Kentucky Nursery LISTSERV Bulletin

University of Kentucky Nursery Crops Team

End of March 2017

Spring is here with stormy weather and higher than average temperatures forecasted across the Commonwealth for the next three months. However, this does not mean we have had our last frost until fall, but it does appear that most of the days ahead will be warmer than is typical for this time of the year.

Warmer weather also brings precipitation in the first week of April, but over the next three months precipitation levels are not forecasted higher or lower than normal.

See **UKAg Weather's Long Range Outlooks** for a variety of forecasts of temperature and precipitation probabilities.

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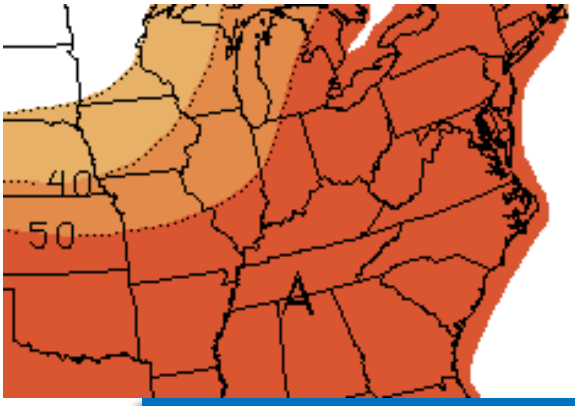

Three-Month Outlook, Temperature Probability
Image: NOAA Climate.gov, 16 MAR 2017

- **Fire blight host range and management**
- **Stresses in bare-root liners from lifting to nursery stock production**
- **Clearwing Borer**

Fire blight host range and management

Joshua Knight, Extension Associate, Nursery Crop Production

"Fire blight is the disease-of-the-month", says Nicole Ward-Gauthier, UK's Extension plant disease specialist for ornamentals. Late winter and early spring are a critical period for controlling infection and spread within nursery stock or among installed landscape plants.

Symptom Descriptions

The earliest disease symptoms, **blossom and spur blight** (Figure 1), are observed on infected spurs when the bases of individual flowers or flower stems wilt and darken. As blooms collapse, infection spreads rapidly into other flowers in the cluster causing the entire spur to suddenly wilt and die. Diseased tissues generally stay attached to the host plant.

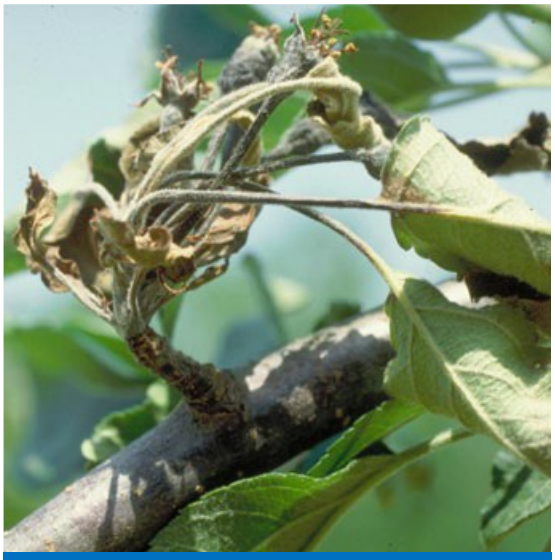

Figure 1. Spur blight.

Infections frequently spread from blossoms to supporting spurs and branches, resulting in **stem lesions or cankers**. Fire blight cankers appear shrunken with dark brown to purple coloring. As cankers increase in size, they can girdle stems or branches; as a result, tissues above these infection sites die.

Figure 1. Shepherd's crook symptom.

Bacterial cells can build up during the blossom and spur blight phases of fire blight and infect rapidly-growing shoots. Blighted shoots wilt from the tip and develop a crook or bend at the growing point, commonly referred to as a "shepherd's crook" (Figure 2). This phase occurs after bloom.

Host Range

While fire blight is acknowledged as a highly destructive disease in commercial pear and apple orchards, it is important in the nursery and landscape industry to note it's full host range (Table 1).

Table 1. Hosts of fire blight

Common Hosts	
Common Name	**Latin Name**
Apple	*Malus domestica*
Cotoneaster	*Cotoneaster* spp.
Crabapple, flowering	*Malus* spp.
Hawthorn	*Crataegus* spp.
Mountain ash	*Sorbus* spp.
Pear	*Pyrus* spp.
Pear, callery	*Pyrus callaryana*
Additional Hosts	
Blackberry, thornless	*Rubus* spp.
Christmas berry	*Photinia villosa*
Firethorn	*Pyracantha coccinea*
Plum, flowering	*Prunus triloba* var. plena
Quince, cultivated	*Cydonia vulgaris*
Quince, flowering	*Chaenomeles japonica*
Raspberry, red & black	*Rubus* spp.
Rose	*Rosa* spp.
Serviceberry	*Amelanchier canadensis*
Spirea	*Spirea vanhouttei*
Stransvaesia	*Stransvaesia davidiana*

Late Winter / Early Spring Management

Pruning infected tissue plays an important role in fire blight management, and when done properly, should reduce the spread of disease and ultimately tree damage. However, pruning when the disease is active during the growing season—temperatures between 65-75F and high humidity/rainy conditions—can spread the disease, so UK advises **pruning** blighted twigs and cankered branches be under taken during winter dormancy. Tissues experiencing rapid growth from fertilization are susceptible to infection. **Fertilization**, especially nitrogen application, should be calibrated for adequate tree health.

Chemical sprays of bactericides and growth regulators may be used for prevention to control fire blight during the spring, when the pathogen is at the surface of cankers and on flowers. After the bacterium has invaded tissues, bactericides are not effective. As sprays are only applied during periods of high risk applications can be eliminated when conditions are unfavorable for disease development (cold or dry weather). Kentucky growers can refer to the UK Ag Weather Center Disease Prediction Models for county and date specific recommendations.

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Sprays include:

• **Copper sulfate**: applied during late dormancy to active cankers, twigs, and branches to help reduce overwintering populations of the fire blight bacterium.

• **Streptomycin**: effective for controlling the blossom blight and shoot blight stages of fire blight in commercial orchards. The use of streptomycin in urban landscapes is discouraged due to the high risk for resistance.

• **Oxytetracycline:** often used in rotations with streptomycin to help discourage resistance development; it is not as effective as streptomycin.

• **Apogee (prohexadione calcium)**: growth hormone that reduces terminal growth, thereby making plants less succulent and less susceptible to infection.

Always use chemical sprays in accordance with their label.

Additional Resources

- **Ag Weather Center Disease Prediction Models** (University of Kentucky)
http://wwwagwx.ca.uky.edu/plant_disease.html

- **IPM for Select Deciduous Trees in Southeastern US Nursery Production** (Southern Nursery IPM Working Group, 2012)
http://wiki.bugwood.org/IPM_book

- **Fungicides for Management of Landscape Woody Ornamental Diseases**, PPFS-OR-W-14 (University of Kentucky, 2011)
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-OR-W-14.pdf

- **Woody Plant Disease Management Guide for Nurseries and Landscapes**, ID-88 (University of Kentucky, 2012)
http://www.ca.uky.edu/agc/pubs/id/id88/id88.pdf

- **Fire Blight: Plant Pathology Fact Sheet** PPFS-FR-T-12 (University of Kentucky)
http://www2.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-FR-T-12.pdf

Stresses in bare-root liners from lifting nursery stock production

Zenaida Viloria, Extension Associate, Nursery Crops
Win Dunwell, Extension Professor, Horticulture

Tree harvest time is not over yet, meanwhile the planning for the new nursery stocks must be ready. Another mild winter in a row warns us to be prepared ahead of time. Deciduous bare root plants must be in dormant stage to be harvested, stored and transplanted to a nursery stock site, these activities are usually completed during late fall-spring period before liners start to break dormancy. Lifting date has been shown to be an important factor for cold storage tolerance and field performance in different hardwood species. In general, stress tolerance of woody liners is determined by accumulated hours of cold temperatures that occur in fall. Root loss and pruning, desiccation, rough handling, and inappropriate storage conditions are sources of stress that affect plant quality and outplanting performance. The following are common stresses that accumulate during different stages before planting that might delay the recovery of newly planted stocks.

Storage of unpacked bare root liners.

Photo by W. Dunwell, University of Kentucky

Root injury

Feeder roots or non-woody fine roots are frequently injured during plant lifting due to their fragility and quick desiccation once they are exposed to the air. The primary function of feeder roots, water and mineral nutrient absorption, is adversely affected when young liners are removed from soil. Plant desiccation initiates when roots cannot provide water to dormant plants, which keep losing water due to transpiration and evaporation. Furthermore, small root mass of bare root stock is more likely to dry out. Extreme temperatures and low relative humidity must be controlled to reduce plant dehydration.

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Storage

Plants must be kept in storage at 33-40 °F and 85-95% relative humidity. High temperatures can trigger carbohydrate depletion, fermentation and desiccation. Additionally, high temperature induces ethylene synthesis, which can reduce root growth. Mold growth rises when free moisture is present in the storage with high temperature. Root chilling can occur in the storage when temperature is too low, plants were not hardened off enough and long storage period. Light deprivation in storage is the first cause of carbohydrate depletion. Plant deterioration in cold storage increases with time. Lifting date and storage duration impact plant vitality.

Bare root liners in compartments allow better weight distribution, temperature, and uniformity of relative humidity during storage.

Photo by Win Dunwell, University of Kentucky.

Physical damage

Rough handling might occur during lifting, transportation and storage of bare root liners. Liner package dropping, throwing and crushing, and plant abrasion cause traumas that affect plant quality and survival.

Transplanting

After planting in the production site, plants might experience reduced growth which is identified as transplant shock. Transplant shock is a condition of distress resulting from all previously described injuries and depletion that involves a process of recovery and a period of adaptation to a new environment. Water stress is the main factor associated with transplanting shock. The root-to-shoot ratio is a valuable indicator of plant quality and survival ability after transplanting. Bare root stock must be kept in a cool and humid place until planting. If they cannot be planted immediately, stocks can be stored in a moist mulch and placed in water for rehydration at planting.

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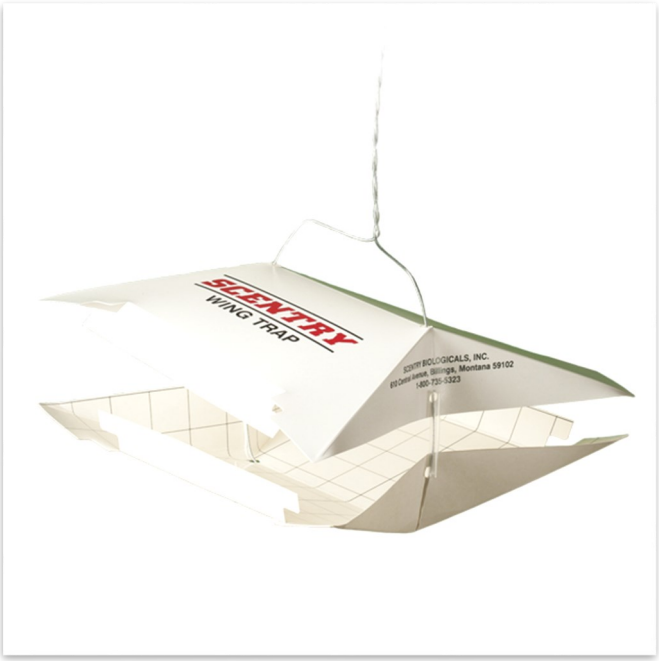
Additional information

Halcomb, M. Suggestions on how to handle bareroot & potted liners upon arrival. https://extension.tennessee.edu/mtnpi/Documents/handouts/General/Liner_Care_upon_Arrival.pdf

Clearwing Borer

Carey Grable, Extension Associate, Nursery Crops

With the month of May comes the emergence of the Clearwing Borer group. There are several borers in this group including the dogwood borer, lilac borer, peachtree borer, and lesser peachtree borer. Growers of peach, plum, and flowering cherry should be especially aware of the lesser peachtree borer. Borers generally target stressed plants weakened by drought, soil compaction, sun scald, or transplanting. Emergence of these borers can vary greatly as temperature has an effect. This combined with the limited residual toxicity of the chemicals used in controlling these borers makes timing difficult.



Growers who wish to monitor for these pests should use the month of April to prepare for scouting by using this month to acquire traps and lures. Monitoring for the emergence of these borers can be done with the use of pheromone lures. These lures are readily available and are used in conjunction with sticky traps (or wing traps). Using these traps will allow growers to fine tune their spray schedule.

Spraying is generally recommended 10 to 14 days after the first borers are caught and again after 6 weeks if borers are still being caught in traps.

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Table 1. Spray Schedule for Tree Borers				
Borer	Principal hosts	Number of treatments[1]	Treatment Timing	
			Calendar Date[2]	Indicator Plants[3]
Dogwood borer	Flowering dogwood	1	May 31-June 4	Flowering dogwood-1 month after full bloom Washington hawthorn-1 week after 1st bloom Little-leaf linden-1 week after 1st bloom Northern catalpa-1 week after 1st bloom
Lilac borer	Lilac, privet, ash	1	May 8-12	Common lilac-1 week after full bloom Flowering dogwood-1 week after full bloom Sargent crab apple-1 week after full bloom
Banded ash borer	Ash	1	August 20-24	
Peachtree borer	Peach, plum, flowering cherry	2	June 18-22 July 30-August 4	Southern magnolia-2 weeks after 1st bloom Little-leaf linden-1 week after full bloom Oakleaf hydrangea-1 week after full bloom
Lesser peachtree borer	Peach, plum, flowering cherry	2	May 11-15 July 5-9	Kousa dogwood-2 weeks after 1st bloom Winter King hawthorn-2 weeks after 1st bloom Doublefile viburnum-1 week after full bloom
Bronze birch borer	White birch	2	May 18-22 June 10-15	Washington hawthorn-1st bloom Little-leaf linden-1st bloom Northern catalpa-1st bloom
Flatheaded appletree borer	Various trees, especially flowering crab apples, hawthorn, red maple	2	May 22-26 June 18-22	Southern magnolia-1st bloom Washington hawthorn-full bloom Northern catalpa-full bloom Tree lilac-full bloom Oakleaf hydrangea-full bloom

1 See text for insecticide guidelines. Always read and follow directions on the insecticide label.
2 Treatment dates listed are appropriate for the latitude of central Kentucky. Dates should be adjusted earlier or later for more northern or southern locations.
3 For pests requiring two treatments, the indicator plant information pertains to the timing of the initial spray.

For more details on recommended sprays, see:

Insect Borers of Trees and Shrubs
https://entomology.ca.uky.edu/ent43

The University of Kentucky's **Nursery Crop Extension Research Team** is based out of two locations across the bluegrass to better serve our producers.

The **University of Kentucky Research and Education Center (UKREC)** in **Princeton** serves western Kentucky producers while our facilities and personnel on main campus in **Lexington** serve central and eastern Kentucky producers.

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