

Guide to Vineyard Trunk Diseases

IN CALIFORNIA

PREVENT TRUNK DISEASES IN YOUNG VINEYARDS

Start preventive practices before symptoms appear in young vineyards (less than 5 years old), beginning at the first dormant pruning. Trunk pathogens infect primarily through pruning wounds by rain-induced spore release during the dormant season in California.

1) Delay pruning until February or later. Schedule hand or mechanical pruning in February or later. Pruning wounds made in early winter (December or January) are very susceptible to infection:

- winter rains induce spore release, and
- cold temperatures lengthen the wound-healing process.

In contrast, pruning wounds made in mid- to late winter (February or later) are at lower risk of infection because rain is less frequent and wounds heal soon after pruning.

Double pruning is a type of delayed pruning for cordon-trained, spur-pruned vineyards and involves two passes:

- **Pass 1** (December or January) – Often with a mechanical pruning machine, canes are prepruned to about 10 to 12 inches above last year's spurs. No cuts are made down to the cordon.
- **Pass 2** (February or later) – Canes are pruned to 2-bud spurs. This removes the section of the cane that may have been infected via pruning wounds made during Pass 1.

2) Protect pruning wounds, when pruning prior to February.

Fungicides that prevent infection of pruning wounds are labeled for dormant-season use in California (refer to the *Grape Pest Management Guidelines*). In addition, there are other nonfungicidal materials that provide a physical barrier to infection. All pruning-wound protectants must remain continuously active for 30 days if vines are pruned in December or January. Reapplication may be necessary, depending on the protectant used and the timing of its first application with respect to rain. Rain triggers spore production and washes protectants off pruning wounds.

3) Inspect plant material before planting and provide proper care for young vines in newly-established vineyards.

Young vines infected by *Botryosphaeria* dieback, Petri Disease (form of Esca that attacks young vines), and *Phomopsis* dieback may be further harmed by abiotic stress (e.g., over- or underwatering, overcropping, improper planting). Weak growth from the combined infection and abiotic stress may doom a vineyard to a lifetime of poor productivity.

MANAGEMENT IN MATURE VINEYARDS

Preventive practices maintain yields by reducing the chance of new infections, but they do not eradicate trunk diseases. In addition to preventive practices, management in infected mature vineyards includes:

Sanitation. Prune away dead spurs or cordons with wood cankers, and burn or remove infected wood from the vineyard. When it rains, all trunk pathogens produce spores from infected wood. Therefore, removing or burning wood eliminates local sources of inoculum.

Sanitation and surgery create large wounds. Perform sanitation and surgery in February or later and apply a pruning-wound protectant.

Surgery. Cut off the vine just above the graft union and train a trunk sucker as a new trunk (Figure 11). Use a T-bud or other graft on vines without trunk suckers. Success depends on complete removal of infected wood, which is difficult to achieve because trunk pathogens are often present in healthy-looking wood. Pathogens are less common in the base of the trunk and using a trunk sucker should result in a new vine with less disease. This aggressive approach removes the pathogen and starts the retraining process to replace fruiting spurs or canes.

In vineyards with many symptomatic vines, surgery can be done on a row-by-row or block-by-block basis to ensure uniform growth of whole sections of the vineyard.



FIGURE 11



For more information, visit the *Grape Pest Management Guidelines* <http://www.ipm.ucanr.edu/PMG/selectnewpest.grapes.html>

Authors: Monica L. Cooper, Larry J. Bettiga, Rhonda J. Smith (University of California Cooperative Extension); Renaud Travadon (Department of Plant Pathology, University of California, Davis); Kendra Baumgartner (USDA-Agricultural Research Service, Davis, CA).

Funding provided by USDA-NIFA Specialty Crop Research Initiative.



Trunk diseases (wood-canker diseases) threaten all California vineyards due to widespread distribution of the fungal pathogens. The infections are chronic and occur each year. Trunk diseases in mature vineyards reduce yields and increase management costs to the point where the vineyard is less profitable.

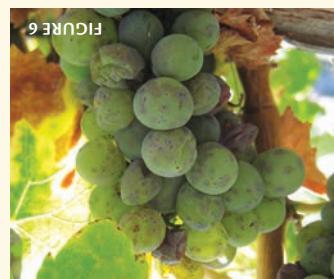


K. BAUMGARTNER
R. TRAVADON

Use this guide to identify trunk diseases and inform management decisions. It is not critical to identify the specific fungal pathogen because the management practices are similar and more than one pathogen is typically present. This guide will help you:

- recognize the trunk disease complex as a problem
- understand the preventive practices
- adopt preventive practices in young vineyards
- perform these practices at appropriate times on an annual basis

Concentric rings of black spots surround the pitch (the naturally darkened core) of this cordón.



Fruit spots are visible on white cultivars of wine grapes (e.g., Sauvignon blanc, shown here) and table grapes (e.g., Thompson seedless).

BOTRYOSPHAEIRA DIEBACK AND PHOMOPSIS DIEBACK



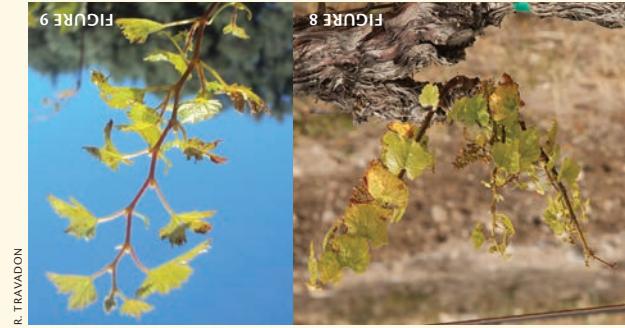
- leaf symptoms (Figure 5)
- fruit spots (Figure 6)
- concentric rings of black spots (Figure 7)
- Main Escal Pathogens: *Phaeacremoniun aleophillum* (teleomorph *Togninia minima*), *Phaeoacremonium aleophillum* (teleomorph *Togninia minima*), and other *Phaeoacremonium* species
- Common symptoms typical of all trunk diseases:

- wood symptoms diagnostic of Eutypa dieback:
 - stunted shoots with deformed leaves (Figure 8)
 - shortened internodes (Figure 9)
 - dead spurs
 - stunted shoots
 - wood symptoms (Figures 1, 2, and 3):
- There are no diagnostic canopy symptoms. These two trunk diseases are best characterized by one or more of the general trunk symptoms described by one or more of the genera listed below.

- Main Botryosphaeria dieback pathogens: *Nectriococcum parvulum*, *Diplodia seriata*, *Lasioiodiploidia theobromae*, and *Botryosphaeria dothidea*
- Other dieback pathogens: *Phomopsis viticola*, which also causes *Phomopsis dieback* pathogen; *Phomopsis dieback* is not well understood.
- Characteristic leaf spot symptoms of *Phomopsis* cane and leaf spot and wood symptoms of *Phomopsis* dieback are described above.

FIGURE 10
MIZUHONIKA, VIRGINIA POLYTECHNIC INST. & STATE UNIV.

- wood symptoms diagnostic of Eutypa dieback:
 - stunted shoots with deformed leaves (Figure 8)
 - shortened internodes (Figure 9)
 - dead spurs
 - stunted shoots
 - wood symptoms (Figures 1, 2, and 3):
- There are no diagnostic canopy symptoms. These two trunk diseases are best characterized by one or more of the general trunk symptoms described by one or more of the genera listed below.

FIGURE 9
R. TRAVADONFIGURE 8
A. BETTIGA

This is not a symptom of trunk diseases.



FIGURE 4



FIGURE 2



FIGURE 3

Permanente woody structure are found year round.

Cross-sectional cuts of the trunk expose cankers (rotten zones of the wood) that vary widely in shape, from the vine (spurs, cordons, or trunk) to the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.

Stunted shoots are most apparent in early summer; healthy-looking shoots continue to grow, but shoots on infected spurs (second spur from the end of this spur) from the end of this spur.



FIGURE 1



FIGURE 3

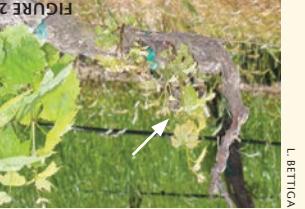


FIGURE 2



FIGURE 1



FIGURE 3

ESCA (BLACK MEASLES)

- dead spurs (Figure 1)
- stunted shoots (Figure 2)
- fruit spots (Figure 6)
- concentric rings of black spots (Figure 7)
- Main Escal Pathogens: *Phaeomoniella chlamydospora*, *Phaeoacremonium aleophillum* (teleomorph *Togninia minima*), and other *Phaeoacremonium* species
- Common symptoms typical of all trunk diseases:

DO YOU HAVE A TRUNK DISEASE?