

## 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>

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# Guide to Vineyard Trunk Diseases IN CALIFORNIA

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.



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:

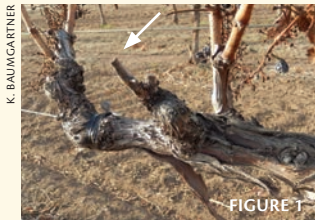
- recognize the trunk disease complex as a problem
- understand the preventive practices
- adopt preventive practices in young vineyards
- perform these practices at appropriate times on an annual basis

## DO YOU HAVE A TRUNK DISEASE?

Common symptoms typical of all trunk diseases:

- dead spurs (Figure 1)
- stunted shoots (Figure 2)
- wood symptoms (Figure 3)

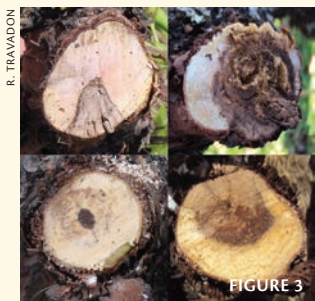
Damage to a cordon or trunk from abiotic factors (e.g., girdling from wire, sunburn, mechanical injury, spray damage) can appear to be a trunk disease symptom (Figure 4). Vines heal from these physical injuries and may form new tissue around the wound, distinguishing such damage from that of a trunk disease.



Dead spurs are found even in the dormant season. This dead spur, photographed in December, is flanked by apparently healthy spurs with canes.



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 cordon) die back.



Internal wood symptoms are found year round. Cross-sectional cuts of the permanent woody structure of the vine (spurs, cordons, or trunk) expose cankers (rotten zones of the wood) that vary widely in shape, color, and texture.



Stunted shoots (left) on a cordon wrapped too tightly to the training wire will girdle the cordon as it grows (closeup at right). This is not a symptom of trunk diseases.

## ESCA (BLACK MEASLES)

Symptoms diagnostic of Esca (Black Measles):

- leaf symptoms (Figure 5)
- fruit spots (Figure 6)
- concentric rings of black spots (Figure 7)

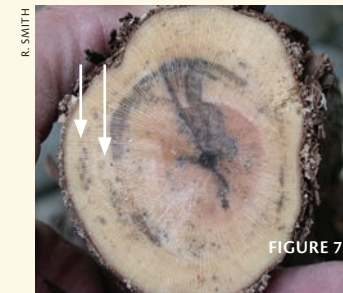
Main Esca pathogens: *Phaeomoniella chlamydospora*, *Phaeoacremonium aleophilum* (teleomorph *Togninia minima*), and other *Phaeoacremonium* species



Leaves with interveinal necrosis appear in mid-summer. The margin outlining the necrosis is reddish brown in red cultivars (left, Cabernet Sauvignon) or yellow in white cultivars (right, Sauvignon blanc).



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



Concentric rings of black spots surround the pith (the naturally darkened core) of this cordon.

## EUTYPA DIEBACK

Symptoms diagnostic of Eutypa dieback:

- stunted shoots with deformed leaves (Figure 8)
- shortened internodes (Figure 9)

Main Eutypa dieback pathogens: *Eutypa lata* and other species in the same family (Diatrypaceae)



Stunted shoots have deformed leaves with necrotic, tattered margins. These canopy symptoms are most apparent in spring.



Stunted shoots with shortened internodes may have a zig-zag pattern of growth.

## BOTRYOSPHERA DIEBACK AND PHOMOPSIS DIEBACK

There are no diagnostic canopy symptoms. These two trunk diseases are best characterized by one or more of the general trunk symptoms (Figures 1, 2, and 3):

- dead spurs
- stunted shoots
- wood symptoms

Main Botryosphaeria dieback pathogens: *Neofusicoccum parvum*, *Diplodia seriata*, *Lasiodiplodia theobromae*, and *Botryosphaeria dothidea*

Main Phomopsis dieback pathogen: *Phomopsis viticola*, which also causes Phomopsis cane and leaf spot, a disease with diagnostic canopy symptoms (Figure 10). The relationship between canopy symptoms of Phomopsis cane and leaf spot and wood symptoms of Phomopsis dieback is not well understood.



Characteristic leaf symptoms of Phomopsis cane and leaf spot appear in early spring on lower leaves of infected shoots.