



Biology, Epidemiology, and Management of Band Canker of Almond Caused by *Botryosphaeria dothidea* in California



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ABSTRACT:

Significant progress has been made in the understanding of the biology, epidemiology, and management of band canker of almond in 2005. For instance:

- ✓ The disease was very severe in some orchards in Butte and Colusa affecting Nonpareil, Carmel, or Padre cultivars.
- ✓ Both the water-splashed (conidial) phase (*Fusicoccum* sp.) and the airborne (ascospore) phase (*Botryosphaeria dothidea*) of the pathogen were found in several almond orchards in Butte County and in three walnut orchards each in Butte, Colusa, and Stanislaus counties.
- ✓ Spore inoculum in almond orchards can be either water-splashed or airborne from hosts next to almonds, the bark itself of infected almond trees, or airborne spores that may be transported from a distance.
- ✓ Stumps of trees that remain in the orchard after removal of infected trees, are still sources for both types of spore inoculum. Thus, infected trees need to be removed entirely (not leaving the stump in the orchard).
- ✓ *B. dothidea* from almond shows greater genetic diversity than *B. dothidea* causing panicle and shoot blight of pistachio and shoot blight of walnut.
- ✓ Some isolates of *B. dothidea* from almond, walnut, and pistachio had similar DNA fingerprints, suggesting the possibility for cross infection.
- ✓ Conidial, and ascospore isolates of *B. dothidea* from almond trunk and upper canopy and conidial and ascospore isolates from walnut had similar DNA fingerprints, suggesting that the pathogen from walnut can move into almonds and infect the trunk and upper canopy.
- ✓ New infections courts were determined in 2005: a) fruit peduncles, b) lenticels, c) growth cracks of shoots in the upper canopy, d) rough bark at the base of large shoots, and e) pruning wounds.
- ✓ Experiments by inoculating potted almond trees and treating simultaneously with azoxystrobin showed that trees can be protected from infections if the fungicide is applied before infection occurs.
- ✓ Experiments to cure the cankers (by either applying on or injecting fungicides or biological agents in the canker) do not look promising.
- ✓ For the first time, managing irrigation by installing splitters that reduce wetting the tree trunks reduced both the canker size and the incidence of trees infected by band canker.

SYMPTOMS:



Figure 1. A Padre tree with characteristic gumming due to band canker (canker not in a distinct band, but all over the trunk).



Figure 2. Band canker initiated from growth cracks.

Figure 6. Infection through lenticels (A), cracks on large shoots (B), and rough bark at base of shoot (C).



Figure 3. Partial and total tree death due to band canker.



Figure 4. Gumming of peduncle due to *B. dothidea* infection.

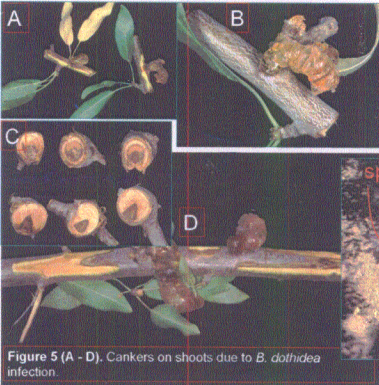
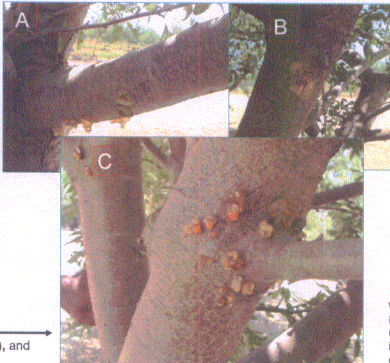


Figure 5 (A - D). Cankers on shoots due to *B. dothidea* infection.

WAYS OF INFECTION:



DISEASE MANAGEMENT:

Effect of fungicide and biological treatments on *B. dothidea* of almond trees (inoculated and treated simultaneously)

Treatment	canker size (inches)
Propiconazole	1.0 cd
Azoxystrobin	0.2 e
Iprodione	0.4 de
<i>Trichoderma viride</i>	1.5 bc
<i>Trichoderma harzianum</i>	1.7 ab
Control (inoc. not treated)	2.3 a



Figure 7. Canker curing experiments by applying fungicides directly on the canker (A); by injecting fungicides or biological agents (B).

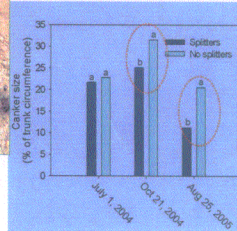
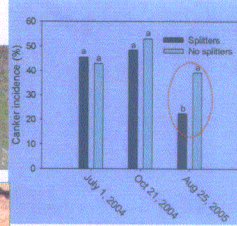


Figure 8. Using splitters attached on sprinklers reduced the size and incidence of band cankers in a commercial orchard.

CONCLUSIONS:

1. Band canker has potential of becoming a devastating disease in almond.
2. Major pruning wounds need to be protected.
3. Infected trees need to be removed entirely.
4. Protecting the tree trunk with fungicides may be effective; curing the cankers seems very difficult.
5. Reducing wetting the tree trunks (sprinklers or micro-sprinklers) reduces band canker.

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