



The incidence of Grapevine Trunk Disease on varieties in Missouri



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Outline

- Background Info
- Research Questions
- Methods
- Results
- Future Work
- Conclusion



What is Grapevine Trunk Disease (GTD)?

- Fungal disease complex
- 133 species of fungi in 24 genera
- Enters vine through pruning wounds & spores spread via wind, rain, or arthropods
- Requires rain, high humidity, warm temperatures
- Results in vine decline and eventual vine death
- Management strategies are costly



Symptoms

- Interveinal chlorosis
- Shoot tip dieback
- Shriveling fruit
- Gray speckling on berries

- Cankers
- Brown discoloration of wood
- Soft yellowish wood



Research Questions

1. Does GTD incidence vary by variety?
2. Do commonly found GTD pathogens fulfill Koch's Postulates?





Does GTD incidence vary by variety?



Methods

1. Prune spurs to 4 nodes
2. Collect pruning weight
3. 4 samples from each vine, totaling 120 vines all planted in 2009



Methods

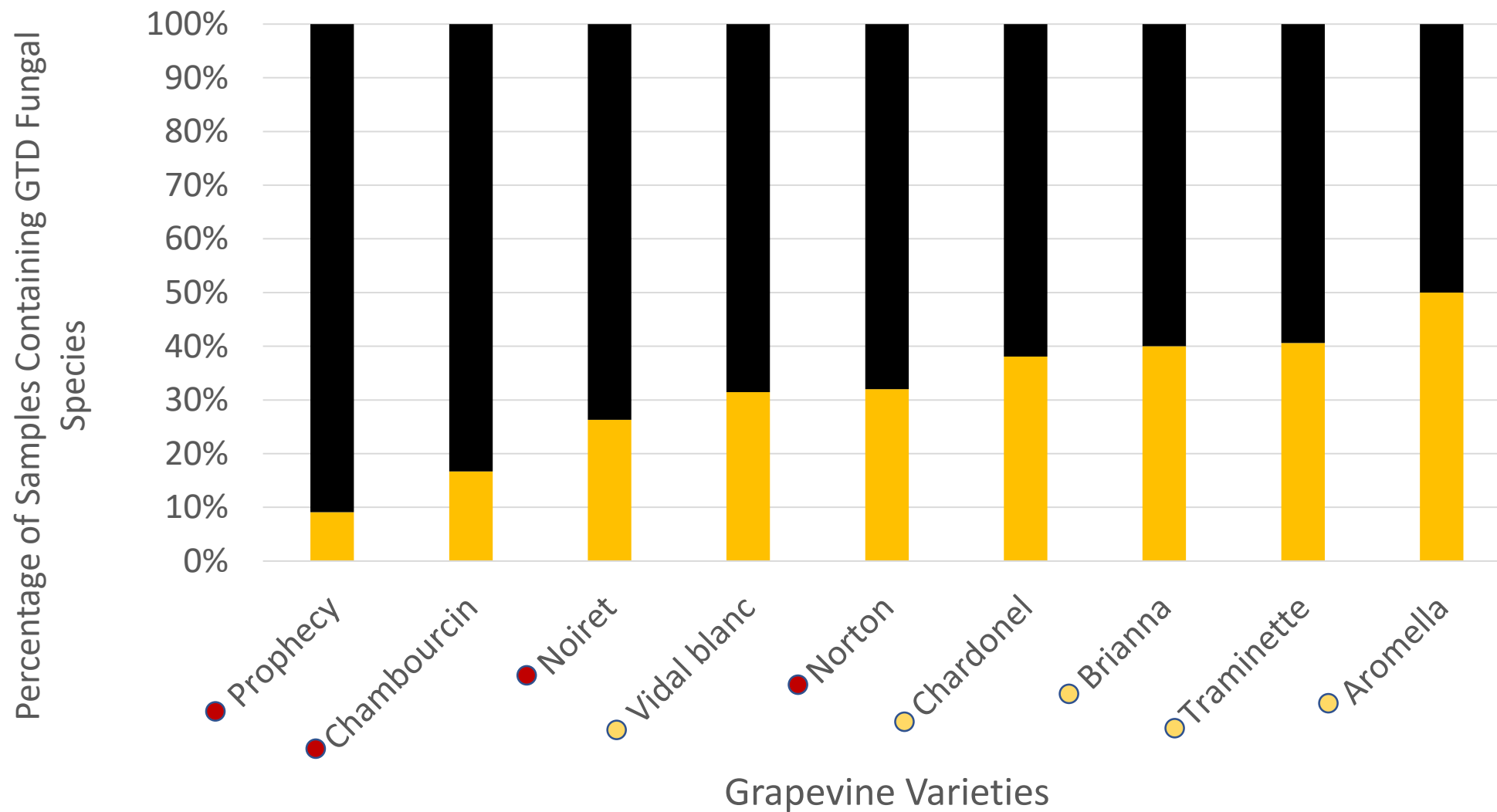
4. Surface sterilize with 10% bleach
5. Plate on PDA
6. Isolate pathogens
7. DNA extraction, PCR, & sequencing of 48 isolates for identification





● Red Variety ● White Variety ■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species

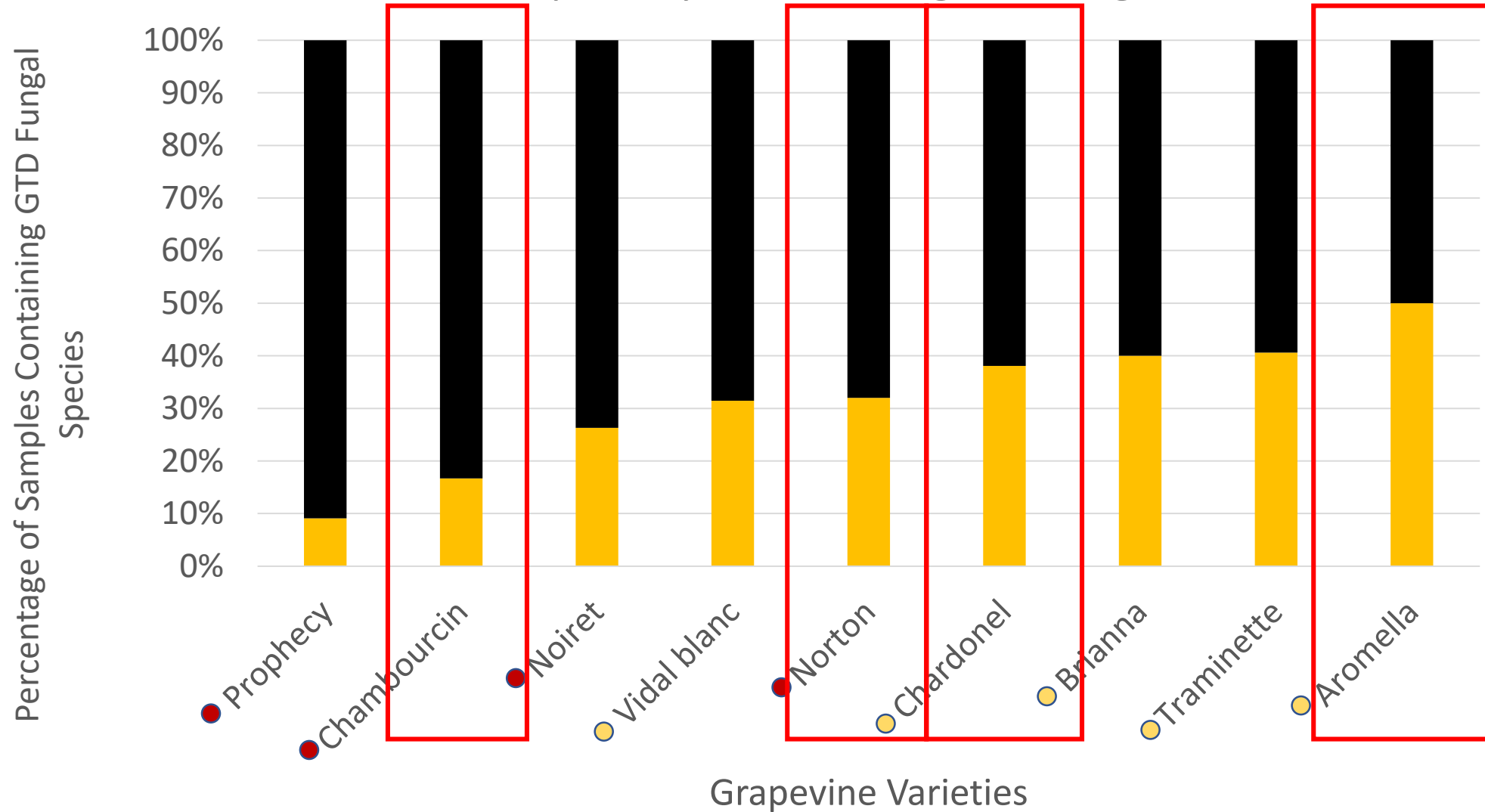
Varietal Susceptibility to GTD Fungal Pathogens





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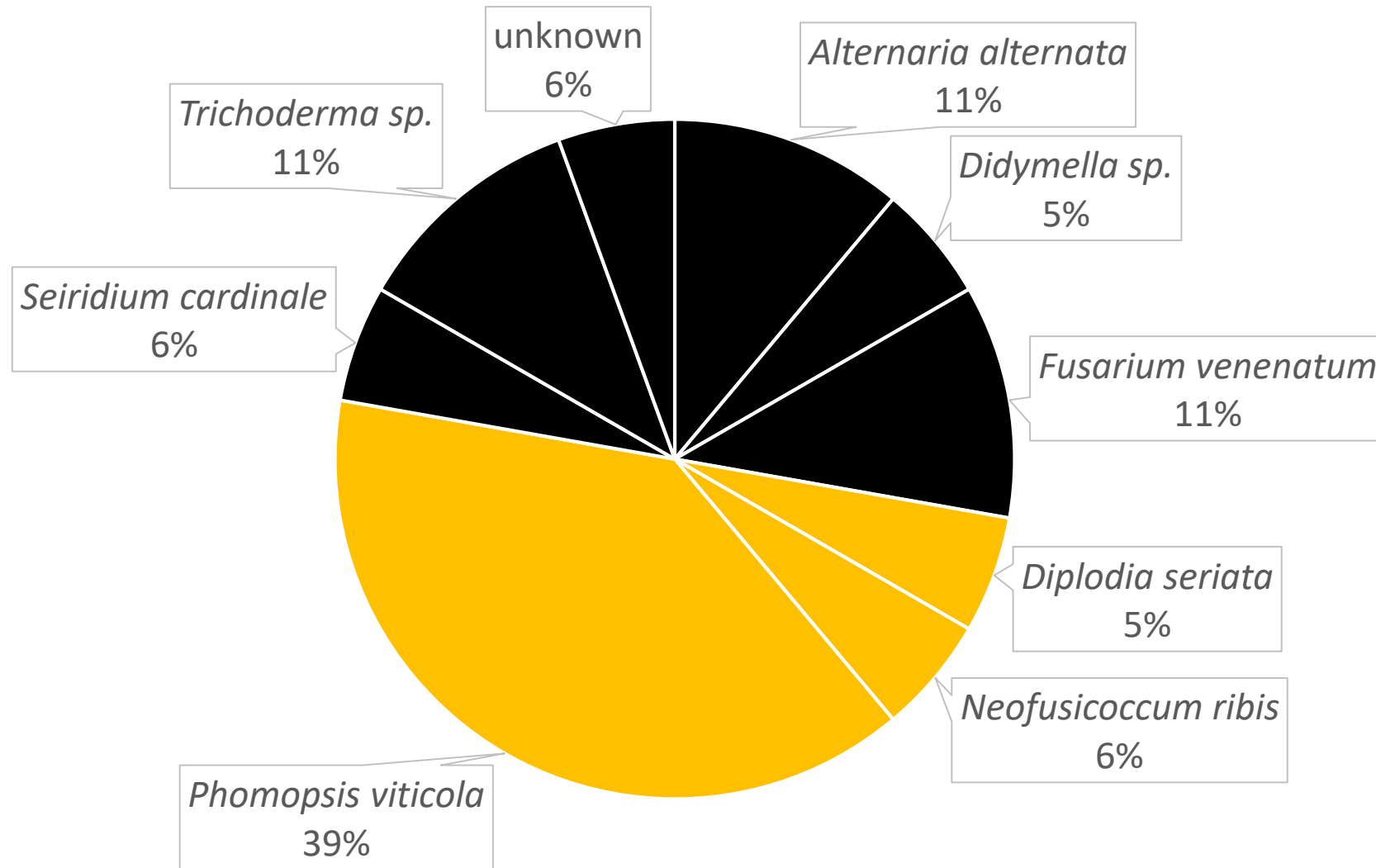
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■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



Fungal Species Found in Aromella at HARC

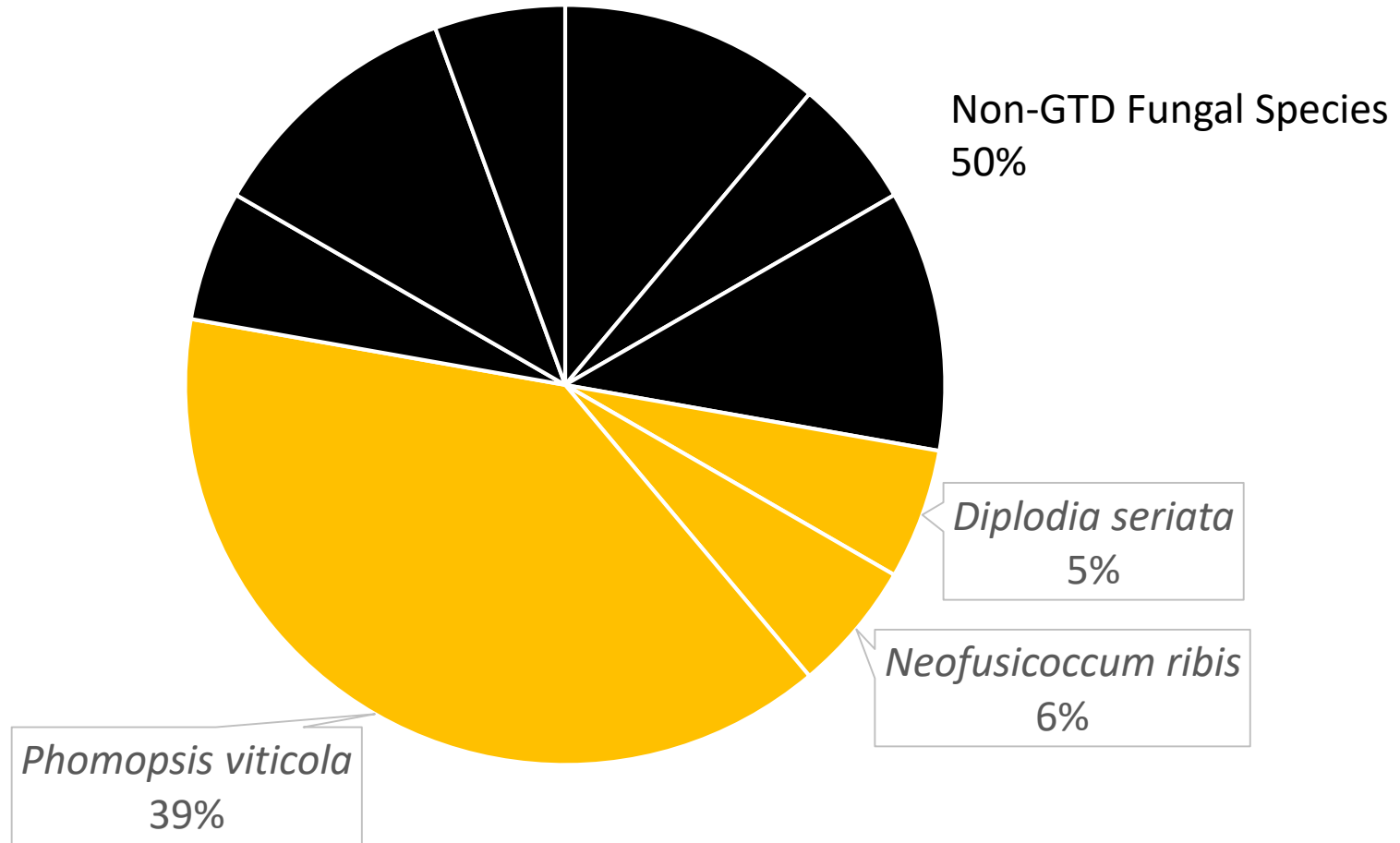


9 different fungal species found in Aromella

■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



Fungal Species Found in Aromella at HARC

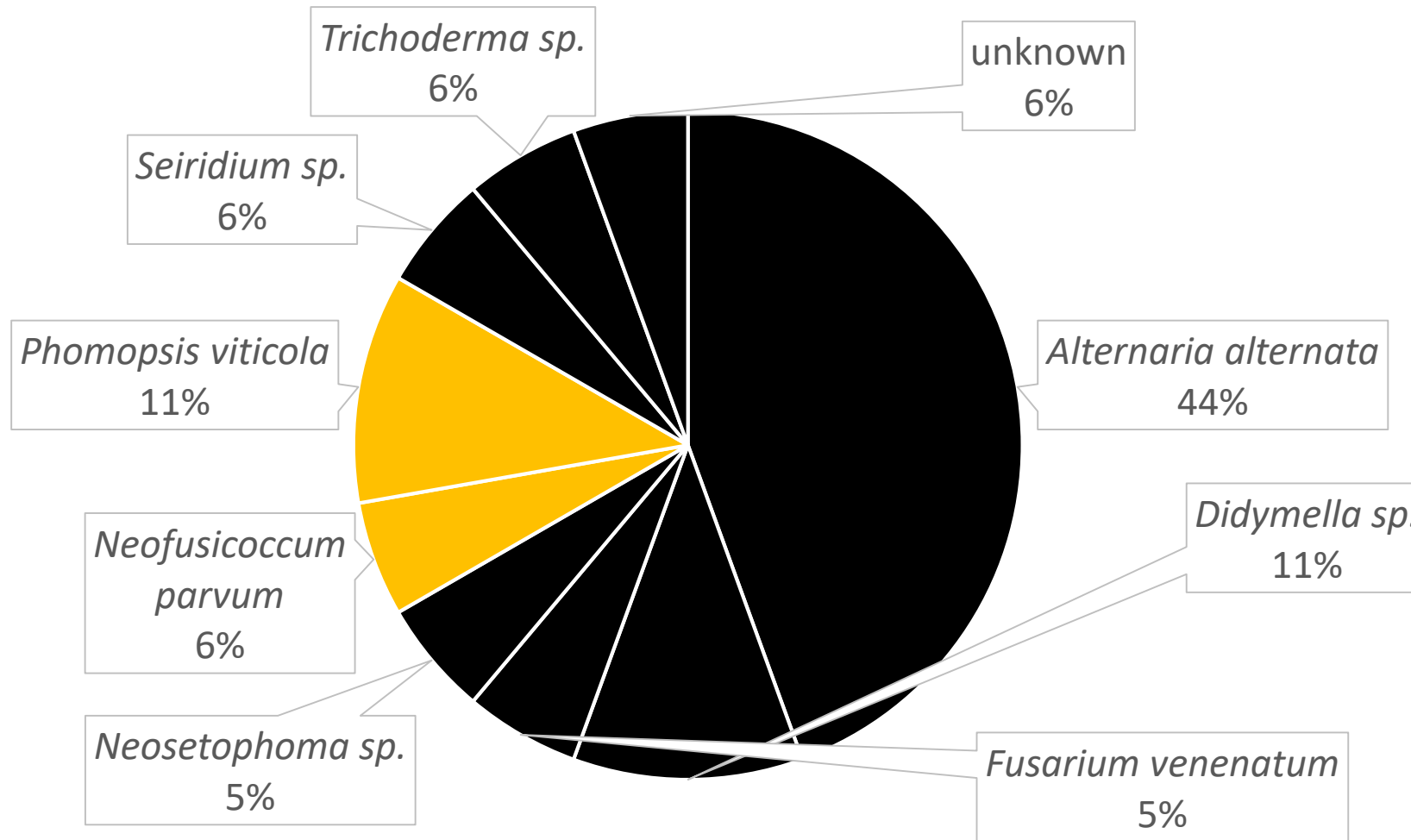


Phomopsis viticola most common species found

■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



Fungal Species Found in Chambourcin at HARC

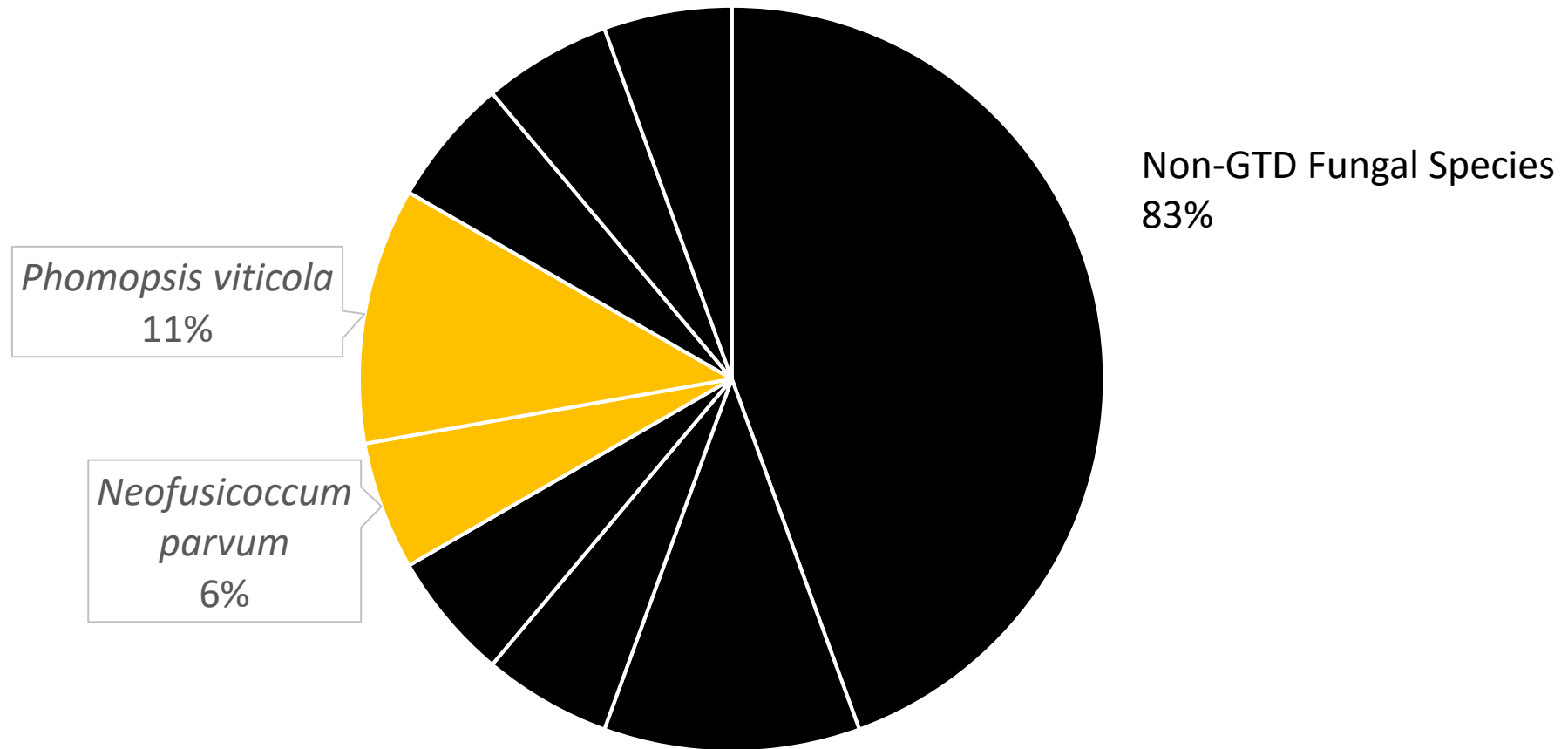


Alternaria alternata most common species found

■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



Fungal Species Found in Chambourcin at HARC

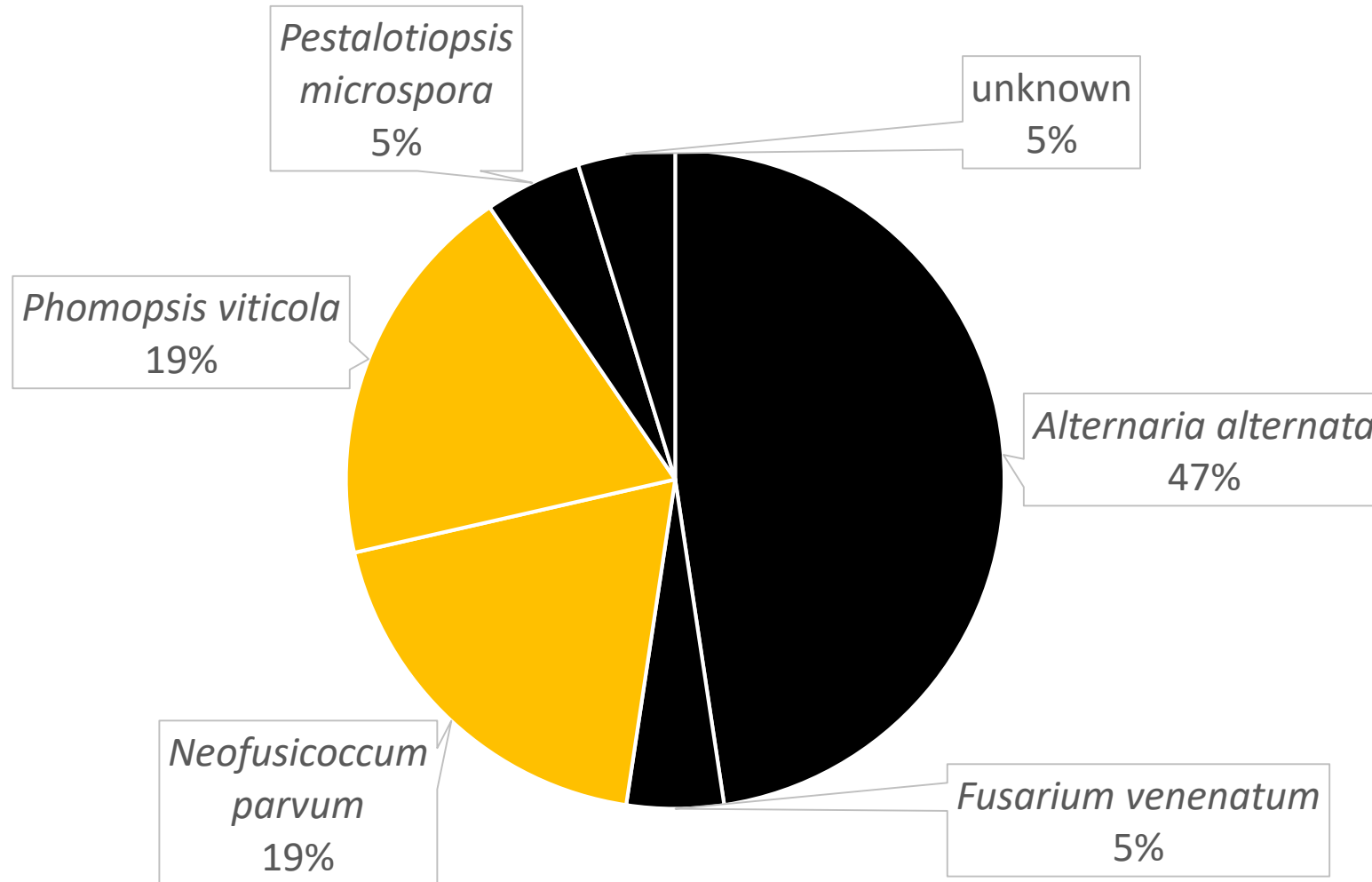


Phomopsis most common GTD pathogen found

■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



Fungal Species Found in Chardonel at HARC

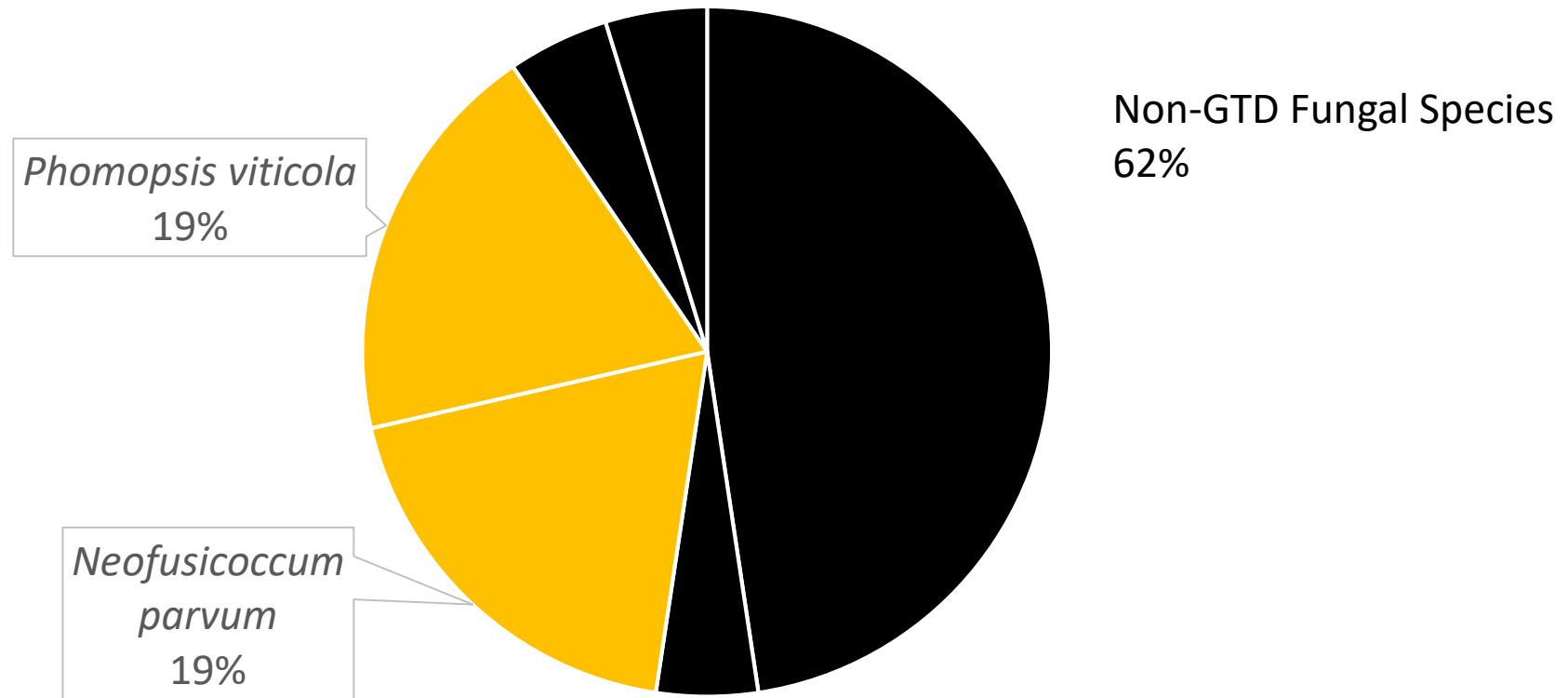


Alternaria alternata most common species found

■ Non-GTD Associated Fungal Species ■ GTD-Associated Fungal Species



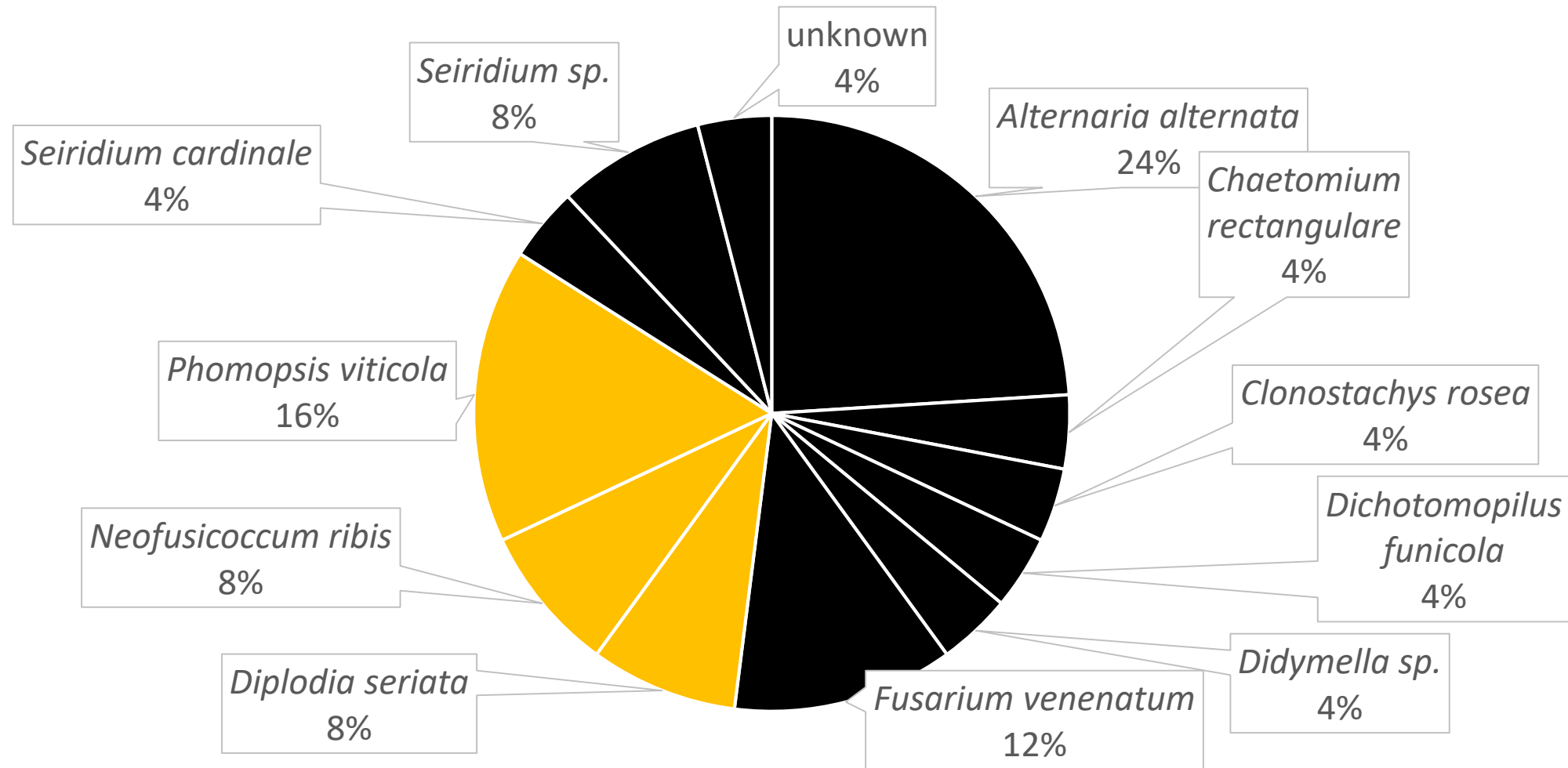
Fungal Species Found in Chardonel at HARC



Phomopsis viticola most common GTD pathogen found



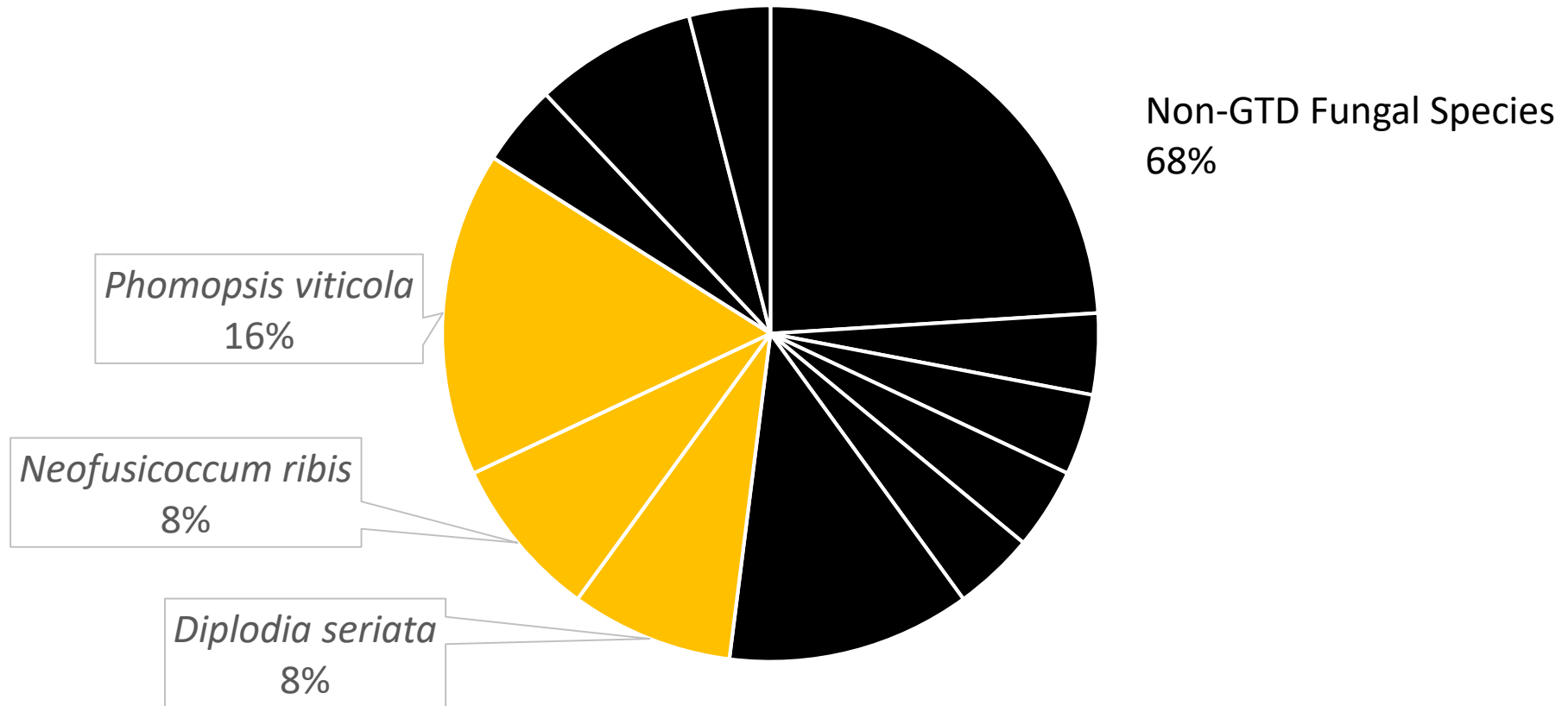
Fungal Species Found in Norton at HARC



12 fungal species found, *Alternaria alternata* most common



Fungal Species Found in Norton at HARC



Phomopsis viticola most common GTD pathogen found

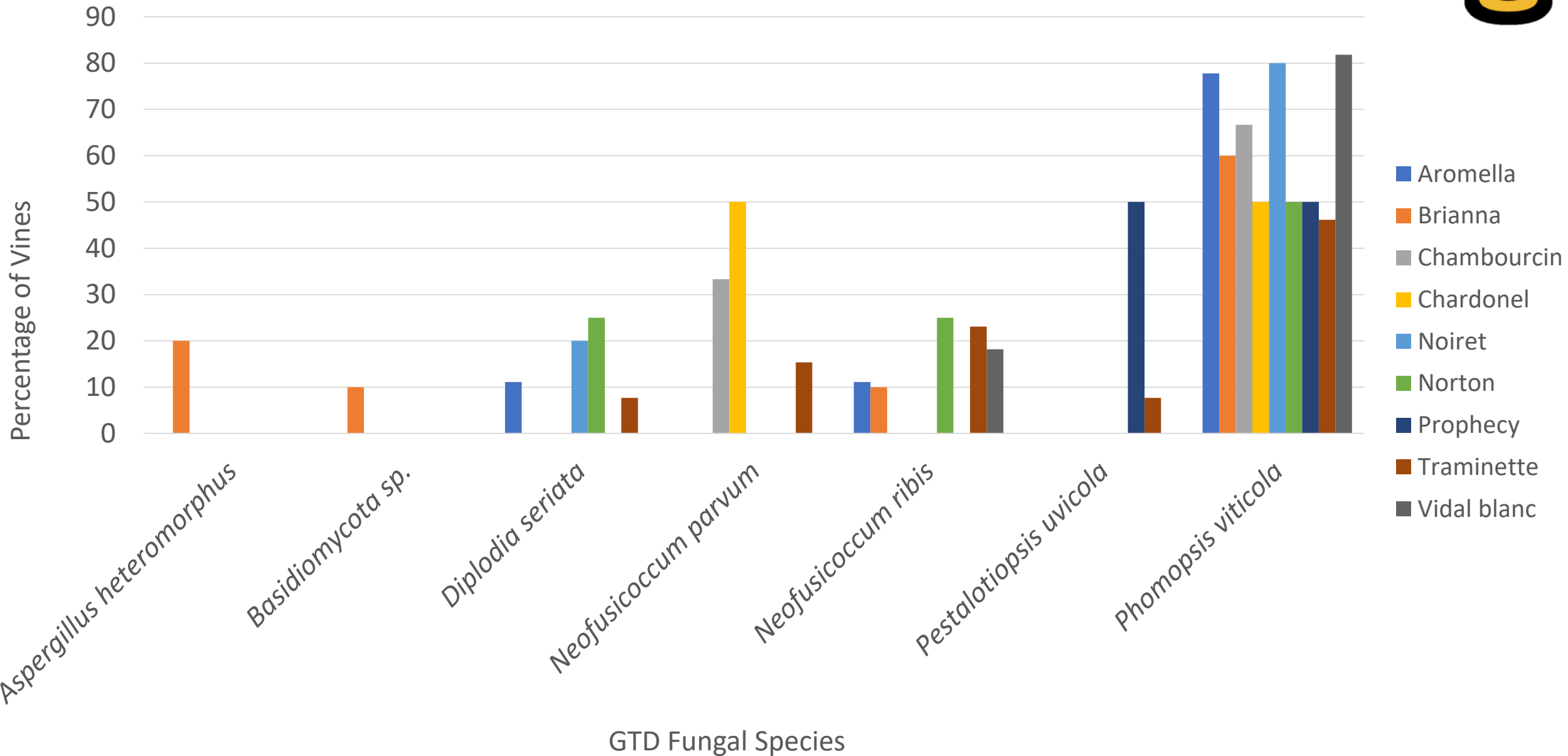


Non-GTD associated fungal species

- Fungal endophytes
 - *Alternaria alternata*- causes leaf spot, rots, & blights on many plants
 - *Fusarium venenatum*- closely related to *Fusarium graminearum* which causes Fusarium head blight on wheat and barley
 - *Trichoderma sp.*- commonly isolated soil microbe, used in biopesticides
 - *Seiridium sp.*- causes cankers in cypress
 - *Didymella sp.*- *Didymella applanate* known causal agent of cane spur blight in red raspberry
- Many fungal species found to be pathogenic to different plant species



GTD Fungal Species Identified from Pruning Cuttings

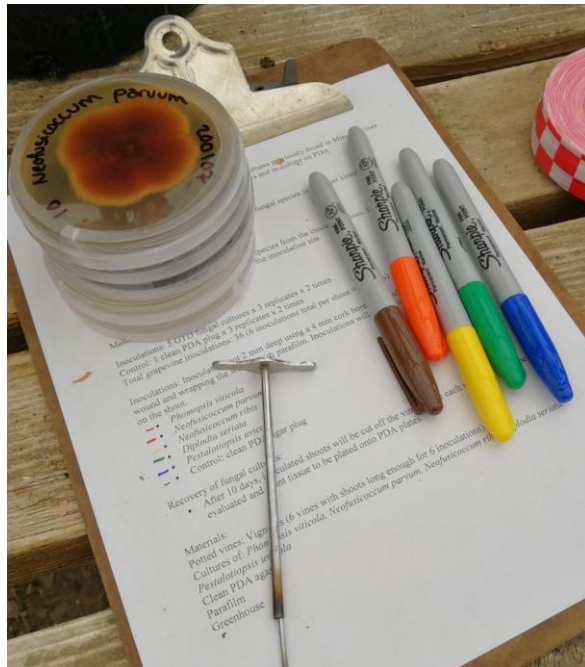




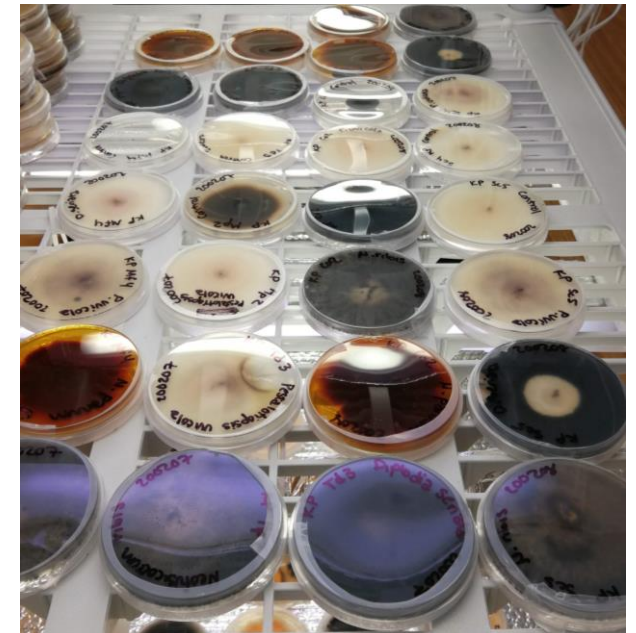
Do commonly found GTD pathogens fulfill Koch's Postulates?



Koch's Postulates



Pestalotiopsis uvicola

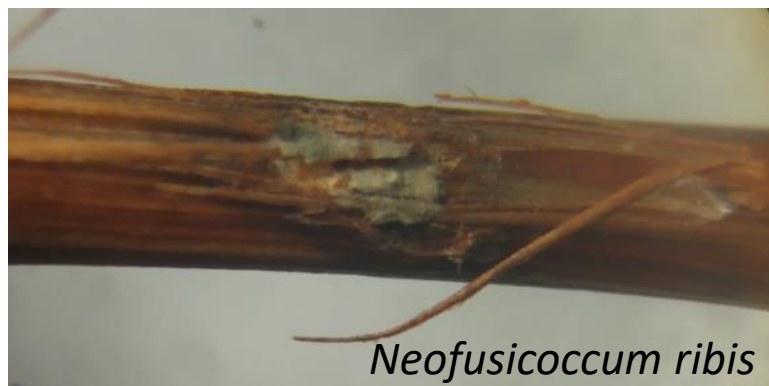
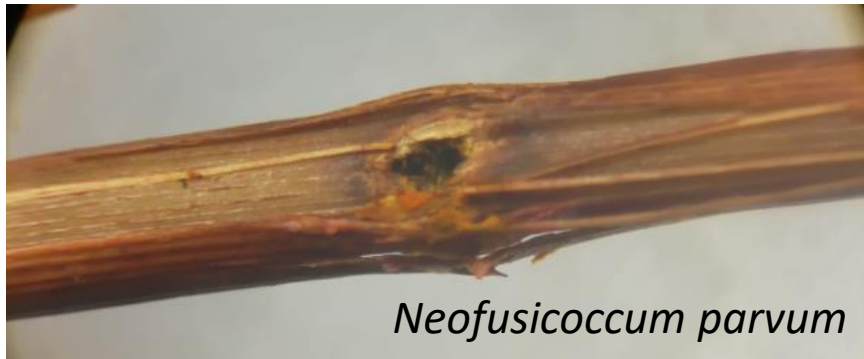


Methods

- Dormant Vignoles vines inoculated
- Greenhouse conditions: 76° F, 32% RH
- Inoculants: 4 cultures + 1 control
 - *Diplodia seriata*
 - *Neofusicoccum parvum*
 - *Neofusicoccum ribis*
 - *Pestalotiopsis uvicola*
 - Sterile PDA
- Shoots: 6 (5 inoculations on each shoot)
- 30 total inoculations using a 4mm cork borer
- *Note: Koch's Postulates has already been done on *Phomopsis viticola* and is one of the more commonly studied GTD pathogens



All of the 4 common GTD fungal species inoculated were recovered from samples 10 days after inoculation



All fungal species tested were found to cause brown discoloration of wood consistent with GTD symptoms



Neofusicoccum parvum



Pestalotiopsis uvicola



Diplodia seriata



Neofusicoccum ribis



Control

Future Work

- More research on fungal endophytes that may be a causal agent of cankers in grapevine trunks
- Research on spread of fungal spores for Missouri weather and time of year
- Management Practices:
 - efficacy of sanitation practices in reducing spread of pathogens
 - Management differences by variety



Conclusion

- Varieties experienced different susceptibilities to GTD fungal pathogens
- White varieties may be more susceptible to GTD fungal pathogens than red varieties
- *Alternaria alternata* and *Fusarium spp.* were the most common non-GTD associated fungal species found in samples
- 5 common GTD fungal species found in Missouri vineyards: *Phomopsis viticola*, *Diplodia seriata*, *Neofusicoccum parvum*, *Neofusicoccum ribis*, *Pestalotiopsis uvicola*
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Thank you!



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