Trunk and Scaffold Canker Diseases of Almond in California

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Almond canker disease:
Almond canker disease:

- Affect young trees (early infections)
Ceratocystis canker:

- Caused by the fungus *Ceratocystis variospora* (syn. *Ceratocystis fimbriata*)
  - Associated with mechanical-harvest injury and pruning wounds
  - Amber gum at the canker margin
  - Cankers are most active during the growing season
  - Bark injuries and pruning wounds are susceptible for up to 14 days
Ceratocystis canker:
Ceratocystis canker:

- The fungus develops only in the cambium and xylem tissue of the current year.
- Perithecia containing the infectious spores are formed in mycelial mats under the bark of injured trees.
Ceratocystis canker:

- Sticky spore droplet can be picked up or ingested by insects (sap-feeding beetles and a drosophilid fly) and moved to fresh wounds
Management of Ceratocystis canker:

- Avoid shaker injuries
- Insure orchards are relatively dry 2-3 weeks prior to harvest
- Limit pruning wounds on branches and scaffold
- Surgery in winter when insects are not active and no rain in the forecast
Perennial Phytophthora cankers:

- Caused by oomycetes *Phytophthora citricola* and *P. cactorum*
- Associated with scaffold crotch pocket
- Cankers are fast growing
- Tree may die over one or two growing season
- Gum balls occur throughout the disease area
- Inoculum blown onto trees during harvest
Perennial Phytophthora cankers:
Perennial Phytophthora cankers:

Phytophthora crown rot

Aerial Phytophthora

David Doll
Perennial Phytophthora cankers: 

Phytophthora

Ceratocystis
Perennial Phytophthora cankers:
Perennial Phytophthora cankers:

- Management
  - The bud union of almond trees should be planted to remain above the soil surface
  - Proper scaffold selection to avoid pockets to form at the tree crotch
  - EU recently decided that all phosphite (phosphonate, phosphorous acid) products are exclusively pesticides
  - This has triggered the need for a Maximum Residue Limit (MRL)
  - The Almond Board of California, along with California Walnut Commission, the Pistachio Research Board and EU trade has successfully obtained an extension on the temporary MRL in the EU
    - Residue data being developed for a proper MRL
  - Check with your PCA or processor if use required
  - Early spring application of mefenoxam (Ridomil Gold SL) (Preventive)
Band canker:

- Caused by *Botryosphaeriaceae* fungi
- A narrow band of asymmetric cankers with oozing amber sap extend around the circumference of the trunk
- Appear in the spring
Band canker:

- The pathogen(s) invade stems through growth cracks
  - Affects 2 to 6-years-old trees
  - Affects vigorously growing cultivars
    - Nonpareil
    - Carmel
    - Padre
    - Butte
  - Orchards receiving large amount of N and water
Botryosphaeria cankers:

- Caused by *Botryosphaeriaceae* fungi
  - Associated with pruning wounds
Band and Botryosphaeria cankers:

- Disease epidemiology
  - 9 species of Botryosphaeriaceae
  - Different level of virulence among Bot. species
Band canker and Botryosphaeria cankers:

• **Disease epidemiology**
  - Inoculum sources: Pycnidia or perithecia on dead wood
    - Almonds (tree stumps)
    - Walnuts
    - Grapevines
    - Olives
    - Pistachio
    - Prunes
    - Willows
    - Oaks
    - Bay Laurel
    - Cottonwoods
Band canker and Botryosphaeria cankers:

- Disease epidemiology
  - Spore trapping study in grapevine:

![Graph showing spore counts, precipitation, and temperature over time]

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Eutypa dieback:

- Caused by *Eutypa lata*
  - Associated with scaffold crotch pocket and pruning wounds
  - Sacramento and northern San Joaquin valleys
  - Common disease of apricot, sweet cherry and grapevine
Eutypa dieback:

- **Disease epidemiology**
  - Inoculum sources: Perithecia on dead wood

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Eutypa dieback:

- Disease epidemiology
  - Spore trapping study in grapevine:
Wood decay fungi, acid and fertilizer burns:
Management of canker diseases:

• No fungicide spray
• Don’t prune trees during rainy weather
• Appropriate tree training and scaffold selection
• Remove dead wood, stumps and dead trees from the orchard
  – Composting, cogeneration
  – Wood chipping
• Avoid wetting the tree trunks with sprinklers
• Remedial surgery, cut into the clean wood
• Protect large pruning wound with Acrylic paint or pruning sealer
Management of canker diseases:

- Maintenance pruning
  - After harvest, Early fall
Management of canker diseases:

- Appropriate tree training and scaffold selection
  - Prevent disease establishment in the early years
Thank you!