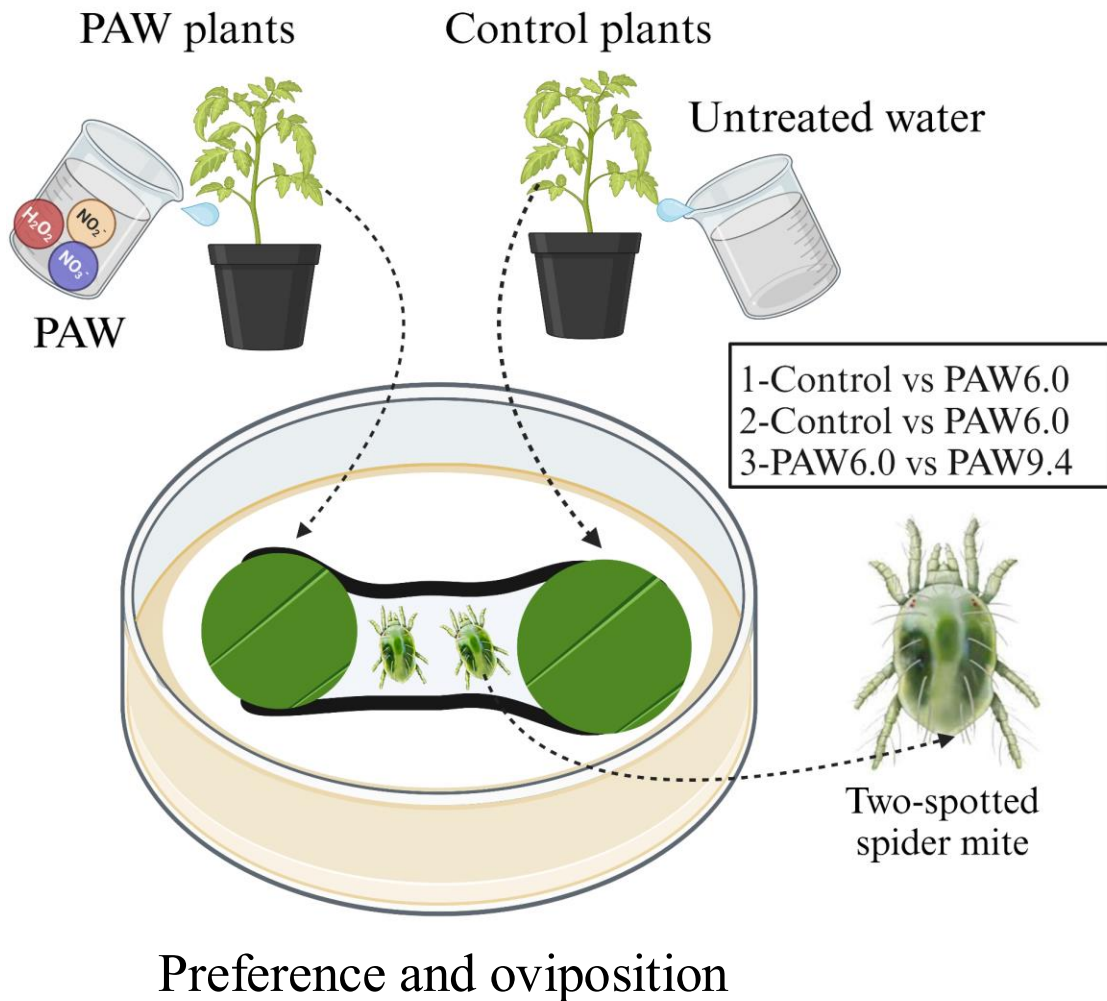


Untreated plant

PAW treatments

# Background

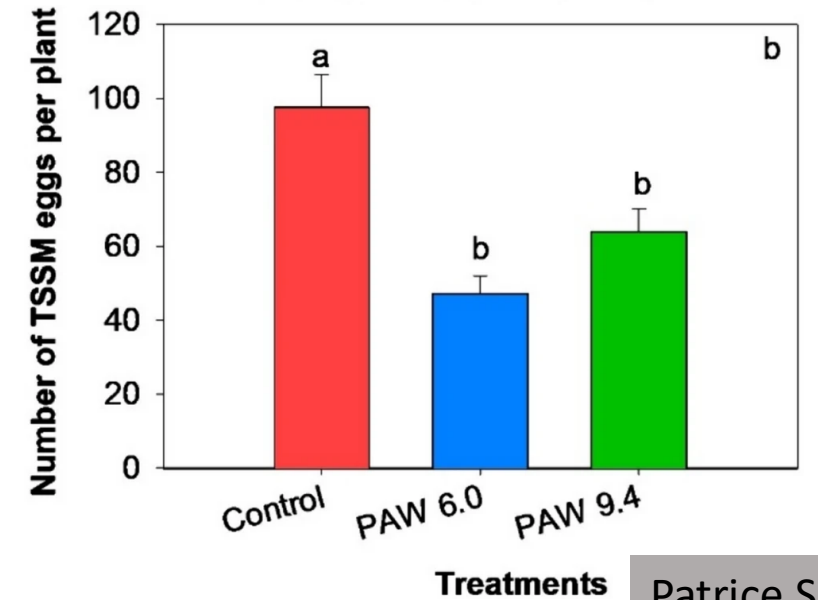
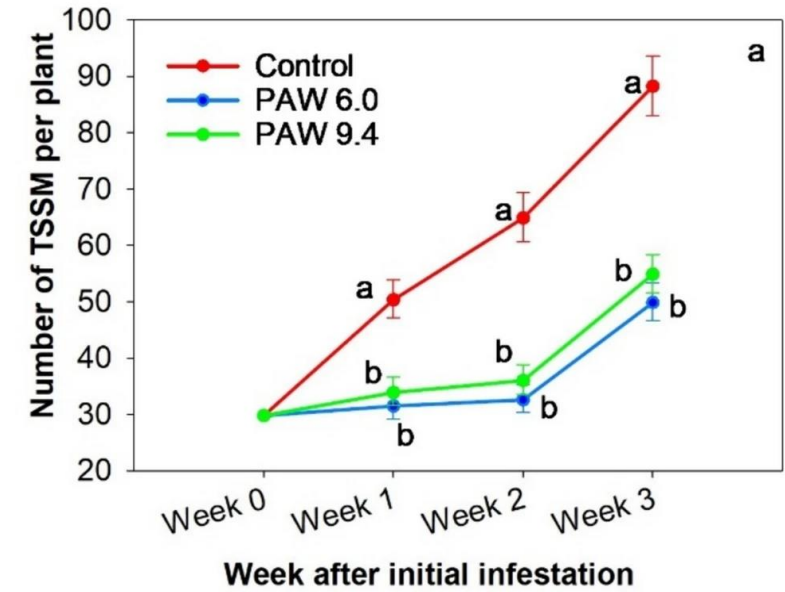
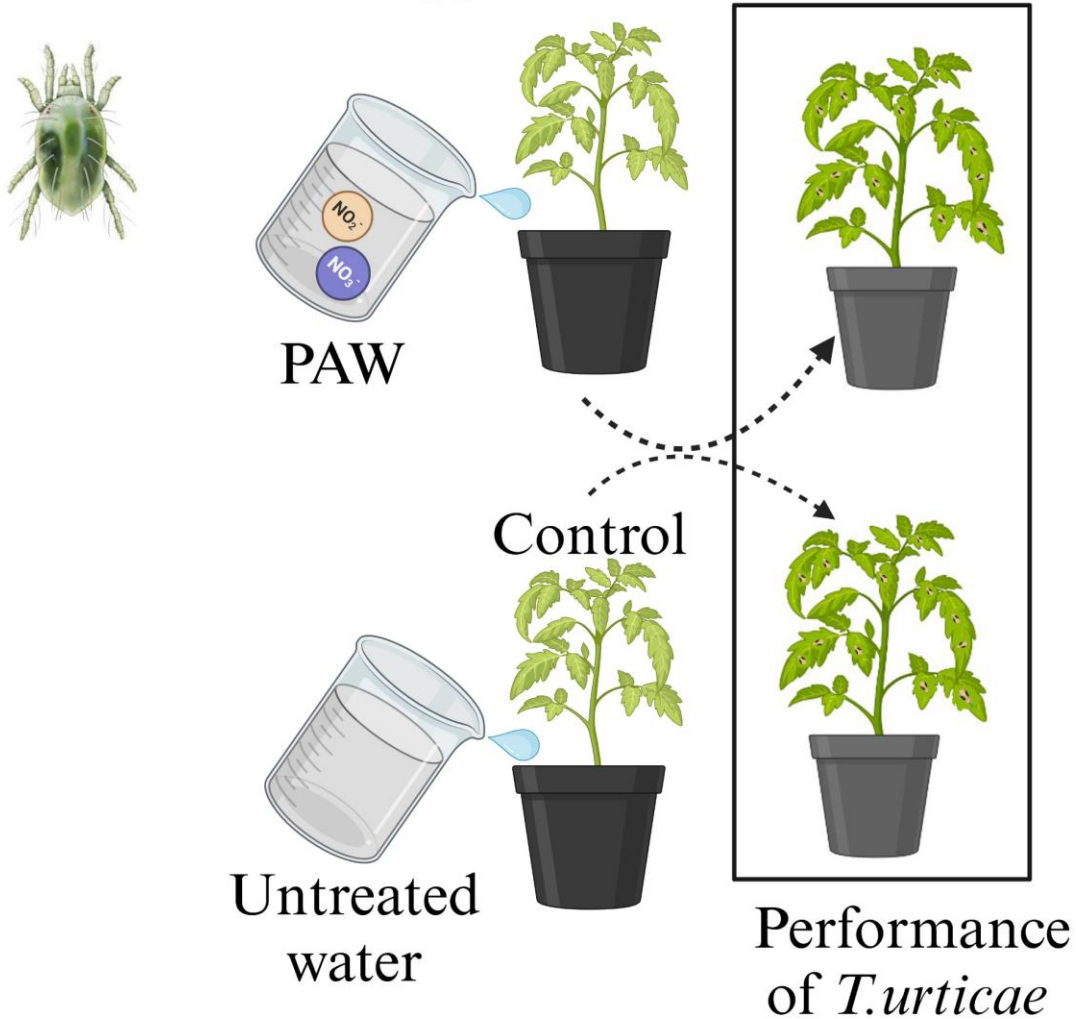
- Can irrigation of tomato plants with PAW boost plant resistance mechanisms to spider mites?



# Background

- Tomato crop

PAW supplementation



# Thank you

Tom Turini  
University of California  
Vegetable Crops Advisor  
Fresno County  
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taturini@ucanr.edu