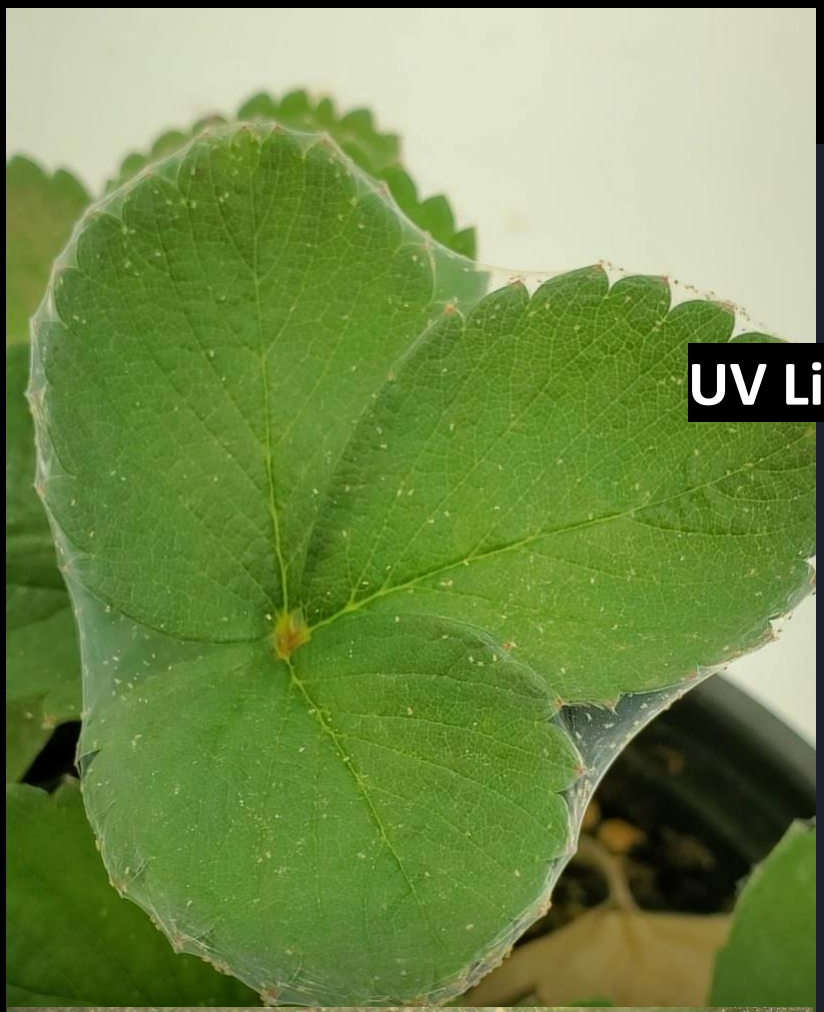

IST#: 32287
February 28, 2024

UV Light and Biocontrol for Thrips and Mite Management in Strawberry

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Talk Outline

- Twospotted Spider Mite Damage on Strawberry
- Chilli Thrips Pest in Strawberry
- UV-C
- Biological Control
- Summary

Twospotted Spider Mite Damage on Strawberry

- Strawberry *Fragaria x ananassa* Duchesne (Rosales: Rosaceae), has a value of $511 million in FL[1].

- *Tetranychus urticae* Koch (Trombidiformes: Tetranychidae) can reduce strawberry fruit yield by 10-25% with piercing-sucking mouthparts[2].

- Resistance to several miticides well documented[3,4].

Adult *T. urticae* and eggs

Twospotted Spider Mite Damage on Strawberry

Stippling on mid-sized leaflet

Photo Credit: S.Lahiri, UF/IFAS-GCREC

Photo Credit: J.D.Montemayor, UF/IFAS-GCREC

Adult *T. urticae* and eggs

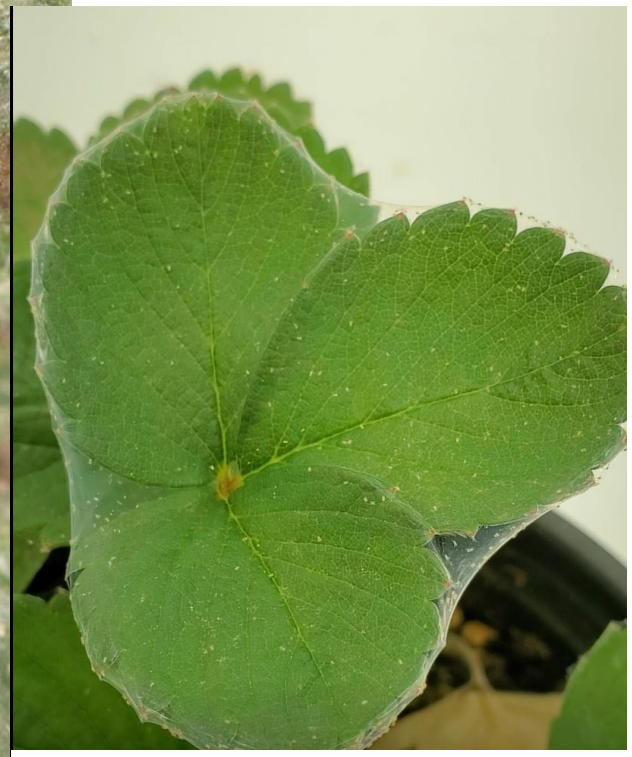


Photo Credit: J.D.Montemayor, UF/IFAS-GCREC

Trifoliate covered in webbing

Miticides for *T. urticae* Management

Agri-Mek (Gp. 6)

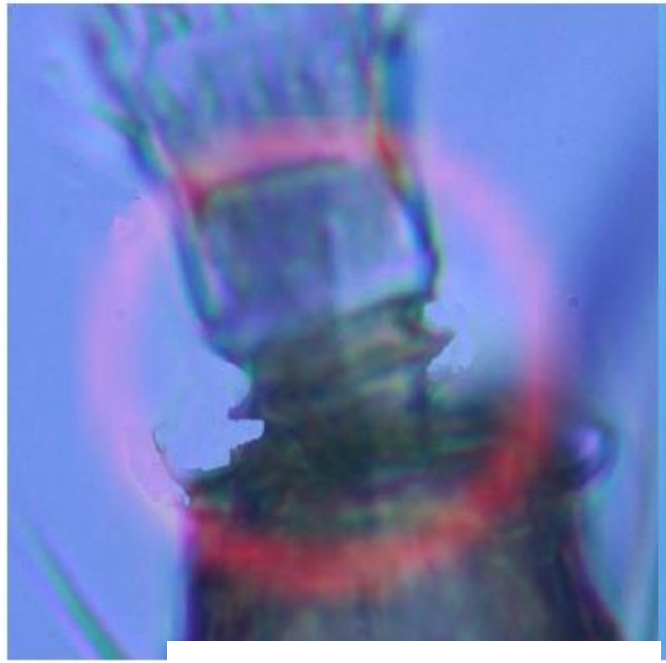
Onager Optek (Gp. 10A)

Acramite (Gp. 20D)

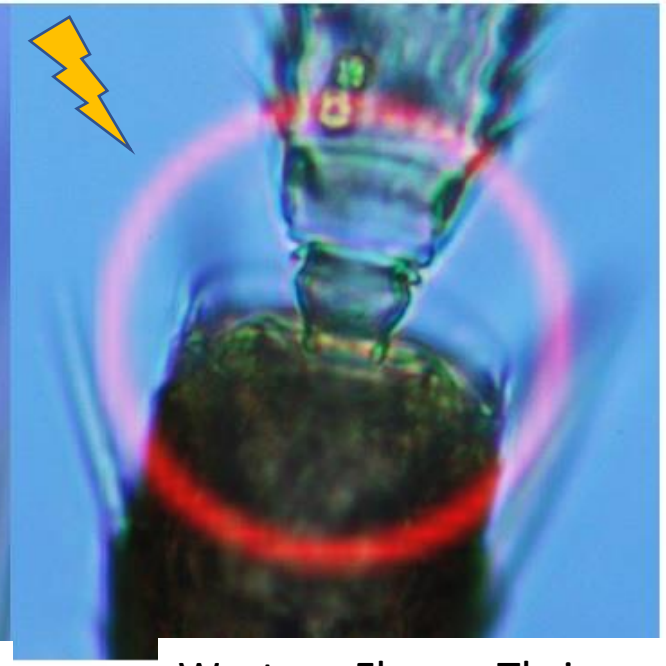
Portal (Gp. 21A)

Chilli Thrips Pest in Strawberry

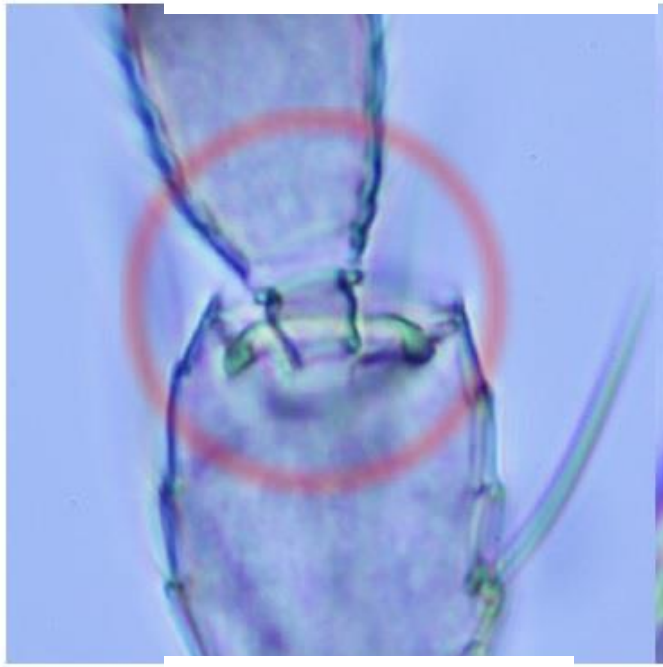
Severe pests



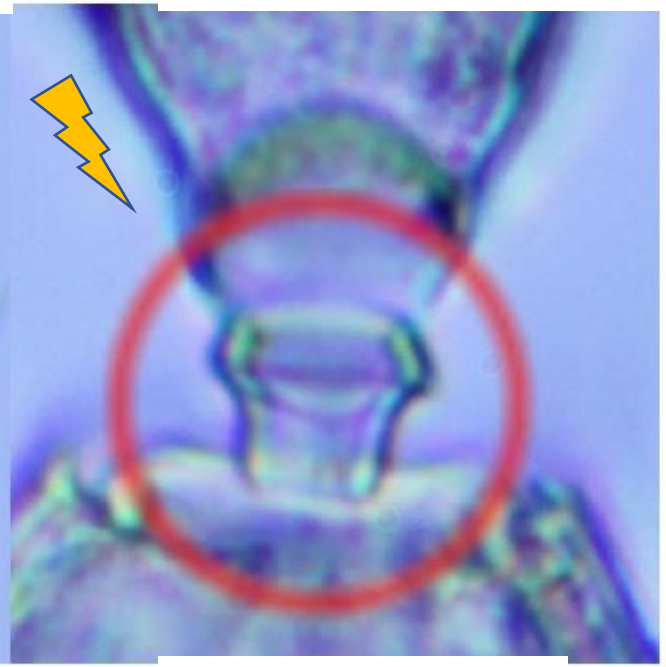
Florida Flower Thrips



Western Flower Thrips



Melon Thrips



Chilli Thrips

Bronzing and cracking of fruits from both thrips species

Leaf curling from Chilli Thrips

Cluever and Smith 2017

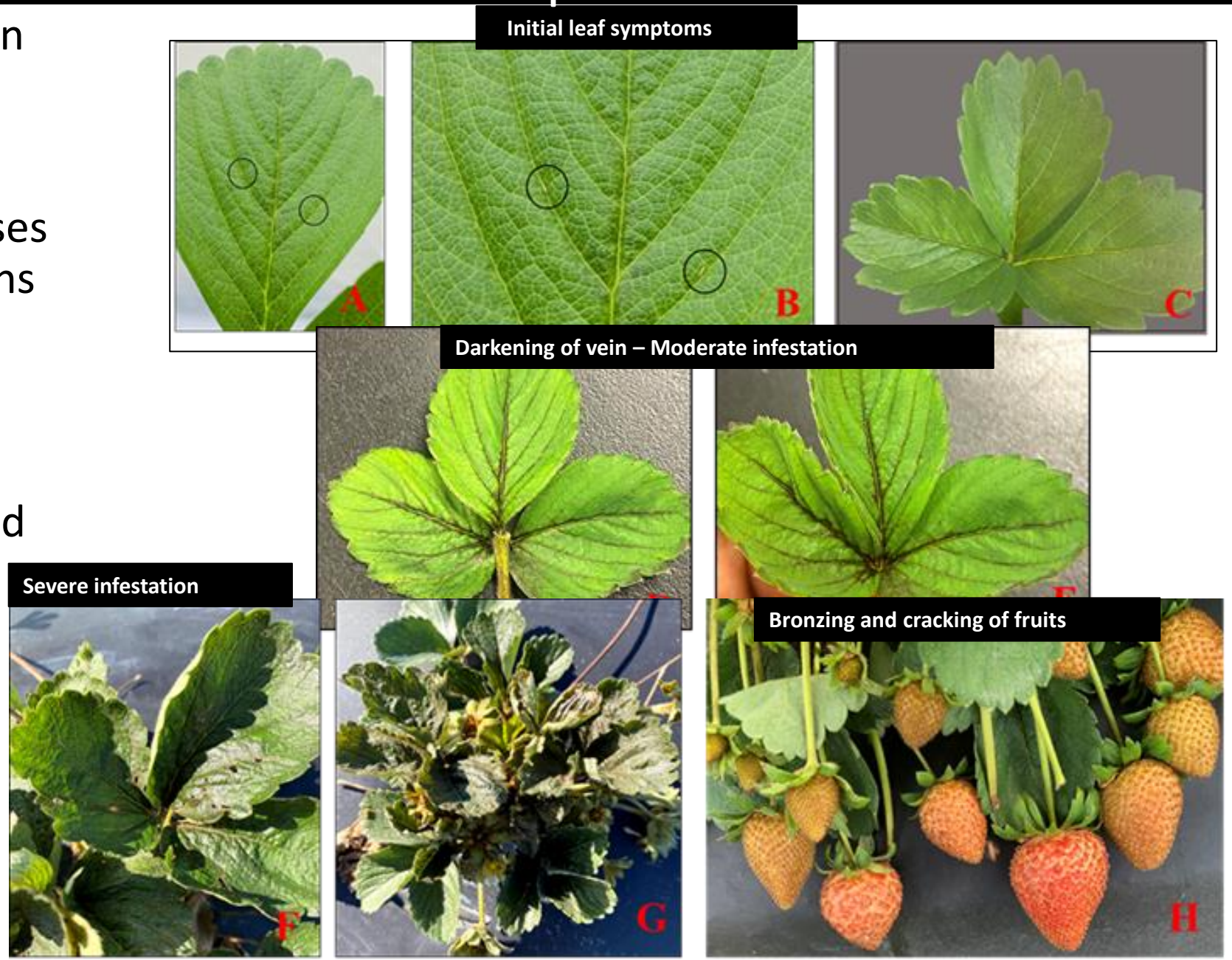
Chilli Thrips

- *Scirtothrips dorsalis* (Hood)
- Invasive and phytophagous (Kumar et al. 2013).
- Six life stages- egg, first and second instar larvae, pre-pupa, pupa, and adult.

Kaur and Lahiri 2022. doi.org/10.32473/edis-IN1346-2022

Chilli Thrips

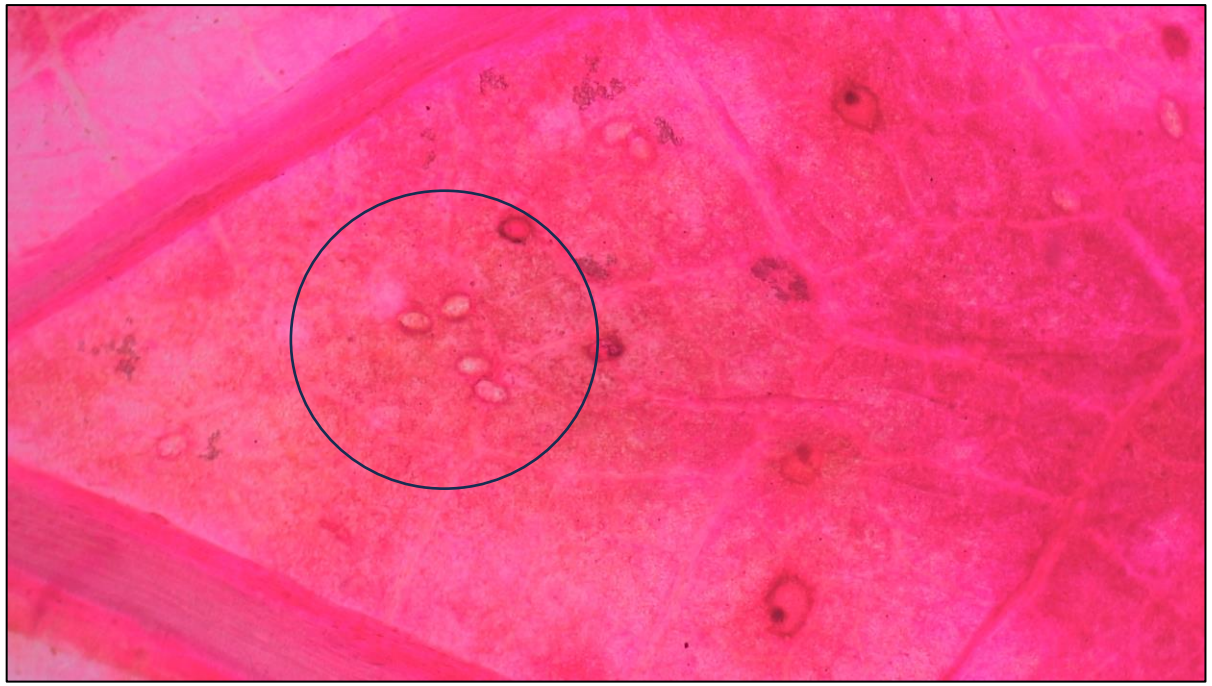
- Infest plants early in the season.
- Heavy feeding causes necrosis of leaf veins and petioles.
- Feeding damage causes bronzing and cracking of fruits.
- Yield loss.



Kaur and Lahiri 2022. doi.org/10.32473/edis-IN1346-2022

Chilli Thrips

Chilli thrips eggs. Image: Lovely Adhikary, UF/IFAS GCREC



Severe infestation

Bronzing and cracking of fruits

Kaur and Lahiri 2022. doi.org/10.32473/edis-IN1346-2022

Host Plants in Woodlands

Dr. Chastity Perry
(Biological Scientist)

Sugarberry

Water oak

Camphor

Laurelcherry

Laurel oak

Ragweed

Grape

Sweet gum

Insecticides for Chilli Thrips Management

Exirel (Grp. 28)

Radiant

Entrust SC OMRI **(Grp. 5)**

Timectin (Grp. 6)

Assail (Grp. 4A)

Transform (Grp. 4C)

Sivanto Prime (Grp. 4D)

Apta (Grp. 21A)

Minecto Pro (Grp. 6+28)

Insecticides for Chilli Thrips Management

UF UNIVERSITY of FLORIDA IFAS - GCREC

Specimen Label

CORTEVA™ agriscience

Radiant® SC

Jemvelva™ active

INSECTICIDE

™® Trademarks of Corteva Agriscience and its affiliated companies.

For control or suppression of lepidopterous larvae (worms, caterpillars), dipterous leafminers, thrips, and certain psyllids.

Active Ingredient:
spinetoram (a mixture of spinetoram-J and spinetoram-L) 11.7%
Other Ingredients..... .88.3%

SPINETORAM	GROUP	5	INSECTICIDE

product is highly toxic to bees and other pollinating insects exposed to direct treatment, or to residues in/on blooming crops or weeds. Protect pollinating insects by following label directions intended to minimize drift and to reduce risk to these organisms. Apply this product only as specified on the label.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the state or tribal agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment, restricted entry interval, and notification to workers (as applicable). The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that

Joseph Montemayor, UF/IFAS GCREC

UV-C

Rationale

Ultraviolet light (UV) application

- Greenhouse studies show UV-B (280-315 nm) applications can control *T. urticae* by reducing the egg hatch[5,6].

- UV-C field applications control strawberry powdery mildew in Florida[7,8].

- Potential of UV-C to suppress *T. urticae* in strawberry field is unknown.

- Objective: <u>To determine the potential of UV-C to suppress *T. urticae* in strawberry field. Doses applied at night were 200 and 350 J/m^2</u>

UV-C (254 nm) application

Photo Credit: J.D.Montemayor, UF/IFAS-GCREC

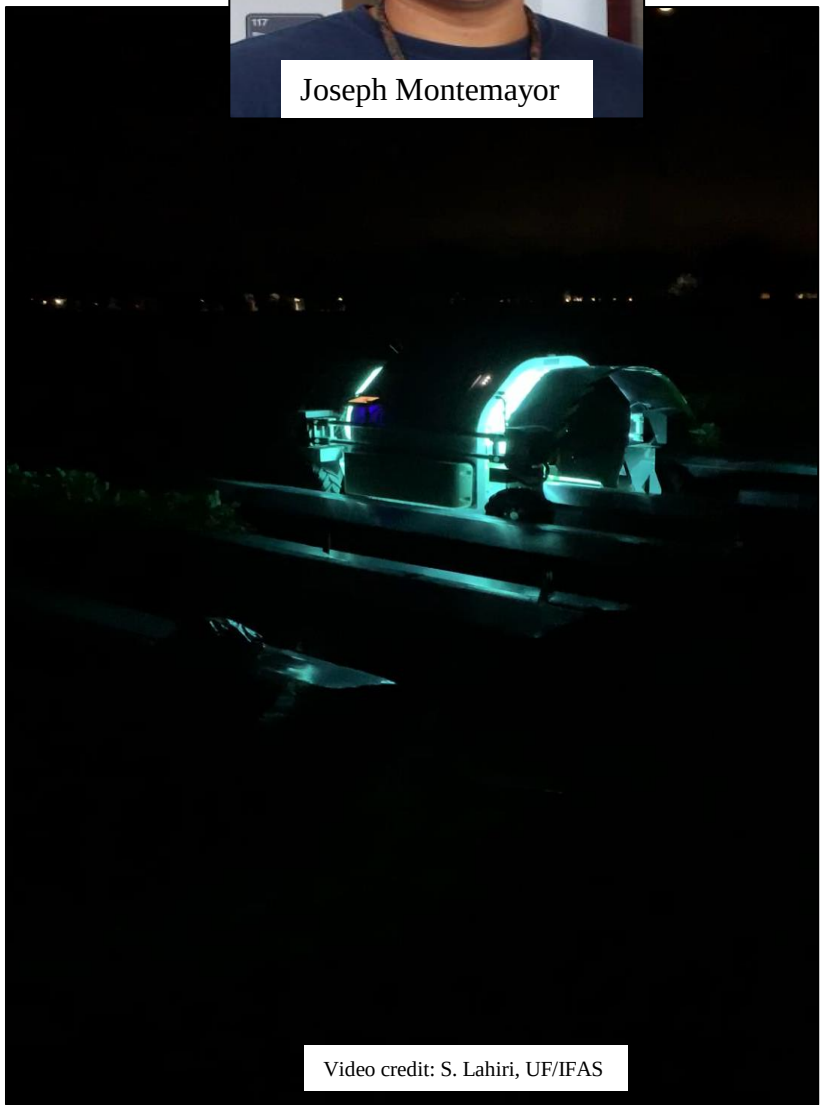
T. urticae eggs

Methods

Montemayor et al. 2022. Pest Management Science. DOI 10.1002/ps.7263

Video credit: S. Lahiri, UF/IFAS

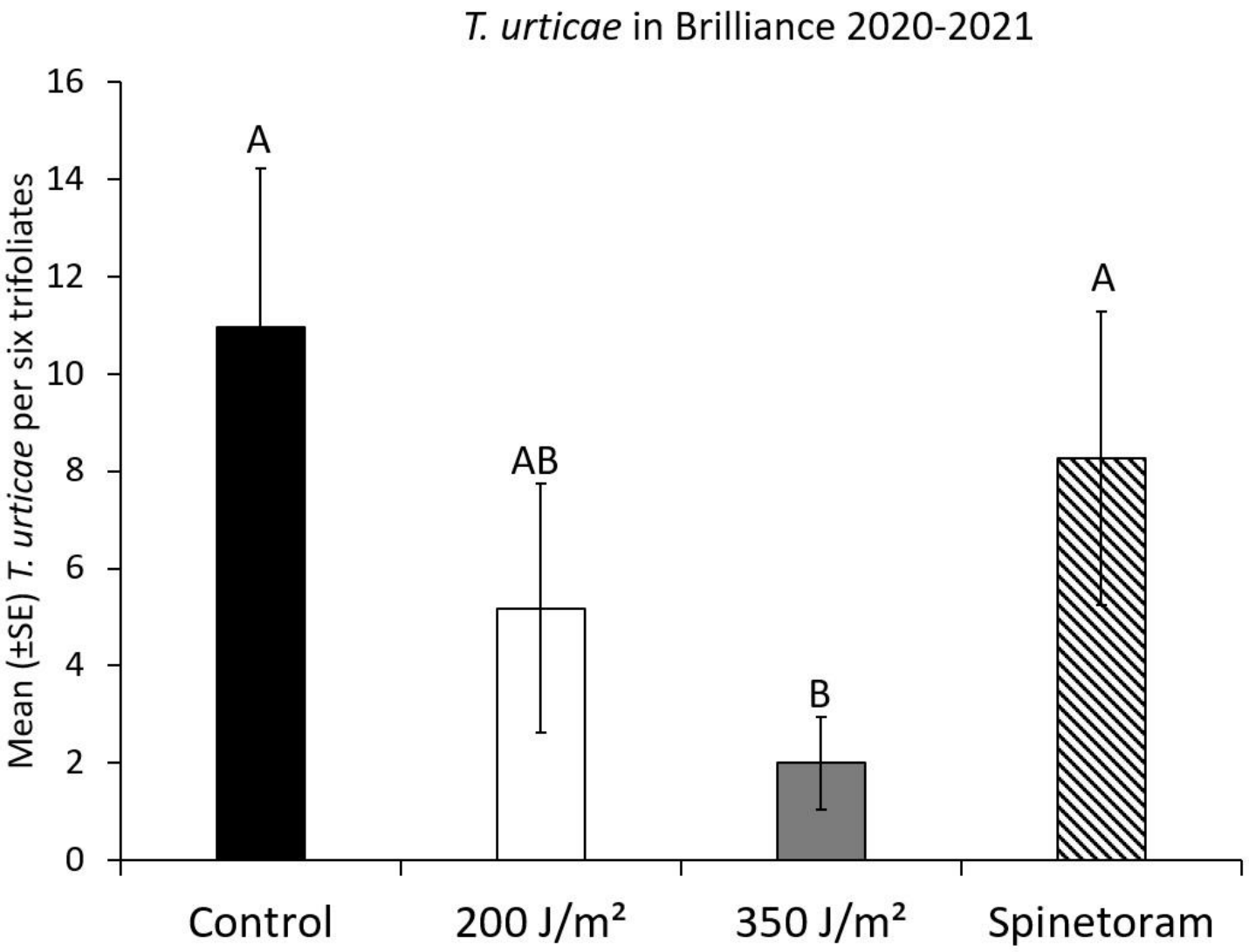
Video credit: S. Lahiri, UF/IFAS



Video credit: S. Lahiri, UF/IFAS

Joseph Montemayor

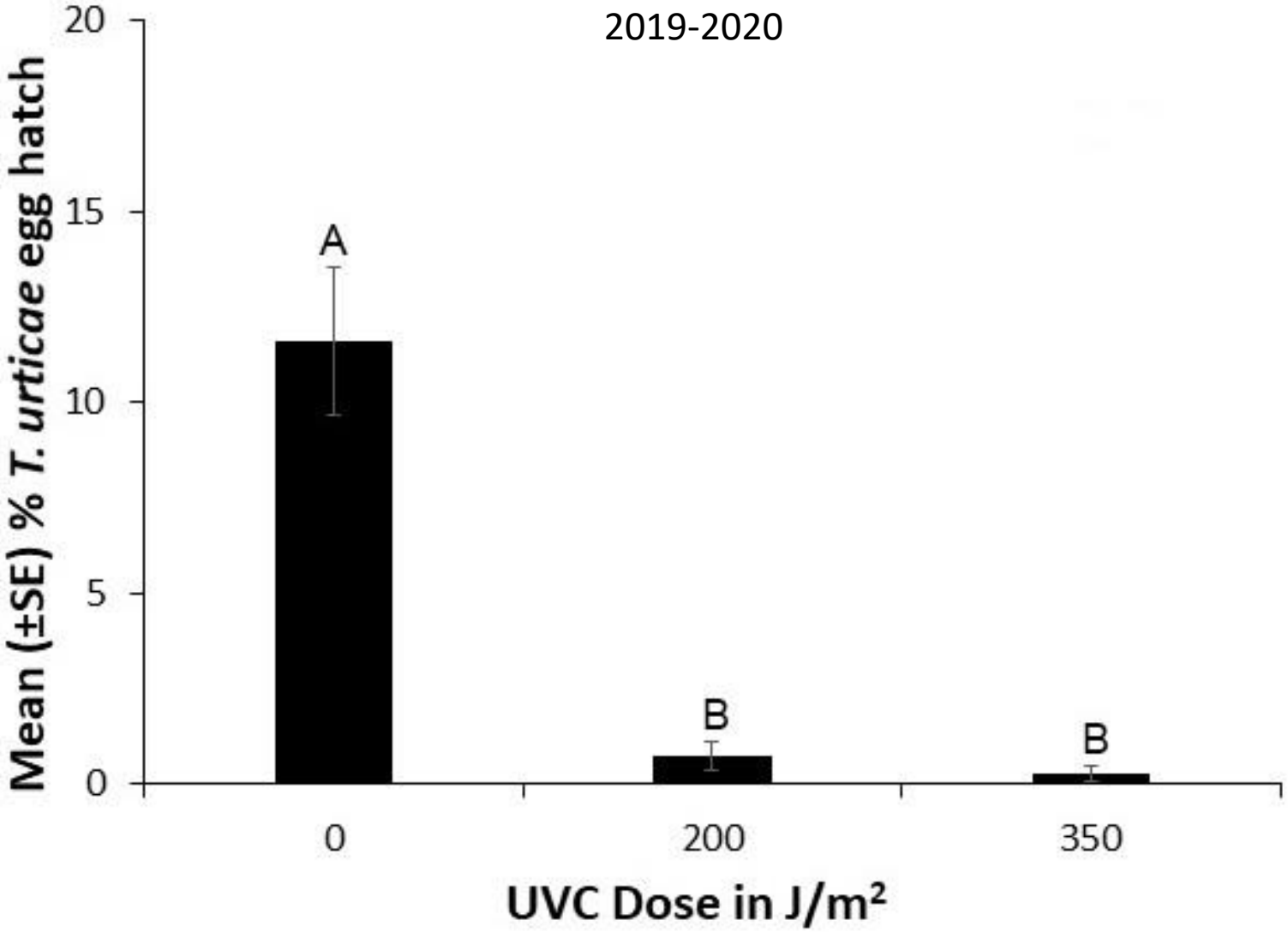
Results



Trifoliate covered in webbing

Repeated measures ANOVA, Proc Mixed followed by Tukey HSD, ⊎ = 0.05, SAS Enterprise Guide v. 7.1, SAS Institute. Means followed by the same letter are not significantly different.

Results



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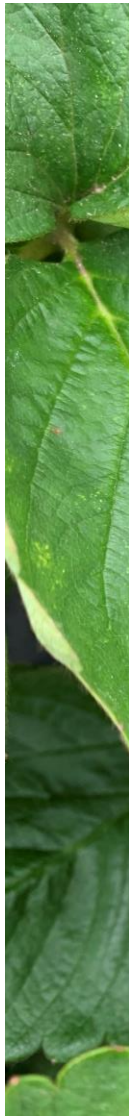
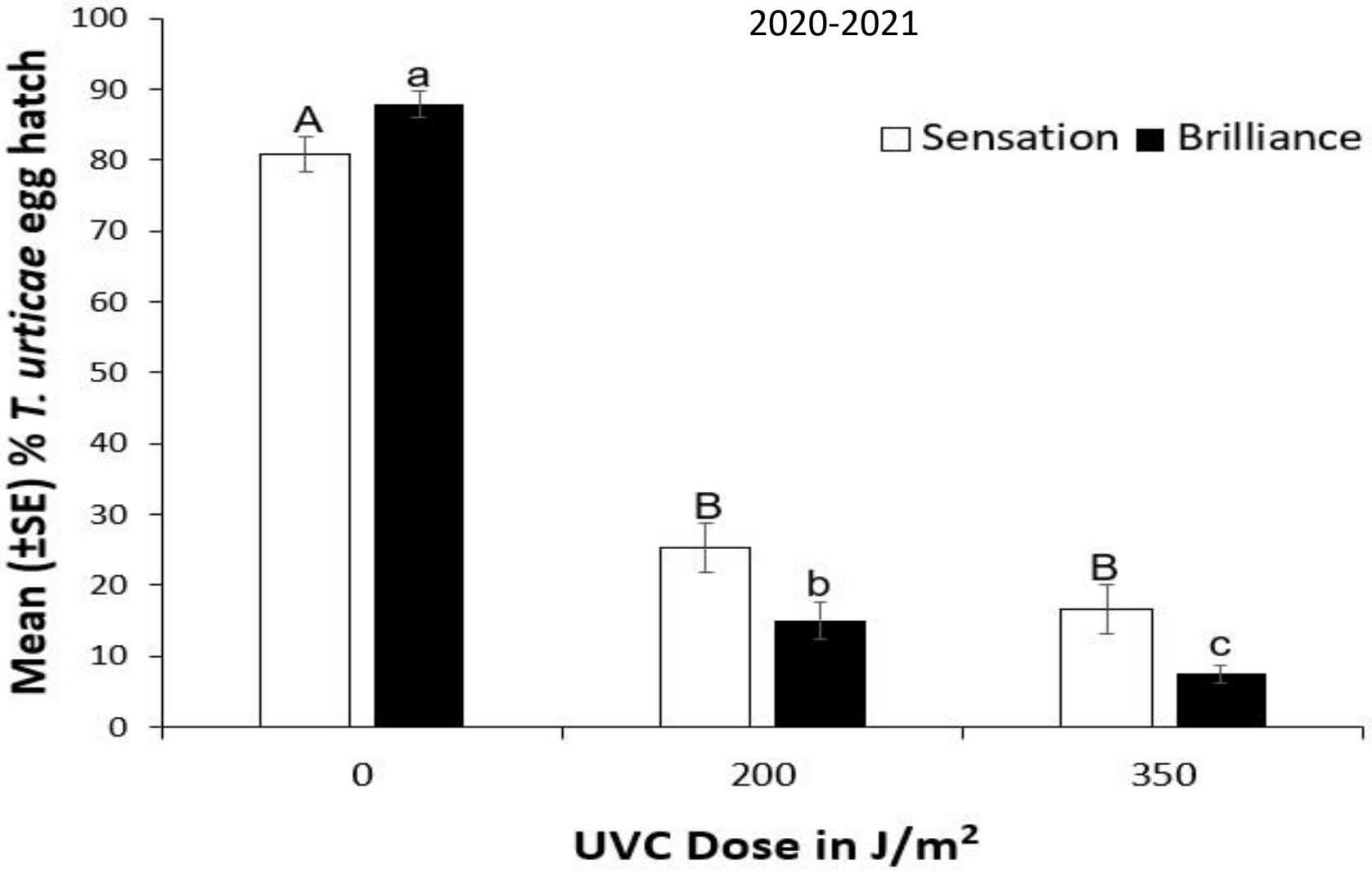




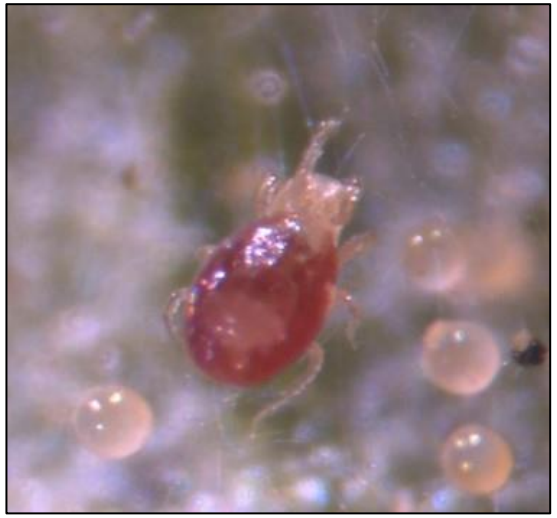
Trifoliate covered in webbing

ANOVA, Proc Mixed followed by Tukey HSD, ⊍ = 0.05, SAS Enterprise Guide v. 7.1, SAS Institute. Means followed by the same letter are not significantly different.

Allan Busuulwa, UF/IFAS GCREC

Biological Control

Rationale for Study



Predatory mite, *Phytoseiulus persimilis*

Predatory mite, *Neoseiulus cucumeris*

Photo credit: S. Lahiri, UF/IFAS

Predatory mite, *Amblyseius swirskii*

Photo credit: M. Cassaway, UF/IFAS

Chilli thrips and western flower thrips

Photo credit: S. Lahiri, UF/IFAS

Rationale for Study

Generalist predatory mites

Predatory mite,
Neoseiulus cucumeris

Photo credit: S. Lahiri, UF/IFAS

Video credit: Allan Busuulwa, GCREC UF/IFAS.

Predatory mite, *Amblyseius swirskii*

Photo credit: M. Cassaway, UF/IFAS

- Typical prey: dried fruit mite or flour mite.
- Prey-naïve predatory mites.
- No experience navigating strawberry leaf.

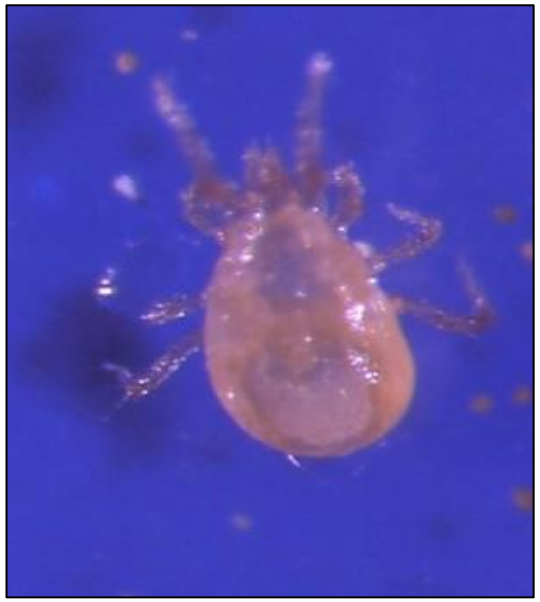
Objective and Hypothesis

Objective:

To compare the predation capability of commercially available *N. cucumeris* and *A. swirskii* feeding on known prey (fruit/flour mite) and various stages of *T. urticae* (unfamiliar prey) in the context of strawberry production.

Hypothesis:

We hypothesize that commercially available *N. cucumeris* and *A. swirskii* will possess low predation rates due to prey unfamiliarity.

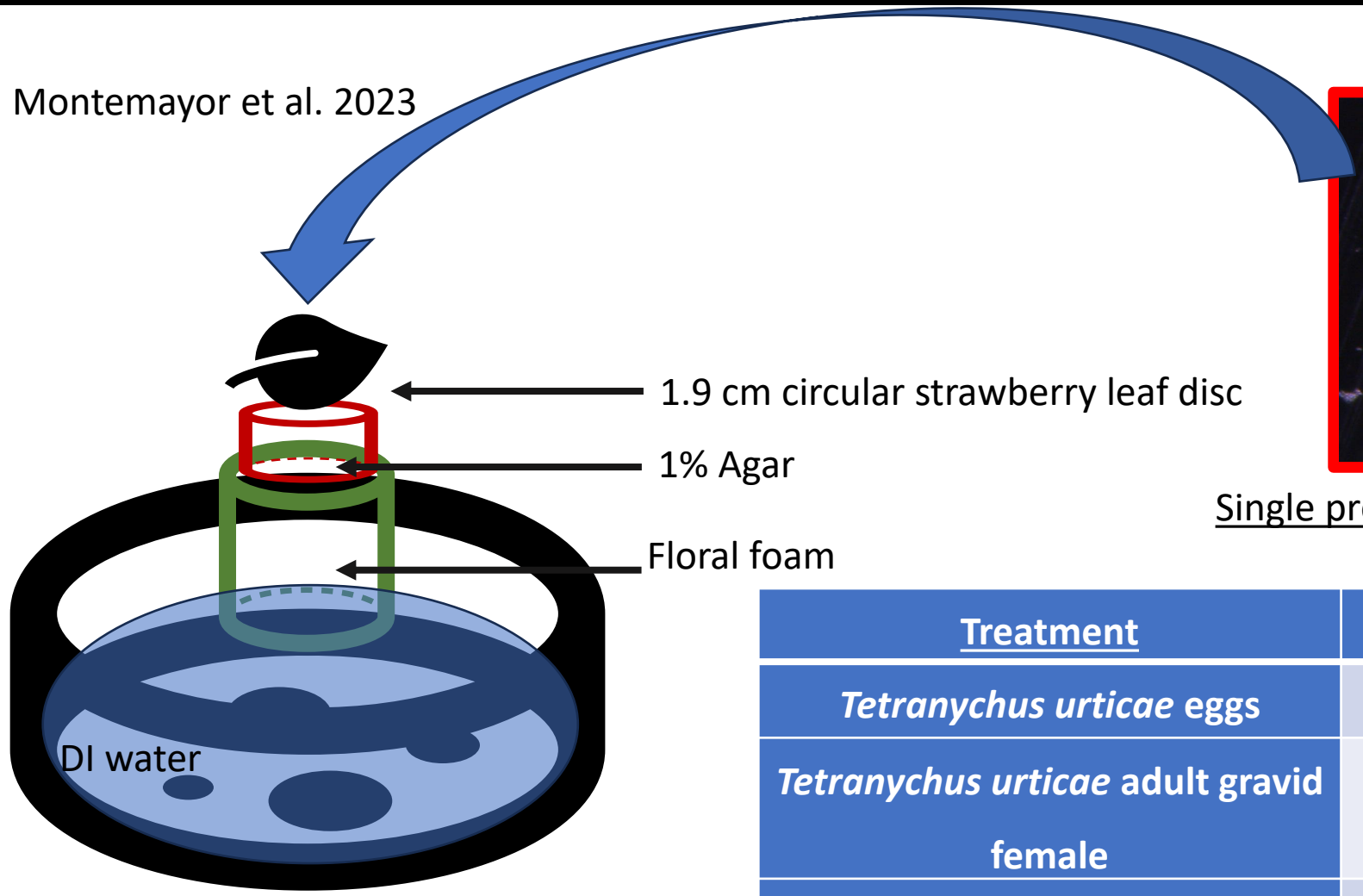


Predatory mite, *Neoseiulus cucumeris*

Photo credit: S. Lahiri, UF/IFAS

Materials and Methods

Arena design: Montemayor et al. 2023

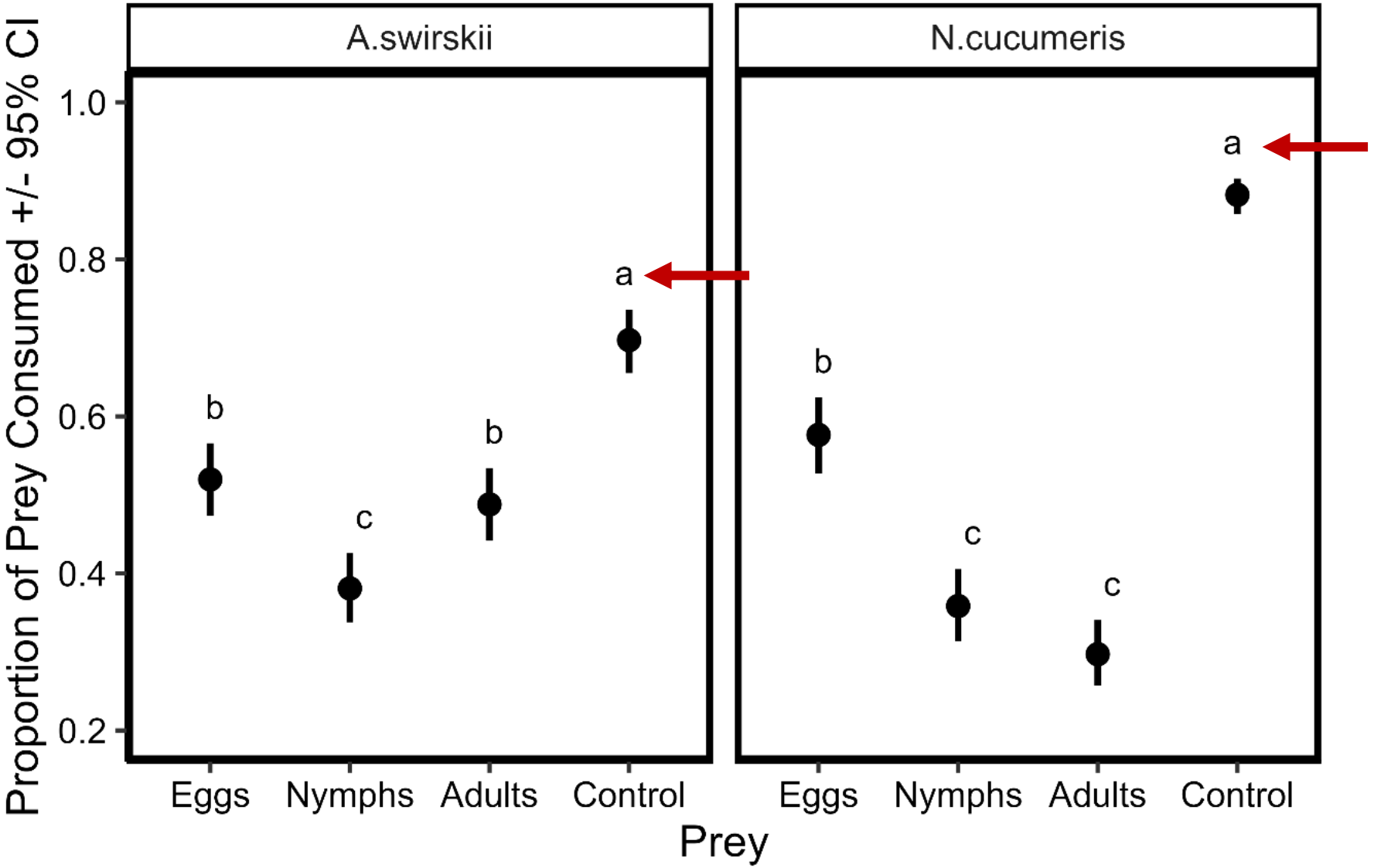


Single predator: *N. cucumeris/A. swirskii*

Treatment	Amount provided
Tetranychus urticae eggs	50
Tetranychus urticae adult gravid female	5
Tetranychus urticae deutonymphs	10
Acarus spp. adult gravid female (control).	5

Growth Chamber: 25 ± 1 ℃, 65 ± 5%, 14: 10 L:D,
Two trials, 15 replications/trial.

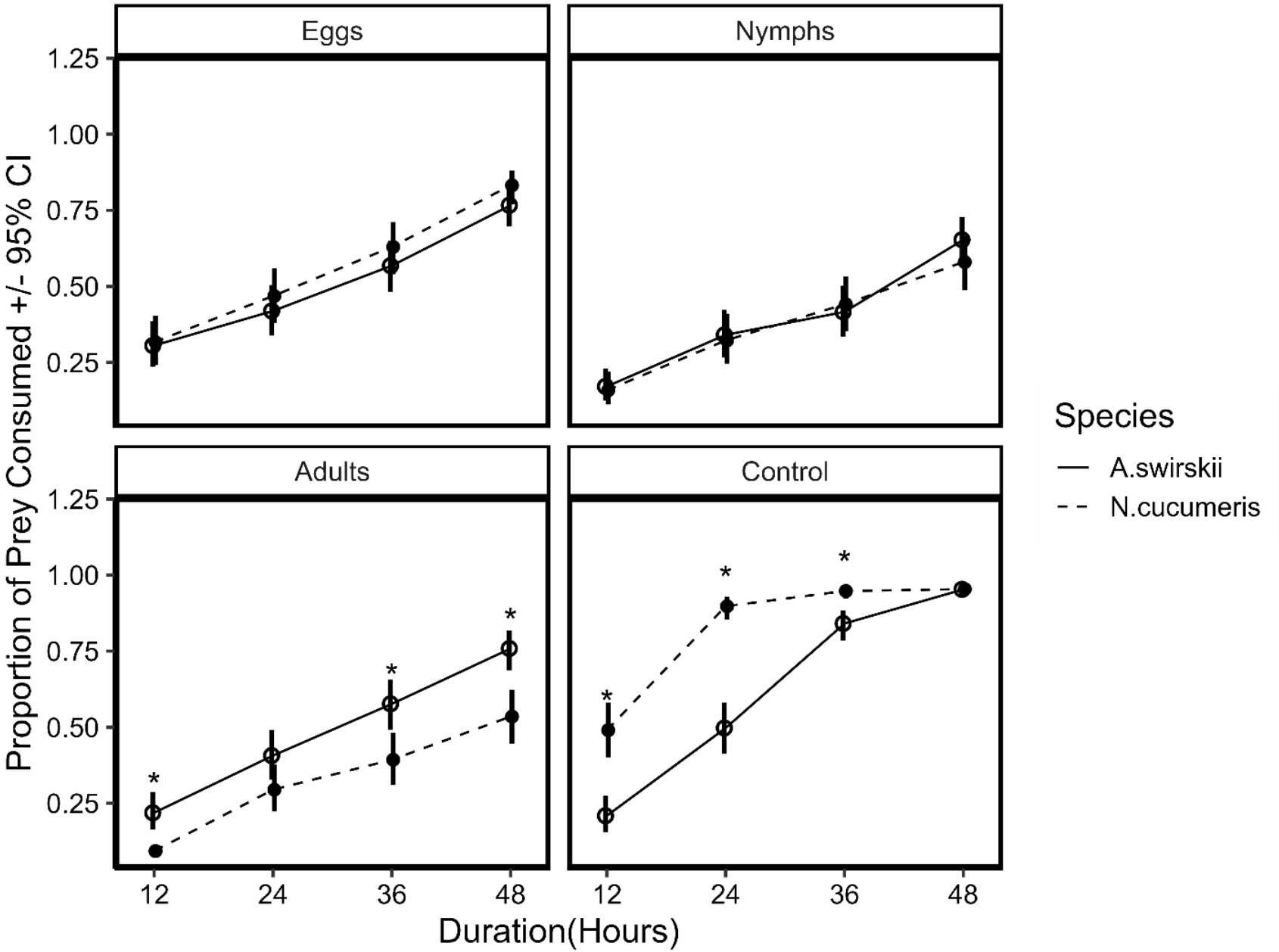
Results



Prey, *T. urticae*

Estimates that differ based on linear contrasts ($p < 0.05$) are differentiated by having different letters.

Results



*comparisons that are significantly different.

Prey, *T. urticae*

Biological Control for Spider Mites

- *Phytoseiulus persimilis* (Athias-Henriot) – Type I Predator (Spider Mite Specialist)

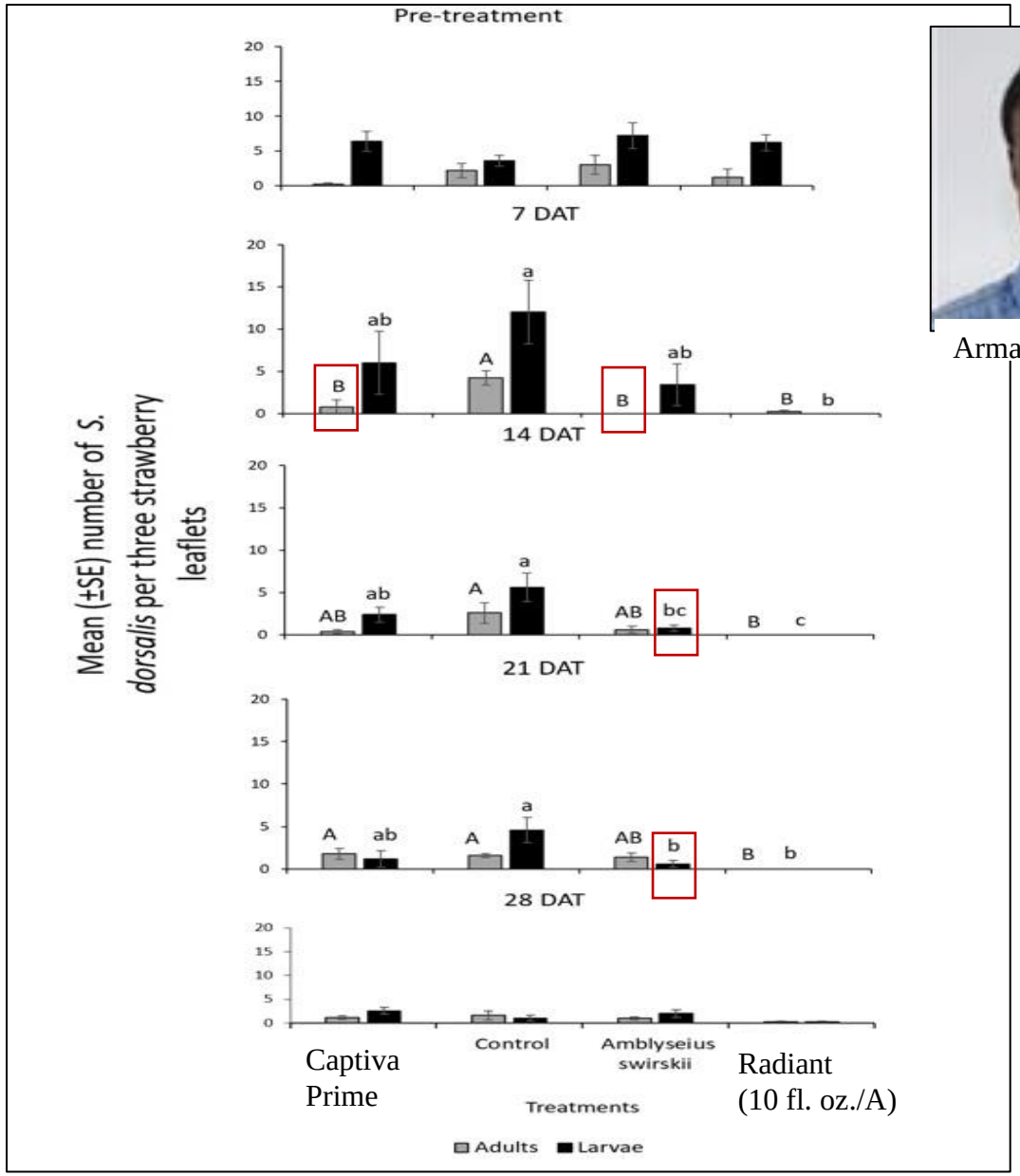
Photo credit: J. Montemayor, UF/IFAS

Photo credit: J. Montemayor, UF/IFAS

Biological Control for Thrips

- *Amblyseius swirskii* (Athias-Henriot): Type III Generalist Predator

Photo credit: M. Cassaway, UF/IFAS



Captiva Prime

Radiant (10 fl. oz./A)

Armand Yambisa

Lahiri and Yambisa (2021)

Summary

- UV-C is consistent for *T. urticae* egg suppression in two strawberry cultivars.
- No negative impact on yield was observed from UV-C applications.
- UV-C shows promise as a component of an integrated pest management program for *T. urticae* in strawberry.
- Biological control of *T. urticae* and *S. dorsalis* is feasible in strawberry.
- Awareness regarding limitations of biological control agents necessary.

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Natalia Peres
Shinsuke Agehara

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USDA Agricultural Marketing Service

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FSGA Florida Strawberry Growers Association

UF UNIVERSITY of FLORIDA ENTOMOLOGY & NEMATOLOGY

Thank you!

Questions?

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