Fusarium wilt in strawberry: races and implications for management

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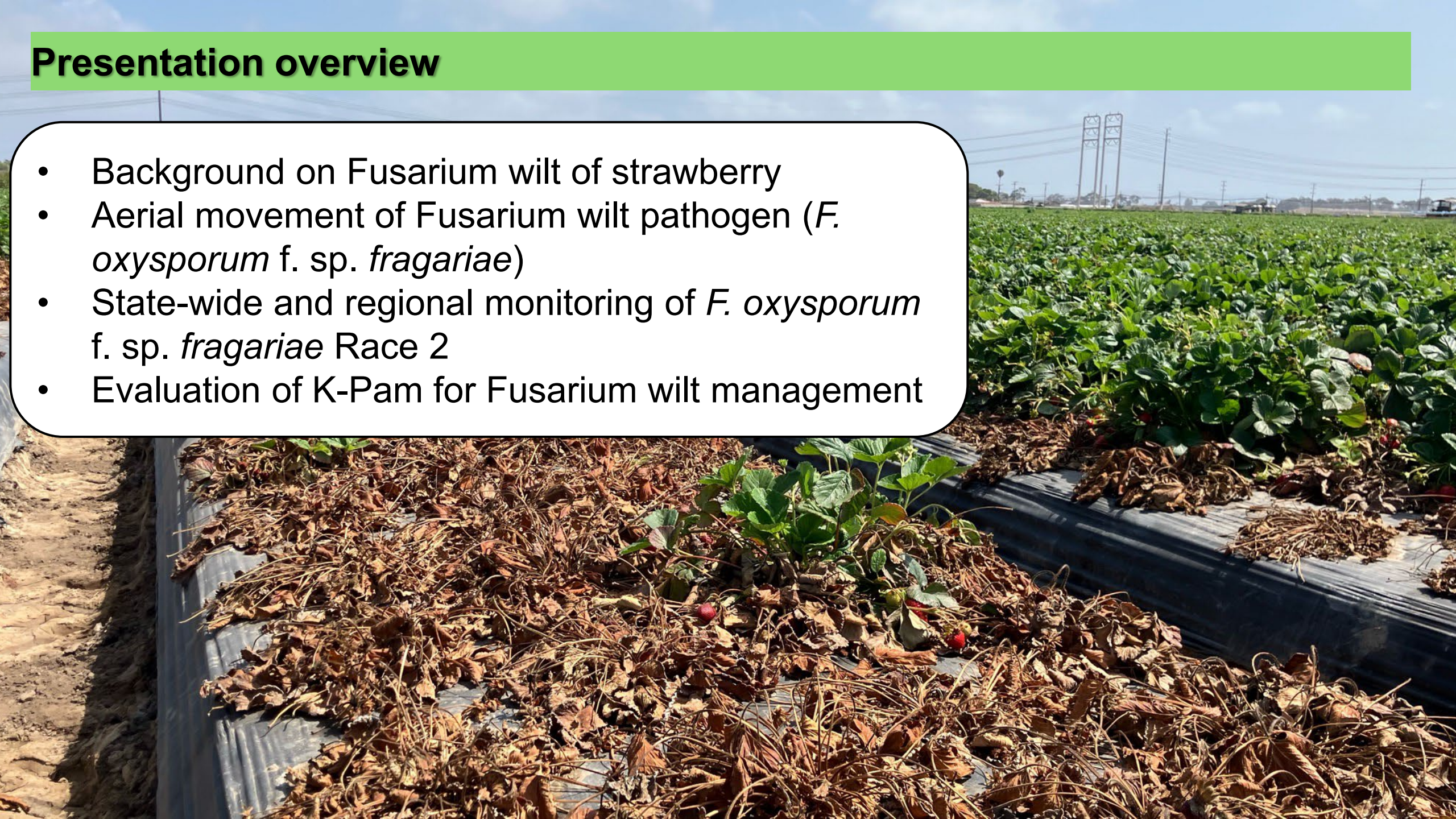
2025 Strawberry Production Meeting
Oxnard, CA

Presentation overview

- Background on Fusarium wilt of strawberry
- Aerial movement of Fusarium wilt pathogen (*F. oxysporum* f. sp. *fragariae*)
- State-wide and regional monitoring of *F. oxysporum* f. sp. *fragariae* Race 2
- Evaluation of K-Pam for Fusarium wilt management



Fusarium oxysporum f. sp. *fragariae* causes Fusarium wilt of strawberry

- Soilborne fungus *F. oxysporum* f. sp. *fragariae* causes Fusarium wilt on strawberry
- Pathogen is widespread in CA strawberry
- Two races in CA, common Race 1 and newer Race 2 discovered in 2022
- Pathogen has a foliar phase and could be moved through the air

Fusarium oxysporum f. sp. *fragariae* makes spores on strawberry stems

- The soilborne pathogen produces masses of spores on above ground strawberry stems
- Common across strawberry fields in CA

Peter Henry (Driscoll's)

Potential movement of pathogen spores in the air to new fields

Field with high Fusarium wilt pressure

Road

Neighboring field with no disease or pathogen

Potential movement of pathogen spores in the air to new fields

Foliar spores

Field with high Fusarium wilt pressure

Neighboring field with no disease or pathogen

Potential movement of pathogen spores in the air to new fields

Airborne spores

Foliar spores

Field with high Fusarium wilt pressure

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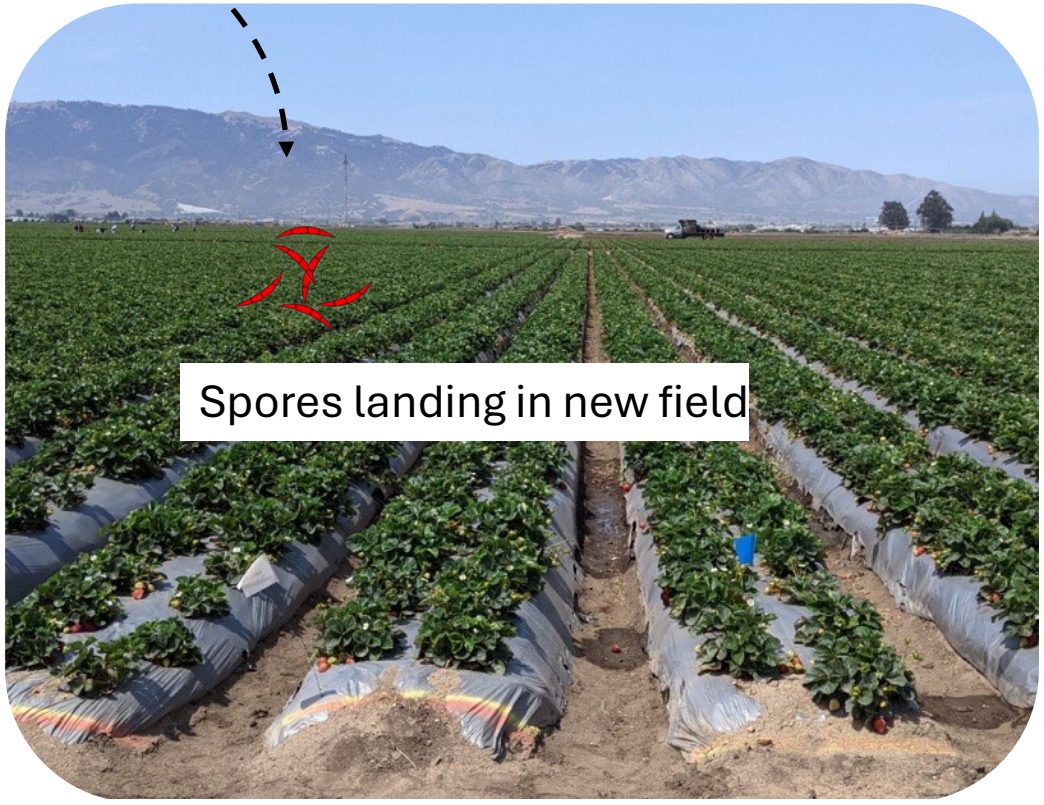

Field with high Fusarium wilt pressure

Neighboring field with no disease or pathogen

Aerial sampling of *F. oxysporum* f. sp. *fragariae* in 2024

Pathogen spores on strawberry stems

Gabe Sacher (CA Strawberry Commission)

Aerial sampling of *F. oxysporum* f. sp. *fragariae* in 2024

- A single field in North Salinas
- Three spore traps (pictured)
- 24h sampling window
- Sampled twice per week
- Sep to Nov

Aerial detection of *F. oxysporum* f. sp. *fragariae* in 2024

- A single field in North Salinas
- Three spore traps
- 24h sampling window
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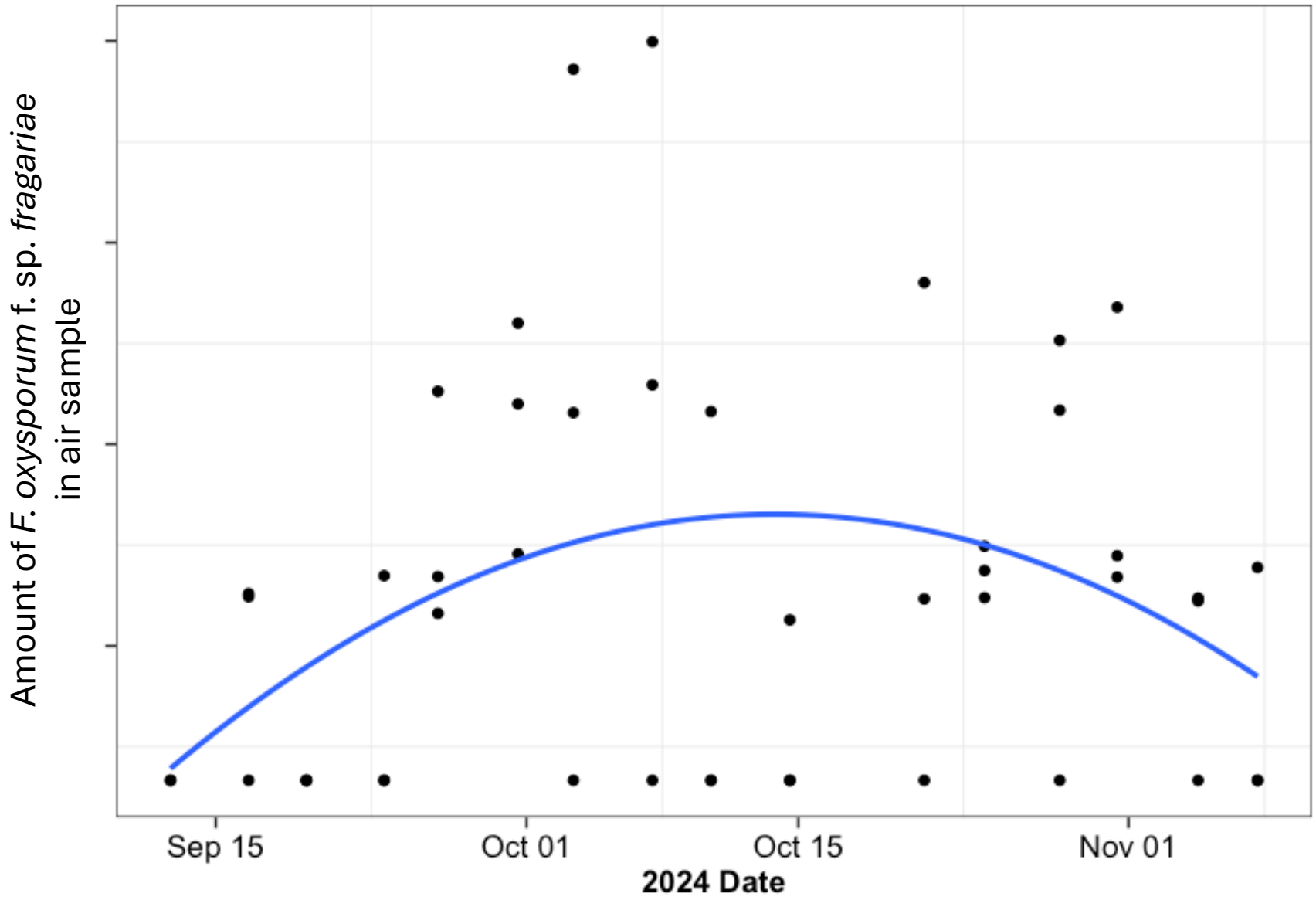
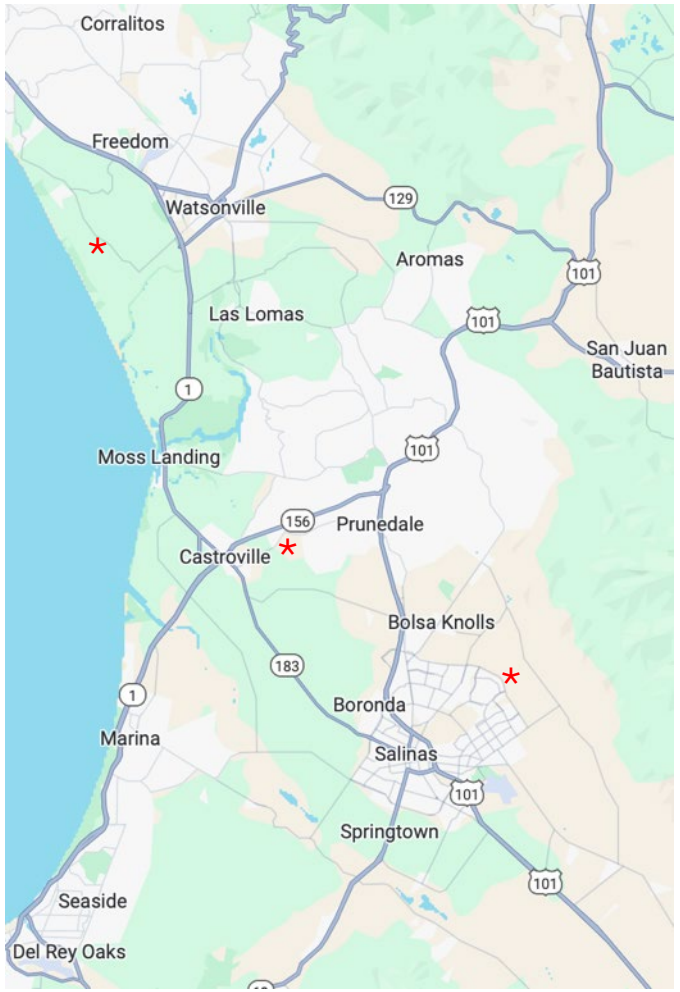


Aerial sampling of *F. oxysporum* f. sp. *fragariae* in 2025

- Three locations in Watsonville/Salinas production region
- Moved spore traps outside fields
- Extended monitoring timeline (July to November)
- Increased monitoring volume (air sample collected for a week at each location)

Spore trap placement in 2024

Spore trap placement in 2025



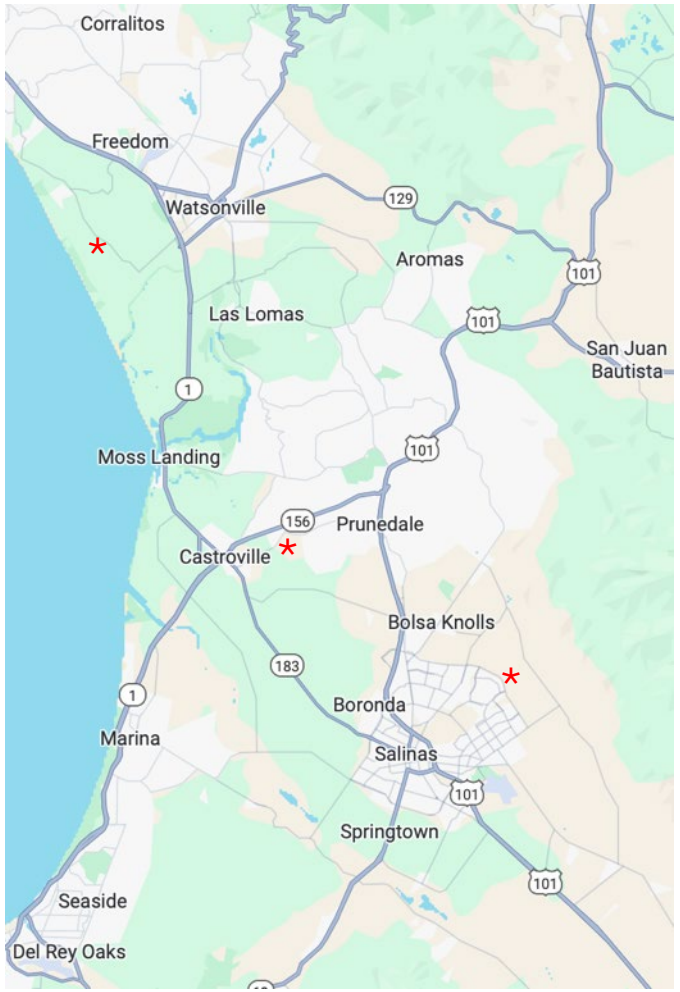
Stars show approximate location of spore traps in Watsonville/Salinas area

Aerial sampling of *F. oxysporum* f. sp. *fragariae* in 2025

- Samples collected from July to September
- Pathogen testing of 2025 air samples in progress
- Spore trapping will continue into October-November

Field with Fusarium wilt in 2025

Field with Fusarium wilt in 2025



Regional monitoring of *F. oxysporum* f. sp. *fragariae* Race 2

Screened 237 diagnostic samples for *F. oxysporum* f. sp. *fragariae* Race 2

- 2 from Florida, remaining from CA
- 5 counties in CA: Santa Barbara, Siskiyou, Ventura, Monterey, and San Luis Obispo
- All samples tested negative for Race 2
- Additional testing in progress

Recombinase polymerase assay (RPA) assay used for pathogen testing

Local monitoring of *F. oxysporum* f. sp. *fragariae* Race 2 in Oxnard, CA

- Confirmed presence of *F. oxysporum* f. sp. *fragariae* Race 2 in four fall planted locations (sampled in June, 2025) previously reporting the pathogen
- Additional trip to Oxnard planned in Nov. to sample spring planted fields
- Diagnostic clinic at Cal Poly Strawberry Center has methods to test for *F. oxysporum* f. sp. *fragariae* Race 2

Oxnard, CA. Image from June 23, 2025

Contact information

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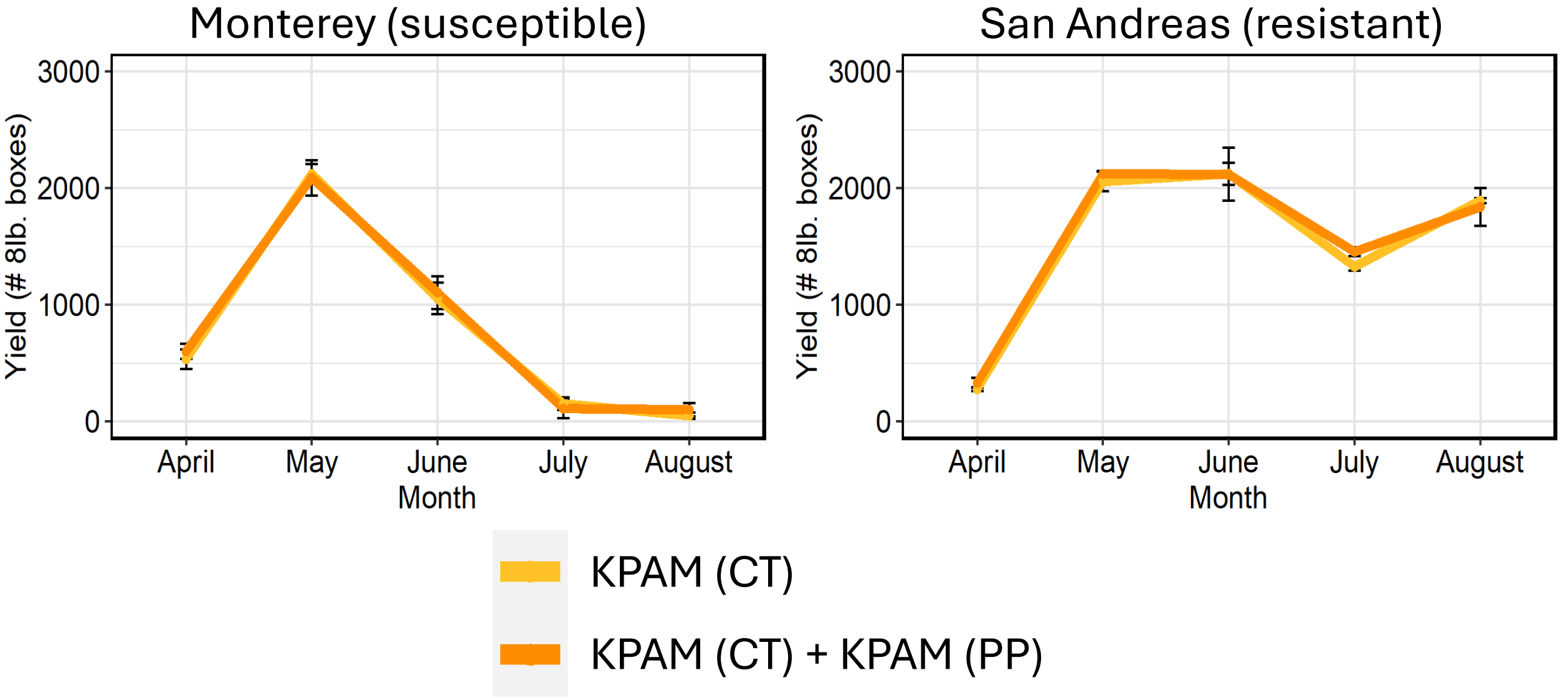
Treatments and Rates (2019 study)

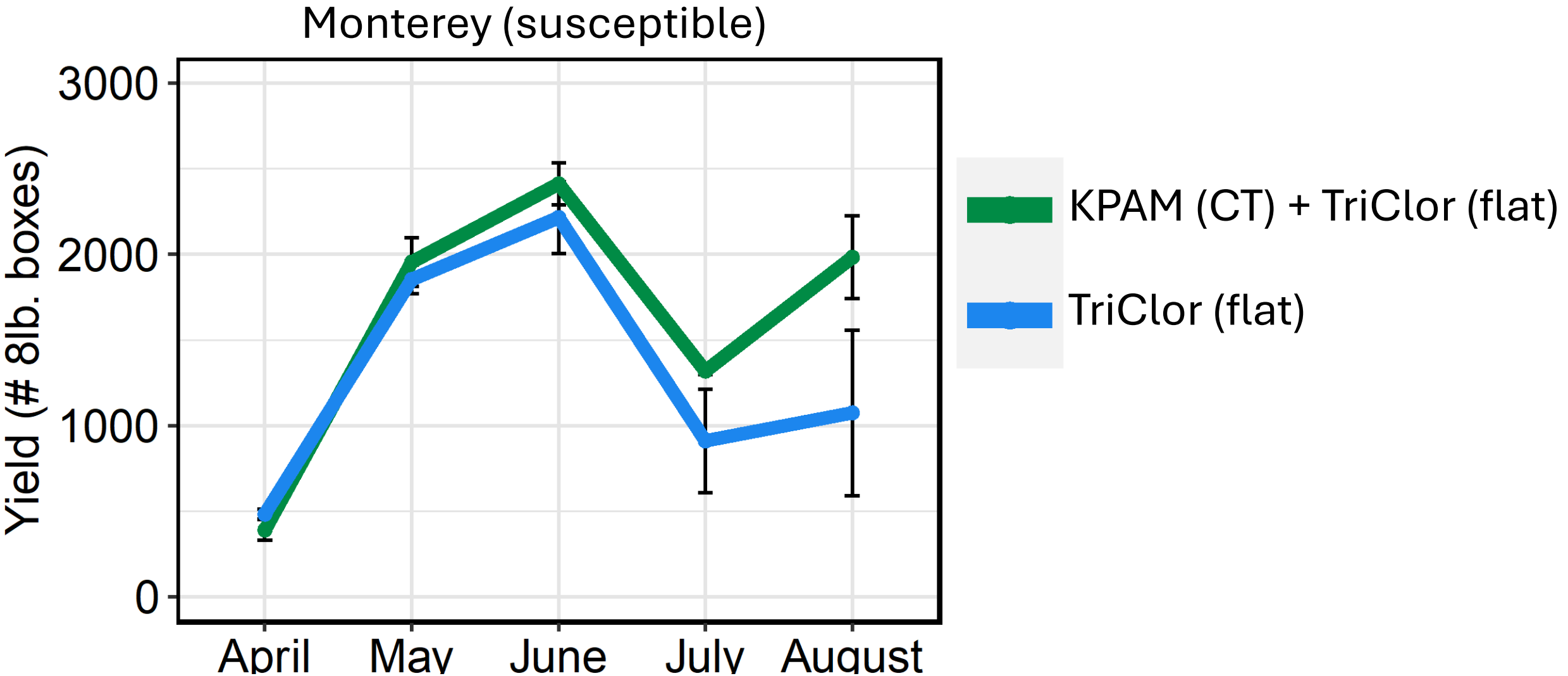
• KPAM (CT)	20 gal per acre
• KPAM (PP)	47 gal per acre
• KPAM (CT + PP)	20 g/A + 47 g/A
• TriClor (flat)	350# per acre
• KPAM (CT) + TriClor (flat)	20 g/A + 350#/acre

- CT = crop termination
- PP = pre-plant

Is 2x better than 1x KPAM?



Does KPAM crop termination improve flat fumigation?

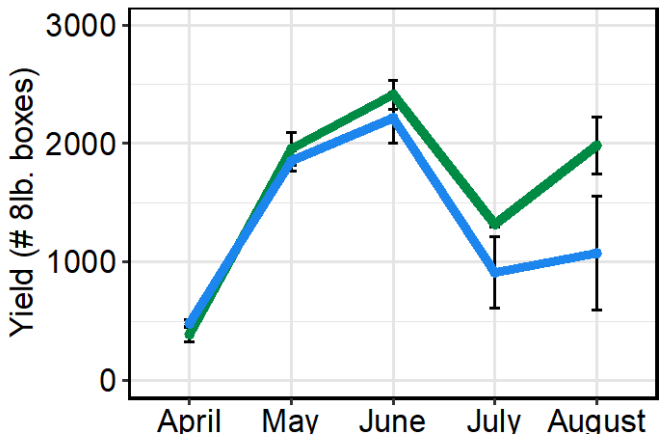


Does KPAM crop termination improve flat fumigation?

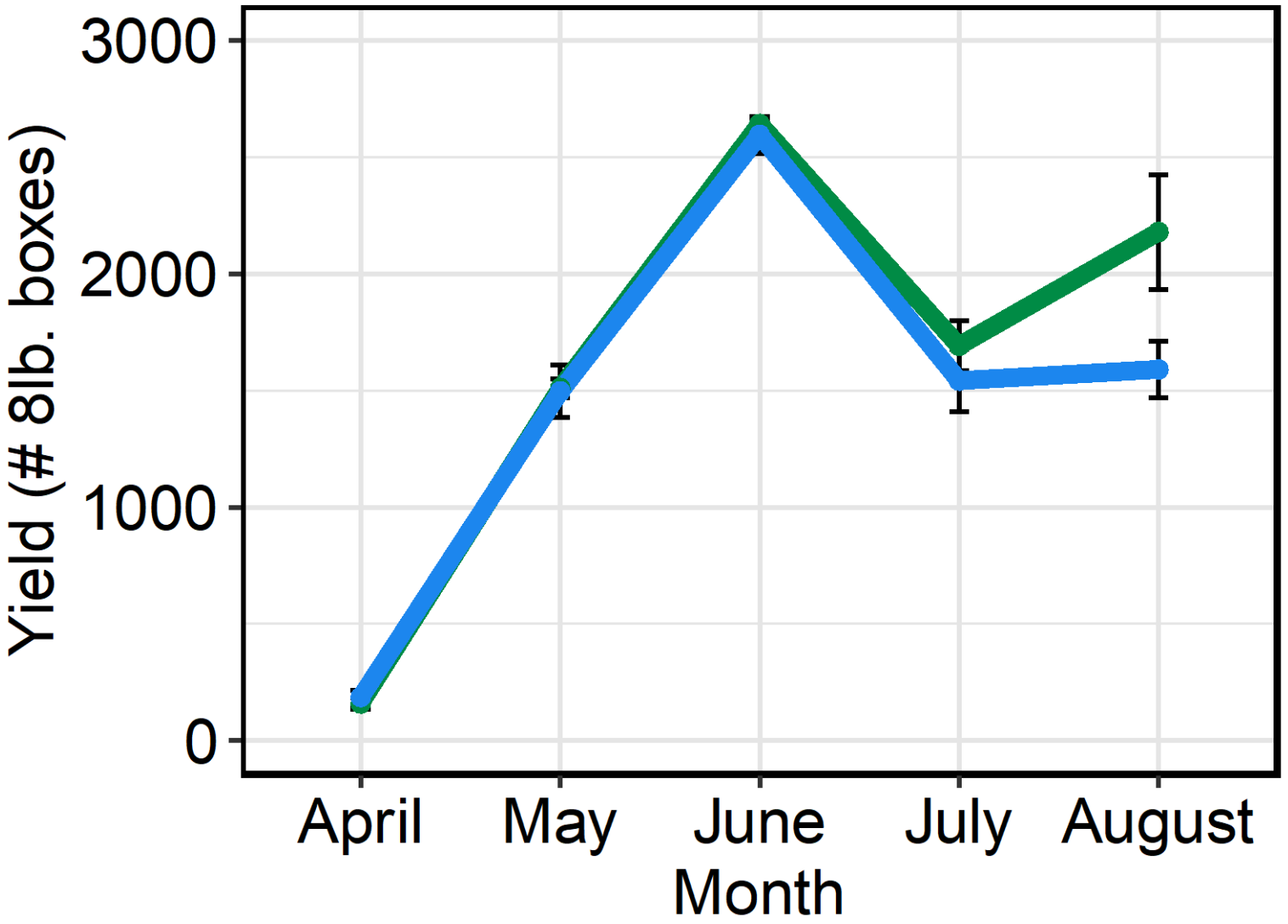
KPAM (CT) + TriClor (flat)

TriClor (flat)

Monterey (susceptible)



San Andreas (resistant)



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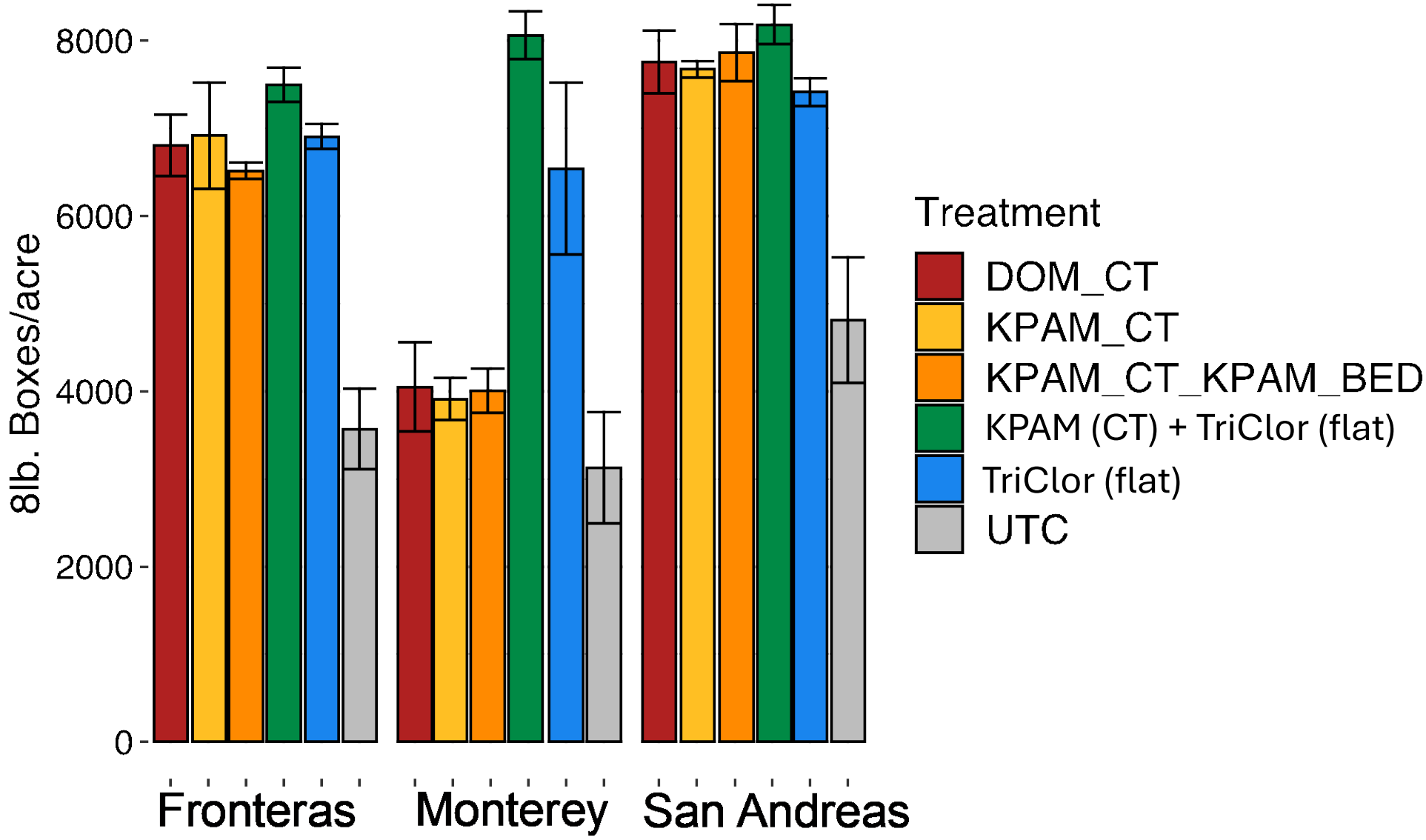
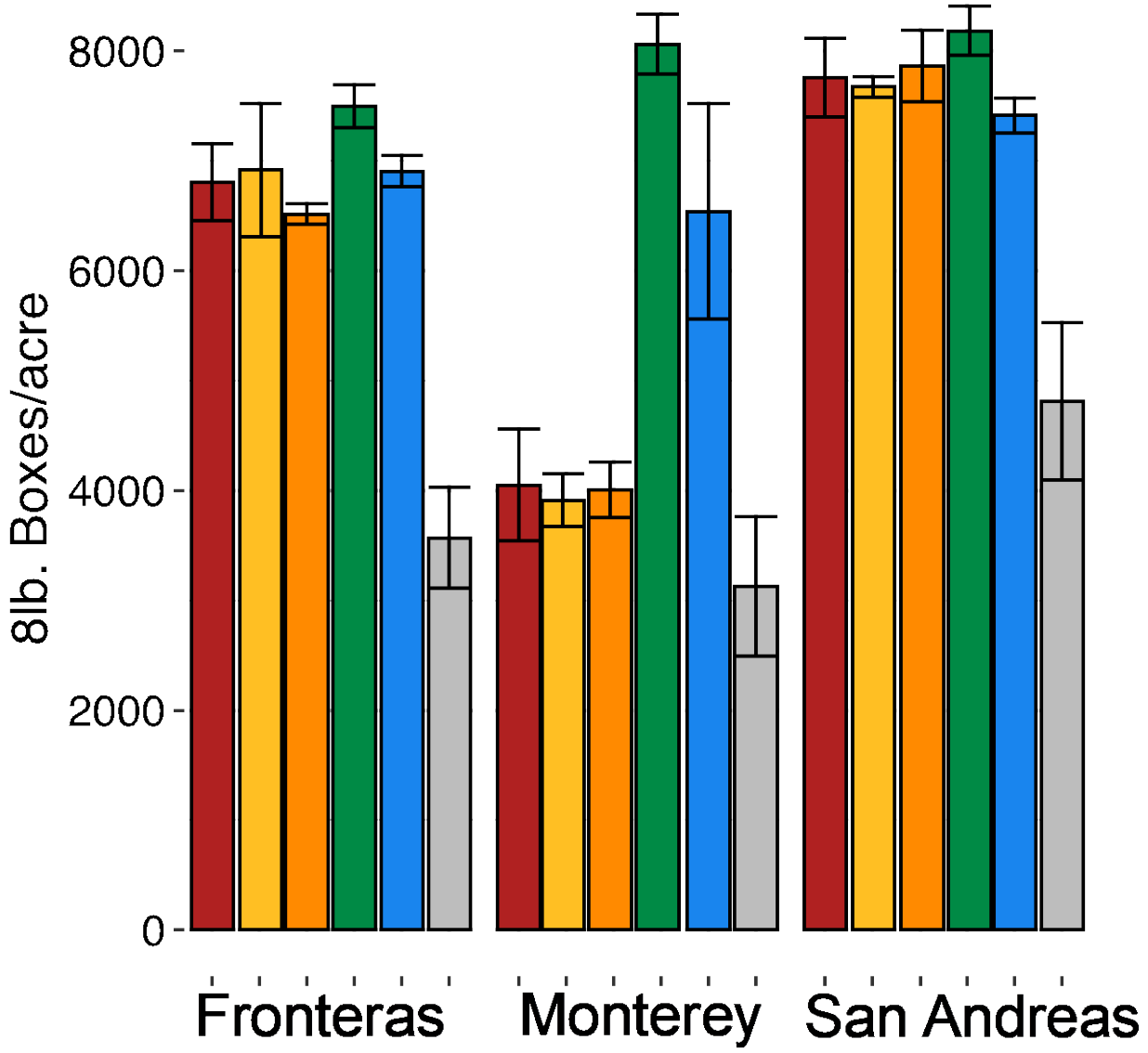


Takeaways



- Two, consecutive applications of KPAM **did not** lead to better yields than a single application
- Crop termination before flat fumigation was slightly better than flat fumigation alone
- This trial was in a highly-infested field, KPAM may be sufficiently effective where no pathogens are present.

Summary

- *Fusarium oxysporum* f. sp. *fragariae* can be detected in the air above wilt infested fields
- Race 2 is rare and still only found in Oxnard, CA
- Consecutive K-Pam applications do not improve strawberry yield

Acknowledgements

Project collaborators

- Peter Henry (Driscoll's)
- Mitchell Feldman (UC-Davis)
- Jade Dilla-Ermitta (UC-Davis)
- Gabe Sacher (CSC)
- Andrew Molinar (CSC)
- Peter Henry (Driscolls)
- Steve Koike (Trical Diagnostics)

Lab members

- Samantha Gebben Hernandez
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- Jose Jaime
- Shulu Zhang

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Funding

USDA ars Agricultural Research Service

cdfa CALIFORNIA DEPARTMENT OF Food and Agriculture

CALIFORNIA STRAWBERRY™ COMMISSION

QUESTIONS?