Fusarium diseases of tomato: the good, the bad and the ugly

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

clswett@ucdavis.edu

UC CE | University of California Agriculture and Natural Resources | Cooperative Extension

UCDAVIS UNIVERSITY OF CALIFORNIA

DEPARTMENT OF PLANT PATHOLOGY UC DAVIS

The Bad: Fusarium diseases of tomato

Fusarium wilt

Fusarium crown and root rot

Fusarium solani-type stem rot and vine decline

The Ugly

Multiple *F. falciforme*-affected fields exhibiting severe losses in California

High incidence of plants dying early in the season

F. falciforme: a recently described tomato pathogen

APS Publications

Search My Cart

Plant Disease Home About Submit Journals Books Publisher's Home

Previous Next

Details Figures Literature Cited Rela

DISEASE NOTES

OPEN

Foot Rot and Wilt in Tomato Caused by *Fusarium falciforme* (FSSC 3 + 4) in Mexico

T. A. Vega-Gutiérrez, C. A. López-Orona, G. A. López-Urquídez, S. Velarde-Félix, L. A. Amarillas-Bueno, A. R. Martínez-Campos, and R. Allende-Molar

Affiliations

Published Online: 29 Oct 2018 | https://doi.org/10.1094/PDIS-06-18-1001-PDN

Vol. 103, No. 1
January 2019

tomato crops in the state of Sinaloa (Mexico). The symptoms included wilting, leaf yellowing, defoliation vascular tissue darkening, and drying and death of branches and the entire plant. Plant crowns exhibited necrosis (visible in the interior) that advanced through the main root, along with slight root

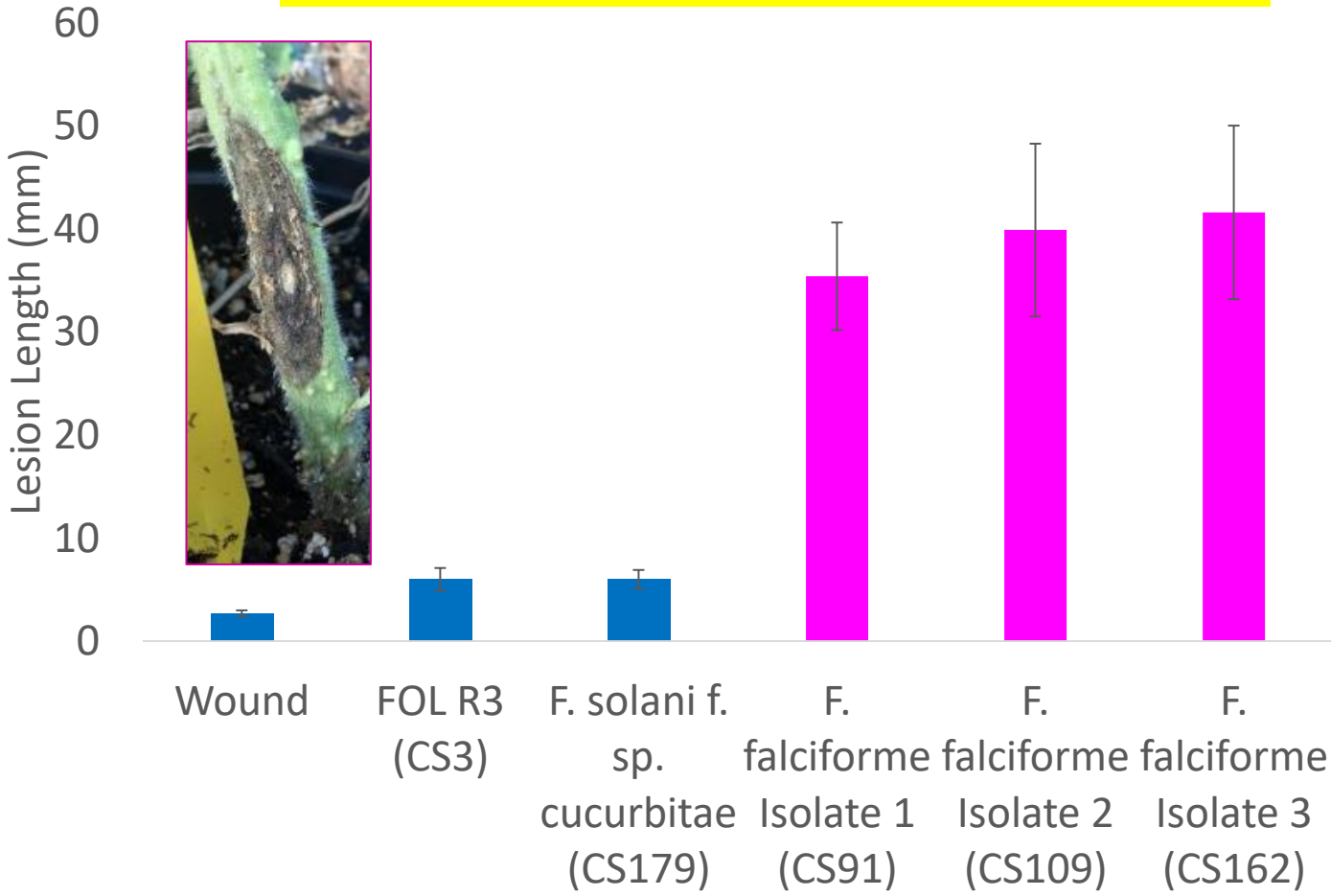
F. Falciforme is in the *Fusarium solani* species complex, long known to be tomato pathogens

- F. solani first described in as tomato pathogen in Australia in 1975
  - Symptoms: girdled tap root, rotten crown, plants rarely killed, yield reduced
- Described in California on processing tomato in 1991
- Disease name: Fusarium foot rot
- Pathogen name keeps changing:
  - 1975: Fusarium solani
  - 2007: *F. solani* f. sp. *eumartii*
  - 2019: *F. noneumartii*
- *F. falciforme* is closely related but phylogenetically distinct from *F. noneumartii*

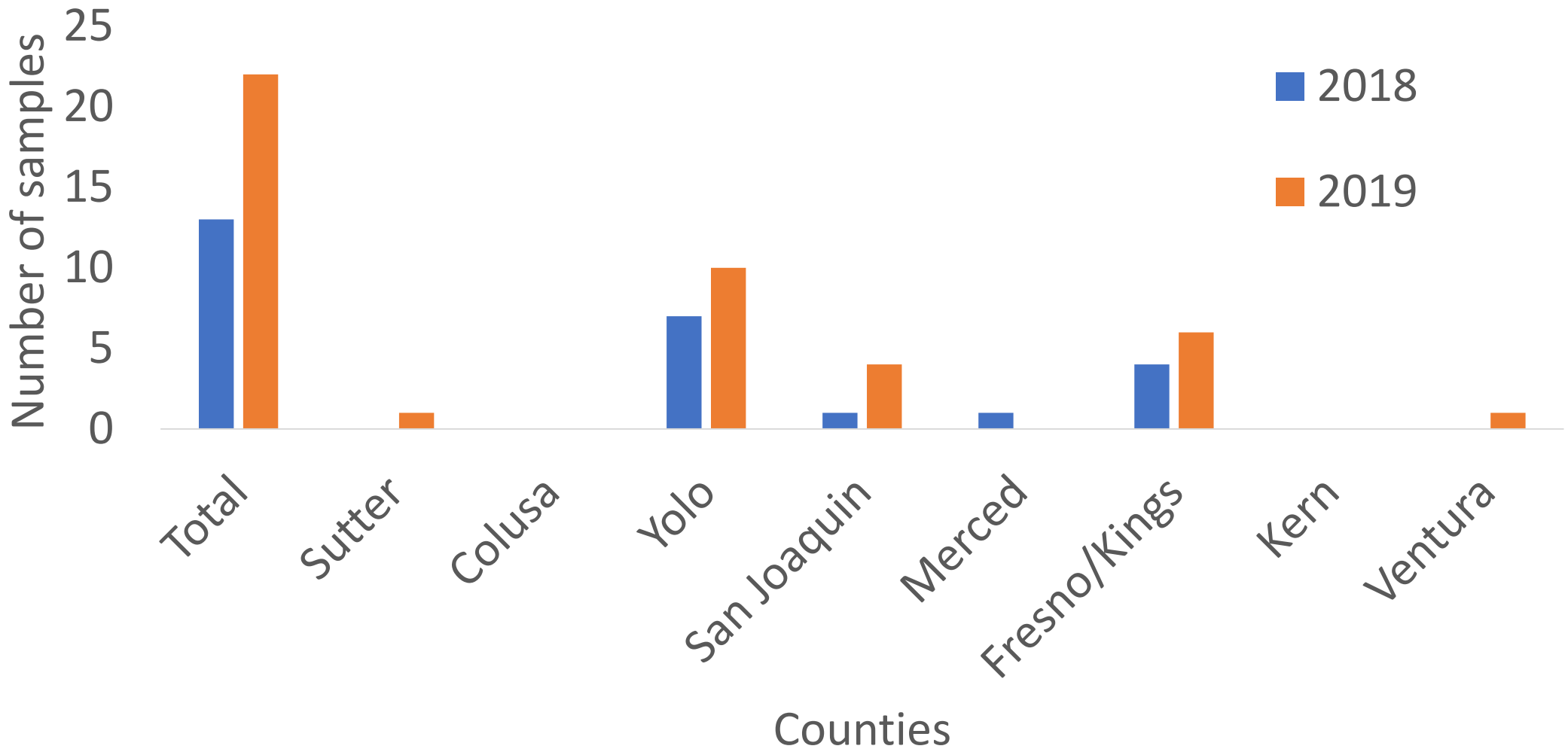
Images: Mike Davis

Started finding F. falciforme on tomatoes in California in 2017, associated with stem rot and severe vine decline

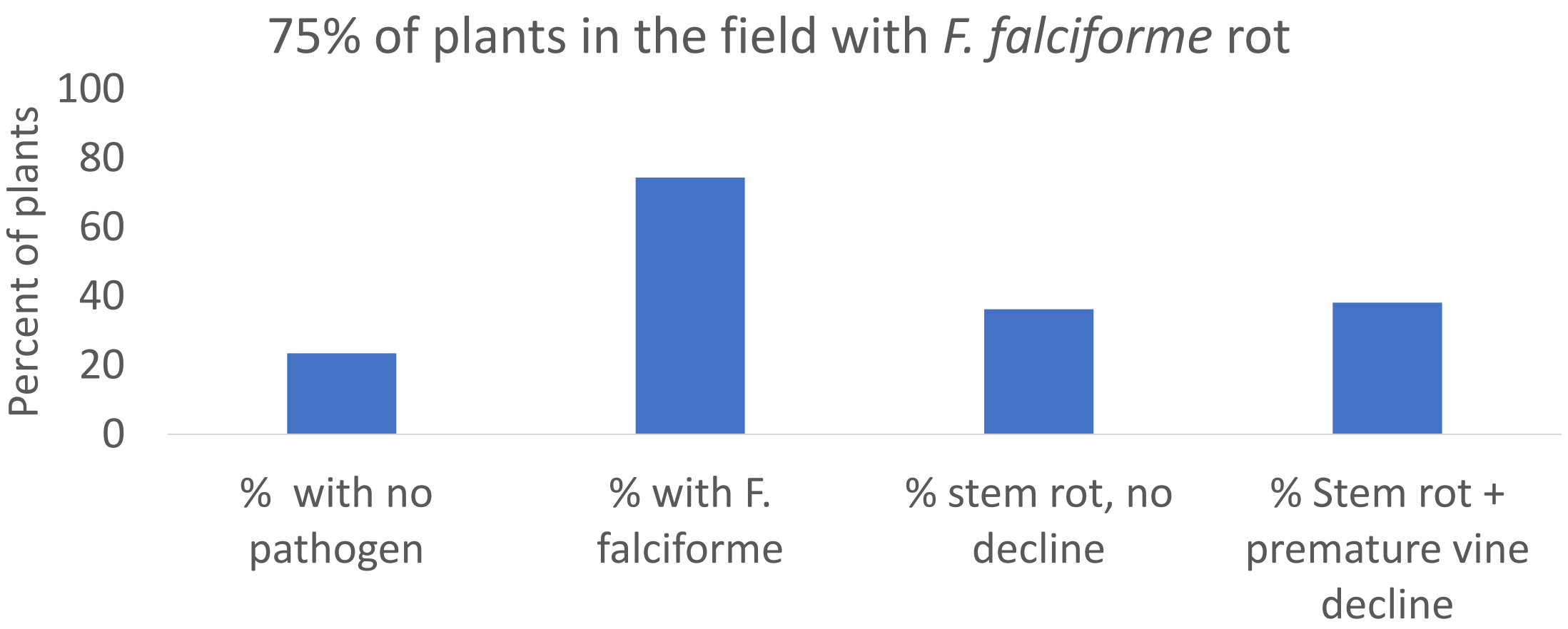
Confirmed *F. falciforme* can cause stem rot



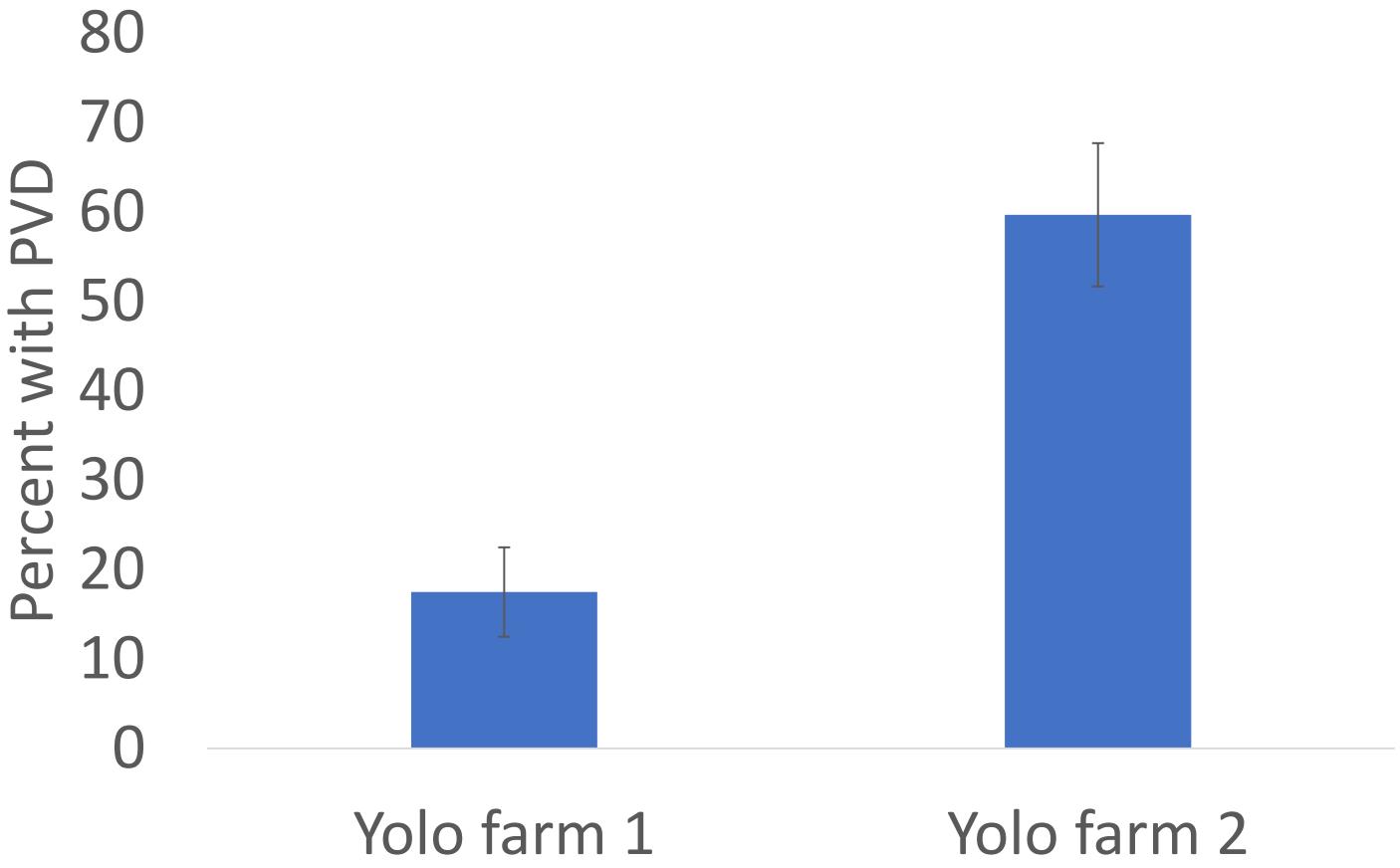
Can find *F. falciforme* in most tomato-producing counties in California



Over 75% of plants can be infected in a field

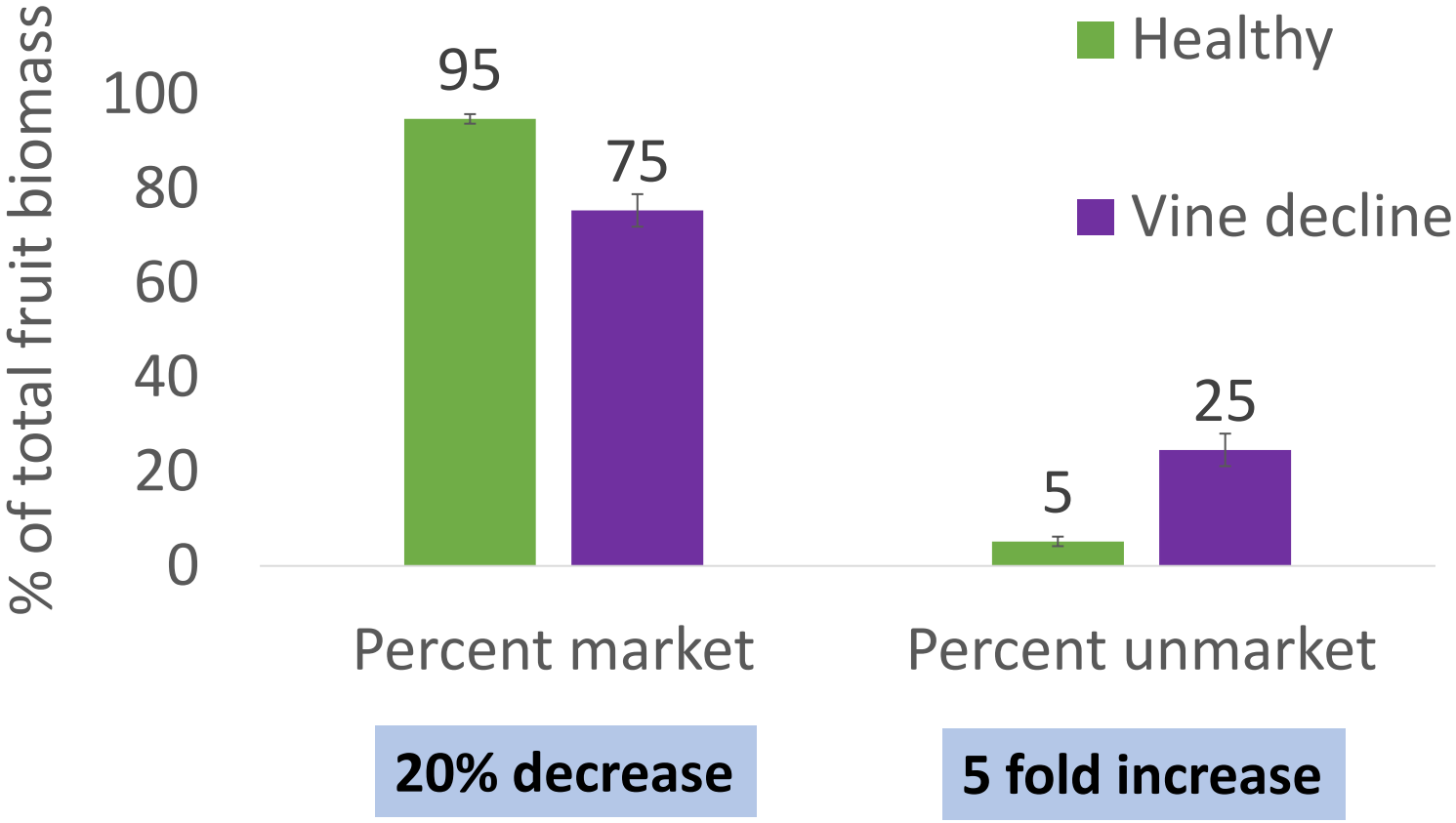


With 20-60% of plants developing premature decline in commercial fields



Premature vine decline causes sunburn and fruit rot

…significantly reducing yields and increasing unmarketable fruit in some cultivars



The good: Managing *Fusarium falciforme*

Commercial cultivar resistance

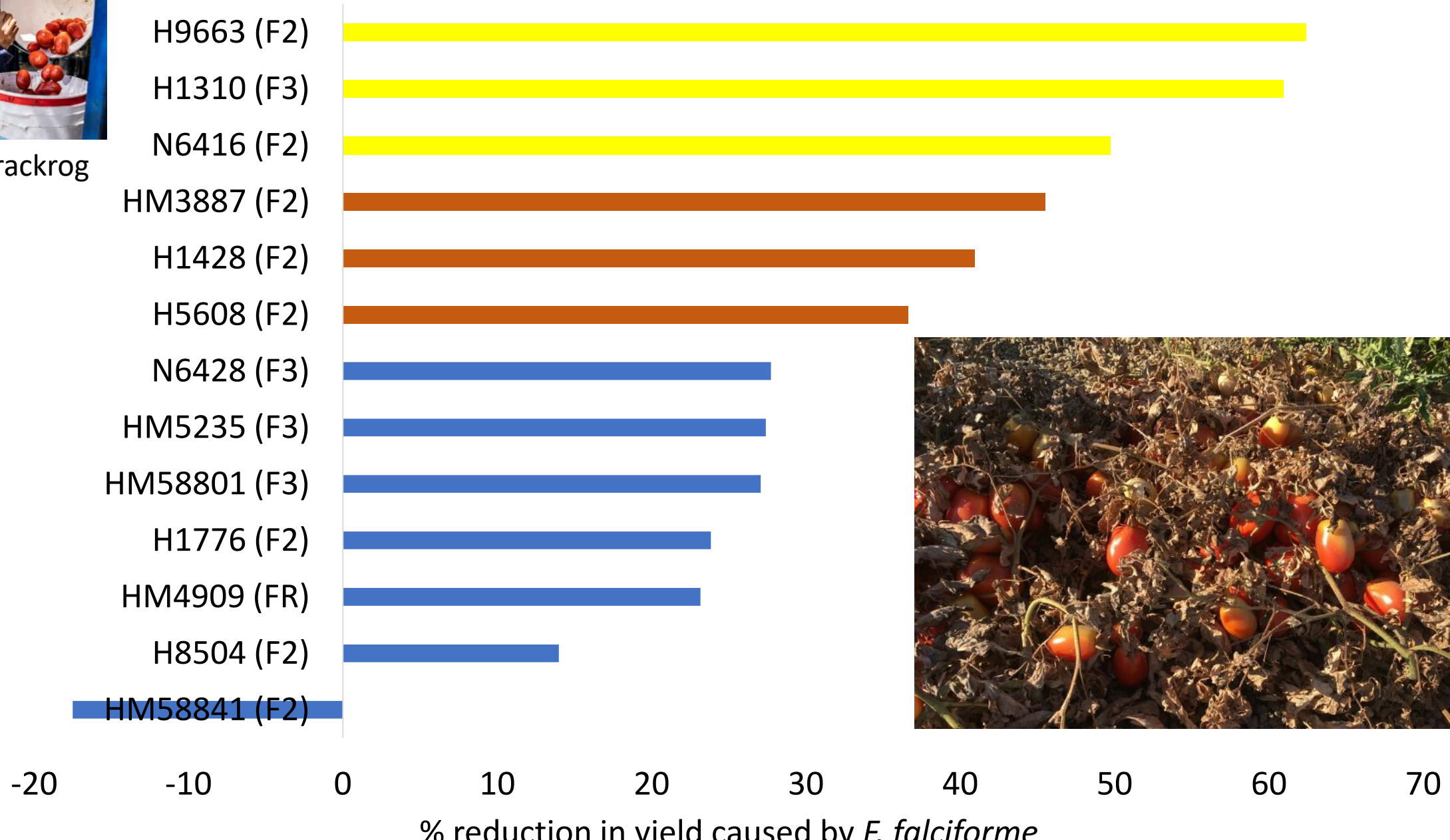
Development of resistance screening protocols


Alyssa Brackrog

All cultivars: 85-100% of all plants developed rot

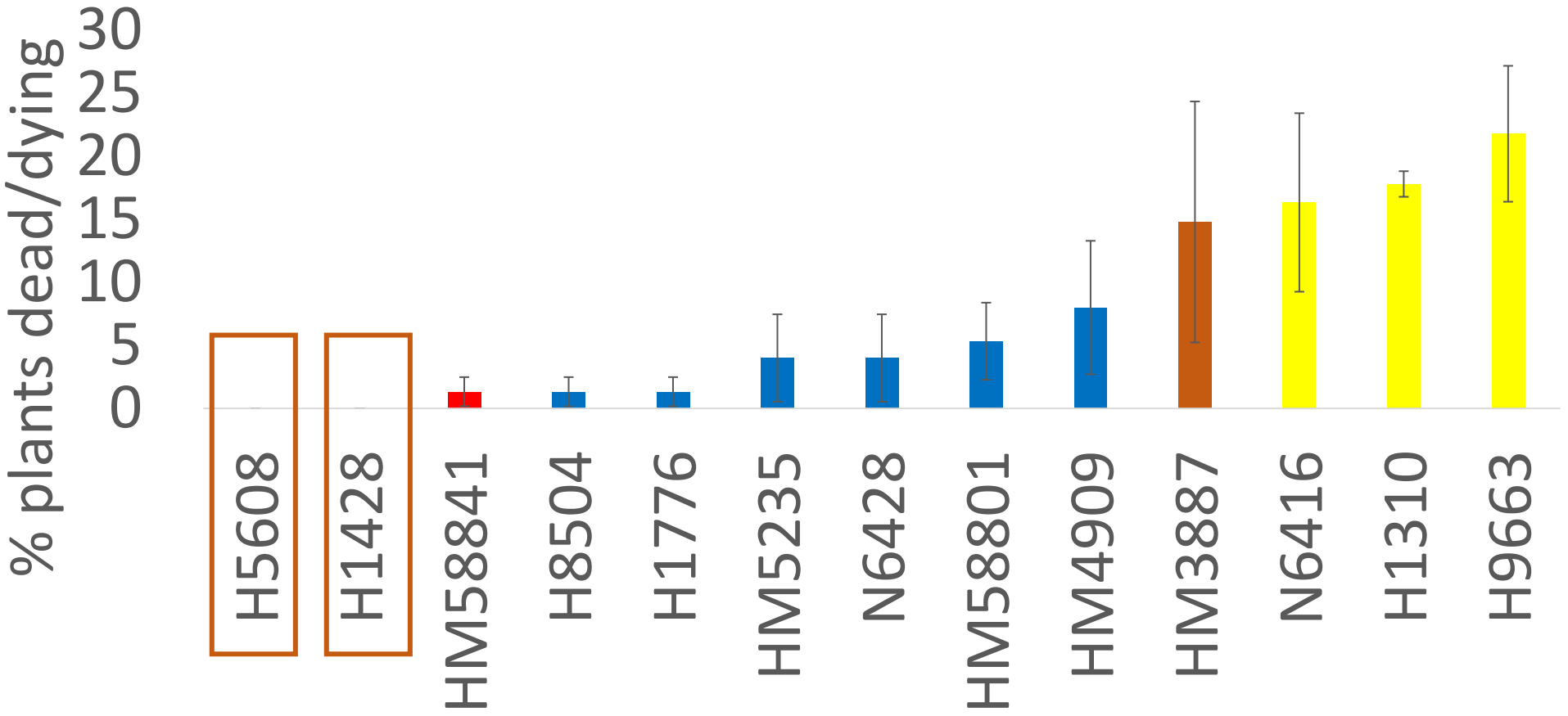
Alyssa Brackrog

Fusarium falciforme varies in impacts on yields

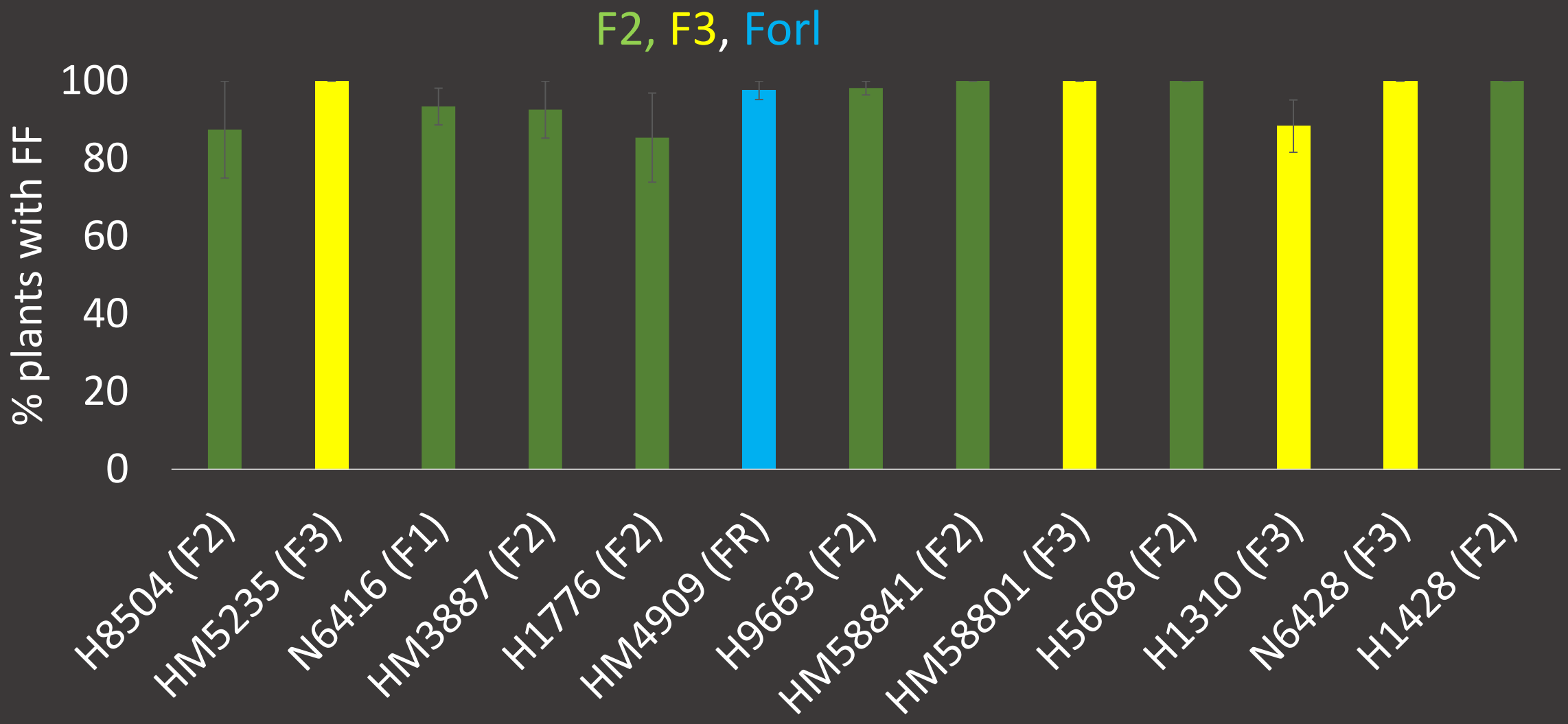


Alyssa Brackrog

Better yield performance associated with lower premature vine decline incidence



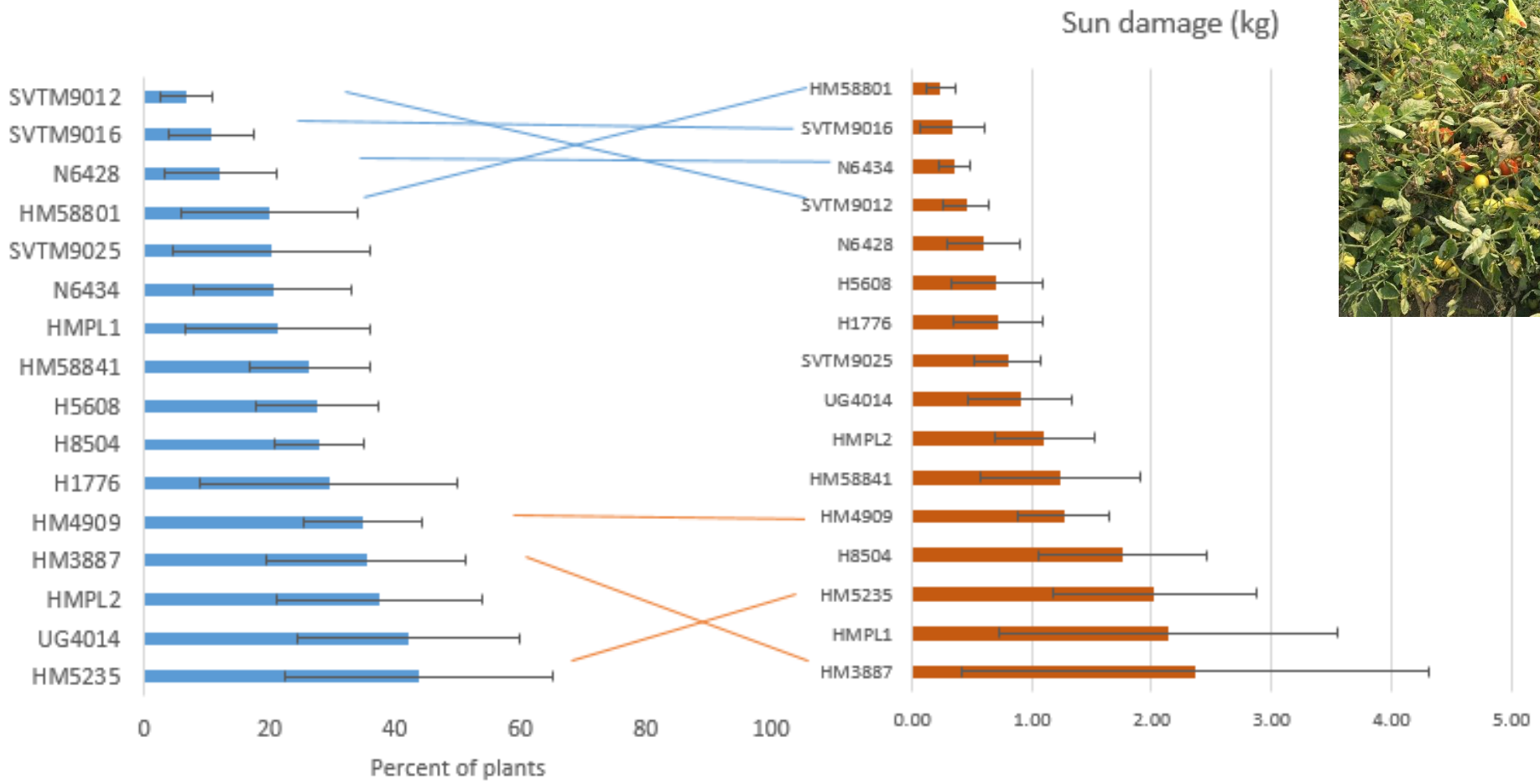
No connection between resistance to Fusarium wilt (F1,2,3) or Fusarium crown and root rot (Fr)



Developing screening protocols for industry breeding efforts in collaboration with seed companies

- Connecting disease phenotypes in the field with field performance traits

Connecting decline phenotype with yield performance



Developing screening protocols for industry breeding efforts in collaboration with seed companies

- Connecting disease phenotypes in the field with field performance traits
- Developing high throughput resistance screening protocols

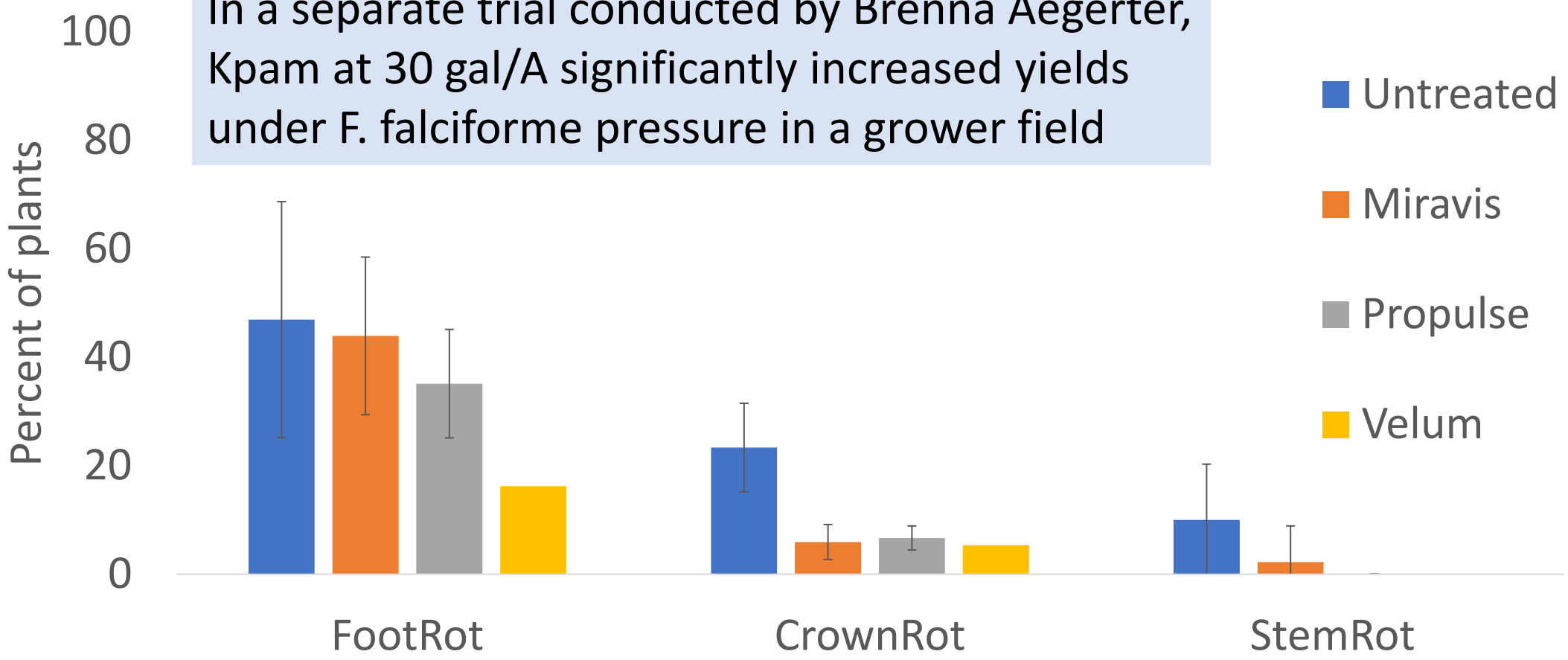
Developing high throughput resistance screening protocols to generate field-relevant phenotypes

Developing screening protocols for industry breeding efforts in collaboration with seed companies

- Connecting disease phenotypes in the field with field performance traits
- Developing high throughput resistance screening protocols
- Screening materials for companies in F. falciforme infested fields (NOT IN 2021)
  - Genetic individuals
  - Replicated trials

On-farm management options-Effect of drip applied fungicides on *F. falciforme*

In a separate trial conducted by Brenna Aegerter, Kpam at 30 gal/A significantly increased yields under F. falciforme pressure in a grower field



The amazing Swettonians!

- **People who conducted/assisted with these projects**: **Alyssa Brackrog, Kelley Paugh, Johanna Del Castillo, Erin Helpio,** Beth Hellman, Justine Beaulieu, Megan Kozel, Andrea Paulk, Karla Espino, Mirialini Narayan,Harrison Powell, Greg Sugwara, Elver Raymundo, Emma Centeno
- **Field support**: Bryan Pellissier, Lexi, Armstrong field assistants
- **Collaborating farm advisors:** Brenna Aegerter, Gene Miyao, Amber Vinchesi, Tom Turini, Joe Nunez, Scott Stoddard, Margaret Lloyd, Joe Nunez
- **Research advisors:** Zach Bagley, industry breeders and pathologists, **many tomato growers**
- **COVID adaptation support: TS &L transplant donation; Zach Bagley harvest assistance**

California Tomato Research Institute

California Department of Pesticide Regulation

Heinz

BASF We create chemistry

BAYER

UnitedGenetics

HM.CLAUSE

nunhems

Seminis


Thank you!
Questions?
clswett@ucdavis.edu