Kentucky Nursery LISTSERV Bulletin

University of Kentucky Nursery Crops Team

End of October 2016

Long Range Outlook Information

Warmer than average temperatures are expected throughout November, as conditions over the tropical pacific have become increasingly consistent with a developing "La Nina" event. For reference, La Nina typically result in above average precipitation across the northern Midwest with below average precipitation in the Southeast with KY in the transition zone between the two. Tom Priddy, the UK Agricultural Meteorologist says, "La Nina means extreme variability."

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

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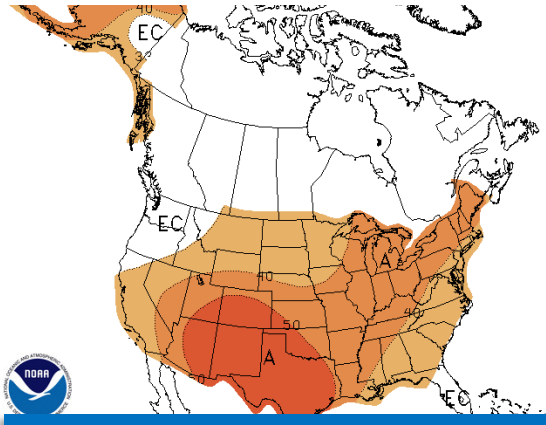

Outlook Imagery, Precipitation probability, Image: NOAA

- **Plant Disease Diagnostic Lab: How *Not* to submit samples**
- **Dormant Season Pour-Through**
- **The real life situation of nutrient extraction and measurement in commercial nursery crops**

Plant Disease Diagnostic Lab: How *Not* to Submit Samples

Kim Leonberger, Extension Associate, Plant Pathology
Julie Beale, Diagnostician, Plant Pathology
Brenda Kennedy, Diagnostician, Plant Pathology
Nicole Ward-Gauthier, Extension Specialist, Plant Pathology

When the most beloved landscape or garden plant begins to show symptoms of a problem, or commercial crops start to decline, panic may set in. The two things on everyone's mind: what is the cause of the problem and what can be done about it? Since disease is often the prime suspect, the first step for many homeowners and growers is to contact the county Extension office. An agent may then assist in preparing a sample to submit to a University of Kentucky Plant Disease Diagnostic Laboratory.

Selection and packaging of a sample sounds like a straightforward and easy concept…put part of the affected plant in a box or envelope and send it away, right? Wrong! Sample quality and care in packaging can make the difference between receiving a rapid diagnostic report and receiving one of those dreaded "insufficient sample" replies. Avoiding common sample submission errors can result in more timely and accurate diagnoses.

Common Sample Submission Errors:

Figure 1. Samples with no packaging often suffer damage during shipping, resulting in complications with diagnosis.

Photo: Nicole Ward Gauthier, University of Kentucky

Figure 2. Samples should include additional padding to prevent damage from shipping.

Photo: Nicole Ward Gauthier, University of Kentucky

Samples submitted with little or no packing material are often further damaged during shipping (Figure 1). Differentiation between symptoms and shipping damage can complicate diagnosis. Wrap rootballs in a plastic bag, leaving leaves and stems exposed; this also keeps foliage from becoming contaminated with soil from the rootball. Use an appropriate sized box that can be padded and secured (Figure 2).

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Figure 3. Samples with no packaging often suffer damage during shipping, resulting in complications with diagnosis.

Photo: Nicole Ward Gauthier, University of Kentucky

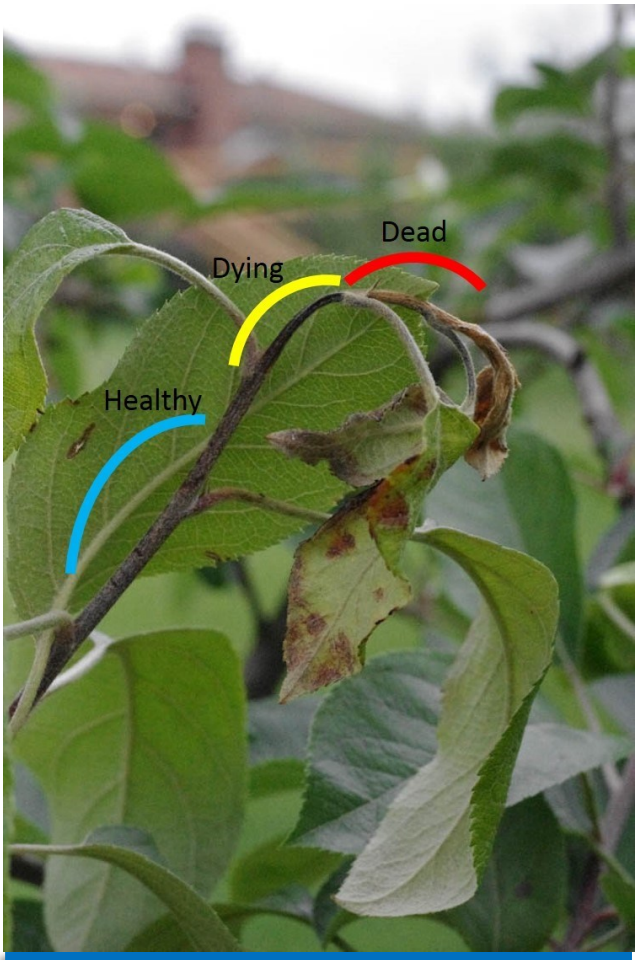


Figure 4 The best samples include dead, dying, and healthy plant tissues.

Photo: John Strang and Kim Leonberger, University of Kentucky

Dead is too late. Samples that contain only dead material are often impossible to accurately diagnose (Figure 3). Once a plant has died, secondary pathogens and other organisms invade tissues, complicating diagnosis and making it difficult to isolate the primary pathogen. The best samples include dead, dying, and healthy plant tissues (Figure 4).

Providing insufficient information can also hinder a diagnosis. Details about the plant, planting site, and symptoms can be as important as the physical material collected. Provide as much information as possible on the diagnostic forms submitted with samples (See next 3 Pages).

Additional Information

Submitting Plant Specimens for Disease Diagnosis (PPFS-GEN-09)

Plant Pathology Publications (Website)

County:	
County Extension Agent:	
County sample number: *(county use—optional)*	

Lab use only:	Lab file no.:
	Date received:
	Diagnostician:
	Date completed:

UNIVERSITY OF KENTUCKY
College of Agriculture, Food and Environment
Department of Plant Pathology

Plant Disease Identification Form

Send plant sample with completed form to:

Plant Disease Diagnostic Laboratory
Ag Science Building North
Lexington, KY 40546-0091

OR

Plant Disease Diagnostic Laboratory
P.O. Box 469
Princeton, KY 42445

Grower: _____ Plant name: _____

Address: _____ Variety: _____

City: _____ Zip: _____ Date collected: _____

Email: _____

Phone: _____

Commercial sample: ☐ Yes ☐ No

Parts diseased:
☐ buds ☐ fruit ☐ flowers
☐ leaves/needles ☐ roots ☐ stems
☐ trunk ☐ twigs/branches

Symptoms:
☐ burn or scorch ☐ galls or swellings ☐ stem rot
☐ canker ☐ mottling ☐ stunting
☐ dieback ☐ root rot ☐ wilt
☐ distortion ☐ shot hole ☐ yellowing
☐ fruit decay ☐ spot

☐ other: _____

Location of plant:
☐ field ☐ indoors ☐ orchard
☐ garden ☐ landscape ☐ outdoor floatbed
☐ greenhouse ☐ nursery ☐ plant bed

Pattern of diseased plants:
☐ single plant ☐ group(s) of plants ☐ entire planting
☐ scattered plants ☐ large area(s)

Is pattern associated with:
☐ cultivation patterns ☐ high, dry area ☐ shade
☐ field borders ☐ low, wet area ☐ slopes

Percent of planting affected: _____

Date problem first noticed: _____

Planting date or age of plant: _____

Soil type: _____

Soil drainage: _____

Previous crop(s): _____

Tillage practices: _____

Recent weather and irrigation practices:

_____

Unusual disturbances: ☐ lightning ☐ hail ☐ construction
☐ pruning ☐ injuries ☐ soil compaction ☐ flooding

Chemicals applied to this crop: *(include name, rate and date of application)*

Fertilizer: _____

Herbicides: _____

Fungicides: _____

Insecticides: _____

Additional information: _____

_____

_____

Please retain a copy of this form for your records.

An electronic diagnosis report will be sent to the local County Extension Office and to the client (if email address is provided).

Grower's Name _____ Lab file # _____

TREE AND SHRUB DISEASE IDENTIFICATION FORM

Information to Supplement the Plant Disease Identification Form

Many tree and shrub problems are best diagnosed only after careful inspection of the whole plant in its growing site. However, because the plant disease diagnostician cannot visit the growing site, the grower's observations and information can be of tremendous help in formulating a diagnosis. The more information the grower provides, the better the diagnostician will be able to narrow down the cause(s) of the problem.

Please complete as much of the following as possible <u>in addition to the Plant Disease Identification Form</u>
(Include relevant photos, if available)

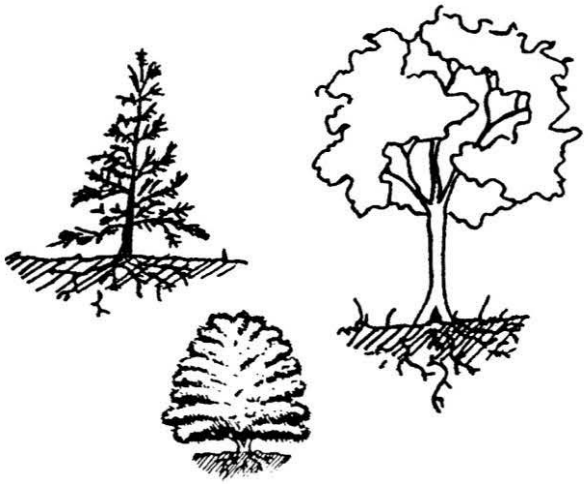
General Information

Approximate height (feet) _____ Trunk diameter (inches) _____ Trunk diameter at planting _____

Time in present site _____

Symptoms

1) What is the distribution of affected branches? Indicate location of damage on the diagram below.



- ☐ Scattered branches all over tree/shrub
- ☐ One portion of tree/shrub only
- ☐ Several portions of tree/shrub
- ☐ Entire plant
- ☐ Other _____

2) What is the progression of symptoms throughout the tree/shrub (e.g. from lower branches to top; from branch tips toward trunk; from one side to another, etc.)?

_____

_____

_____

3) What is the progression of symptoms on leaves/needles? (e.g. leaf margins/needle tips inward; between leaf veins) _____

_____

4) Has problem occurred: ☐ slowly or ☐ rather suddenly? How rapidly? _____

5) Are cankers, sunken areas, or injuries (mower, string trimmer, or other) present on main limbs or trunk? ☐ Yes ☐ No

Describe size and location _____

How old are cankers or injuries indicated above? _____ Is there any evidence of "healing"(callus)? ☐ Yes ☐ No

6) Does tree have a girdling root up near trunk, at soil level, or below soil level? ☐ Yes ☐ No
[Look for a large root forming a "noose" around trunk within 12 inches of soil surface. Mature trees (15 years or more) that are girdled lack a normal flare of the buttress roots and trunk will appear to go straight into the ground (like a telephone pole)].

(continued on reverse side)

7) Are there other plants of this type also showing the same symptoms? ☐ Yes ☐ No Are there healthy plants of the same type nearby? ☐ Yes ☐ No Are there other plants not of this type showing the same symptoms? ☐ Yes ☐ No

8) Are mushrooms, bracket fungi, or conks apparent on trunk or at base of tree/shrub? ☐ Yes ☐ No If so, describe:

_____

Growing Site

1) Is tree/shrub surrounded by pavement or buildings? ☐ Yes ☐ No Is soil around tree/shrub compacted? ☐ Yes ☐ No
2) Is tree/shrub in ☐ full sun ☐ partial shade ☐ full shade
3) Have roots been disturbed in the past 5 years? ☐ Yes ☐ No Has the grade (soil level) around tree/shrub changed in the Past 5 years? ☐ Yes ☐ No If yes, explain ☐ soil added ☐ soil removed Reason _____
4) Is tree/shrub located in a low wet area or at the base of a downspout? ☐ Yes ☐ No Does water stand or puddle on soil after rain? ☐ Yes ☐ No Is tree/shrub in a site where topsoil was removed (e.g. a new home development)? ☐ Yes ☐ No

Cultural Practices

1) Is there mulch around tree/shrub base? ☐ Yes ☐ No Is there a tree guard around trunk ☐ Yes ☐ No
2) Has tree ever been topped ☐ Yes ☐ No When? _____
3) Has tree/shrub been bumped by lawn mower, string trimmer, or other equipment? ☐ Yes ☐ No
4) Have herbicides been used to control weeds ☐ in lawn ☐ around tree ☐ other _____
5) Is tree/shrub watered thoroughly during dry periods (equivalent of at least 1 inch of rain per week)? ☐ Yes ☐ No
6) If tree/shrub was transplanted in last 2 to 3 years, describe method _____

_____

Was plant ☐ bare root ☐ container-grown ☐ ball & burlap Container diameter _____ or root ball size _____

If ball & burlap: type of root ball covering ☐ degradable burlap ☐ plastic ☐ other _____

Before planting, was root ball covering ☐ removed ☐ loosened ☐ slit

7) What were the results of last soil test taken for this site? pH _____ P _____ K _____

Ca-Mg _____ When was the last time tree/shrub or surrounding lawn was fertilized? _____

[Be sure to indicate type of fertilizer on Plant Disease Identification form]

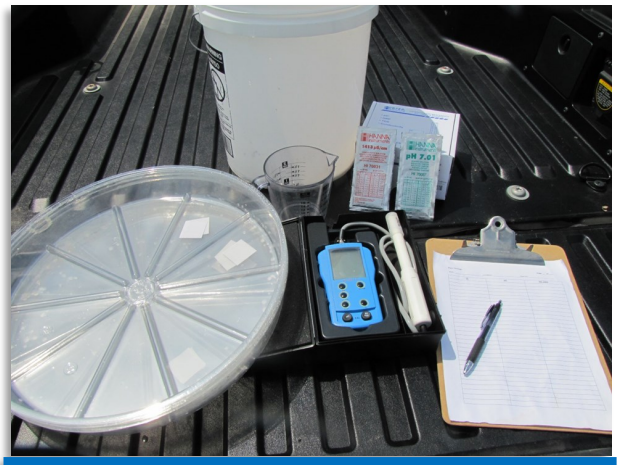
How was fertilizer applied ☐ cores dug ☐ broadcast ☐ injection ☐ other _____

Applied ☐ at drip line ☐ near trunk ☐ other _____

Additional Information

Dormant Season Pour-Through

Carey Grable, Extension Associate, Nursery Crops



Pour-Through Procedure Tools

Photo: Carey Grable, University of Kentucky

This year, we have talked a lot about the Pour-Through Procedure as a method of monitoring fertilizer levels and pH in container production through-out the growing season. It's important to remember that this procedure can generate valuable information for growers during the dormant season as well.

If you will recall, we stated earlier this year that, during periods of active growth, electrical conductivity levels should be roughly 500-1500 µS/cm. Readings in this range indicate that there is sufficient fertilizer release occurring for most nursery crops (Figure 1). During the dormant season, we would ideally find readings below this range. This would indicate that we had properly timed our fertilizer release and amount, which means less wasted fertilizer, both financially and in terms of runoff through the bottom of the container.

Fertilizer release during the dormant season can also lead to dangerously high salt build-up in the container. This can lead to root injury as well as plant death in more sensitive crops like Azaleas. Fertilizer release timed too late in the growing season can also lead to a flush of tender new growth than can be injured by colder fall nights. All of these factors make dormant season pour-throughs an important part of your fertilization plan.

For those unfamiliar with the Pour Through Technique, a video demonstration of the procedure can be found online at the UKRECHort YouTube Channel. If you have questions about the pour-through procedure, feel free to contact me at: cagrab2@uky.edu.

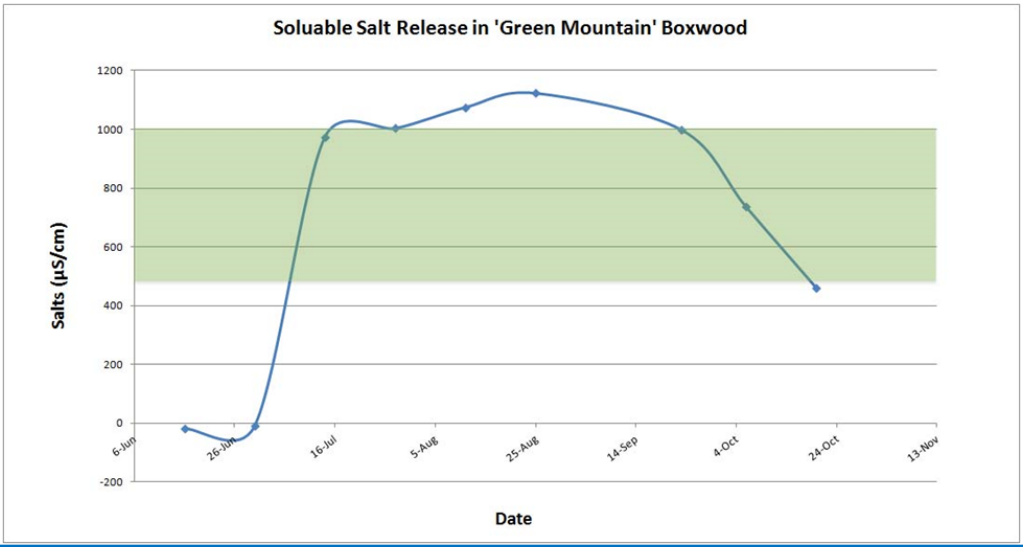


Figure 1. EC measurement during and after growing season, dropping off at the end of October with the beginning of the dormant season. Fertilizer release is well managed in this crop.

The real life situation of nutrient extraction and measurement in commercial nursery crops

Zenaida Viloria, Extension Associate, Nursery Crops
Ginny Travis, Research Farm Technician, Horticulture
Win Dunwell, Extension Professor, Horticulture

Persistent chlorosis in some commercially grown nursery crops was observed in western Kentucky in the last couples of years, in spite of yearly fertilization with controlled release fertilizer. This year, pour through procedure (PTP) was carried out to determine the nutrient release from Harrell's controlled release fertilizer during the growing season.

Detailed PTP protocol can be found in the Additional information listed below. In this article, we would like to comment on several issues we came across when we ran PTP for 18 nursery crops grown in 15-or-20-gallon containers on the ground and pot-in-pot system (Figure 1).

Issues running PTP and nutrient measurement in commercial nursery settings

- Commercial nursery settings such as plant size, diversity and distribution in the nursery, and water source availability can make PTP laborious and time consuming. It is more appropriate to group all taxa in the same block under similar water program, and close to a water faucet.
- Distilled water is recommended to remove and collect the PTP leachate, a large volume of distilled water can be expensive and difficult to handle. In this case, the farm's high-quality irrigation water (average EC 52.5 µS/cm and pH 5.3) was used for pouring. On the contrary, when water with high salt content is used, the corresponding EC reading can be subtracted from each crop's EC measurement to estimate the nutrient content in the medium.
- The initial irrigation is applied to saturate the medium. Irrigation with a garden hose needs close attention to reduce excessive drainage water and nutrient leachate. Here, a two-liter pitcher facilitated the initial irrigation and reduction of drainage water volume.

Figure 1. Selected nursery crops grown on ground and in pot-in-pot systems.

Photo: Ginny Travis, University of Kentucky

- It is recommended to pour 60 oz (1,775 mL) water for a 15-gallon container. We adjusted the water volume to 500 mL and 1000 mL for 15 and 20-gallon container, respectively. Large volume caused larger leachate volume in very short time.
- In addition, the lack of uniformity regarding root system and medium and its water retention capacity can affect the water percolation, and the 500 mL leachate recommended for EC measurement can overflow a few minutes after pouring. Dry or rainy period before the PTP also affects the leachate drainage time.

- The weekly PTP recommendation would certainly increase the labor hours. Besides, big containers make it more challenging to run the test particularly in the pot-in-pot system. It took about 6 hours to run the first evaluation for 7 trees scattered all over the nursery. Confining trees in a particular area, close to a water source reduced the test time to less than 3 hours for 18 taxa. Biweekly PTT would still provide informative results for a fertilizer status determination.
- Any EC measurement error can be reduced by increasing the number of plants per species, which would multiply the test time and work. Here only one plant per species was evaluated, however evaluation of 18 trees generated essential information to support decisions regarding fertilization strategies; for instance, scheduling a new application or selecting fertilizer application rate and formulation.

Additional information

LeBude A. V. and T. E. Bilderback. 2009. The pour-through extraction procedure: a nutrient management tool for nursery crops. http://www.ncagr.gov/agronomi/pdffiles/pourthru.pdf

Torres, A.P. M. V. Mickelbart and R.G. Lopez. 10. Measuring pH and EC and large containers. https://ag.purdue.edu/hla/lopezlab/Documents/ExtPubs/Measuring%20pH%20and%20EC%20of%20crops%20grown%20in%20large%20containers.pdf

Bilderback, T. E. Using the pourthru procedure for checking EC and pH for nursery crops. https://content.ces.ncsu.edu/using-the-pourthru-procedure-for-checking-ec-and-ph-for-nursery-crops

Camberato, D.M. R.G. Lopez and M.V. Mickelbart. pH and electrical conductivity measurements in soilless substrates. Purdue Extension HO-237-W. https://www.extension.purdue.edu/extmedia/ho/ho-237-w.pdf

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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