

FAQ for the Call for Grape & Apple Wood Samples

D.H. DeKrey | Updated 2023-02-27

Why contribute samples?

This is a really excellent opportunity for growers to gain insight into the disease status of their vineyards and orchards at no cost other than time and shipping or delivery cost. The [UMN Plant Disease Clinic](#) may charge between \$45-\$120 per sample for a similar service. This work to develop this novel rapid diagnostic service is funded by the [USDA/MDA Specialty Crop Block Grant Program](#) at \$131K for the benefit of growers.

When is the deadline to receive samples?

Preferably, the majority of samples should be received before the end of March 2023. However, there is not a specific deadline for the reception of samples for this project. Samples can be delivered or priority shipped to Davy DeKrey at the UMN Dept. of Plant Pathology.

Why is February and March pruning recommended for woody perennial crop growers?

Current recommendations for Minnesota and other Northern Midwest growers is to prune in snowy, dry, winter weather conditions. Typically February and March pruning are recommended, and at the very latest finishing pruning before Tax Day, extensions not included. The February/March pruning window is thought to be a low-risk infection period for trees and vines in the Northern Midwest. Fresh pruning wounds serve as portals for infection by pathogenic fungi. Pruning wounds over some time will dry up which closes these portals for infection. How long pruning wounds remain susceptible to infections can be highly variable according to some research. Many of these pathogenic fungi release spores in the cool, rainy weather of Spring and are thought to be largely inactive in the Winter. Thus, the pruning recommendation and the helpful reminder...

"when it rains, it spores".

How many samples would be appropriate?

Around 5 samples per vineyard or orchard would be best with a minimum of 3 samples and preferably no more than 7 samples. Include a variety of sample parts. A good example of a sample collection may include (1) woody canes, (2) a cordon or branch, (3) an older trunk, (4) a younger trunk, (5) thick roots, and if possible (6) a healthy part with no or very little symptoms and no signs. Sample plants growing apart from each other that are representative of plot(s) such as areas of low or high elevation, center or border of plot, or areas near a forest, body of water, highway, or building. Finally, sample plants of different varieties including varieties that are most widely grown and focus on including Minnesota varieties like Marquette, Itasca,

Frontenac for grapes and Honeycrisp, Zestar, SweeTango for apples. For simplicity, avoid grafted grape plants.

Why spend so much time and work collecting and detailing samples?

The more information provided about samples provides more opportunities for to better develop best growing practices recommended to Northern Midwest growers. However, significant difference cannot be found unless there is enough information provided. Pictures are especially important for rating the vigor and disease severity of the vines samples come from. Signs and symptoms are challenging observations to make and understand without formal training. Additionally, these pictures can serve as good examples.

Why include a sample from a healthy vine?

I truly understand how heartbreaking it can be to include a healthy part from one of your vines after all your hard work to get the vine to produce and grow vigorously. However, healthy parts are extremely valuable and informative because the best science conducted has control samples to compare the other test samples too. But you can rest easy because tree and vines are hardy and resilient plants and in a few short years will bounce back to its former glory. I always ask for healthy parts but rarely ever get them.

Why should samples include a variety of parts?

Thoughtful sample selection can provide better information on the status of a vineyard's or orchard's population and composition of fungal trunk pathogens. Grapevine trunk diseases (GTDs) are a disease complex meaning there are several different fungal species associated. Often specific fungal species are associated with specific grapevine parts. Including a variety of grapevine parts in your sample collection will provide the best and broadest view of the associated GTD species in your plots.

Why include samples from plants of different varieties?

Including samples of different varieties has potential to improve our breeding programs and the recommendations for growers. For example, If there is a significant difference in the pathogens detected in different varieties this could indicate genetic resistance to specific pathogen(s).

Why do samples need to be frozen and placed in a zip bag before and during shipping?

Freezing samples as soon as possible after collection is important for a few reasons. First to ensure that the accuracy of pathogens detected by the rapid diagnostic test. Samples that are not frozen can be prone to contamination from outside microbes that where not initially present in or on the sample as well as microbes inside the sample may outgrow others. Freezing helps with accurately detecting the microbes that are present. Additionally, it is also very important to

freeze samples to kill any bugs or eggs. This is crucial so as to prevent the accidental (re)introduction or spreading of invasive species such as the spotted lanternfly. Keeping samples in zip-top bags is an additional layer of protection from the escape of foreign organisms.

Should infected plants be removed and replaced?

Absolutely not. Trees and vines have evolved with pathogens just as humans have with our pathogens. In most cases infections are minor and do not inhibit the overall vigor and productivity of the plant. However, plants with great decreases in vigor and productivity with advanced disease may need to be replaced. Yet, many woody plants are very good at compartmentalizing infections allowing for low vigor infected parts to be pruned off and replaced by new growth. For grapevine, re-trunking own-rooted plants with severe advanced trunk infections is also a good option. Trees are much better at compartmentalizing and overcoming wood infections compared to vines.

What information can different sample parts provide?

Green parts such as leaves and shoots can provide information on some pathogens but for this project are not useful. Please do not submit any succulent green parts, thank you.

Twigs, canes, last year's growth, or rather new wood about 1-year old that is diseased likely would harbor fungi present in your immediate environment. Often these are fungal species considered to be **primary pathogens** such as *Cytospora viticola* or *Diaporthe ampelina* which are commonly found in the Northern Midwest. The outdated old name of *Diaporthe ampelina* is *Phomopsis viticola* which may be more familiar to some growers. Some primary pathogens may have initially infected soft, succulent, green parts the previous Summer before these parts could harden-off prior to winter. Many of these primary pathogens come from pruning debris left nearby or contaminated tools. Most primary pathogens do not travel far distances in the air so regular tool sanitization and prompt debris removal and destruction is a best practice for disease mitigation.

Branches, cordons, or smaller woody parts older than 2 years can include primary pathogens as well as **secondary pathogens**. Primary pathogens can pave the way for additional infection by secondary pathogens. Primary and secondary pathogens can work together in synergy to progress disease faster than a single infecting pathogenic species.

Crotches and crowns where branches or cordons meet the main trunk as well as spurs where several pruning wounds are packed close together will also likely harbor primary and secondary pathogens. Yet, these parts can include many more environmental acquired pathogenic species due to insulated, humid, and protected microclimate which is favorable for the growth of pathogenic fungi in addition to pruning wounds which act as portals of entry for these pathogenic fungi.

Trunk samples are likely to harbor the most diversity of species including primary pathogens, secondary pathogens, and sometimes **wood decay fungi**. Wood decay fungi are indicators of advanced disease and can produce white-rot or brown-rot. In grapevines, decay fungi are almost exclusively white-rotters. Brown-rot fungi are often considered more devastating as they more quickly compromise the architecture of wood. Brown-rot in larger trees and wood structures are hazardous and the tree or structure is prone to spontaneously collapsing which may result in injury or death of nearby people. In cases of extremely advanced disease, wood decay fungi will emerge from wood as mushrooms. Mushrooms often can be seen with the naked eye but can still be tricky to find. Any wood with fruiting mushrooms should promptly be pruned or cut out because mushrooms produce huge amounts of spores. It is important that the infected wood and not just the mushroom is removed and destroyed because mushrooms can quickly fruit again from the infected wood. Additionally, mushroom spores often can travel in the air much farther distances than primary or secondary fungal pathogens.

Root samples are more likely to harbor fungi that are **soil-borne pathogens**. These soil-borne pathogens are most frequently found in low-lying areas that are wet or near bodies of water. Some soil-borne pathogens such as *Cadophora* spp. can be yeast-like single cells that can easily spread via contaminated water.

Where are the mushrooms?!

Sometimes mushrooms are much smaller and harder to see than people expect. Moreover, not all fungi produce large mushrooms to produce spores. In fact, the majority of fungi produce microscopic spore producing structures that can be impossible or extremely difficult to see with the naked eye. The orangish mushroom in the guide was just a bit bigger than a quarter. Many mushrooms on woody plants will fruit on the underside of wood parts. So, if you have a particularly twisted trunk with a part that is parallel with the ground, that would be a prime location for a mushroom to fruit. I often find myself lying on the ground looking up a trunk to try and find mushrooms since the pores/gills are often lighter colored and easier to see than a darker topside of a mushroom. Though not all plants are worth searching for mushrooms as often mushrooms only fruit from thicker and older trunks. Yet, a trunk part with white rot or brown rot inside is also an indicator that there is a mushrooming fungus inside and I should be able to get that fungus out regardless if a mushroom is present or not.

Where can I read more?

You can read the findings of the initial UMN GTD vineyard survey.

[DeKrey DH, Klodd AE, Clark MD, Blanchette RA \(2022\) Grapevine trunk diseases of cold-hardy varieties grown in Northern Midwest vineyards coincide with canker fungi and winter injury. PLOS ONE 17\(6\): e0269555. <https://doi.org/10.1371/journal.pone.0269555>](https://doi.org/10.1371/journal.pone.0269555)