

Current Management of Grapevine Trunk Diseases

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Background: Grapevine trunk diseases (GTD) are currently considered one of the most important challenges for viticulture worldwide. These destructive diseases are caused by a broad range of wood-colonizing fungal pathogens, which primarily infect grapevines through pruning wounds. Occasionally, a single vine can be infected by more than one of these pathogens. The economic impact of GTD can be significant in both young and mature vineyards. Characteristic symptoms include poor vigor, distorted leaves and shoots, shoot and tendril dieback, and berry specks caused by fungal toxins produced by some of these pathogens. Perennial cankers produced by canker-causing fungi on grapevine cause spur, cordon, and trunk dieback and the eventual death of the entire vine

Epidemiology: Most of the fungal pathogens responsible for GTD produce overwintering fruiting structures containing the spores of the fungus. When environmental conditions are favorable, these fruiting bodies release the spores into the environment. Spores will land on susceptible pruning wounds and initiate infection, completing their life cycle. In California, research suggests that most GTD spores are released during winter (December to February), primarily following precipitation events. GTD fungal pathogens have a broad host range and, in California, are known to cause dieback in many different native or introduced tree species and other woody perennial crops, including tree fruits and nut trees. Therefore, the source of GTD inoculum (spores) can come into a vineyard from multiple sources.

Management in Nursery:

- Treat pruning wounds on mother plants to prevent new infections
- Sanitation in mother fields and during the entire nursery process
- Disinfect grafting machines regularly
- Reduction of the cutting hydration period
- Apply control products (chemicals or biologicals) as a dip after grafting, before storage and/or before dispatch
- Hot water treatment of dormant nursery plants prior to dispatch

Management in Vineyards:

- Use the cleanest plant material available when establishing new vineyards
- Protecting pruning wounds with effective registered chemicals and/or biological control agents is the most effective way to prevent new infections from air-borne spores of GTD fungal pathogens. More than one application may be necessary to protect the pruning wound during its susceptible period.

- Minimize stress conditions on young vines after planting
- If applicable, In VSP systems, double pruning has been shown to facilitate late pruning of large acreage vineyards and, thus, reduce infection.
- Prune dead shoots, spurs, and cordons below the symptomatic tissue (at least a few inches past the last symptomatic wood)
- Make a clean and smooth pruning cut to speed up the callusing process at the pruning wound.
- Sanitation is very important in the vineyard. Remove pruned and infected plant materials away to prevent the development and increase of GTD fungi overwintering structures in the vineyard.
- Remedial surgery, where visible infected parts of the vine (spurs, cordons and/or trunk) are removed, can be an effective strategy to remove the pathogen from the vine (primarily when cuts are done 7" to 10" below the visual canker tissue) and thus, prolong the lifespan of vineyards.

Pruning wound protection options:

Biologicals- *Trichoderma asperellum* + *Trichoderma gamsii*, *Trichoderma atroviride*, *Bacillus subtilis* QST713, *Bacillus velezensis*, *Aerobasidium pullulans*

Synthetic- Thiophanate methyl, Fluopyram/Trifloxystrobin, Pyraziflumid, Flutriafol, Azoxystrobin + *Pseudomonas chlororapsis*,

Sealant/barrier- Acrylic Co-Polymer, Polymer of Cyclohexane

Disinfectant- Sodium carbonate peroxyhydrate (85%)



Figure 1. Leaf (tiger stripes) (A), fruit (black measles) (B) and vascular (C) symptoms caused by esca disease complex. Esca (black measles) and petri disease are primarily caused by the vascular pathogens *Phaeoaniella chlamydospora* and *Phaeoacremonium minimum*, which are also involved in Petri disease in young plants (D).

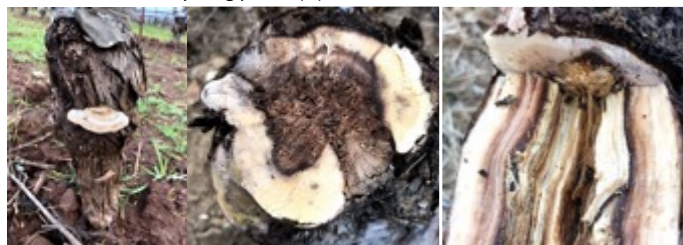


Figure 2. In mature plants, several basidiomycetes fungi (primarily in the genera *Fomitiporia*, *Fomitiporella*, *Inocutis*, *Inonotus*, and *Phellinus*) play also a role in disease and symptoms development. Characteristic symptoms are a white rot in the vascular system in many occasions observed as a yellowish-spongy wood.



Figure 3. *Botryosphaeria* dieback, commonly known in California as 'Bot canker' is caused by multiple species in the *Botryosphaeriaceae* family. Characteristic symptoms are the lack of spring growth of infected areas, including cordons (A) or spurs (B). Cross sections of infected parts reveal a wedge-shape canker (C). The GTD disease known as *Phomopsis* dieback and primarily caused by the fungus *Phomopsis viticola* shows very similar symptoms as *Botryosphaeria* dieback.



Figure 4. Symptoms of *Eutypa* dieback, caused by the fungal pathogen *Eutypa lata* and several other *Diatrypaceae* species, are characterized by distorted and chlorotic leaves and short internodes (A) and by wedge-shape cankers (B)

Visit following link for the result from field trial for effective biological and chemical pruning wound protectants

<https://ucanr.edu/sites/eskalenlab>