



Fireblight

by Mark Halcomb
UT Area Nursery Specialist
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This information has been gathered from several sources with the controls slanted to benefit the field and container nurseries more than the orchard or landscape situations.

These notes were added 7-1-10:

- Insects, wind and splashing rain or irrigation can spread the bacteria. Insects would not have to feed, just visit a plant. Labor might spread it while handling foliage before and after symptoms appear.
- Found on potted Thundercloud plum irrigated with spray stakes a few weeks after plants were topped. They were also topdressed at same time. Found on 10 Shasta Viburnums in a group out of 300 with no fireblight in vicinity in field with no irrigation.
- Improve Sanitation: disinfect pruners at all breaks, lunch, end of day and when switching crops. Greenshield (by Whitmire) is best choice
- Nurseries should quit growing the highly susceptible crops. Grow the moderately susceptible crops together for convenience of spraying.
- Begin growing the more resistant varieties.
- Shoot blight phase- do not have any good control measures
- Zeritol offers no residual control; it is a contact disinfectant
- Spray copper compounds (CuPRO 2500, formerly Kocide) after sundown to reduce phyto during the summer in an attempt to reduce the shoot blight phase.

Fireblight is caused by the bacteria *Erwinia amylovora*. Fireblight is favored by humid, rainy weather, above 65°F. Also, fireblight is most severe on tender, succulent spring growth caused by excessive nitrogen fertilization.

Fireblight just loves fruiting apple, crabapple, fruiting pear and ornamental pear. It will also attack Amelanchier (serviceberry), cotoneaster, hawthorn, mountain ash, firethorn (pyracantha), plum, quince & spirea. Pear cultivars Aristocrat, Autumn Blaze & Redspire are more susceptible than Bradford, Capital, Cleveland Select, Fauriei and Whitehouse.

The Symptom

Branch terminals will be green, appear healthy one day and will wilt the next. The leaves on 3-8 inches of a terminal will turn brown or black in a day or so. Leaves will stay attached. There will be a characteristic crook in the terminal as the tip bends over, resembling a shepherd's crook. It is appropriately named because the shoots and limbs appear as though they have been burned by a torch. See image at end.

The Problem

Fireblight is caused by a bacterium. We lack good bactericides for fireblight.

The weather controls if we have any fireblight or a light or severe infection. The severity varies from year to year based on the weather. Managers might tend to get lazy after 2-3 years of no fireblight and then lose massive numbers of nursery plants.

Nurseries insist on making it easy on fireblight. We grow our *Malus* and *Pyrus* as fast as possible. We produce extremely succulent growth that fireblight can invade and travel down extremely fast.

We insist on growing the plants close together so that splashing water from overhead irrigation will scatter the bacteria to adjacent healthy foliage.

Before fireblight infection can occur, the following things are necessary: a susceptible host plant at the proper stage of development, presence of the bacterium and proper weather conditions.

Four types of fireblight infection have been identified:

Canker blight is the wound from a previous blight infection. In spring, a clear exudate may ooze from the cankers. This exudate contains the bacteria which may be transported by insects or water (rain or irrigation) splashing to susceptible sites on the plant.

Blossom blight is probably the most common type of fireblight infection. During bloom, bacteria carried to the blossoms by insects or other means can invade the tissues of the bloom and proliferate. Once the bloom has reached the petal-fall stage, it is no longer susceptible to infection.

Shoot blight is infection of a shoot through the youngest leaves on the shoot. Generally, the terminal two or three leaves on an actively elongating shoot are susceptible to infection. As the shoot continues to elongate those leaves that were susceptible become increasingly resistant to infection. Once shoot elongation ceases, infection via twig blight is unlikely to occur.

The fourth type of infection is called **trauma blight**. Wounds to the foliage or shoots from such events as a hailstorm, high winds or driving rain can serve as entry points for the bacteria.

It is proposed that the bacterium responsible for fireblight is always on the surface of plant tissue but infection will not occur without the proper conditions. From a weather standpoint, 65°F and 60% relative humidity are given as the minimum conditions necessary for the development of fireblight infection. Rainfall is not necessary for

One source suggested reducing fireblight by spraying the trees with copper with a good sticker to prevent wash off before they leaf out in March.

A 3 year study by Hagan and Akridge at Auburn was published in Journal of Environmental Horticulture, Volume 20, Number 2, June 2002.

Streptomycin gave consistent disease control on the fire blight susceptible crabapple cultivar 'Snowdrift'. Aliette WDG, Phyton 27 and a dormant application of copper (Kocide 101 77W) failed to provide protection from Fireblight during the research.

infection to occur, although due to splashing, it may promote more widespread dispersion of the bacteria, as overhead irrigation will do.

When a late cold event occurs, fireblight is often more of a problem as the bacteria will enter cold damaged plant tissues. Bacteria overwinter in cankers of infected trees.

The Solution

There is not an easy solution. While perhaps not practical for a nursery, a different fertilization program, the use of drip irrigation instead of overhead irrigation and a wider plant spacing would help.

Streptomycin sprayed onto the foliage at 5-7 day intervals during the bloom stage will help reduce the intensity of fireblight infection. It will not prevent it entirely under most circumstances. If weather conditions favoring fireblight infection persist during bloom, it may be necessary to repeat the streptomycin sprays every three days to maintain protection. The rate is 100 parts per million (8 oz./100 gal or 1 teaspoon /gal).

Streptomycin is most effective when applied alone, to the point where the material is almost ready to drip & under slow drying conditions, such as at night. There appears to be very little value in applying streptomycin once the trees are no longer in bloom. In fact, continued use of streptomycin may lead to a resistant strain of fireblight. This has been reported in several parts of the United States.

“The only material that would be effective on vegetative growth is fixed copper (see list below). I have used 0.3 lbs metallic copper equivalent (0.6 lbs of a 50% product) per 100 gallons safely on apple during rapid shoot growth. I have not tested or seen pear rates, but this is a low rate and should be safe. Shoot blight infections can continue until the terminal bud sets and growth stops. Check the label of the formulation to determine rate. Weekly applications will probably be necessary if overhead irrigation is used.

Kocide 101 (by Dupont or Griffin) dropped its' ornamental use label several years ago and is now illegal to use on ornamentals. Kocide 3000 has retained a limited use on ornamentals. It is labeled for Fireblight on pear and various pathogens on several conifers on this label dated 8-18-08, (2006-2009) from the cdms site Sept 5, 2011 <http://www.cdms.net/LDat/ld7HK001.pdf>

The same active ingredient as Kocide (Copper Hydroxide) with an ornamental use label is offered by SePro called Cupro 2005 T/O http://www.sepro.com/documents/CuPRO_Label.pdf

Also Copper-Count-N: <http://www.cdms.net/LDat/ld352004.pdf>

Basicop: <http://www.greenbook.net/Docs/Label/L51316.pdf>

Phyton 27 (Copper Sulphate Pentahydrate) is labeled for fire blight; no idea about effectiveness. It will be expensive. <http://www.phytoncorp.com/EPA%20Label%20pdfs/043USSpecLab.pdf>

Nitrogen fertilizer should be used very judiciously, with all the inoculum present. If summer pruning must be done, try to keep nitrogen low before and after doing it because the resulting flush of tender succulent growth is very susceptible to a resurgence of fireblight. Avoid overhead irrigation if practical. Avoid getting foliage wet at night; but 5am to 6pm is okay.”- Dr. Steve Bost, UT Extension fruit tree plant pathologist

Fixed copper is not the silver bullet that we need. It should help. It is the best we have. Copper has the reputation of burning foliage at air temperatures of 90°F and over. Use care. Observe label rates. Apply after sundown.

Fireblight is worse on extremely tender succulent new spring growth. Therefore, do not fertilize susceptible genera (*Malus*, *Pyrus*, etc.) until the new growth is no longer succulent. Summer growth will likely make the growth up, but plant losses should be greatly reduced. An alternative for container producers would be to incorporate a portion (1/3) at potting and topdress the rest (2/3) after the new growth is no longer succulent.

Pruning Fireblight damaged terminals out

The natural inclination is to prune out the affected parts of the tree. Removal of infected shoots can help slow the spread of the disease, but only if done soon after the leaves begin to wilt and repeated whenever other shoots wilt. Cutting the dead branch tips off incorrectly during the spring can resurrect the disease & cause more tissue to be damaged. Make all cuts at least 12-18 inches below the affected part. If that cut will be in the main stem, then remove the plant immediately and burn it ASAP.

Does the cutting surface of the pruner need to be disinfected after each cut to prevent spreading fireblight? This issue is the subject of debate. Some claim that disinfecting is of no benefit while others maintain that it may be. If it will be impossible to get the pruning done in a very short period if you take time to disinfect the pruner head, don't do it. However, if you can prune and disinfect within a short time, do it.

Disinfectant for pruning shears

The previous recommendation was to use alcohol or one part household bleach or Lysol in nine parts water and dip the head of the pruner in the solution after every cut. Bleach and alcohol are corrosive to metal. Research also indicated that Lysol diluted 1 to 4 was just as effective as bleach and causes less corrosion. Best results will be obtained by soaking the tool for at least one minute as opposed to dipping. In reference to the rate, the higher the concentration, the shorter the "soak time".

The current recommendation is to dip or soak in a quaternary ammonium disinfectant such as GreenShield http://titanarum.uconn.edu/msds/greenshield_label.pdf or Triathlon <http://www.ohp.com/Products/triathlon.php> which is effective and will not corrode the metal. Whether you dip or soak is a matter of time. (An OHP representative recently suggested carrying two pair of pruners and allow one pair to soak while using the other between plants.) Allow the solution to cover the metal blades. Dr. Alan Windham, UT Extension plant pathologist suggests mixing as directed in a spray bottle and spray the pruners frequently and wet from 2 sides while pruning the susceptible plants during fire blight season.

Summary:

- Fireblight is very difficult to prevent or control.
- Severity varies from year to year based on the weather.
- Fireblight is caused by a bacteria. We lack good bactericides for fireblight.
- Streptomycin (or Agri-Strept) is only beneficial during bloom.
- Fireblight will be more severe on tender, succulent growth.
- We can modify our nutritional program if we want to bad enough.
- Incorporate 1/3 of the controlled release fertilizer at potting; topdress the remaining portion when growth is no longer succulent.
- Splashing water (rain or irrigation) will scatter bacteria to adjacent healthy foliage.
- Space *Malus* & *Pyrus* wider during the fireblight infection period (April and May).
- Figure out how to irrigate *Malus* & *Pyrus* in April and May to keep the foliage dry.

UT Extension Pub- Fire Blight

<http://utextension.tennessee.edu/publications/Documents/SP277-R.pdf>

Auburn Pub- Fire Blight

<http://www.aces.edu/pubs/docs/A/ANR-0542/ANR-0542.pdf>

Comments from Dr. Dave Lockwood, UT Extension Fruit Tree Specialist, made following the 2010 fireblight season: "I regard 2010 as being a severe fireblight year based on what I have seen and heard. Several established growers have told me this is the worst fireblight year they have experienced. I have had more inquiries regarding fireblight from Tenn and Ga agents than in previous years.

Here are a few sources that list fireblight susceptibility:

<<http://extension.missouri.edu/publications/Display.aspx?P=G6026>>

Disease Resistant Apple Cultivars by Dr. Michele Warmund

<<http://www.omafra.gov.on.ca/english/crops/facts/98-013.htm#resistance>>

Disease Resistant Apple Cultivars Ontario Ministry of Agriculture

<<http://www.cumminsnursery.com/restable.htm>>

Resistance of Apple Varieties Cummins Nursery

<http://www.ag.ndsu.edu/pubs/plantsci/hortcrop.pp454w.htm#Fireblight>>

Diseases of Apples and Other Pome Fruits (apples & crabapples)

<http://www.homeorchardsociety.org/ebooks/samples/Disease_Resistant_Apples_Sample.pdf>

offers a book listing disease resistance of 1,325 varieties

\$7.00 buys online @ <http://www.homeorchardsociety.org/ebooks/>

There are hand pruners that have a container for alcohol which attaches to your belt and has a hose running to the shears so when a cut is made, both the cut surface and the pruner blade is sprayed by alcohol. I do not know if it is worth the price or not.

There is not a lot of information on older apple varieties in regards to disease resistance. Here are a few comments and observations I have heard/seen:

Jonathan is one of the worst in regards to fireblight.

Many growers consider Pink Lady to be a fireblight indicator tree in that it always shows up there first and worst. Other growers disagree.

One of our growers lost young Honeycrisp trees to fireblight this year.

While non-spur Red Delicious are not very fireblight susceptible, spur-type trees are.

Phenological stage of development is everything to fireblight. [Phenology refers to the precise stage of plant growth in relation to weather (temperature, humidity, moisture)] I have seen years where there has been no fireblight in pears, but tremendous infestation in apple. That year, weather conditions favoring fireblight infection were not present when pears bloomed, but were for apples.

Arkansas Black does not appear to be very susceptible to fireblight or several other "spring" diseases like cedar apple rust and scab. Winesaps in general are similar in this regard.

Alliette has not proven to be very effective.

Overhead irrigation is a recipe for disaster with fireblight. The "trauma blight" phase is very apt to be a problem do to the impact of the irrigation water.

Good coverage is critical for control. Streptomycin does not redistribute on leaves. During favorable weather conditions for infection, sprays may need to be applied every 3 days.

There is a tremendous amount of information and misinformation about fireblight and its control. I wish I knew the difference sometimes. Resistance does not mean immunity. For example, I have seen and heard reports of fireblight on Liberty apple. However, it does not appear to be devastating like it is for other varieties.

Based on research done by Paul Steiner, plant pathologist at the University of Maryland, several years ago (Paul has since passed away), the bacteria moves down the stem very rapidly once it enters the vascular system of a plant. The old recommendation that infected shoots should be pruned out by cutting about a foot below the last visible evidence of fireblight is probably incorrect since the bacteria is apt to be several feet below this area unless the cut is made at the very early stage of infection. We have suggested that growers make a "dirty stub cut" if they are going to prune out fireblight during the growing season. That is, if the infection is on a side shoot, prune several inches below the last visible evidence of the disease, but do not cut a shoot back to its base. Instead, leave about a 2 to 3 inch stub. The idea is that a new canker will develop at the cut surface - whether this surface is on the end of a stub or on the main branch from which the side shoot originated. That winter, the infected stub can be cut out without the threat of new fireblight cankers developing as opposed to having to cut back or remove a larger branch due to the presence of a fireblight canker on it. While this may not have a lot of value for a nursery, perhaps it will be of some interest." – Dr. Dave Lockwood, UT Extension Fruit Tree Specialist, 2010

I appreciate the contributions of Dr. Alan Windham, UT Extension plant pathologist; Dr. Steven Bost, UT Extension fruit plant pathologist; Dr. Frank Hale, UT Extension entomologist; Dr. David Lockwood, UT Extension fruit specialist. Comm/Dis/Fireblight handout

Fireblight beginning on Cleveland Select Pear,

May 6, 2010



Severe Fireblight on Cleveland Select Pear,

May 6, 2010



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