

# Lower Limb Dieback Update

Roger Duncan, Pomology Farm Advisor, UC Cooperative Extension, Stanislaus County

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<sup>®</sup> 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<sup>®</sup> DF applied in October and December, liquid lime sulfur in October and December, Pristine<sup>®</sup> fungicide (14.3 oz per acre) applied every two weeks from October 14 through November followed by an early December Kocide<sup>®</sup> application, NutriPhyte<sup>®</sup> P (0.5 gallons per acre), and PlantShield<sup>®</sup>, 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.

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.