University of California
Agriculture and Natural Resources
Cooperative Extension

UC DAVIS
UNIVERSITY OF CALIFORNIA

Management updates for Fusarium diseases of tomato, and beyond

Cassandra Swett
CE Specialist—Vegetable and Field Crop Pathology, Plant Pathology Dept., UC Davis

Brenna Aegerter, UC Cooperative Extension Advisor, San Joaquin Co.
Tom Turini, UC Cooperative Extension Advisor, Fresno Co.
Zach Bagley, CTRI director

Will pause for questions as we go along

Fusarium wilt

Fusarium crown and root rot

Fusarium falciforme stem rot and vine decline

Management strategies lacking

Fusarium diseases cannot be diagnosed in the field

Vascular discoloration definitive of Fusarium wilt?
NO- Vascular discoloration caused by all diseases

Fusarium diseases cannot be diagnosed in the field

Yellow flagging definitive of Fusarium wilt?
NO- also caused by F. falciforme

Vascular discoloration definitive of Fusarium wilt?
NO- Vascular discoloration caused by all diseases

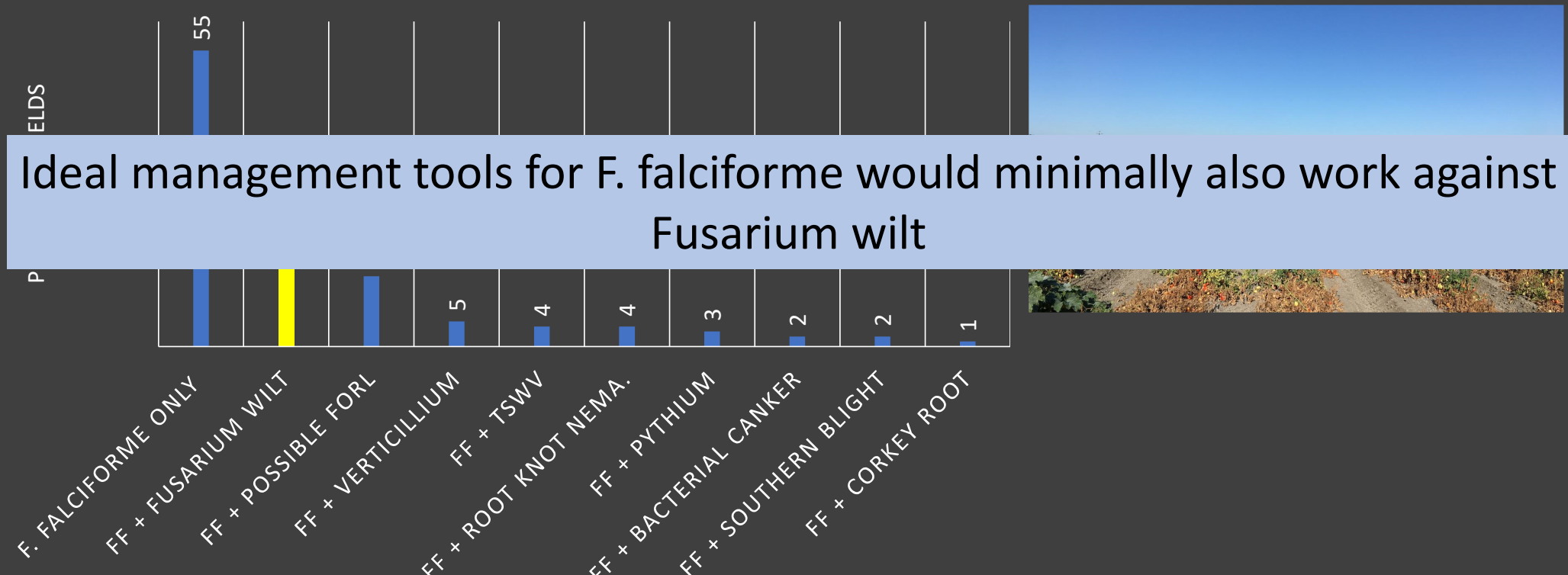
Fusarium diseases cannot be diagnosed in the field

Yellow flagging definitive of Fusarium wilt?
NO- also caused by F. falciforme

Laboratory analysis needed for diagnosis

Vascular discoloration definitive of Fusarium wilt?
NO- Vascular discoloration caused by all diseases

These pathogens commonly co-occur, making diagnosis and management challenging

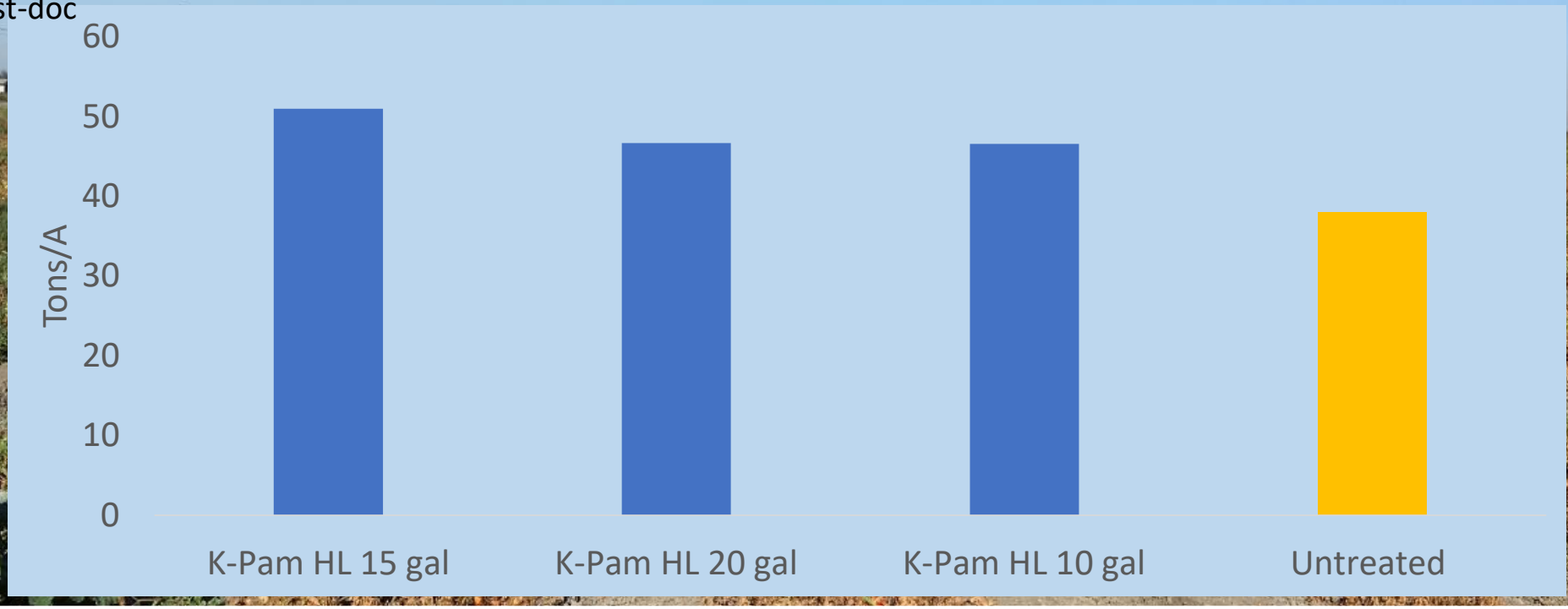


Ideal management tools for F. falciforme would minimally also work against Fusarium wilt

Chemical management of F. falciforme-pre planting

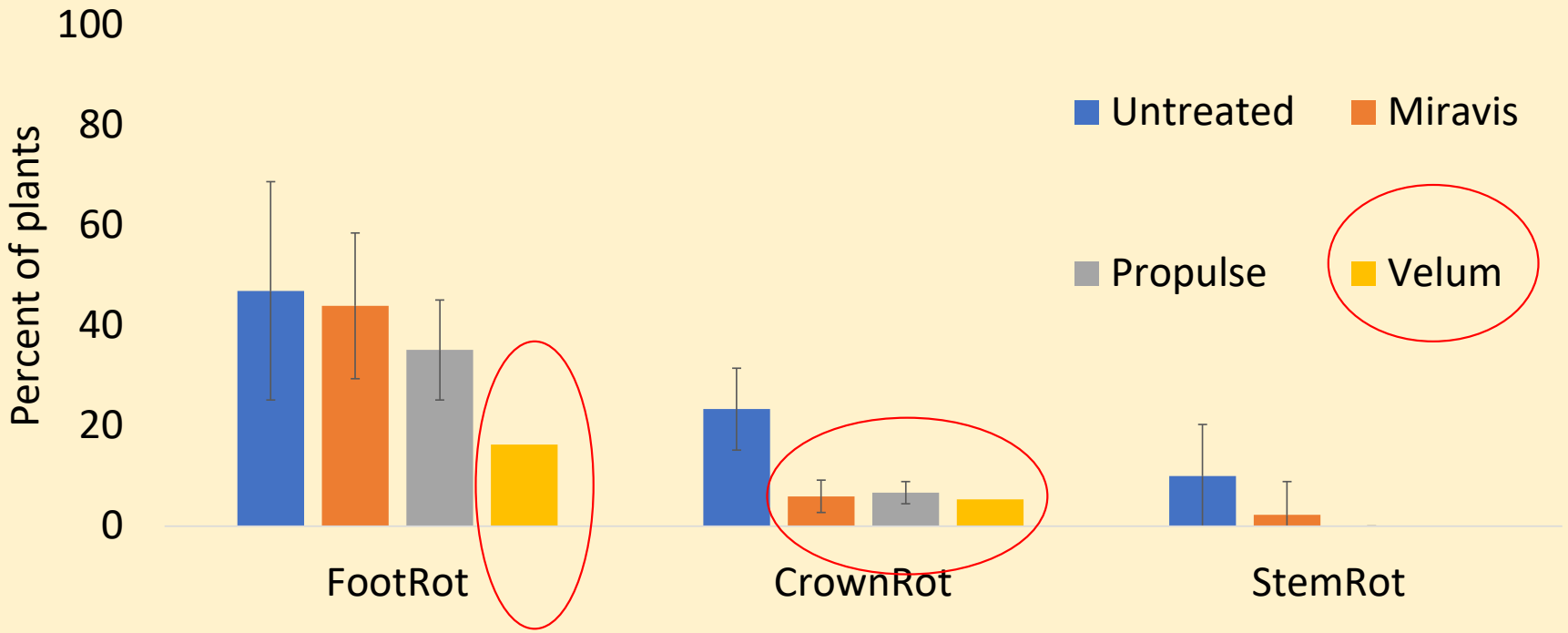
Dr. K. Paugh
Post-doc

F. falciforme (F3 field)
Yields under KPam enhanced 1.3x's



Chemical management of F. falciforme -in season

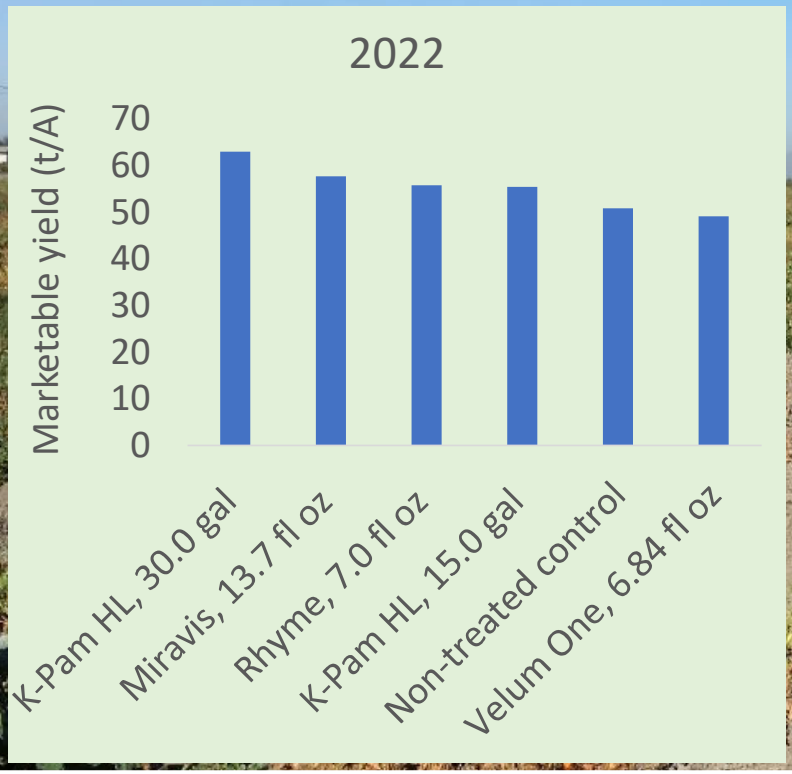
F. falciforme alone:
Velum reduced total disease incidence

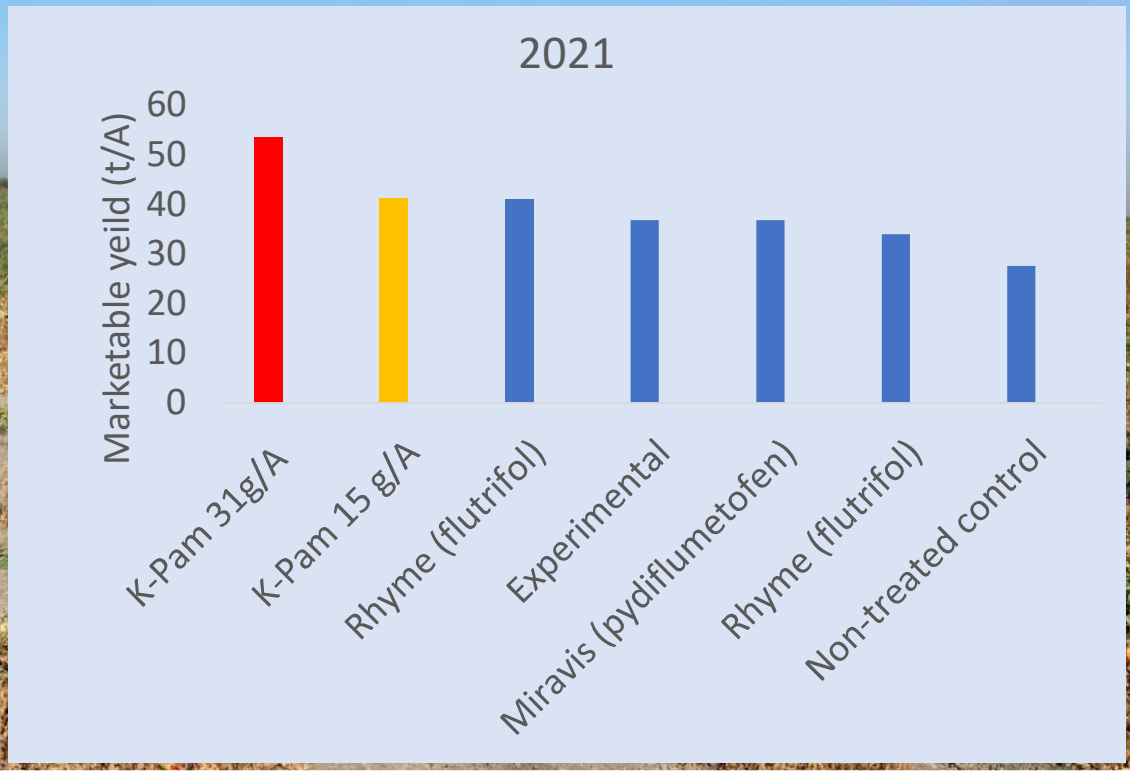


Chemical co-management of F. falciforme with Fusarium wilt-pre planting and in season

B. Aegerter

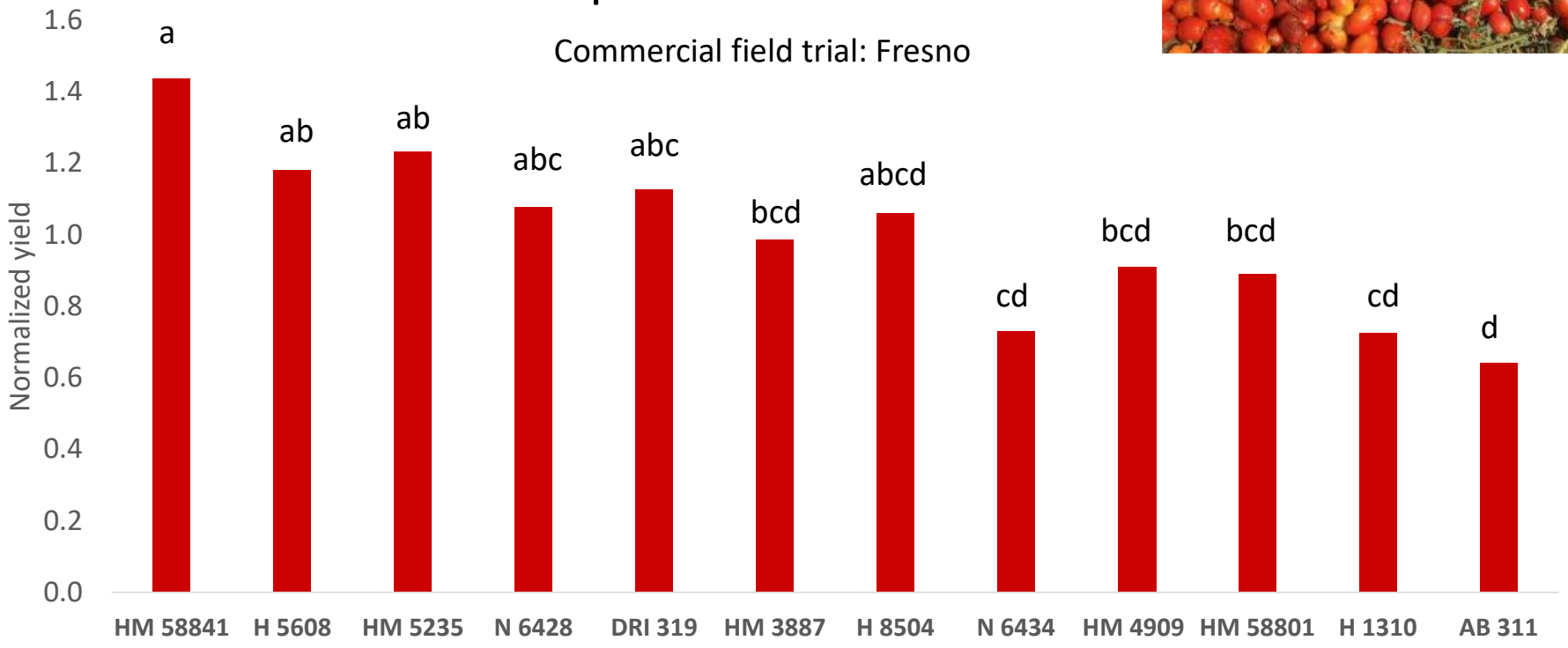
San Joaquin: F. falciforme + Fusarium wilt
Yields nearly double with 30g/A KPam





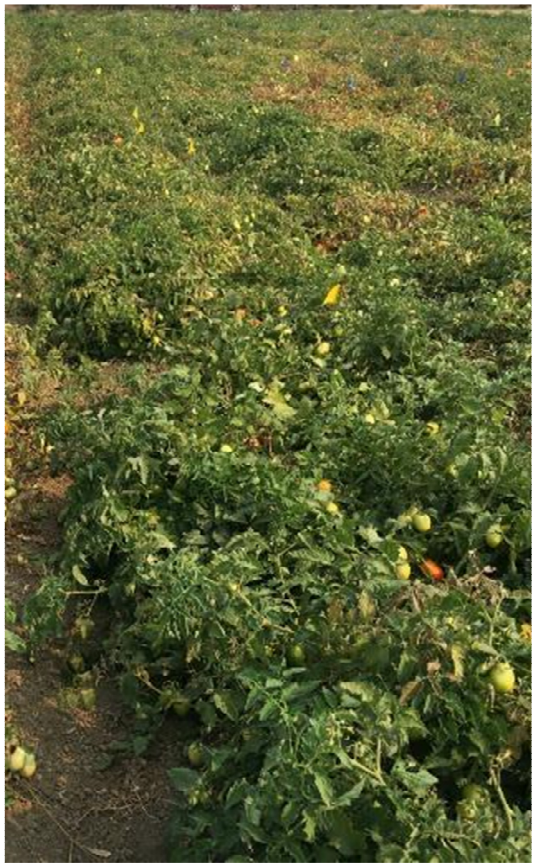
Cultivar-based management tools

Yield and disease-based assessments of commercial cultivars under F. falciforme pressure



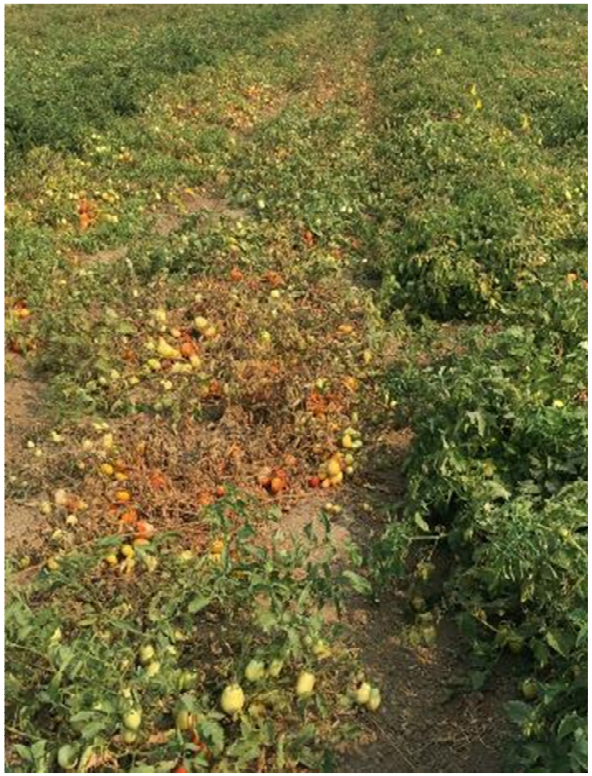
Top yielders under *F. falciforme* pressure

- Consistently top performers:
  - N 6428; H 5608; SVTM 9016
- Cultivars which performed well in one site but not the other:
  - HM58841, HM5235, HM58801
- Cultivars which performed well in the first trial year
  - H1779, UG4014, DRI 319; SVTM 9023
- Intermediate performers
  - H8504, SVTM 9036, SVTM 9037, BQ 391



Do not plant these in F. falciforme-infested fields

- High risk, tested at many sites
  - HM 3887, H 9663
- High risk, only tested at a single site:
  - 2020: AB 311, HM4909, N6434
  - 2019: H1310, H9663, N6416
  - 2021: SVTM 9027, 9032, 9034
- Cultivars which performed poorly in one site but not the other:
  - HM58841, HM5235

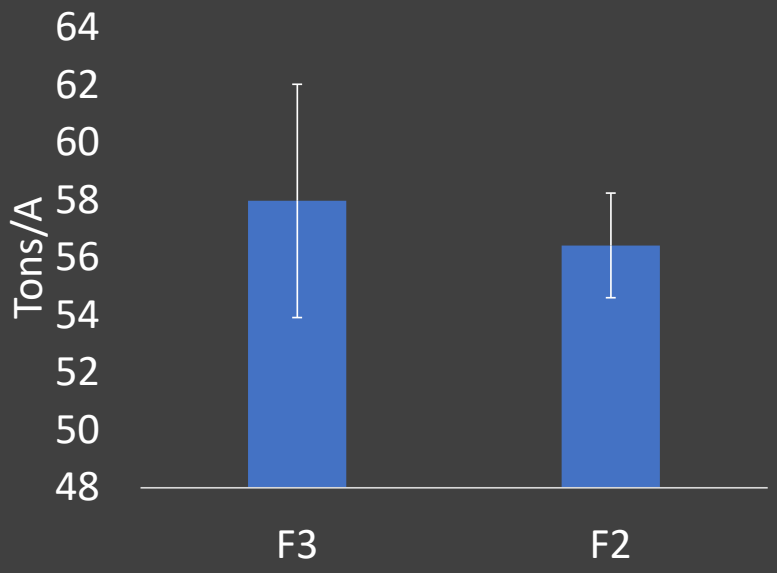


Co-managing F. falciforme and Fusarium wilt- performance of F3 cultivars in co-infested fields

B. Aegerter

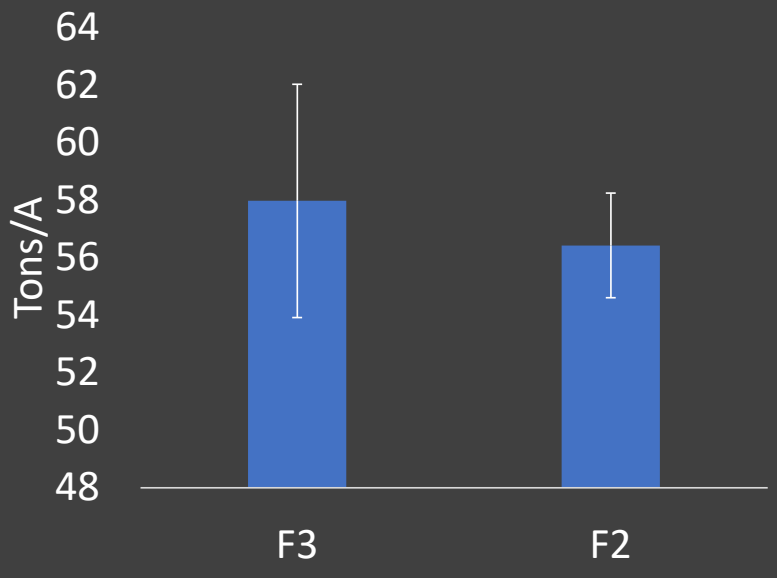
No difference in Fusarium wilt race 3 resistant (F3) and susceptible (F2) cultivars

Highlights significant impact of F. falciforme in co-infested fields



Co-managing F. falciforme and Fusarium wilt- performance of F3 cultivars in co-infested fields

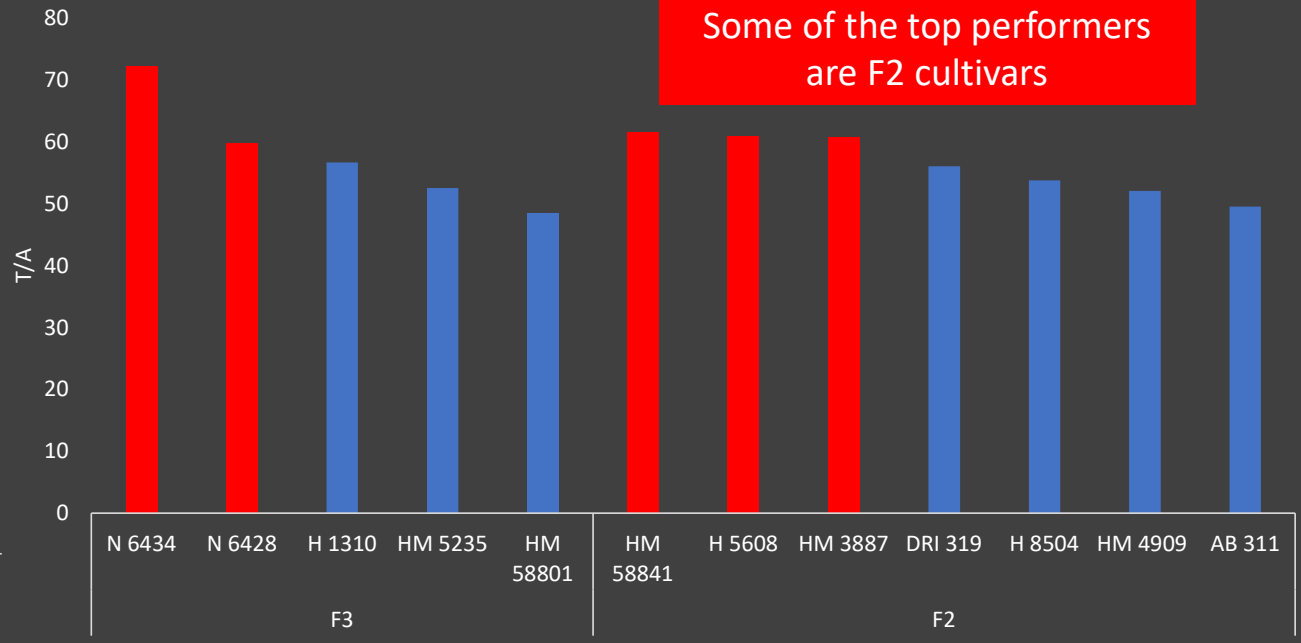
F3 cultivars have slightly greater performance overall



…However

B. Aegerter

Some of the top performers are F2 cultivars

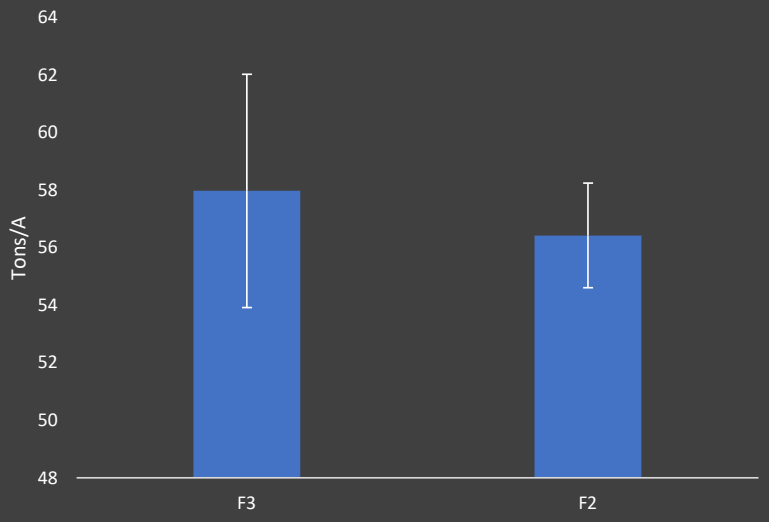


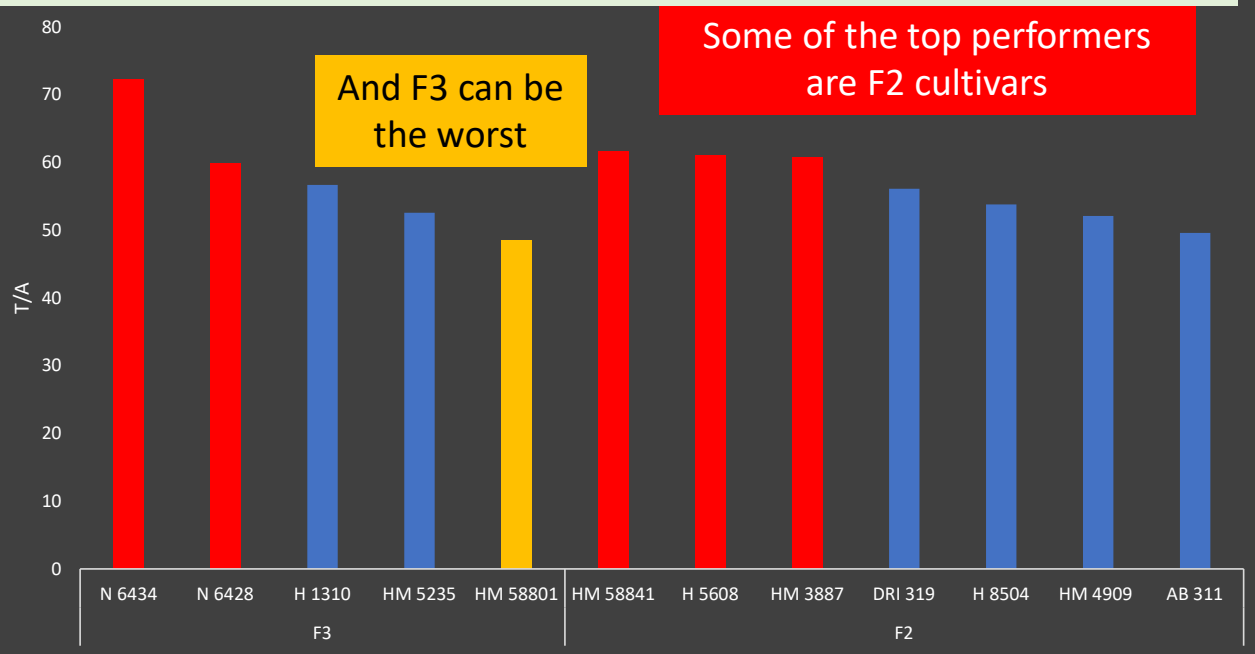
Co-managing F. falciforme and Fusarium wilt- performance of F3 cultivars in co-infested fields

F3 c

er

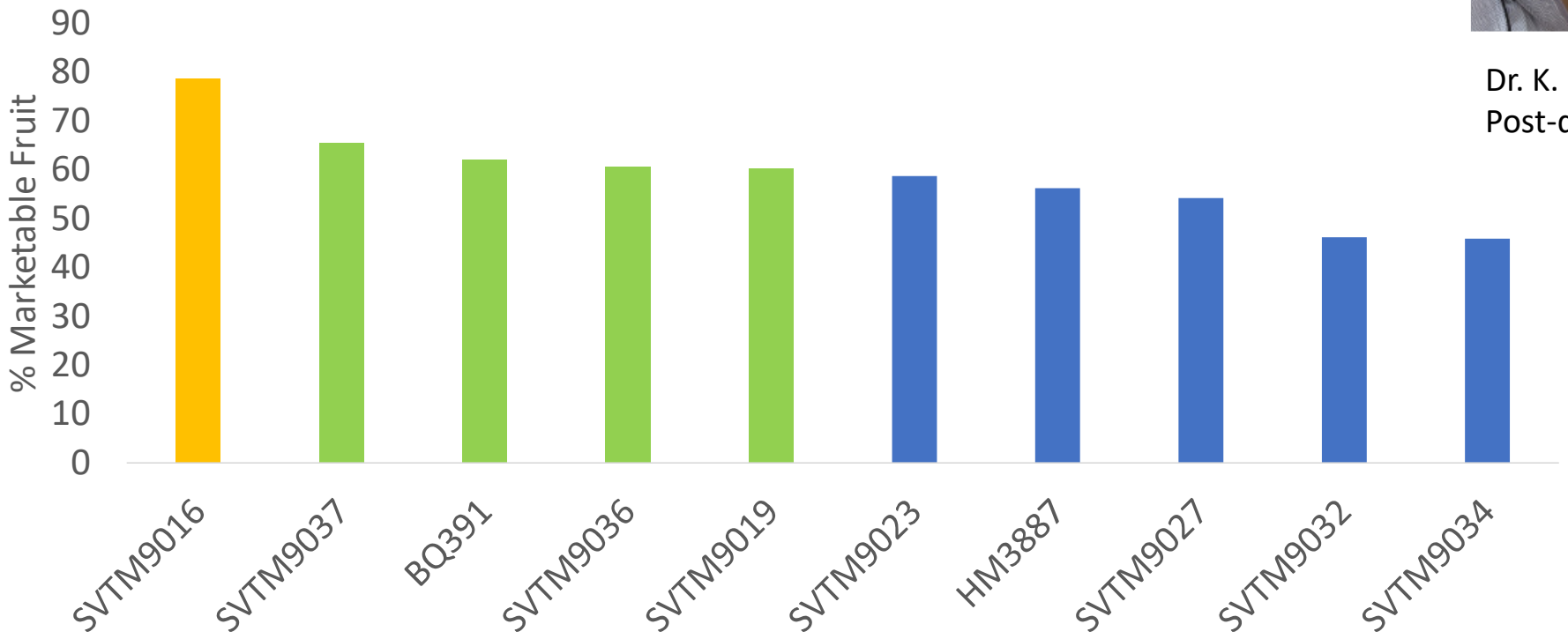
There is strong potential to ID F3 cultivars that are also F. falciforme resistant





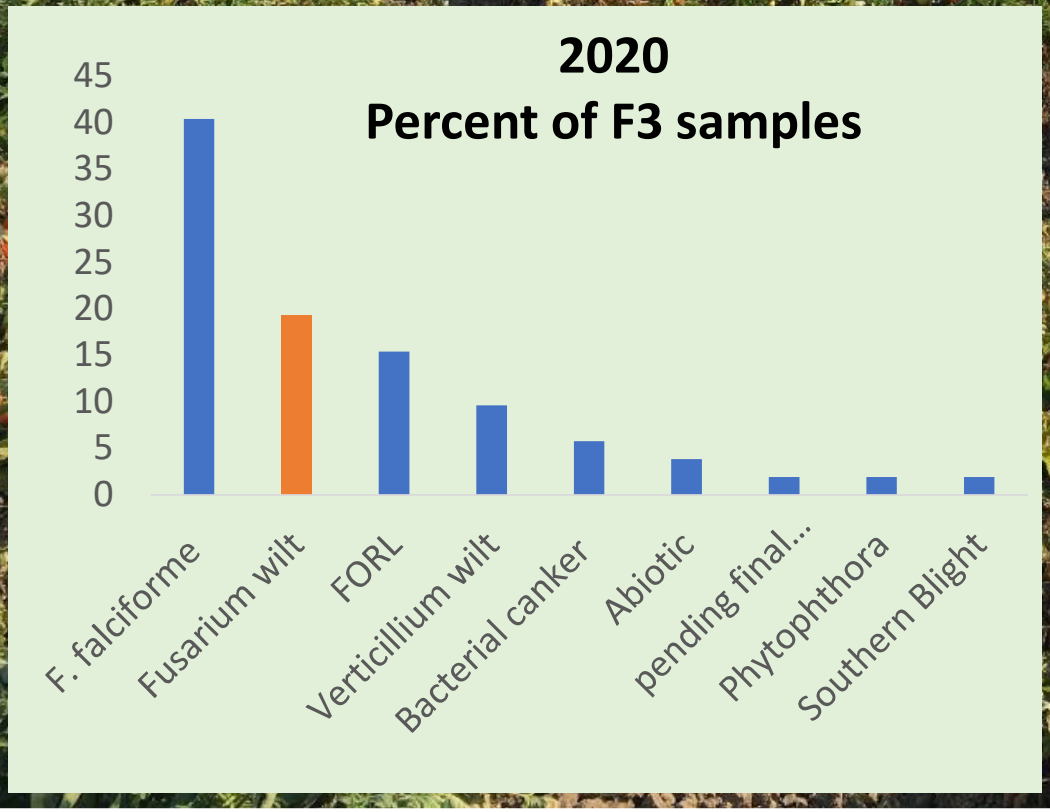
Increasing efforts to evaluate a wider range of F3 cultivars for performance under F. falciforme and dual pathogen pressure

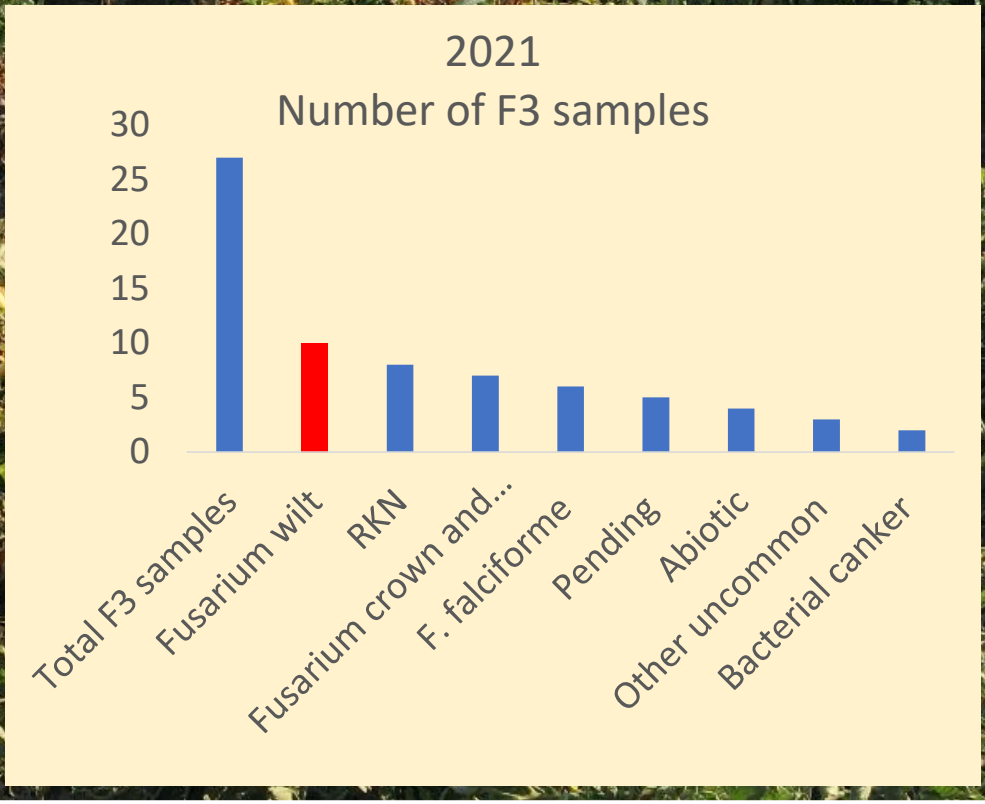
Dr. K. Paugh
Post-doc



Are F3 cultivars still working to control Fusarium wilt?

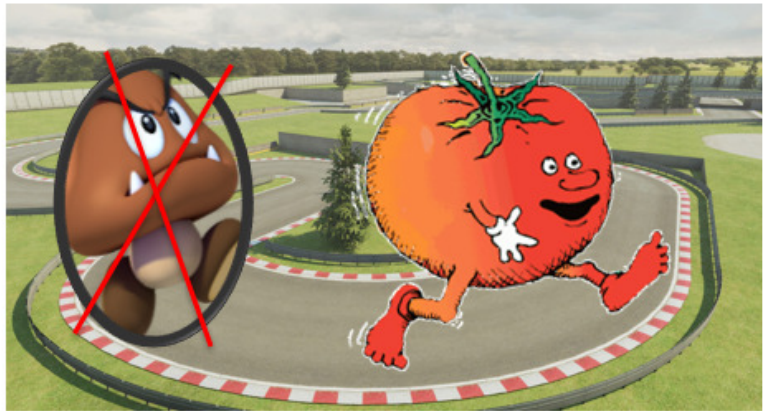
Fusarium wilt occasionally recovered from F3 cultivars





Fusarium wilt race 4 monitoring: not yet detected

Year	# putative R4	% race 3	% race 4
2018	9	100%	0
2019	2	100%	0
2020	12	100%	0
2021	10	TBD	TBD



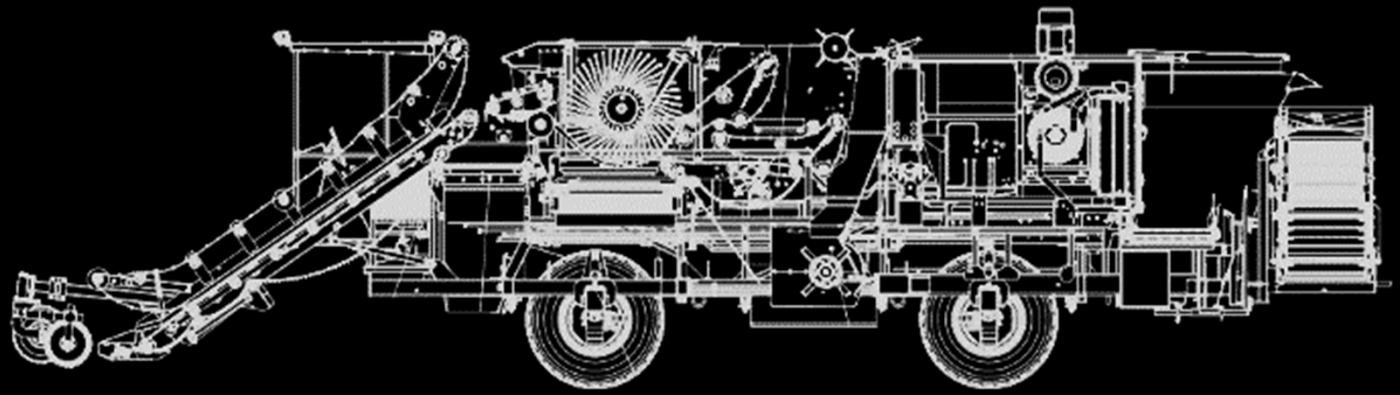
Why Fol R3 is causing Fusarium wilt in F3 cultivars? Variable efficacy of the I3 resistance gene

Salinity

Resistance-breaking root knot nematode

63% of F3-Fusarium wilt diagnoses had RKN infections (More to come-next talk)

Managing between-field spread of pathogens and other soil borne pests on field equipment



Equipment is moved between fields and often farms

Infested soil and plant debris clings to field equipment allowing spread to new sites

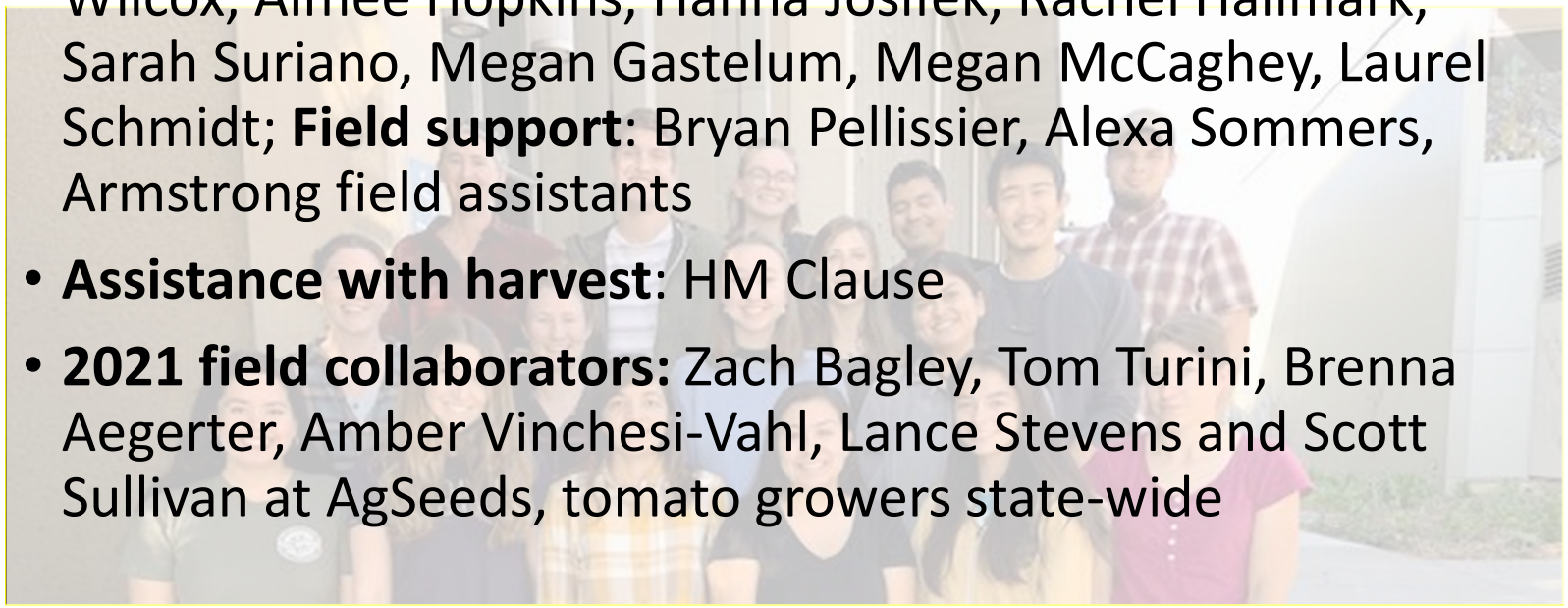
With emergence of branched broomrape, development of effective sanitation methods have become critical to prevent spread

Microbial measures can provide a biometric approach to evaluate efficacy in broomrape sanitation

Main goal at this point: Aim to develop methods optimize broomrape eradication that also have efficacy against other soil borne pests

The amazing Swettonians!

- **People who conducted/assisted with these projects**: Kelley Paugh, Alyssa Brackrog, Beth Hellman, Myles Collinson, Emma Centeno, Brian Caine, Justine Beaulieu, Forrest Wilcox, Aimee Hopkins, Hanna Josifek, Rachel Hallmark, Sarah Suriano, Megan Gastelum, Megan McCaghey, Laurel Schmidt; **Field support**: Bryan Pellissier, Alexa Sommers, Armstrong field assistants
- **Assistance with harvest**: HM Clause
- **2021 field collaborators:** Zach Bagley, Tom Turini, Brenna Aegerter, Amber Vinchesi-Vahl, Lance Stevens and Scott Sullivan at AgSeeds, tomato growers state-wide



Funding for this project was made possible by a USDA Agriculture Marketing service through grant 19-0001-037-SF
Its contents are solely the responsibility of the authors and so not necessarily represent the official views of the USDA.


Questions?
clswett@ucdavis.edu