Canker diseases of grapevine

JANUARY 14, 2016

Doug Gubler, Plant Pathology

Grapevine canker pathogens

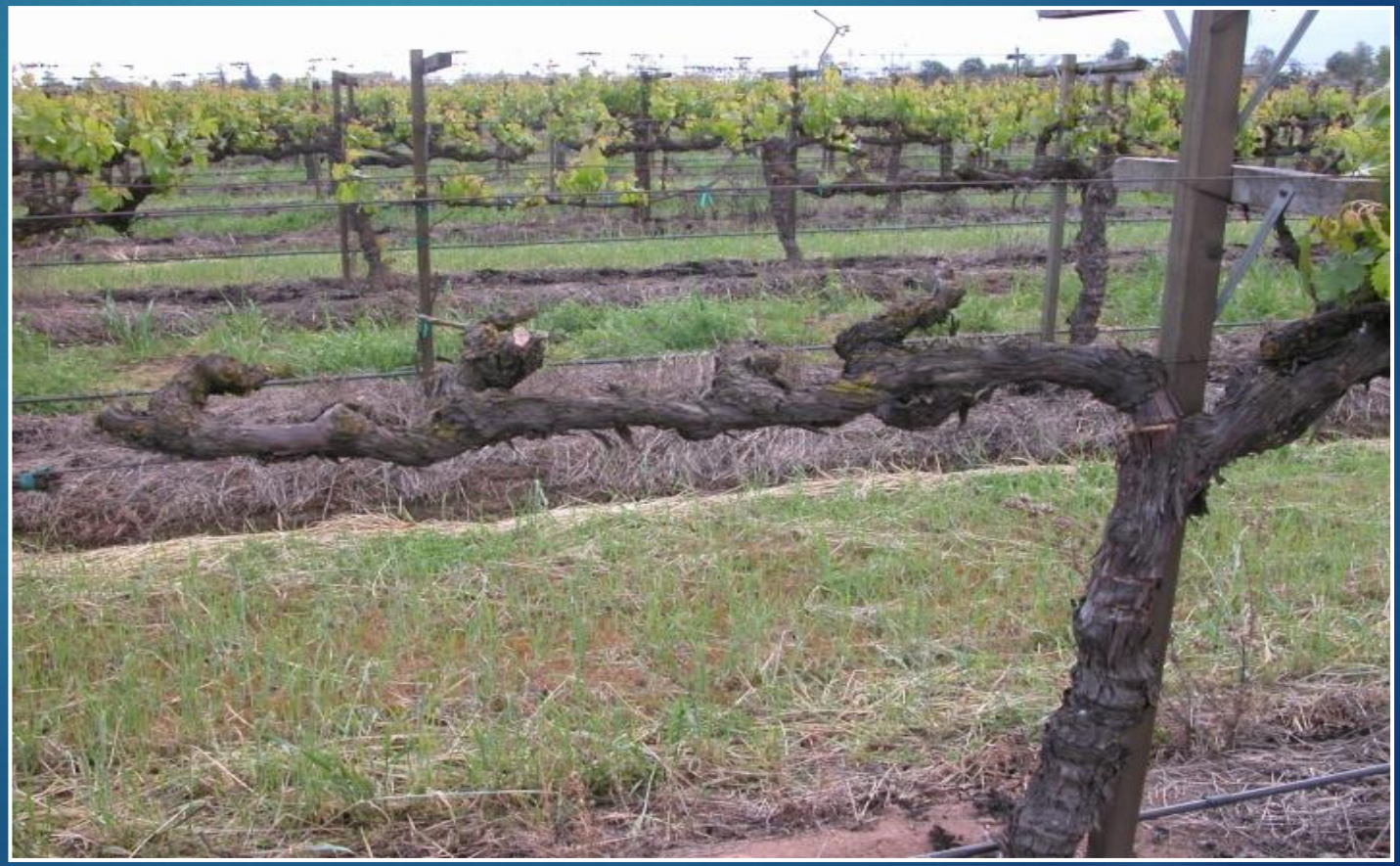
- *Eutypa lata- Eutypa Dieback*
- *Botryosphaeria spp- Bot Canker*
- *Phomopsis viticola- Grapevine dead arm*
- *Phaeomoniella chlamydospora- Esca*
- *Phaeoacremonium aleohilum- Esca*

Eutypa dieback Canker

- Botryosphaeria canker "Bot Canker" in California 1990

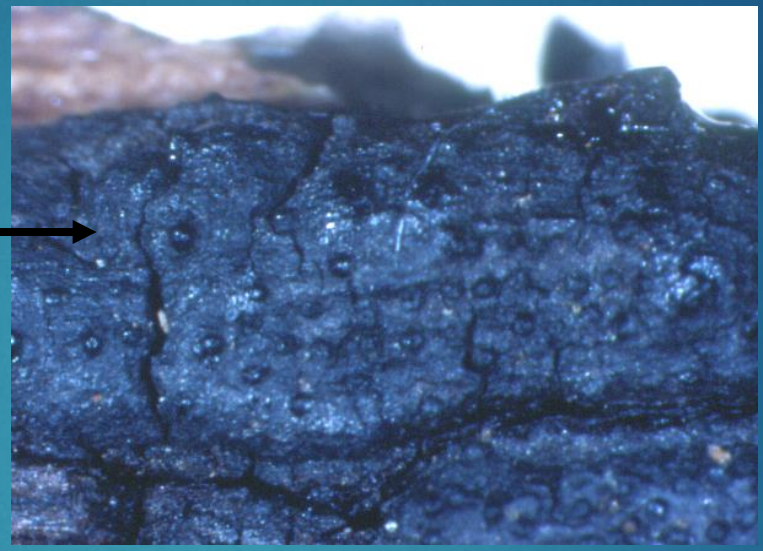
Botryodiplodia theobroma=Botryosphaeria rhodina=Lasiodiplodia theobromae.

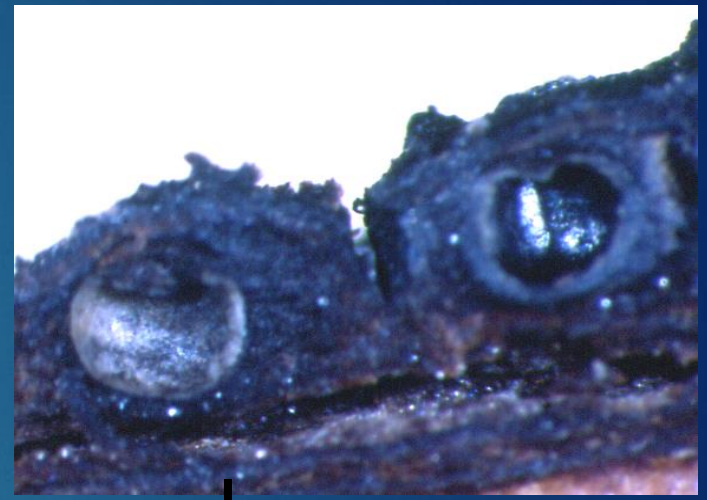
9 other species found by 2005



Eutypa Disease Cycle

Dead Wood/ Stroma





Wind Rain

Pruning Wound

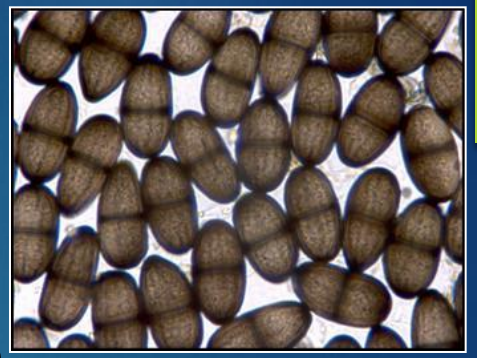
Growth & Decay

Old pruning wounds

Fruiting bodies (Pycnidia)

Pruned debris on the ground

Spores (conidia)



Late fall - winter

Blockage of vascular system

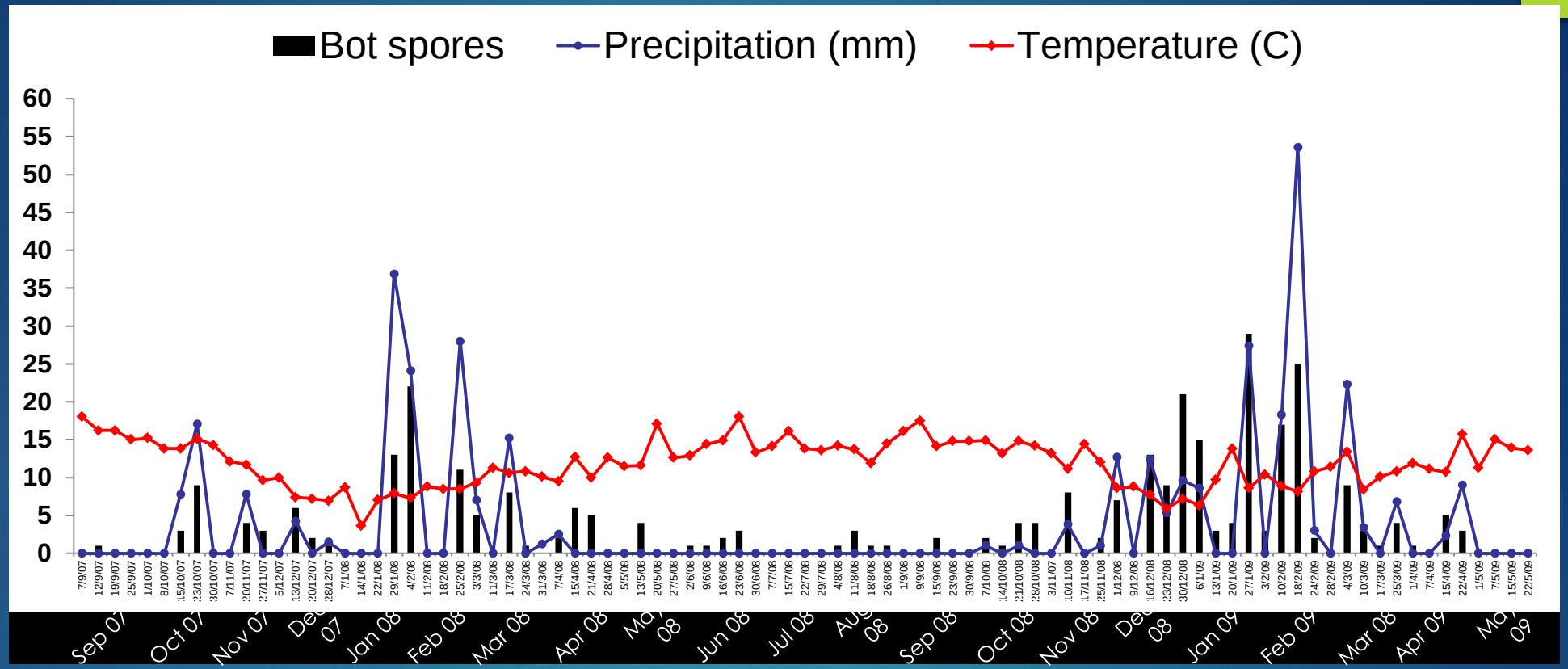
Yield losses / Death of the plant

"Bot Canker"
Disease Cycle

***BOTRYOSPHAERIA* PYCNIDIA FOUND IN CALIFORNIA GRAPEVINES.**

- Pycnidia of *Lasiodiplodia theobromae* found in Coachella Valley grapevines.

Vaseline slides spore trapping results in Monterey County



Bot spores values = Total spores / 2 ml of H_2O

Rainfall
Sprinkler irrigation
Fog

- Esca, Black Measles

  External symptoms

Disease cycle of Esca (black measles) & Young Esca (Vine Decline)

Fall

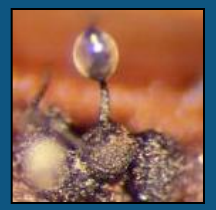
Perithecia in old pruning wounds or dead wood

Teleomorph formation

Pycnidia overwinter on 3-5 year old Pruning wounds

Pycnidium formation

Ascospores are discharged during rainfall



Insect dispersed?

Winter

Ascospores and pycnidial spores infect pruning wounds

Pathogen colonizes the vascular system

Infection of vascular system leads to toxin production and symptom expression internally and foliage symptoms under water

Spring

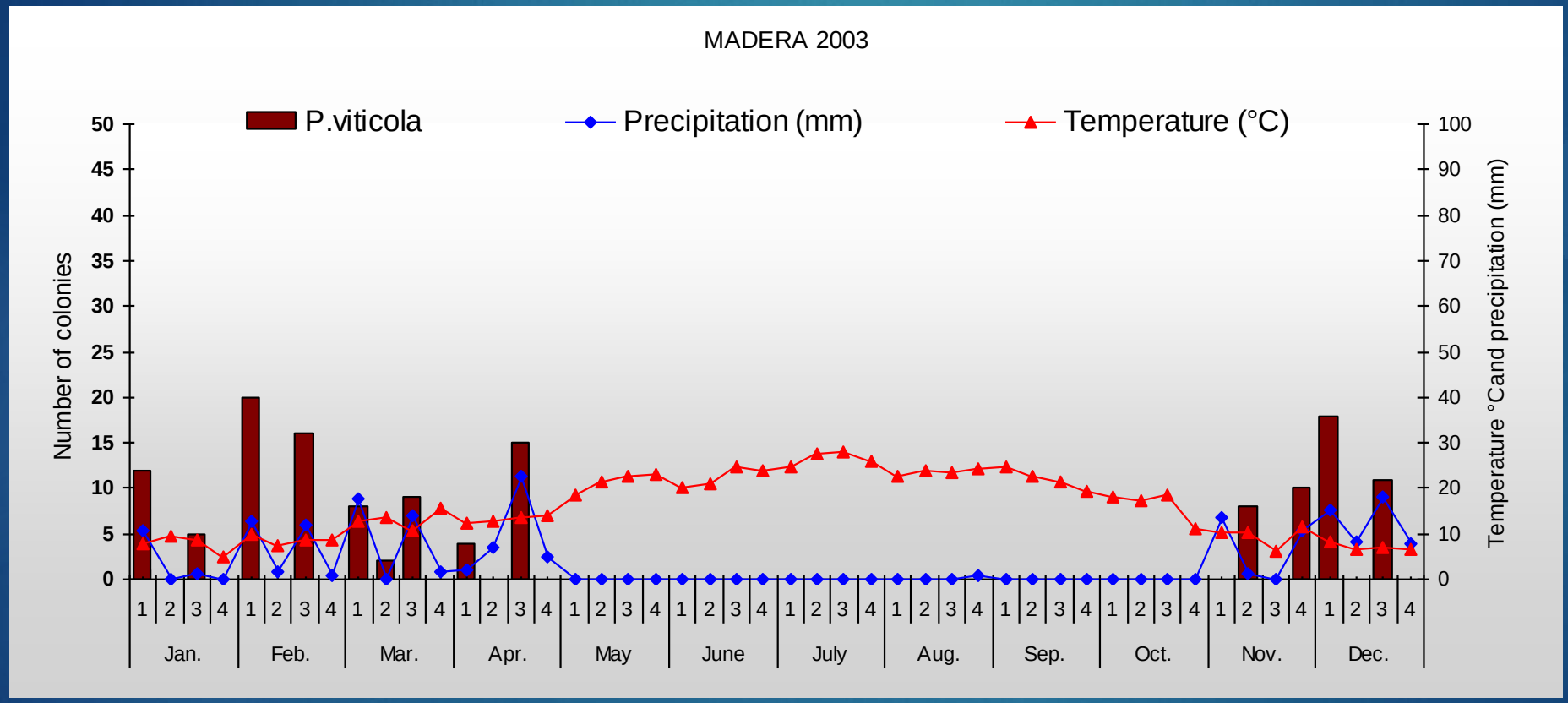
Decline

Foliar and berry symptoms

Summer

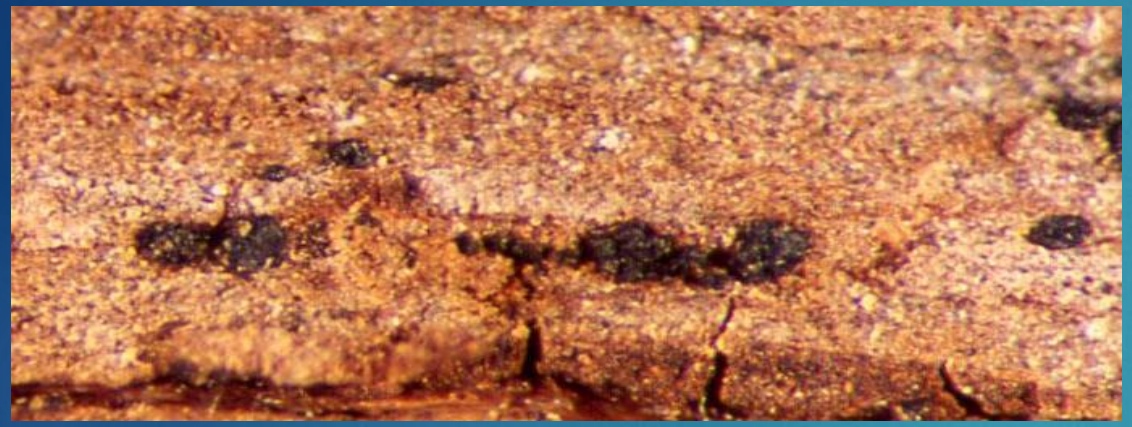
Overwintering of Black Measles pathogen: *Pm. aleophilum*

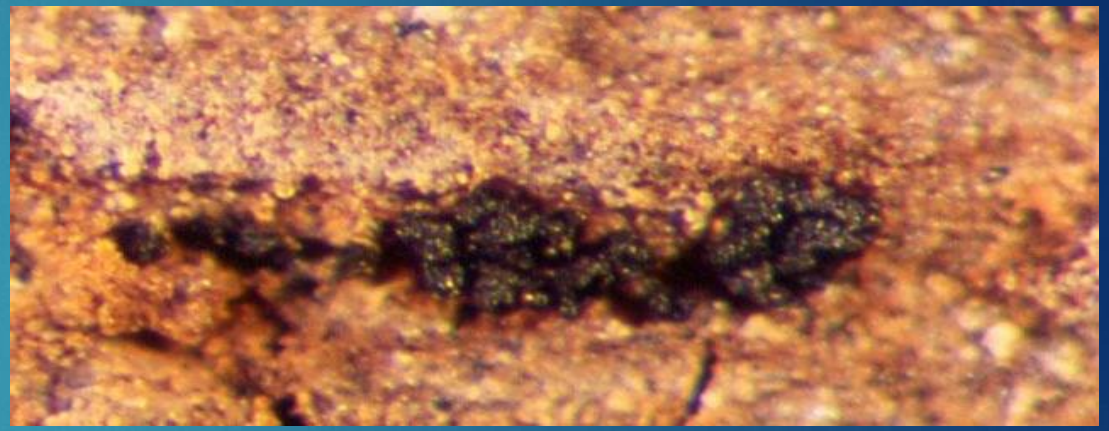
Spore release of *Pm. viticola*



Overwintering of black measles pathogen: Phaeomoniella pycnidia

(Rooney and Gubler, 2001).



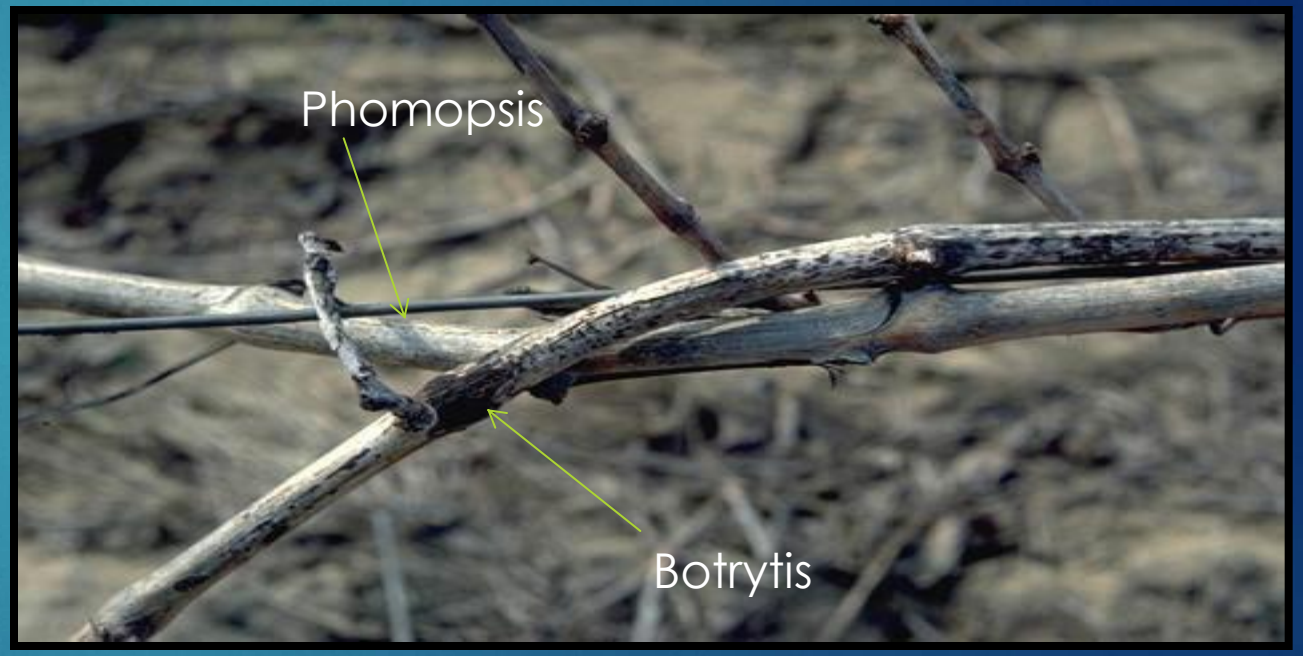



Pc (e.f.) 5 ml

Phompsis cane and leaf spot/dead arm

- Fungus survives winter as pycnidia on previously infected spurs
- Spores released with rainfall in the spring
- Infect newly emerging green tissue (basal internodal)
- Control
  - Spring applications of fungicides
    - Sovran, Captan, Sulfur (10K/ha), Mancozeb
  - Dormant LLS

Severely infected canes appear bleached in winter



Dormant infected spur position


Botrytis

Pycnidia of *Phomopsis* on infected tissue, cirrhus formation

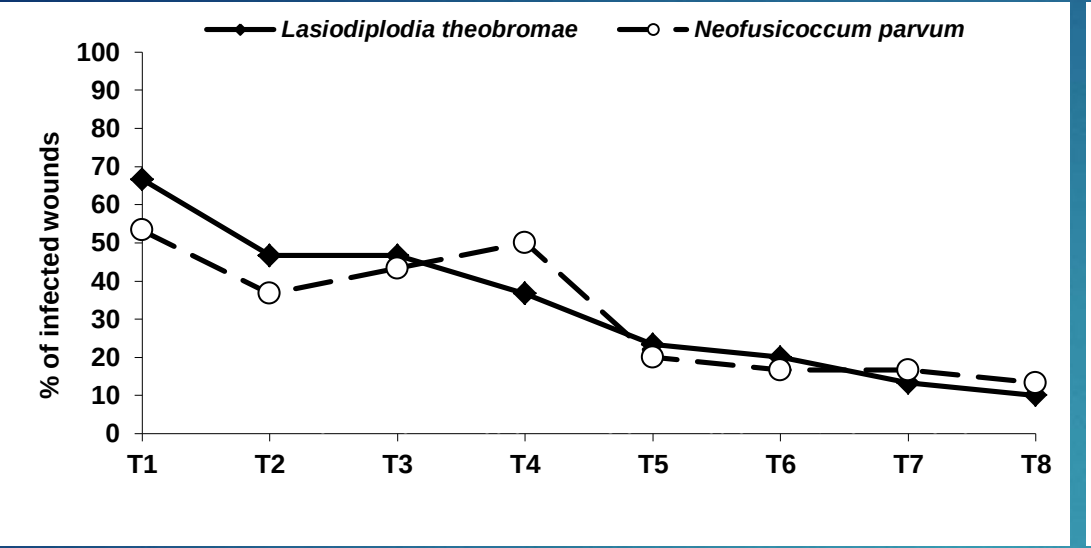
Phomopsis infected shoots a scabby appearance

Overwintering inoculum

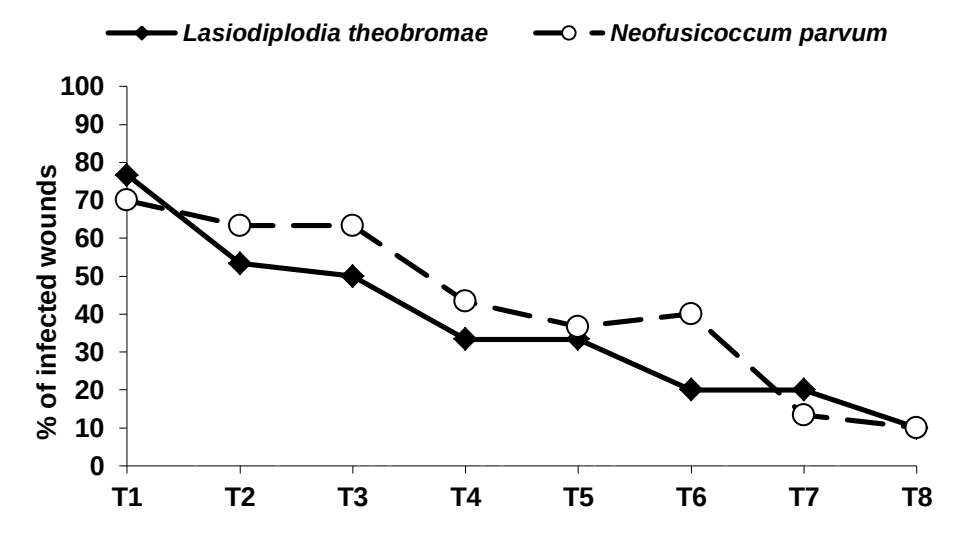
- Control using dormant sprays with directed nozzles
- No broadcast sprays

Time Course Inoculation

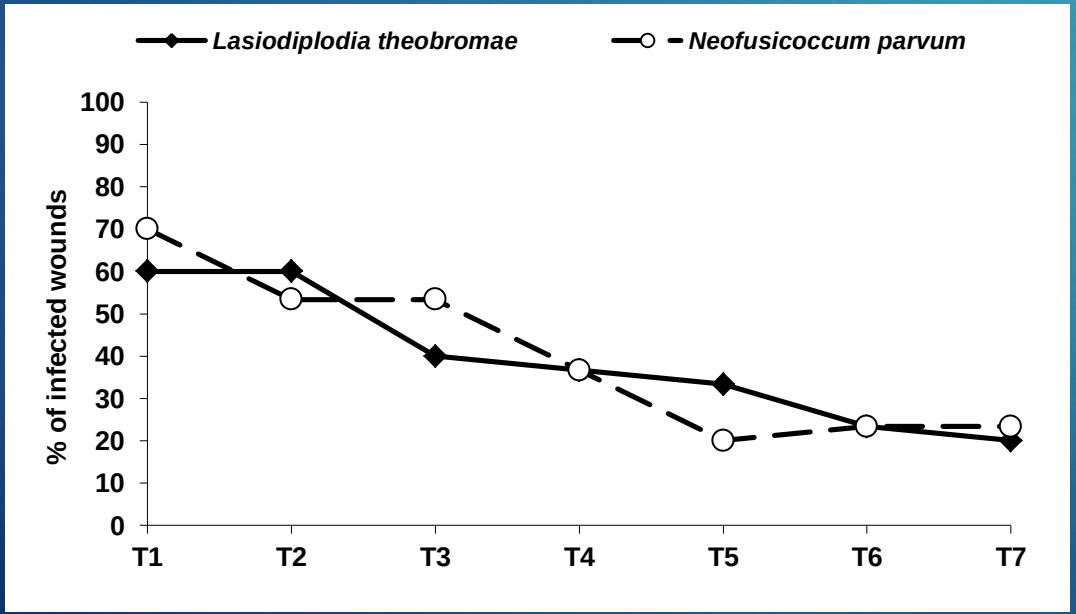
November



December

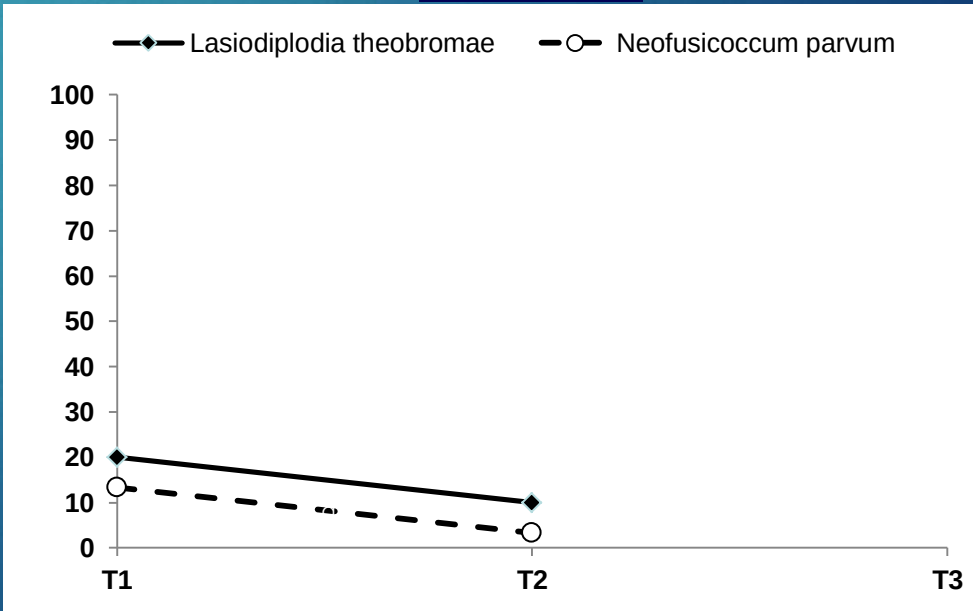


January

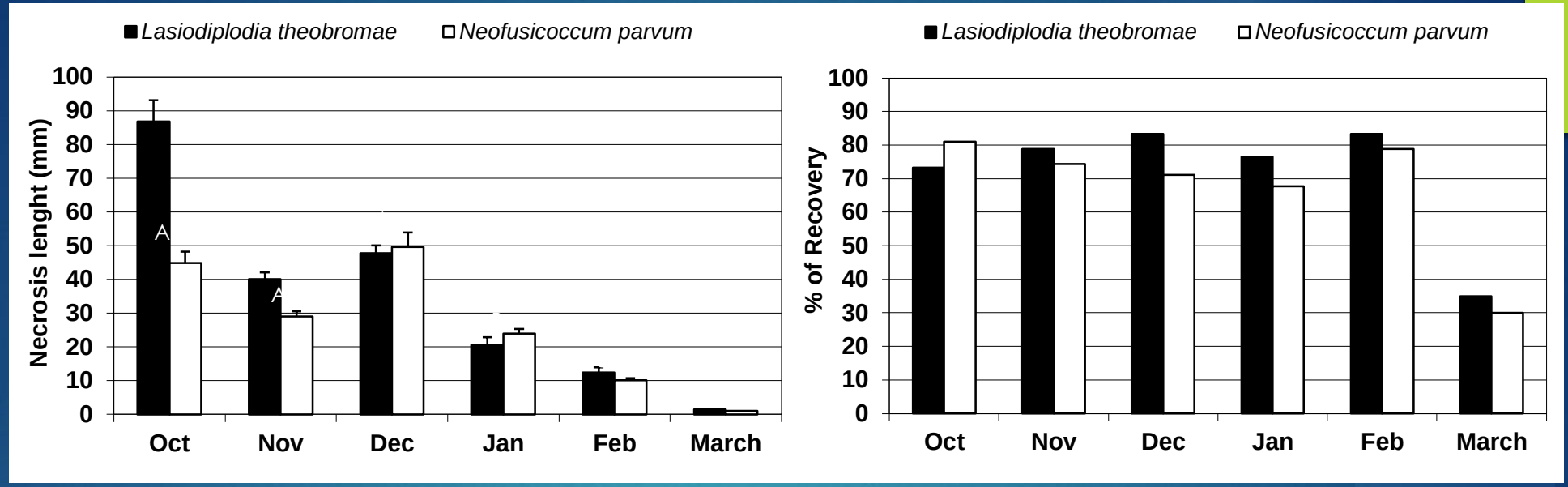


February

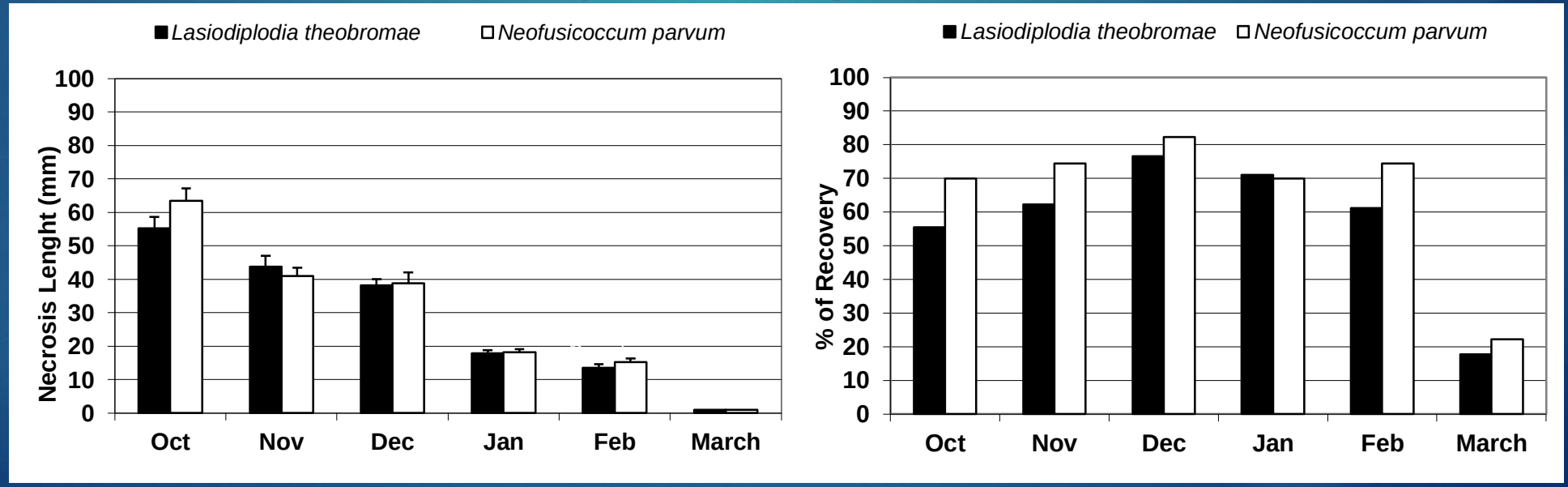
March



Susceptiblity of wound age



Susceptibility of wound age-Cabernet



Fungal species were not re-isolated 1 inch below end of necrosis

Pathogen Biology and Disease Epidemiology

- Disease is more severe when vines are water stressed
- Cane pruned vines generally have less disease
- Heavy disease one year will result in more disease the next year
- All produce fruiting bodies that overwinter on the vine or vine parts
- All canker pathogens release spores during rainfall
- Pruning wounds are the main infection ports

Cultural Control

- Cultural
  - Retraining from cordon or trunk
  - Late pruning
    - Mid to late February-early March
      - Wounds less susceptible
      - Inoculum decreased
      - Wound healing is faster
  - Double pruning (Weber et al. 2007. Am. J. Enol. Vitic. 58:61-66)
    - First pruning done with tractor mounted rotary saw
    - Second pruning done in late winter (Feb-early March)
    - Allows large acreage to be pruned late due to speed of second pruning
    - Excellent efficiency & economics
    - Should give at least 90-95% control

Control

- Double pruning or late pruning has been shown to be effective in significantly reducing infection by:
  Eutypa spp., Phaeo spp., and Botryosphaeriaceae spp.
- B-LOCK
- Vitiseal
- Spur Shield
- Currently Rally and Topsin M registered for tractor application
- Recommend Rally + Topsin in tank with non-ionic spreader i.e. Freeway/Pentra Bark
  - Tank mix fights resistance development
  - Application by machine is relatively fast and highly effective in control
  - Topsin M and Rally have been shown to be a good pruning wound protectants against Botryosphaeriaceae, Eutypa lata (Diatrypaceous), Pal and Pc infection

Effective Products Against Canker Pathogens

- DMI's- some have activity against Eutypa (Rally, 2X)
- Benzimidazole- Excellent activity against all pathogens (Topsin M, 2X)
- B- excellent activity against Eutypa (B-LOCK, 1X)
- Vitiseal with or w/o Rally + Topsin M
  - Paint 1X
  - Spray (1: 9 dilution)1X
- Biological's- good activity if applied 2 weeks before infection (Trichoderma, Cladosporium)
- New product being tested

Vitiseal wet


Vitiseal dry

Fur


PAK-TANK

Take Home

- Prune late in winter
- Treat all pruning wounds before rain
- Use products shown to stop all pathogens as wound treatment
- Spraying results in better coverage than painting or dobbing
- Understand disease epidemiology
  - Pathogens overwinter on infected grape wood
  - Spores are released with rain, sprinkler irrigation or fog
  - Naked fungicides last only about 2 weeks then reapply
  - Fungicides in Vitiseal last 3 months (other paint?)
  - Spur Shield

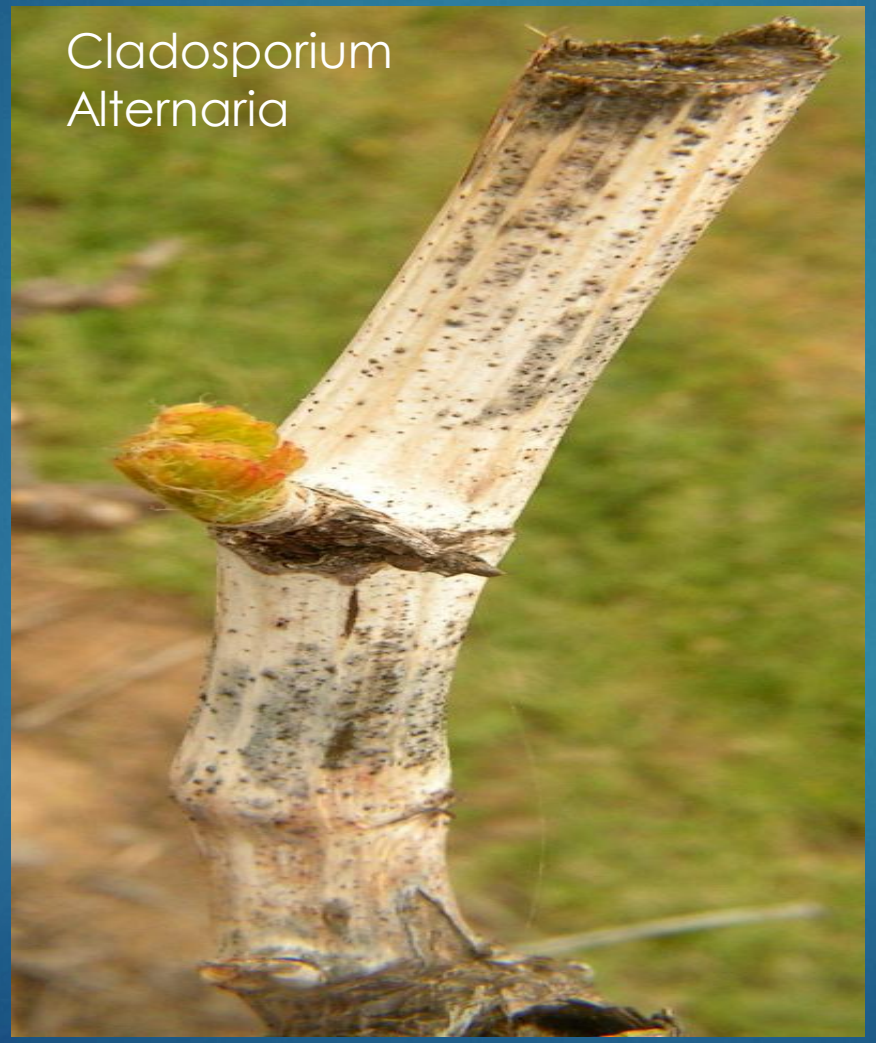
- Thank you

Safecoat VitiSeal™

- Natural waterborne co-polymer emulsion with other NOP (National Organic Program) approved ingredients.
- It is marketed as a unique crop management tool that creates a protective resistant barrier against the typical point of entry for wood canker disease pathogens including Eutypa, Botryosphaeria and Phaeo group.
- VitiSeal™ is applied either through painting, daubing or spraying directly over pruning cuts onto vines, trunks, and tree bases.
- The proprietary formulation is water based, environmentally safe containing no hazardous materials or HAPs (hazardous air pollutants), has no re-entry wait restrictions after treatment, and has been proven effective through multiple years of university research center testing.
- California Certified Organic Farms has been approving materials request forms for VitiSeal use by organic and biodynamic growers.

False Phomopsis

False Phomopsis



False Phomopsis

Control

- Fungicides
- Retraining
- Double Pruning
- Late Pruning
  - 90-95% disease control

Control of canker diseases

- Chemistry
  - Vitiseal
  - Topsin M
  - Rally
  - Spur Shield
- Retraining
  - Jim Kissler
  - Bob Sisson
- Double Pruning (Late Pruning)
  - 90-95% disease control