



# Topics in Subtropics Newsletter

University of California Cooperative Extension

Fresno, Kern, Madera, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, & Ventura Counties

## News from the Subtropical Tree Crop Farm Advisors in California

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*Editor’s Note:*

Topics in Subtropics, is also available as an online blog. Visit our blog for up-to-date information that may be available prior to receipt of this newsletter: <http://ucanr.org/blogs/Topics/>

Please let us know if your mailing address has changed or you would like to add someone to our mailing list. Simply call or e-mail the farm advisor in your county to make additions or changes to our mailing list.

We strive to extend to you the most recent information pertaining to topics in subtropics. We encourage you to contact your local farm advisor to suggest topics of importance to your commodity or industry for inclusion in future editions of this newsletter.



We are pleased to announce that UC ANR will be celebrating the centennial of the passage of the Smith-Lever Act and the centennial of Cooperative Extension in California in 2014. For brief historical overview please link to: <http://ceriverside.ucanr.edu/>

**Eta Takele  
Editor**

## **Cultural Practices to Reduce Pest and Disease in Avocado and Citrus**

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In many ways our pest and disease management of fruit tree crops is exacerbated by our cultural practices. Avocado and citrus offer some very clear demonstrations of how we manage our trees can lead to reduced pesticide use. From the beginning, our selection of rootstock and scion can help lessen pest and disease problems. In both avocado and citrus we have good rootstocks which can handle problems, such as root rot more effectively than seedling rootstocks. So it is imperative that if you know that drainage will be a problem, starting off with the right, healthy rootstock helps. Also scion selection can have a major impact, as well. For example, 'Lamb' avocado is much less prone to perseia mite than is 'Hass'. This pest can significantly increase a pesticide spray program and planting 'Lamb' could mean virtually no sprays for this pest. There are similar examples in citrus where one variety is more prone to a pest or disease than another, such as navel orange is more susceptible to citrus thrips scarring than Lisbon lemon.

Irrigation is probably the most important cultural factor in managing tree disease. Over, under and improperly timed irrigations are the conditions necessary for many root diseases. *Phytophthora* spp. are fungi which are favored by distressed root systems brought on by waterlogging and other stressful conditions. Wetted trunks can also bring on some trunk diseases, like gummosis in citrus and crown rot in avocado. Simply preventing irrigation water on the trunks can limit these pathogens.

Other diseases, such as black streak, stem blight and bacterial canker in avocado are brought on by soil moisture stress.

Nutrients, especially nitrogen management, have long been known to affect insect population, such as scale, mealy bug and aphid. Encouraging lush growth helps sustain these insects, so reducing this growth tends to lower their numbers. Managing the time at which canopy growth occurs can affect pest severity. Avocado thrips build their populations in the spring and move easily from leaf to fruit causing significant scarring. Promoting leaf growth at flowering time with a nitrogen application keeps the insect on the leaves and reduces fruit scarring. This also promotes growth that replaces leaves that have been damaged by perseia mite. Likewise the incidence of citrus leafminer damage can be reduced if spring pruning is avoided so that a flush of growth does not occur at the same time the population is building. Timing of pruning is important in lemons to avoid wet periods of rain and fog to reduce the spread of *Hyphoderma* wood rot fungus when it is actively sporulating.

Pruning can change pest pressure by changing the humidity in the canopy, introducing light and changing the climate supporting disease and pests. Additionally, pruning enables spray coverage more thorough and effective. Modified skirt pruning can have significant effects on mealy bug and scale control, fuller rose weevil incidence, ant colonization and snail damage. It is important that the trunk also be protected from snails and ants as this becomes an alternative route for access to the tree. Skirt pruning also reduces problems with weeds such as bladder pod as well as reducing the chances of fungi being splashed from the ground onto low-hanging fruit, which in turn is splashed to higher fruit.

Because predators are less efficient when the canopy has dust or fire ash, keeping a canopy clean also makes for more efficient biological control. Parasites such as wasps are also slowed by the physical abrasion from dust and ash. Dust also creates a drier environment, which is more hospitable to pest mites. Watering picking rows, roads, and even the trees themselves can lessen mite populations. Use of cover crops can also reduce dust and potentially provide pollen and nectar for predators and parasites. Of course, cover crops create a whole new set of management issues, such as colder winter orchards and snails. And rodent activity, such as gopher and meadow mice

Finally harvest timing to avoid pest and disease is often overlooked. In avocado, fruit is often set in clusters. Greenhouse thrips love the microclimate created by these clusters, and if in a size-pick the cluster is reduced, greenhouse thrips will often not be a problem. Harvest timing is also important in citrus. Fruit left too long on the tree can often develop Septoria fungal spot. Picking in a timely manner reduces the incidence of this disease.

These are just a few examples of how cultural practices at the right time can reduce pest and disease problems.

**Polyphagous Shot Hole Borer in  
California**

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The Polyphagous Shot Hole Borer (PSHB) is a new pest in Southern California. This boring beetle, from the group of beetles known as ambrosia beetles, drills into trees

and brings with it a fungus (*Fusarium* sp.). The beetle is dark brown to black and tiny, with females between 0.07 and 0.1 inches long, and males even smaller, usually about 0.05 inches. Pregnant females bore through the tree's bark, creating galleries under the bark. They plant the fungus in these galleries, where it grows and spreads through the tree. The female then lays her eggs in these galleries and when the eggs hatch, the larvae eat the fungus. The larvae develop into adults in about a month. Many more of the larvae develop into females than males, and the females mate with the males (their brothers) while still in the gallery. The pregnant females then pick up some of the fungus in their mouths, and leave through the entry holes created by their mothers to start the process again.

**The pest in California**

The PSHB seems to have originated in South East Asia or Africa. At first, researchers identified it as the Tea Shot Hole Borer (*Euwallaeceaformicatus*) which it very closely resembles, but DNA evidence points to it being a new, as yet unnamed species in the same genus. The symbiotic fungus may also be a new unnamed species, in the genus *Fusarium*, which is commonly associated with ambrosia beetles. The PSHB was first found at Whittier Narrows in Los Angeles County in 2003. From 2003-2010 it was caught a few times in traps in the county, then in 2010 it was found to have caused the death of a large number of Box Elder street trees in Long Beach, and in 2012 both the fungus and the beetle were found on several backyard avocado (cv. Hass, Bacon, Fuerte, Nabal) trees in residential neighborhoods and commercial avocado groves in South Gate, Downey and Hacienda Heights. It now appears to be wide spread in Los Angeles, Orange, and western Riverside Counties. It's been found to attack over 200 species of

trees in the LA area, including the native Coast Live Oak (*Quercus agrifolia*) and the California sycamore (*Platanus racemosa*), and 52 species of the most common street trees in the area. It has the potential to cause serious damage to avocado and nursery production, municipal and residential trees, and natural woodlands.

### **What happens?**

There are several potential outcomes of a beetle attack.

1. Beetle is repelled with no infection. This has been observed in 20 species of trees. Investigators are trying to figure out what features of the tree might repel the beetle.
2. Beetle drills into the tree and transmits the fungus, but doesn't produce offspring. This has been observed in over 50% of the tree species attacked. We don't know the final outcome of this interaction. Often leakage of xylem fluid is noticed on the trunk and branches: can the tree leak to death? Maybe nothing bad will happen to the tree, but the tree could suffer if the xylem vessels are clogged up, which could cause dieback of branches. Damage could also make the tree more prone to attack from other pest species.
3. Beetle drills into the tree, fungus infects the tree, and the beetle produces offspring in the tree. This has been seen in about 8% of the tree species attacked, and these species are considered true host of PSHB, and include box elder, coast live oak, and avocado. Interestingly from a natural resources perspective, it also includes invasive plants like castor bean and tree of heaven (*Ailanthus*). Some trees seem to

suffer mild symptoms like branch die-back, while others are killed outright.

Symptoms of PSHB attack and fungus infection differ among tree species. The beetle produces a very precise, perfectly round, tiny (0.33 inches in diameter) entry hole in most trees. Infection with the fungus can cause a dry or wet and oily dark stain surrounding the entry holes, discolored wood, leaf discoloration and wilting, and dieback of entire branches. In box elders and avocados, a white crusty ring of sugar, also called a "sugar volcano" can be produced. Frass may be produced, but because this can quickly dissolve in water it can be easy to miss. If the bark is scraped away, dark dead tissue may be found around the galleries.

### **The pest on avocados in Israel**

The beetle/fungal complex is causing damage to avocado groves in the central coastal region of Israel and the northern Negev. On a recent trip, UC pest management experts observed "severe limb dieback, many broken branches scattered on the orchard floor, dropped mature fruit and smaller than normal fruit size for the fruit remaining on the trees". Growers and researchers there have had some success with chemical treatments in the laboratory, but no luck with field applications (Arpaia and Obenland, 2013).

### **Management**

PSHB has been found to attack healthy trees, but as always a good defense against disease is to keep trees in optimal health. Choose trees that are appropriate for the site and don't require a lot of additional water. Provide appropriate soils and access for roots to grow and expand. Avoid excessive pruning, over- or under-watering, and

planting inappropriate companion plants within the dripline. If trees are infected, systemic insecticides generally are poor for treating ambrosia beetles. Prophylactic spraying of the bark could be used to protect uninfected trees in some situations. Protect trees overall by avoiding moving infected wood around – use firewood locally. Sterilize pruning tools between uses to avoid spreading the fungus. Chipping and solarizing/tarping infested wood may help to limit the spread of the beetle/fungus complex.

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### References and Resources

Arpaia, Mary Lu, and Obenland, David, 2013. Update from Israel on the Polyphagous Shot Hole Borer and its Fusarium fungal symbiont. Topics in Subtropics Newsletter, March, 2013, V11:1, UC Cooperative Extension Southern California Oak Pests Website, [www.ucanr.edu/socaloakpests](http://www.ucanr.edu/socaloakpests) Polyphagous Shot Hole Borer, UC Riverside Center for Invasive Species Research, [http://cistr.ucr.edu/polyphagous\\_shot\\_hole\\_borer.html](http://cistr.ucr.edu/polyphagous_shot_hole_borer.html)



Round tiny entry hole on an avocado tree



White crusty ring of sugar “sugar volcano” on an avocado tree



Polyphagous Shot Hole Borer (PSHB) Beetle

## Electronic “sniffer” for Detecting HLB

*Ben Faber, Farm Advisor Santa  
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At a recent conference on Postharvest Technology Advances, Cristina Davis from the UC Davis Department of Mechanical and Aerospace Engineering presented information on the development of a device that can sniff out trees infected with Huanglongbing (HLB).

Scientists at UC Davis are refining a mobile chemical sensor that can detect diseased citrus trees by analyzing their volatile organic compounds (VOCs). VOCs are emitted by all types of plants and contribute to their distinctive odors—such as the perfume of orange blossoms and pungent scent of garlic in the air. VOCs must exist at very high levels for humans to smell them, and there are some VOCs people cannot smell at all. The machine is able to distinguish the signature smells of HLB infected trees, sort of the way people evaluate wines with terms like “grassy”, “plum”, or “austere”, from healthy or trees infected by other diseases.

Finding HLB-infected trees and eliminating them before Asian Citrus Psyllid (ACP) picks up the disease and spreads it to neighboring trees is a major challenge. The pathogen in the tree cannot be detected by leaf testing for three to nine months after infection, and the symptoms don’t show up in the tree for a year or more after infection. Meanwhile, the disease can be spread by ACP. Research is under way to develop early HLB detection so that infected trees can be rapidly removed. Early detection will also allow researchers to more rapidly assess treatment programs for controlling not only the spread of the disease, but also possible cures or rootstocks or scion

varieties that might have some resistance to the disease.



HLB infected tree showing mottling in one of the canopy

**Bee kill in Oregon – A reminder of pesticide use:** E-mail distribution sent by:

*David Epstein, Ph.D., Entomologist; USDA  
Office of Pest Management Policy (OPMP)*

IPM Colleagues,

The EPA notified OPMP this morning (6-28-2013) regarding a large bumble bee kill in Oregon involving a landscaper using a pesticide to control aphids in linden trees at a Target parking lot. EPA has been notified that as of last night (8pm ET), the State of Oregon has issued a 180 day “don’t use” moratorium on the product. The investigation is ongoing. This event indicates a need to remind users of pesticides about the absolute importance of reading and following the label – and to pay particular attention to WARNINGS. While this was not a result of an agricultural application and was an urban use, the EPA has asked if OPMP can work thru the land grant system to get the word out through extension and education offices to reinforce this very important message to the agricultural community. EPA is contacting their stakeholders.

With agricultural production in full swing all across the country, OPMP requests your assistance through outreach and education to remind all users of pesticides of the importance of following the label. This helps to ensure good pest management while protecting wildlife, their habitat, and the environment. It is especially important that urban gardeners and homeowners, who may not be as familiar with the content of the label, have access to this important information. We are requesting your assistance in communicating this information to your communities. Information could include the following:

***Use of any pesticide in any way that is not consistent with label directions and precautions is illegal.*** It may also be ineffective and dangerous. The basic steps in reducing pesticide risks are:

- Choose the form of pesticide best suited to your target site and the pest you want to control:
  - First, identify the problem correctly and then, choose the least-toxic pesticide that will achieve the results you want **and** be the least toxic to you and the environment.
  - When the words “broad-spectrum” appear on the label, this means the product is effective against a broad range of pests. If the label says “selective,” the product is effective against one or a few pests.
  - Read the label **before buying** the pesticide, read the label **before mixing or using** the pesticide **each time**, and read the label before storing or disposing of the pesticide.
- Determining the right amount to purchase and use: **do not assume that using more pesticide than the label recommends will do a better job.** It won't.
- Find the signal word—either ***Danger***, ***Warning***, or ***Caution*** on the pesticide label. The signal word tells you how poisonous the product is to humans.
- Choose the form of pesticide (aerosol, dust, bait, or other) best suited to your target site and the pest you want to control. Certain formulations work better for some pests and/or some target areas than others
- Using the product safely and correctly:
  - Never apply pesticides outdoors on a windy day (winds higher than 10 mph)
  - Wear protective clothing, don't smoke or eat
  - Mix and apply only the amount you need
  - Watch for negative effects on wildlife (birds, butterflies, and bees) in and near treated areas. If you see any unusual behavior, stop using that pesticide, and contact EPA's Pesticide Incident Response Officer
- Store and dispose of pesticides properly.
  - Follow all storage instructions on the pesticide label.
  - Always store pesticides in their original containers, complete with labels that list ingredients, directions for use, and first aid steps in case of accidental poisoning.

State and local laws regarding pesticide disposal may be stricter than the federal requirements on the label. Be sure to check with your state or local solid waste agency before disposing of your pesticide containers.

## **Important Information Sources Related to Fire Management and Protection**

Here is a list of links for growers and homeowners on how to prepare for fire and in the case of fruit trees, how to treat them after they have burned and how to calculate the loss of a commercial fruit tree.

**[Tree and Vine Loss Calculators:](#)** Spreadsheet to help you calculate tree loses.

**[Calculate Cost of Fire Damage to Avocado and Citrus Trees:](#)** Information from Ben Faber, Soils and Water, Avocado and Minor Subtropicals Advisor.

**[Living with Fire:](#)** Information on how to care for fire damaged trees from Ben Faber, Soils and Water, Avocado and Minor Subtropicals Advisor.

**[Safe Landscapes Project:](#)** Information on fire ecology and fire safe landscaping for homeowners, developed by Sabrina Drill, Natural Resources Advisor.

**[UC Center for Fire Research and Outreach:](#)** Information on fire science from UC experts. Includes information on how to make homes and other structures more fire resistant, developed by Steve Quarles, Statewide Wood Performance and Durability Advisor.

### **Publications Available From University of California ANR Catalog**

You can find the publications listed below at the [University of California DANR Catalog](#) site (In the ANR Search type fire) and order more than one publication at a time or you may click on one of the links below. if you purchase a priced publication enter the

promotion code **PRVEN56** at check-out. You will receive a 10% discount on your order, and a portion of the sales will benefit local programs.

**[A Property Owner's Guide to Reducing Wildfire Threat:](#)** Describes ways homeowners can reduce the threat of fire to their property. Cost \$1.50

**[Home Landscaping for Fire:](#)** Incorporating fire safe concepts into your landscape is one of the most important ways you can help your home survive a wildfire. FREE

**[Landscaping Tips to Help Defend Your Home from Wildfire:](#)** You can have both a beautiful landscape and a defensible fire-safe zone. FREE

**[Recovering from Wildfire:](#)** Discusses issues that family forest landowners should consider following a wildfire. Cost \$5.00

**[WildFire: How Can We Live With It? \(DVD\):](#)** This program contains general information about wildland fire in California. Cost \$20.00

**[WildFire: How Can We Live With It? \(DVD\):](#)** This program contains general information about wildland fire in California. Cost \$20.00

**[Companion Set: How Can We Live with Wildland Fire? \(Publication and DVD\):](#)** What role does fire play in the natural cycle and what choices can we make about coping with wildland fire? Cost \$27.50

**[How Can We Live with Wildland Fire?:](#)** What role does fire play in the natural cycle and what choices can we make about coping with wildland fire? Cost \$10.00.



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# *Topics in Subtropics*



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