



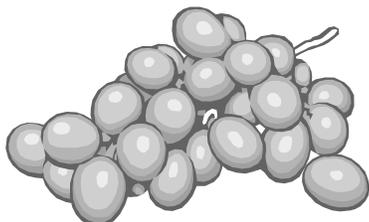
THE SCOOP

on fruits and nuts in Stanislaus County

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Lower Limb Dieback Update

Over the past couple of years, many orchards in California have been affected by a disease we are calling "lower limb dieback." Padre and Butte are affected most severely. Symptoms begin to show in late April or May as leaves on small, lower limbs turn yellow. Over a period of weeks, the limbs become girdled from enlarging cankers and die. Symptoms progress through most of the summer.

Two canker-forming fungi, *Botryosphaeria dothidea* and *Phomopsis sp.*, are consistently isolated from cankers on dying limbs. However, we still cannot say for certain that these fungi are the primary causes of the disease as they may come in as secondary invaders. We have also isolated these fungi from dead limbs in nearby walnut orchards as well as landscape trees like cedar and redwood. We have noted that these fungi sporulate profusely on these alternate hosts but don't appear to sporulate nearly as much on infected almond wood. I suspect most almond infections are from spores that are blown in from outside of the orchard.

Last spring I tried to reduce lower limb dieback in a badly affected orchard by applying fungicides from petal fall through early June. Unfortunately these spring fungicide applications had no effect on reducing symptoms last year. Based on reports out of Europe that *Phomopsis* infections may occur primarily in the fall, we conducted field trials in three orchards testing fall treatments. In two orchards, the growers applied copper hydroxide (Kocide[®] DF at 12 lb. per acre) or liquid lime sulfur (15 gallons per acre) in mid-late October. In a third orchard, several other treatments were tried in smaller plots using a hand gun sprayer. These treatments included Kocide[®] DF applied in October and December, liquid lime sulfur in October and December, Pristine[®] fungicide (14.3 oz per acre) applied every two weeks from October 14 through November followed by an early December Kocide[®] application, NutriPhyte P (0.5 gallons per acre), and PlantShield[®], a commercial formulation of *Trichoderma harzianum*, which is a biological fungicide.

Results. The bottom line is that we saw no significant reduction in lower limb dieback symptoms this spring by any of the fall treatments in any of the orchards.

Continued . . .

U.S. Department of Agriculture, University of California, and Stanislaus County Board of Supervisors cooperating

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This was, of course, very disappointing. There may be a few explanations for our poor results. First, I observed that many old cankers that had “died out” last summer reactivated this spring leading to more limb death. Of course, a fungus that survives from one season to the next inside of a limb will not be affected by a fungicide spray. Another possible reason we did not reduce lower limb dieback significantly with the fall treatments is because the two fungi can sporulate and infect new wood at a very wide temperature range. Sporulation of *Phomopsis amygdali* pycnidia occurs from 34°F – 100°F and infection can occur from 41°F – 97°F, as long as there is moisture present. This means infection could potentially occur any time from the first rains in the fall through the last rain event in the spring. There is no practical way to protect trees with standard fungicides for a period of six to seven months or longer. It is also possible that there is another primary cause of the disease we have yet to discover.

One out of the three cooperating growers pruned out all the dead and diseased wood in his orchard last fall. This orchard had significantly less dieback this year than last year and also much less than the other two orchards I worked in. I assume this is because the grower removed limbs containing old cankers which would have reactivated this spring. Management of this disease may require removal of diseased limbs in combination with multiple applications of a long residual fungicide like copper. It may be best to prune out the wood during the summer while it is easy to identify affected limbs. We will continue to work on this problem and hopefully come up with clearer management suggestions. Thank you to growers Ron Piazza, Robert Longstreth and Chris Ott for participating in these trials. Thanks to Best Sulfur Products, BASF, Syngenta and Salida Ag Chem for supplying chemical products used in these trials.

Hull Samples

What is the most common nutrient deficiency in Stanislaus County almonds? If you said nitrogen or zinc you are wrong. While zinc and nitrogen are commonly applied to area orchards, boron is often neglected and therefore boron deficiency is far more common. If you haven't applied boron TO THE GROUND recently and your orchard is east of the San Joaquin River, you are almost certainly deficient. Boron is essential for pollen tube growth. There are no obvious foliar symptoms of moderate boron deficiency, but less than optimum boron can reduce nut set. Analysis of mature almond hulls is a much better indicator of boron status than a leaf analysis. Wait until harvest to collect hulls because they will continue to accumulate boron while splitting. Trees with hull boron levels of less than 120 ppm may benefit from a post-harvest boron spray (1-2 lb of a 21% B product in 100 gallons of water per acre). This will help with pollen

germ tube growth in the flowers next spring but will not improve overall boron status of the tree.

Hull boron of less than 80 ppm indicates the need for a ground application. Fertilize with the equivalent of 10 – 20 pounds of a 21% boron product per acre. Boron can be injected through micro-irrigation systems, broadcast or sprayed on the ground, or included in a herbicide spray. Herbicide sprays containing glyphosate may need to be buffered to prevent reduction of herbicidal activity. Hull levels over 200 ppm indicate excessive boron.

Mite Alert

Through July, mite pressure has been fairly low, most likely due to our very long, cool spring. We had a similar situation last year but mites took off in August catching many growers by surprise. Be sure to monitor mites closely using a presence / absence sampling technique in almonds. With this method, you don't have to count mites, just look at the leaves and determine if there are mites present or not on each sampled leaf. As a general rule, it is time to treat if about half of the leaves have mites and mite predators are also present (they usually are unless they have been wiped out by broad spectrum insecticides). If no predators are present, treat when about one out of three sampled leaves have mites.

In the past few years, many new miticides have been registered with shorter pre-harvest intervals. This allows the grower more flexibility in mite management and should result in fewer unnecessary mite sprays by allowing the grower to wait longer before making a treatment decision. Below is a table of several miticides with PHI's of seven days or less. Double check labels for registration information before application. Also, a 2% oil solution has no PHI and will often carry you through a jam during harvest.

	Pre-harvest Interval		
	Almonds	Peaches	Grapes
Acramite®	7 days	3 days	14 days
Desperado®	7 days	7 days	NR*
Dicofol	NR*	NR*	7 days
Kanemite®	7 days	NR*	NR*
Kelthane®	NR*	NR*	7 days
Nexter®	7 days	7 days	7 days

* NR = not registered for that crop



Pre-Plant Fumigation Pays

In October 2000, we initiated a pre-plant fumigation trial with grower, Norman Kline, to study the effects of various pre-plant fumigants and post-plant treatments on a replanted Loadel cling peach orchard. During the early years of the orchard's life, we monitored tree growth, yield, nematode dynamics, soil microbial changes, plant and soil nutrition, and other aspects of orchard and soil "health". The bottom line was that fumigation paid huge dividends during the first two harvests and there was no substitute for preplant fumigation. Fumigation increased gross per acre income by \$4127 (methyl bromide), \$1806 (Telone® II) or \$2102 (Vapam®) over unfumigated trees during the first two harvests. Telone® treated trees started out slow for some reason, but grew very well after the first year. Post-plant nematicides like Nemacur® and Enzone® reduced nematodes in unfumigated areas for a few months after each application but it was difficult to see significant plant responses, even in unfumigated areas. This shows that there is more to the replant problem than just nematodes. Microbial and kelp-based products injected through the drip system each year did not change the microbial makeup of the soil, nor did they have any effect on nematodes, tree growth, nutrition, yield or anything we measured. Placing black polyethylene film down the herbicide strip reduced ring and root lesion nematodes and increased plant growth for the first few years. However, this practice is probably impractical and was no longer effective after the trees got large and produced shade. The only effective & practical post-plant treatments in this trial were foliar micronutrient sprays and frequent, small nitrogen applications. Only the unfumigated trees responded to the fertilizer treatments. There was no measurable response when foliar sprays were applied to "healthy" fumigated trees.

Do Unfumigated Trees Eventually Catch Up? I sometimes hear people say that fumigation may not be worth the cost in the long run because unfumigated trees will eventually "catch up" to fumigated trees, especially in peach orchards where trees are pruned heavily and maintained at a given height. This does not make sense because any money lost in the early years can never be made up, even if unfumigated trees finally produce yields equivalent to fumigated trees. Since the project officially ended two years ago, Norman has done a great job bringing the unfumigated trees into full production with proper irrigation and fertility practices, including periodic foliar micronutrient sprays and fall lo-biuret urea sprays. Amazingly, there has been no bacterial canker in this orchard and the unfumigated trees look good. Now that the orchard is in its 6th-leaf and growing well, I wanted to see if the unfumigated trees really did catch up. Yield data are shown in the table below. These data show that even though the unfumigated trees look good, they still produced 4.9 – 7.1 tons per acre less than fumigated trees this year.

Fumigation Treatment	2006 Tons per Acre (6 th leaf)	Cumulative Yield 3 rd , 4 th & 6 th leaf	Cumulative Gross Income	Increase in Income Over Unfumigated*
Unfumigated	13.8	25.2	\$7,280	--
Vapam®	18.7	37.7	\$10,852	\$3,572
Telone® II	20.9	38.9	\$11,216	\$3,936
Methyl bromide	18.7	45.1	\$12,877	\$5,597

*Guestimating a price of \$300 per ton for Loadels, including premium in 2006.

In Search of New Fumigation Trials

It was not surprising that the previously described site would benefit from pre-plant fumigation because it was very sandy, had high ring and root lesion nematode counts, it was at least the third peach orchard in a row in the same ground and the previous orchard struggled with replant problems. However, it is sometimes less clear in other situations just how much benefit, if any, pre-plant fumigation would provide. What about replant situations where nematode counts are much lower? What about heavier ground like on the west side or in the Sierra foothills? What about almonds following another perennial crop like grapes or walnuts? I would like to initiate a few more fumigation trials this fall to answer some of these questions. If you would like to participate in one of these experiments, please give me a call very soon at 525-6800. We will cover the cost of all fumigation in the trial area. The ideal situation would include:

- « Almonds following almonds, peaches or grapes within one or two years after orchard removal
- « Drip or microsprinkler irrigation
- « Minimum of ten acres
- « Ground must be prepped and ready to go by early this fall

LOOK WHAT'S INSIDE . . .

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