Preventing & Managing Strawberry Anthracnose Resistance

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http://phytographics.com/

Strawberry Anthracnose is Fungal

http://phytographics.com/

Anthracnose on strawberry fruit

- Caused by *Colletotrichum* spp.

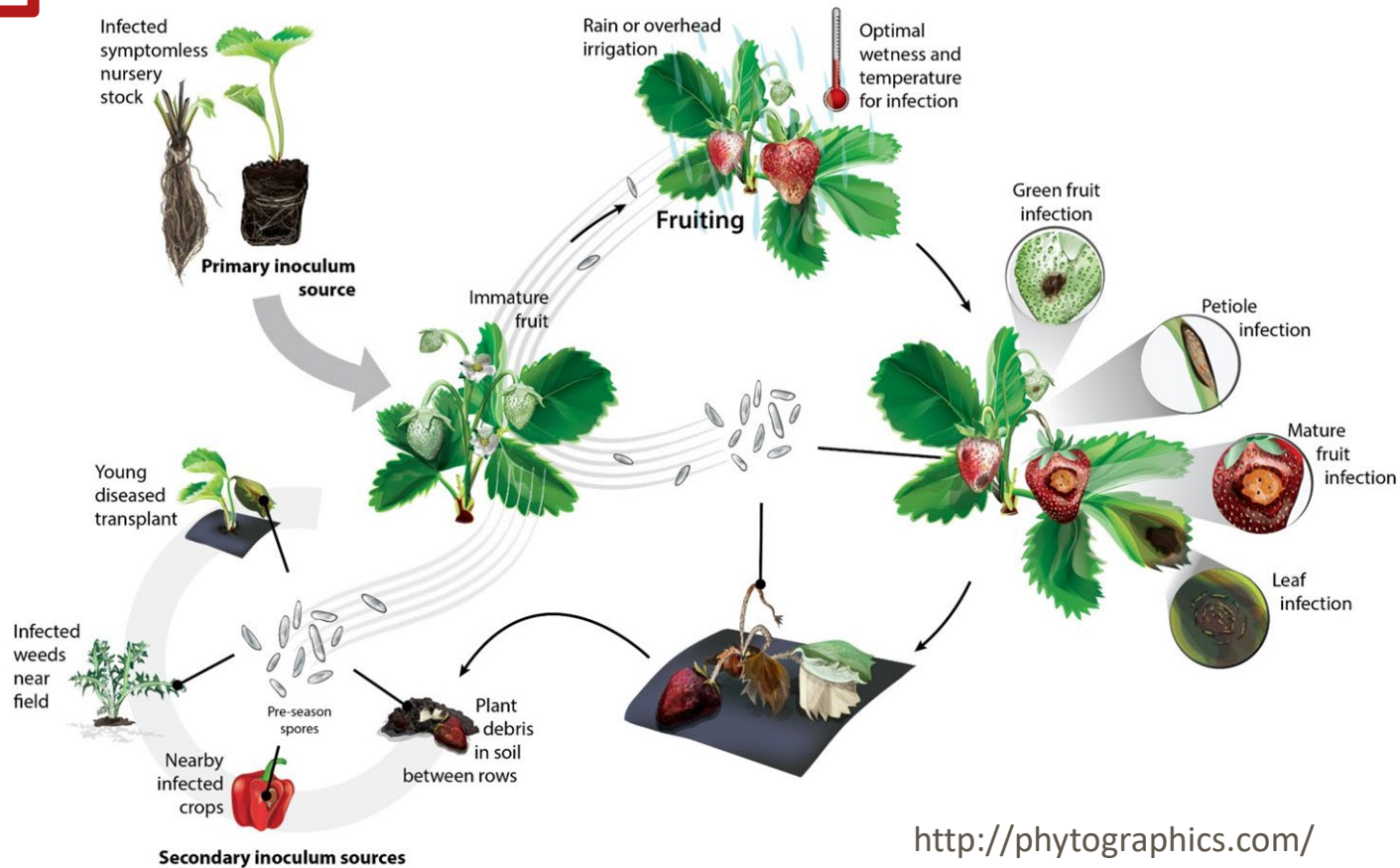- All parts of the plant (fruit, crowns, leaves, petioles and runners) are susceptible

https://content.ces.ncsu.edu/anthracnose-crown-rot-of-strawberry

Anthracnose on strawberry crown

Life Cycle

Anthracnose on Strawberry
(*Colletotrichum acutatum*)

Infected symptomless nursery stock

Primary inoculum source

Rain or overhead irrigation

Optimal wetness and temperature for infection

Fruiting

Immature fruit

Green fruit infection

Petiole infection

Mature fruit infection

Leaf infection

Young diseased transplant

Infected weeds near field

Pre-season spores

Nearby infected crops

Plant debris in soil between rows

Secondary inoculum sources

http://phytographics.com/

Colletotrichum is complex!

Colletotrichum
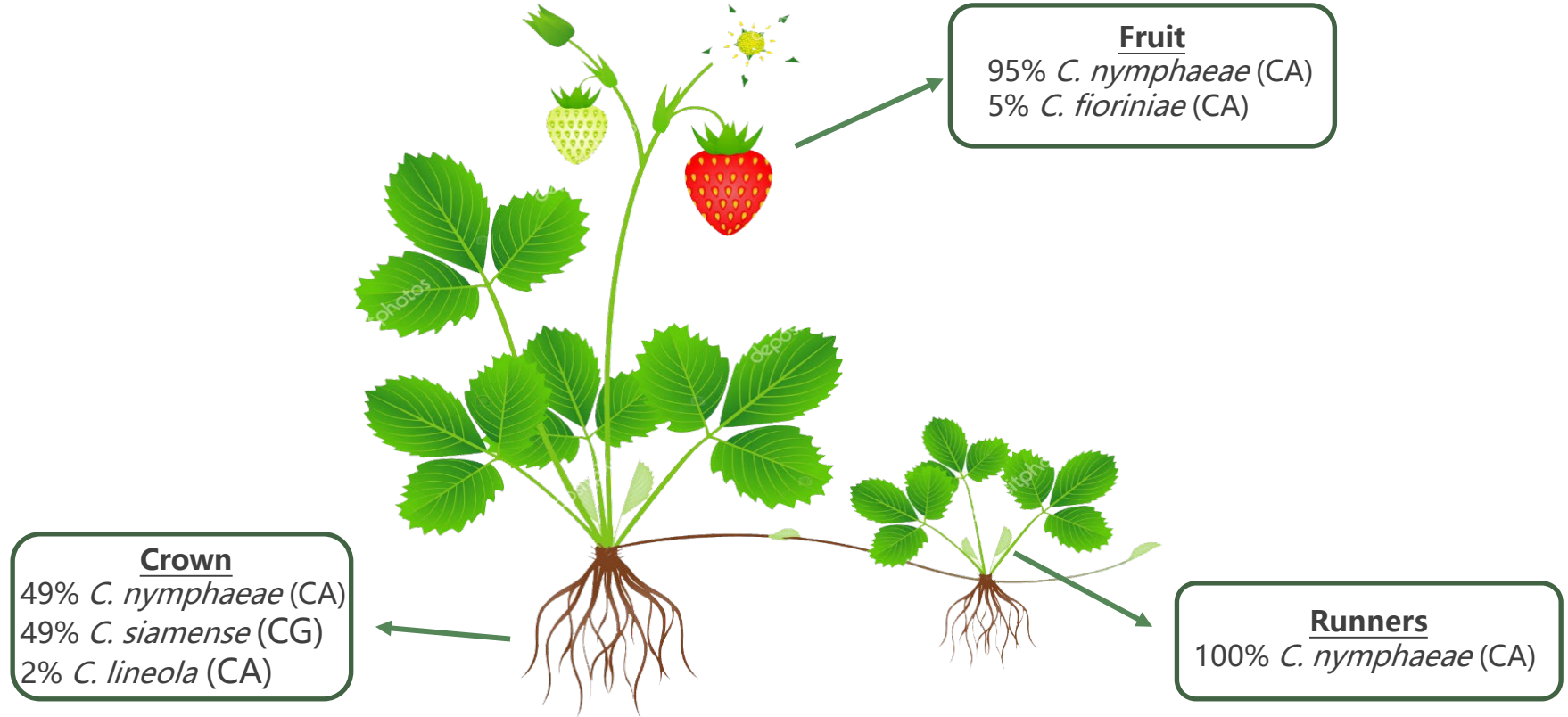
Colletotrichum acutatum complex
31 spp. in total
CA

Colletotrichum gloeosporioides complex
22 spp. in total
CG

Species Identification

200 isolates collected from MD, VA, PA, and NC

Fruit
95% *C. nymphaeae* (CA)
5% *C. fioriniae* (CA)

Crown
49% *C. nymphaeae* (CA)
49% *C. siamense* (CG)
2% *C. lineola* (CA)

Runners
100% *C. nymphaeae* (CA)

Fungicide efficacy: crown rot

Treatments

1) Not inoculated
2) No fungicide
3) FRAC 11: Abound (8 fl oz/100 gal)
4) FRAC 9;12: Switch (8 oz/100 gal)
5) FRAC 7: Kenja 400SC (15.5 fl oz/acre)

Mode of action and resistance are critical

Not inoculated

Inoculated
No fungicide

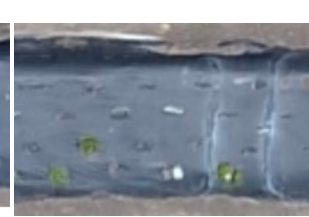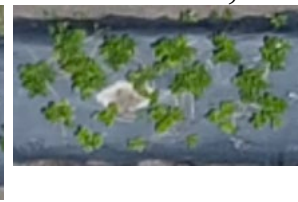Inoculated
FRAC 7

Inoculated
FRAC 9;12

SENSITIVE
Inoculated
FRAC 11

Resistant
Inoculated
FRAC 11

Resistance Frequency in Mid-Atlantic

FRAC 11 (Azoxystrobin)

Sensitivity	CA	CG
Resistant	40%	100%
Moderately Resistant	7%	0%
Sensitive	53%	0%

FRAC 1 (Thiophanate-methyl)

Sensitivity	CG
Resistant	63%
Moderately Resistant	0%
Sensitive	36%

Fungicide Efficacy and Resistance

Fungicide Class	Efficacy (CA)	Efficacy (CG)	Resistance?
FRAC 1	✗	✓	Common
FRAC 3	✓	✓	Reduced sensitivity
FRAC 7	✗	✗	Not known
FRAC 11	✓	✓	Common
FRAC 12	✓	✗	Rare/not found
FRAC M3/4	✓	✓	Rare/not found

# How to preserve good chemistries with effective control?

- Rotate modes of action
- Utilize multi-site and bio-rational fungicides during lower disease pressure
- Apply only when absolutely necessary
    - Not necessary during dry periods
    - Only between bloom and harvest for fruit rot
    - Use models

Disease prediction models for AFR and BFR

- Strawberry Advisory System (StAS) developed in Florida (Pavan et al. 2011, MacKenzie and N. A. Peres 2012)

  - On average 40% reduced fungicide use compared to (weekly) calendar sprays

  - No significant differences in marketable yield

- AFR and BFR Models available on NEWA

  - https://newa.cornell.edu/

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AFR and BFR models in the Mid-Atlantic?
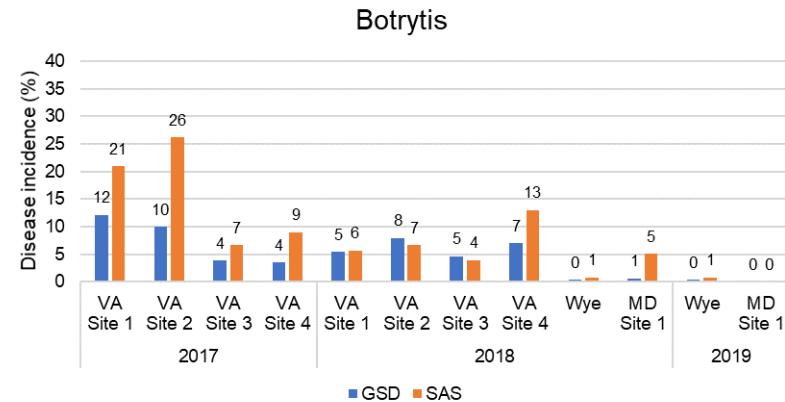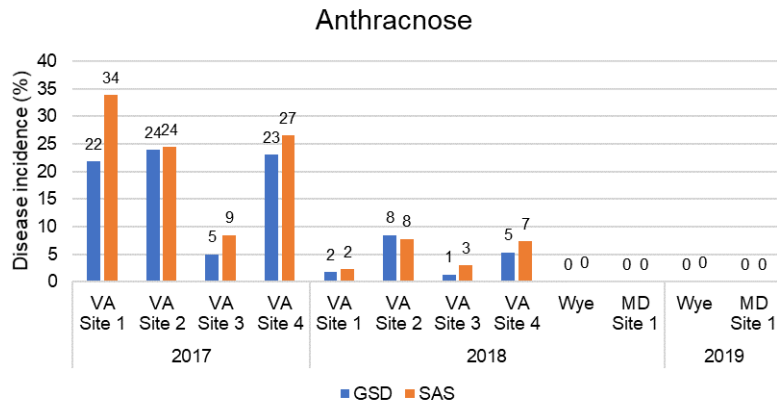
Similar disease control

32% fewer sprays

Summary

- Anthracnose is caused by *C. acutatum* and *C gloeosporioides*
  - Fruit and crown rot are detrimental

- Applying correct fungicides is highly important

- Resistance has developed to some chemical classes
  - Prevent resistance by spraying at-risk fungicides wisely