Management of southern blight in tomatoes

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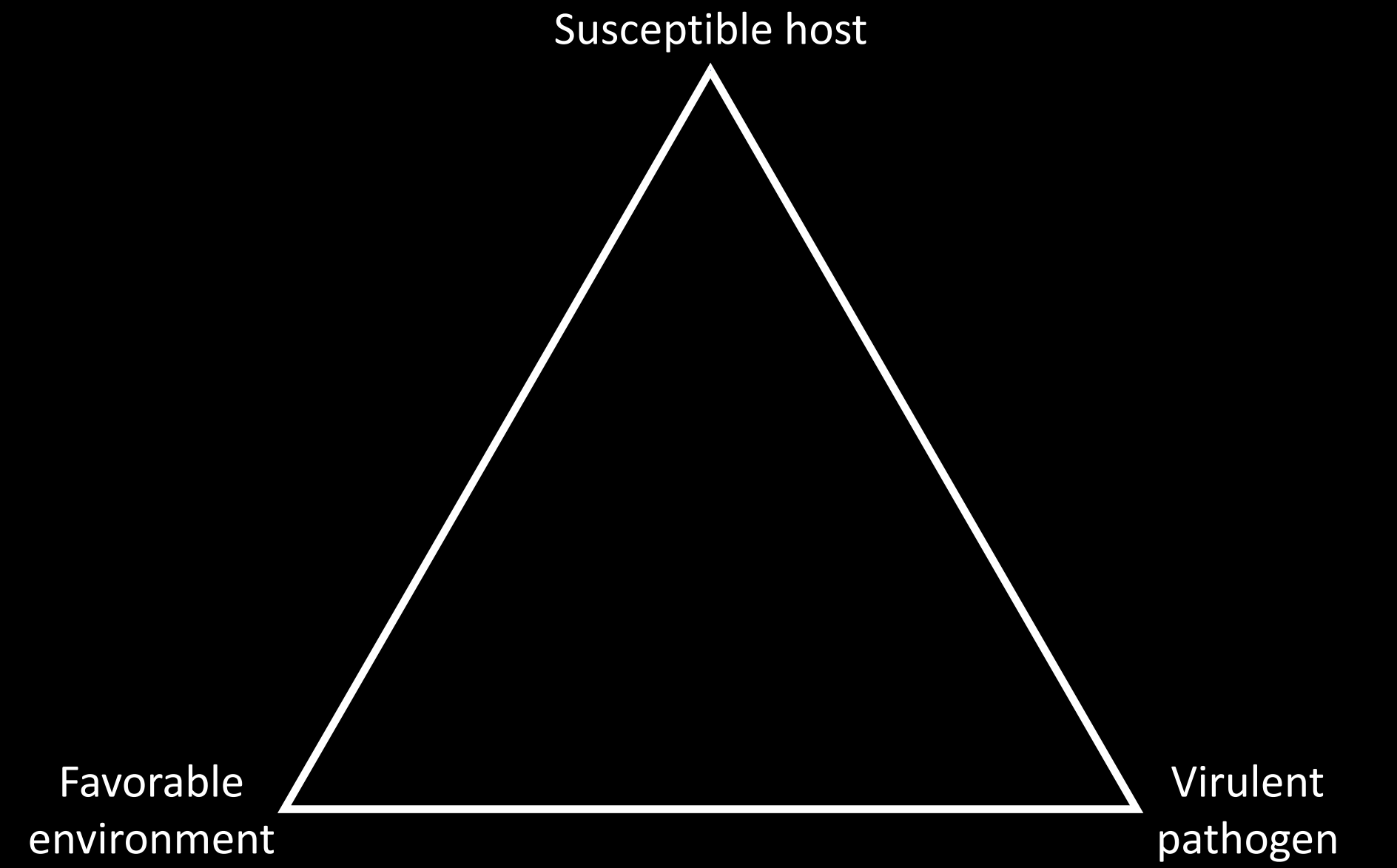
You Will Be Able To

- Describe features important for identifying the southern blight pathogen
- Describe why chemical management of southern blight of tomato is difficult
- Design a cultural program for southern blight management

Disease Triangle



Southern blight

Susceptible host

Favorable environment

Virulent pathogen

Distribution in Field

Roughly circular patches

Symptoms

Sudden wilt

Symptoms

Collapse and death

Signs of *Athelia rolfsii* (*Sclerotium rolfsii*)

Sclerotia (small, round, tan-reddish brown)

Signs of *Athelia rolfsii* (*Sclerotium rolfsii*)

R. Melanson, Miss. St. Univ., Bugwood.org

Mycelium (white threads in fan-like pattern)

Identification

G. Holmes, Cal Poly SLO, Bugwood.org

Incubate in sealed bag or box with moist paper towel at warm temperature

Athelia rolfsii (*Sclerotium rolfsii*)

Can cause disease on over 500 plant species

Factors favoring southern blight

Susceptible host

- Unprotected stem tissue at soil line
- Susceptible cultivar

Favorable environment

- High temperatures
- High soil moisture

Virulent pathogen

- Rotation with susceptible host crops
- Build-up of sclerotia of pathogen

Management – Chemical

- FACTOR: unprotected stem tissue at soil line
- Fungicides (by FRAC Group Code)
  - 3: DMI
    - Tebuconazole
  - 7: SDHI
    - Flutolanil
    - Penthiopyrad
  - 11: strobilurins/QoI
    - Azoxystrobin
    - Pyraclostrobin
- Fungicide must be applied to stem tissue at soil line
- Often not a feasible option for processing tomato because disease is most active when canopies are full

Management – Chemical

- FACTOR: excessive numbers of pathogen sclerotia
- Fumigants
  - Metam sodium
  - Metam potassium
- Ideally applied through sprinklers for maximum coverage of top 6 in. of soil
  - Sprinkler application not allowed in many counties
- Shank application can be less effective due to inadequate coverage of top 6 in. of soil

Management – Cultural

- FACTOR: High soil moisture
  - Reduce moisture at soil surface
  - Avoid cycling between wet and dry conditions
- FACTOR: High temperature
  - Plant early to avoid high temperatures of late summer
  - Good option for fields with recent history of southern blight

Management – Cultural

- FACTOR: build-up of pathogen sclerotia*
  - Selection of crop rotation partners
    - Crops that don't support much growth of pathogen: corn, wheat, millet, oats
    - Avoid crops favored by pathogen: legumes (beans, peas, hairy vetch)
    - Crops that suppress pathogen when residue incorporated: mustard
  - Deep plowing to bury sclerotia
    - Reduces germination and survival
    - May spread pathogen in field
- *Sclerotia can survive 3-4 years

Management – Plant Resistance

- Often the cornerstone of managing any plant disease
- Resistance could mean:
  - Complete: no disease
  - Partial: some disease, but less (less susceptible)
- Can plant resistance be used to manage southern blight?

2017 Grafting Studies

- Acknowledgements
  - Joe Nunez (UC Coop. Ext. Kern Co.)
  - Natalie Solares (M.S. student, UC Riverside)
  - Cassandra Swett (UC Davis)
  - J.G. Boswell

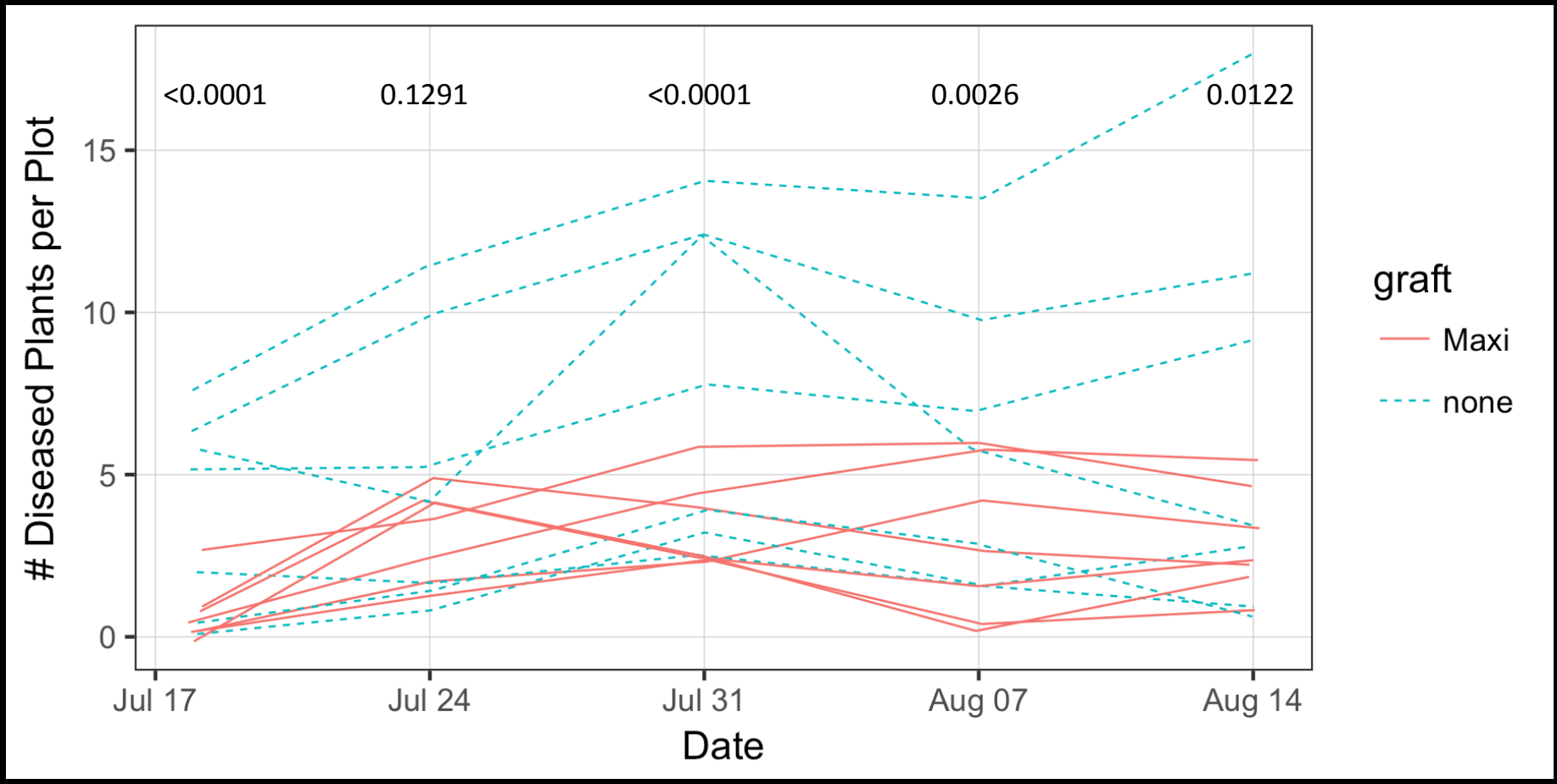
- OBJECTIVE: Evaluate grafting commercial cultivars to resistant rootstocks

- Maxifort
  - Hybrid between tomato and wild tomato (*S. lycopersicum* × *S. habrochaites*)
  - Resistant to southern blight, root knot nematode

2017 Grafting Studies

- Two cultivars: Heinz 5608 and 8504
- Two grafting treatments:
  - Non-grafted
  - Grafted to hybrid cultivar Maxifort
- Locations
  - Commercial field (Kern Co.)
    - Single row, 12 in. plant spacing, 500 ft. plots, subsurface drip
  - Research field (Shafter)
    - Single row, 12 in. plant spacing, 20 ft. plots, surface drip
  - Greenhouse (UC Riverside)
    - Single plant per pot; 4 inoculum levels

2017: Commercial Field – Disease

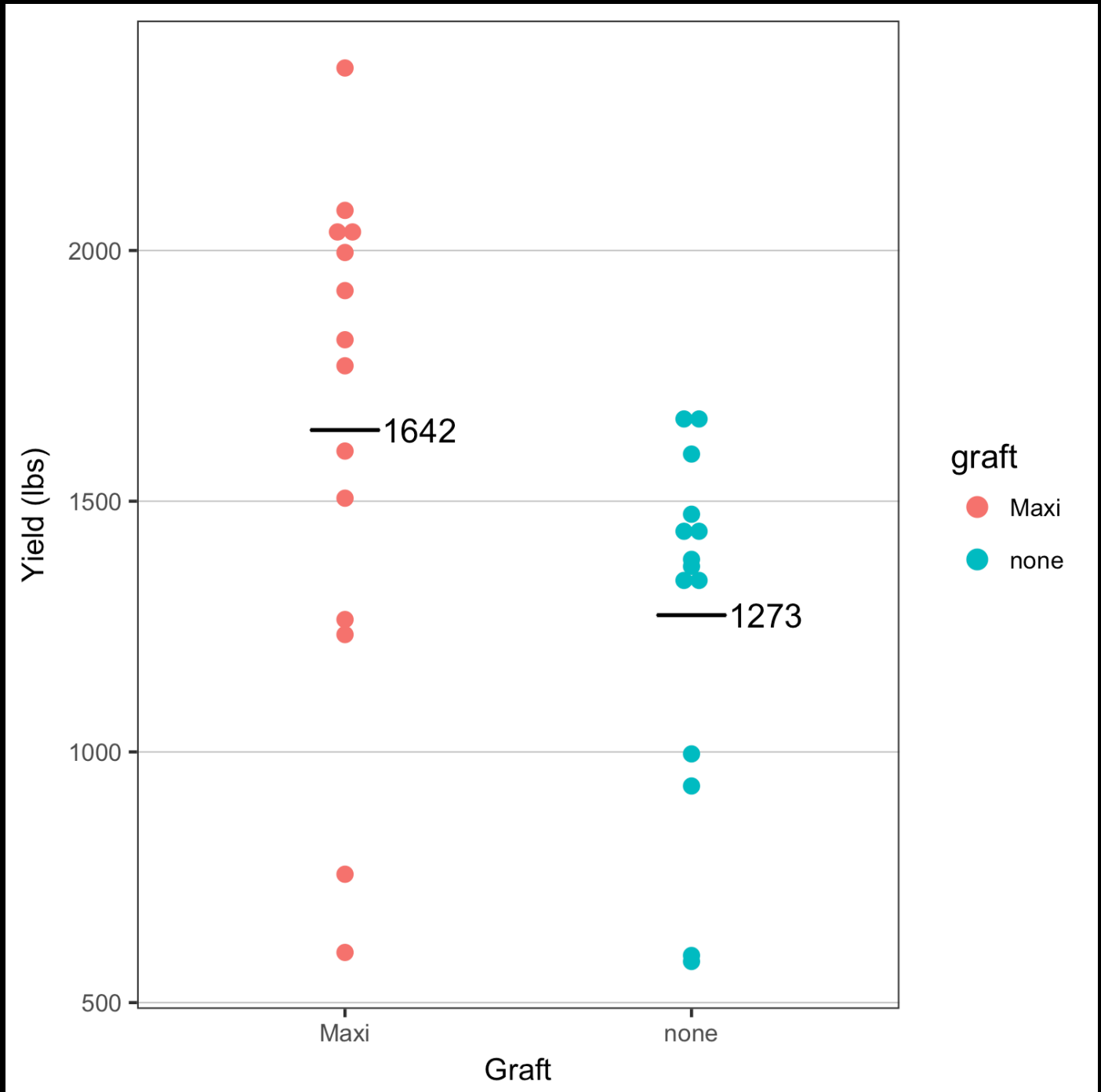


Disease was significantly lower in grafted plots (on 4 of 5 dates), regardless of cultivar

2017: Commercial Field – Disease

H5608	H8504	H5608	H8504
Maxifort	none	none	Maxifort

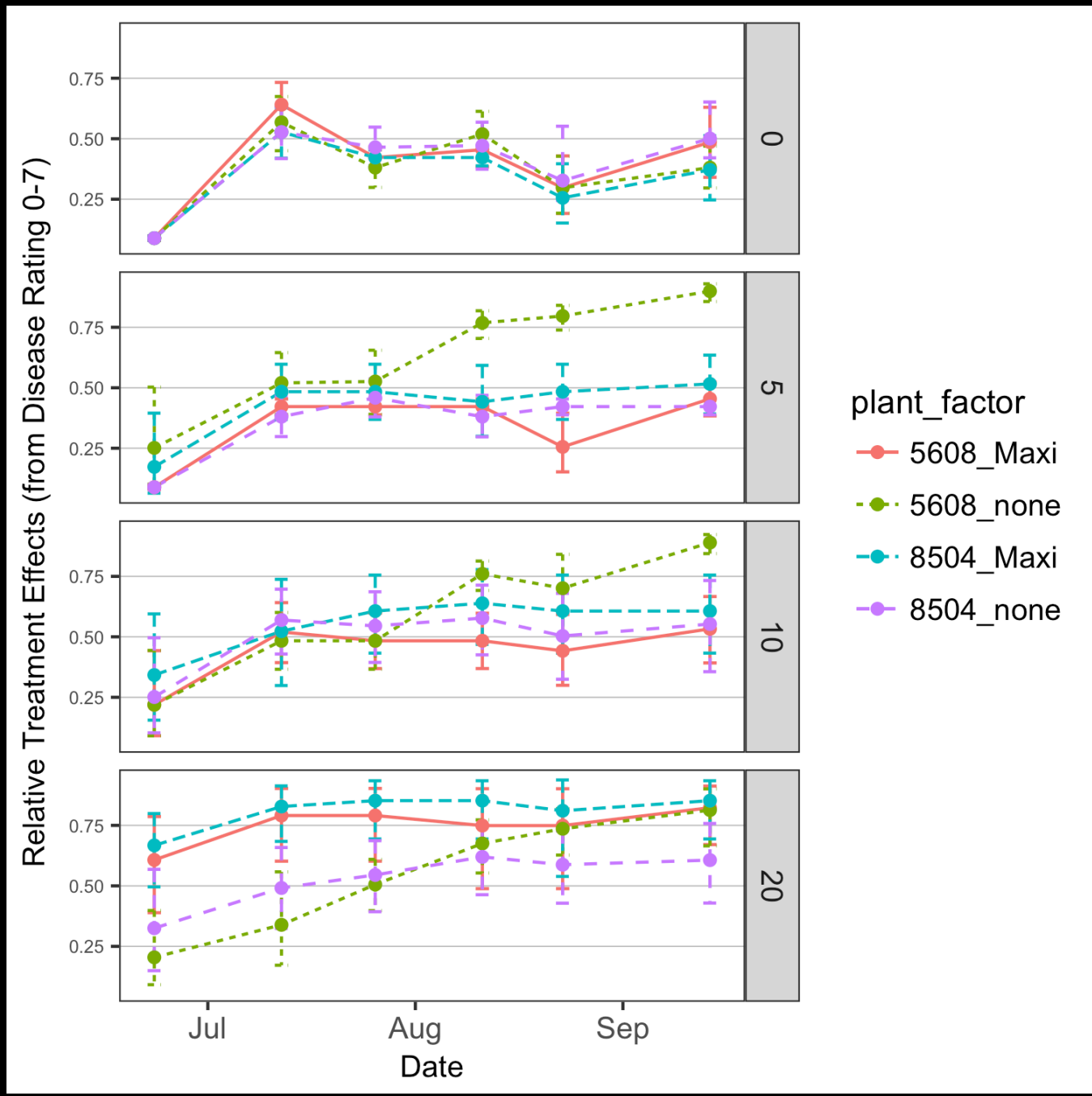
2017: Commercial Field – Yield



- Yield was 29% higher in grafted plots
- Effect of cultivar was not significant

2017: Greenhouse Study

Greenhouse Study – Disease Severity



- When 5608 was grafted to Maxifort, southern blight was significantly lower

2017 Grafting Studies – Summary

- Grafting commercial cultivars to resistant rootstocks reduced southern blight
- Results are preliminary
- 2018:
  - Evaluate susceptibility of commercial cultivars
  - Reduce occurrence of southern blight of grafted plants

Summary

- Identification: mycelium in fan pattern, tan-reddish brown sclerotia
- Chemical management of southern blight is difficult due to full canopies and application restrictions
- Cultural options to manage southern blight include
  - Manage soil moisture
  - Plant early
  - Select crop rotation partners
  - Deep plowing