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The Pomology Post

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Lower Limb Death in Almonds

Roger Duncan, Pomology Farm Advisor, UCCE Stanislaus County

We are noticing more dieback of lower limbs in many almond orchards this year. This "disease" has become quite significant, killing a large percentage of the lower wood in some orchards. Padre appears to be the most seriously affected variety, although Butte can be very bad also. Nonpareil, Carmel, Aldrich and a few other varieties are affected to a lesser degree. The problem appears to occur primarily in orchards older than ten years.

Symptoms. The problem is associated with weaker, small diameter wood in the lower canopy, although shoot death sometimes extends ten feet or more from the ground. Beginning in late April, leaves on affected limbs first turn yellow, then brown as the limb collapses. Limbs may die right up to the point of attachment but the large wood of the scaffolds appear to remain unaffected. If the bark on yellowing limbs is scraped away with a knife, you can often see brown spots underneath. These spots seem to grow together to form large dead areas which then causes the whole limb to collapse. Shoots continue to collapse throughout the summer. Sometimes darkened cankers can be seen extending deep into the middle of the branch if you cut the branch in cross section. Sometimes the cankers are wedge-shaped, sometimes they are not.

The Cause. With help from UC plant pathologist, Themis Michailides, we surveyed several orchards in Stanislaus and Merced Counties to determine if the limb death is a disease or if it is caused by some other problem. Clearly the limb death is not caused by excessive shading, anthracnose, Alternaria, or bread mold. In all surveyed orchards, two different species of fungi were consistently found growing on affected limbs. The fungus most consistently isolated from "diseased" limbs was an unidentified species of Phomopsis. There are many species of Phomopsis that cause canker diseases in grapes, figs and other plants. *Phomopsis amygdale* causes limb dieback of almond in some Mediterranean countries, Australia and in South America. This fungus was also shown to be the cause of a fruit rot and associated limb dieback in a Butte County almond orchard in 1998 after an unusually wet spring.

The second fungus commonly isolated from affected shoots was *Botryosphaeria dothidea*. This is the fungus that causes band canker, a fairly rare disease affecting the trunks and scaffolds of young almond trees. It is also the cause of panicle and shoot blight of pistachio, a serious disease for that industry. Recently, this fungus has been shown to cause shoot dieback in local walnut orchards. During our survey, we found this fungus sporulating on dead walnut shoots in orchards next to affected almond orchards. We also found spore-producing structures in nearby cedar and redwood trees. Botryosphaeria fruiting bodies were rarely found on the affected almond wood. It is unclear at this time if one or both of these fungi are responsible for this lower limb dieback. If these fungi are involved, it is unclear when infection is occurring.

This spring, we tried to reduce lower limb dieback in a badly affected Butte/Padre orchard by spraying Abound® fungicide from petal fall through June 1. Of course, we would never want to apply any fungicide that often back to back in the real world, but we were just trying to determine if the problem could be reduced with spring-time fungicide sprays. Unfortunately, even trees sprayed four times after petal fall had just as much lower limb dieback as the unsprayed trees. Abound® should have been very effective against both of these fungi. This information suggests that infection had already occurred prior to petal fall and that it may take several months for the dieback symptoms to show. In fact, the literature from other countries suggests that Phomopsis infections on almond shoots occur primarily in the fall. In the coming months, we will try some fall and/or dormant treatments to see if we can reduce this

lower limb dieback problem. However, based on conversations with growers, typical dormant copper applications do not seem to make a difference.

As you can see, we are just in the first stages of figuring this problem out. At this point, I suggest pruning out affected and dead limbs before the fall rains arrive (and while trees still have leaves so you can identify which limbs to remove). Removing these limbs should reduce the inoculum in the orchard. It is also important to keep limbs strong by keeping scale populations low with an occasional dormant oil application. Guidelines to determine when a San Jose scale treatment is necessary can be found at http://ipm.ucdavis.edu or you can give me a call. We will continue to work on this problem and hopefully come up with some answers for next season.

Verticillium Wilt

Roger Duncan, Pomology Advisor, UCCE Stanislaus County

This has been a particularly bad year for Verticillium wilt, especially on the west side in old row crop ground. Many second and third-leaf orchards have extensive limb death. Affected trees will have to be retrained or replaced. Even first-leaf trees are affected this year, which is pretty unusual. All *Prunus* species trees (almond, apricot, cherry, plum, peach, etc.) are susceptible.

The soil-borne fungus invades trees through the root and grows up into the water-conducting pipes (called xylem) in the trunk and limbs. The fungus eventually clogs the pipes and then shoots die from lack of water. Affected limbs collapse quickly and shoot tips often turn dark and curl into a characteristic "shepherds hook". If you cut cross ways through an affected limb, you can often see a darkened ring. This is the area of clogged xylem vessels. Extended, cool spring weather like we had this year favors growth of the fungus which leads to more extensive problems. Once temperatures heat up in the summer, the fungus dies out in the upper part of the tree and no more shoots die. Although shoot dieback is rarely observed in almond and stonefruit trees older than five years, it is very likely that tree growth and yield will be affected even in the absence of disease symptoms. Pistachios on susceptible rootstock can have serious shoot dieback problems for the entire lifespan of the orchard.

This fungal pathogen is generally present at very low levels in most areas of the San Joaquin Valley. High populations of Verticillium build up in soils when susceptible crops such as tomatoes, cotton, cucurbits (melons) and strawberries are grown over and over. Vert can also build on weeds such as pigweed, groundsel, London rocket, nightshade and dandelion. Verticillium forms resistant spores called microsclerotia that can survive for 6-12 years in the soil.

There is no "cure" for an infected tree. The best strategy is prevention. If you plan to plant an orchard in ground previously planted to susceptible row crops, you should take soil samples to determine your risk of Verticillium wilt. Only sample the top twelve inches of soil because the microsclerotia are pretty shallow. Significant Verticillium wilt disease can occur in almond orchards when there are only three microsclerotia present per gram of soil. Only one microsclerotia per gram is necessary for significant problems in pistachio. Following a susceptible annual crop, there may be **60 or more microsclerotia per gram** in the top foot of soil!

Solarization with clear plastic is very effective in killing Verticillium. Fumigating with chloropicrin or combinations of methyl bromide or Telone® that contain chloropicrin can also be effective in reducing Verticillium. All peach and peach/almond hybrid rootstocks are very susceptible. Marianna 2624 plum rootstock is somewhat resistant, but probably not worth the trouble.

Federal Marketing Order for Pistachios

http:giannini.ucop.edu and click on: Update, on the right hand column. In July August issue Vol. 8 No. 6 is an article about the newly established federal marketing order for pistachios. The article discusses benefit-cost analysis of the marketing order and concludes that producers as a whole will experience a net gain from the marketing order.

PISTACHIO PRODUCTION: 2005

A UCCE Short Course

November 8 – 10, 2005
UC Merced Administration Building
550 E. Shaw, Fresno, CA

The 2005 Pistachio Production Short Course is designed to deliver the latest research-based production practices in a format that enables prospective or current pistachio growers, production managers, and pest control consultants to better achieve their pistachio growing goals. The course covers: the economics of establishment and production; orchard site selection and development; an assessment of the current cultivars and rootstocks; irrigation; fertilization; training and pruning; weed, pest, and disease diagnosis and control; and postharvest handling.

Also featured is a half day of field demonstrations primarily in orchard preparation and pruning. Participants receive: a manual written specifically for the course; quick guides for year round production practices; and information about nutrition, disease, and pest diagnosis and control. Certificates are given to those who complete the course. This course is offered once every five years. The next course will be held in 2010.

Course information and on-line registration can be found at: http://fruitsandnuts.ucdavis.edu/crops/pistachio.shtml

Program Topics

- Economics
- The Tree
- Establishing the orchard
- Producing the crop
- Pest disease and management

Course Schedule

Tuesday, Nov. 8 (7 am – 7 pm)
- Economics
- The Tree
- The Orchard
- Production

Wednesday, Nov. 9 (7 am – 7 pm)
- Production & Field Trip

Thursday, Nov. 10 (7 am – 5 pm)
- Pests & Diseases
- Resources

Registration

The $525 course fee includes course materials, the Pistachio Orchard Management manual, one field trip, and all lunches and social events. Housing is not included.

Enrollment is limited and is on a first-come, first-served basis.

Please put only one name on each enrollment form. Additional forms are available from Cooperative Extension (Farm Advisor) offices in each pistachio producing county or from the UC Fruit & Nut Center (see above). Photocopies are acceptable.

Please register by 9/30/05. A full refund, less a $50 processing fee, may be obtained if a notice of withdrawal is received by the UC Fruit & Nut Center by 10/30/05.

Hotel Accommodations

Please contact the hotels directly and identify yourself as a participant of the Pistachio Short Course.

- Ramada Inn, 324 E. Shaw Ave., Fresno, CA 93710. Phone (800) 241-0756 (special rate available when mentioning code PSCM)
- Courtyard by Marriott Fresno Shaw Avenue, 140 E. Shaw Ave., Fresno, CA 93710. Phone (800) 321-2211

Further Information

Questions regarding short course content should be directed to Louise Ferguson, Extension Specialist at louise@uckac.edu or call (559) 646-6541.

Questions regarding registration details should be directed to JoAnn Coviello at joann@uckac.edu or phone (559) 646-6525.

Classroom Location

UC Merced Administration Building
550 E. Shaw Avenue
Fresno, CA 93710

Enrollment - PISTACHIO PRODUCTION: 2005

❑ Please enroll me in **Pistachio Production: A UCCE Short Course** - November 8 – 10, 2005 / Fresno / $525
❑ No! I can't enroll at this time, but please add my name to the mailing list for information about future pistachio production courses.
❑ I have special needs. Please check here and we will contact you to discuss them.

Name (first, middle initial, last) _____ ❑ Grower ❑ Other

Job title and organization _____ Acreage in pistachios _____

Address ❑ work ❑ home _____

City _____ State _____ Zip _____

Daytime telephone _____ E-mail address _____

Payment information

❑ Check enclosed, payable to "UC Regents"
❑ Please charge my credit card. Card type: ❑ Visa ❑ MasterCard

Account #: _____ Expiration Date: _____

Name on Card: _____ Signature: _____

Mail to: Pistachio Production Short Course
JoAnn Coviello
University of California Kearney Agricultural Center
9240 S. Riverbend Avenue
Parlier, CA 93648

Fax to: 530 754-8523 - UC Fruit & Nut Research and Information Center

Register on-line at: http://fruitsandnuts.ucdavis.edu/crops/pistachio.shtml

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7/25/05

~ Reprint freely with credit to: Brent A. Holtz, Ph.D., Pomology Farm Advisor, University of California Cooperative Extension, Madera, CA.

Sincerely,

Brent A. Holtz, Ph.D.
Pomology Farm Advisor

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