Martin-Gatton
College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-FR-T-30**

Considerations for Diagnosis of Fruit Diseases in Orchard Production

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Diagnosing plant problems can be challenging. However, detailed observations of the growing site can provide the information necessary for a complete and accurate diagnosis. Once on-site, it is important to know how to proceed. The following guidelines are intended to assist in gathering pertinent information and determining a possible cause. Keep in mind while going through this process that not all plant issues are disease-related. Often, abiotic conditions (such as environmental damage or mechanical injury) or other biotic causes (such as insects or wildlife) may be to blame. Should the field site diagnosis be inconclusive, and samples need to be submitted to a local Extension office, the information gathered here can provide valuable supplementary information.

Step 1: Begin the Evaluation

At the start of the evaluation, consider the following:

- Plants affected (including cultivars)
- Normal appearance and growth patterns of plants
- Location of plants
- Plant height
- Planting date/Age of plant
- Planting depth
- Soil type
- Watering program
- Drainage
- Sun exposure
- Fertilizers (dates and rates applied)
- Fungicides/Insecticides/Herbicides (dates and rates applied)

When assessing a plant problem, taking photos of the affected plant and surrounding area may be helpful in the diagnostic process, especially if it becomes necessary to consult with a local Cooperative Extension Service office, specialist, or other consultant. The following are suggestions, but other pictures may be needed depending on the situation.

- Close-up of affected plants
- Close-up of plant symptoms
- Wide view of affected plants
- Wide view of area around affected plant

Figure 1. Photos showing the entire plant and close-ups (inset) of affected plant parts are helpful in the diagnostic process (Photo: thread blight of apple).

Step 2: Examine the site

(More than one may apply)

Type(s) of Plants Affected

- ☐ Only one plant of its type; others are healthy
- ☐ Multiple plants all of the same type
- ☐ Multiple plant species
- ☐ Entire planting (all plants)
- ☐ Comments/other:

Look for a Pattern

- ☐ Near neighbor's property
- ☐ Near a building or foundation
- ☐ One section or side of planting
- ☐ Shady areas only
- ☐ Sunny areas only
- ☐ Follows drainage patterns
- ☐ Groups of plants
- ☐ Near wooded areas
- ☐ Younger plants
- ☐ Older plants
- ☐ Recently pruned plants
- ☐ High density plantings only
- ☐ Low density plantings only
- ☐ Comments/other:

Look at the Topography

- ☐ Low area(s)
- ☐ High area(s)
- ☐ Slopes
- ☐ Compacted (e.g., due to foot traffic, vehicles, equipment)
- ☐ Hard pan or underlying rock (probe soil with narrow spike)
- ☐ Comments/other:

Consider Site/Plant History

- ☐ Fertilizer applications
- ☐ Grade change (soil added or removed)
- ☐ Herbicide applications
- ☐ Irrigation practices
- ☐ Recently transplanted
- ☐ Site disturbance (e.g., construction, digging, utility lines, irrigation lines)
- ☐ Weather extremes in past (cold, drought, flooding) – Check KY MESONET for past weather patterns
- ☐ Weather extremes recently (e.g., flooding, drought, hail, lightning)
- ☐ Surrounding weeds
- ☐ Comments/other:

Figure 2. Determine the type(s) of plants affected and examine site(s) for a pattern (Photo: Pythium root rot of red raspberry).

Figure 3. Weeds restrict air movement and compete with plants for water and nutrients. In addition, they can harbor plant pathogens (Photo: strawberry planting).

Figure 4. Some diseases can mimic nutrient deficiencies or herbicide damage. Knowledge of the site history can help identify or eliminate potential causes (Photo: peach leaf curl).

Step 3: Examine the whole plant

(More than one may apply)

Symptom Progression Timeline

- ☐ Gradual progression of symptoms
- ☐ Rapid progression of symptoms
- ☐ Symptoms reoccur most years
- ☐ No symptoms observed prior to current season
- ☐ Comments/other:

Symptom Progression

- ☐ Begins at top of plant and moves downward
- ☐ Begins lower on plant and moves upward
- ☐ Tips of leaves/twigs, moving inward toward main stem or trunk
- ☐ Base of plant or trunk, moving outward along leaf tips
- ☐ Comments/other:

Distribution of Symptoms

- ☐ Uniform over entire plant
- ☐ New leaves/shoots
- ☐ Older growth
- ☐ Upper portion of plant
- ☐ Lower portion of plant
- ☐ Upper part of fruit
- ☐ Lower part of fruit
- ☐ One side of plant
- ☐ Single side-stem
- ☐ Single branch or limb of tree
- ☐ Only on trunk
- ☐ Comments/other:

Other Observations

- ☐ Wire, string, or other material rubbing or embedded in trunk or branch
- ☐ Suckers emerging from ground, trunk, or branches
- ☐ Failed trellising or damage due to trellising
- ☐ Plastic mulch or landscape fabric rubbing or cutting plants
- ☐ Insect activity on underside or upper surface of leaves or around plants
- ☐ Evidence of animal activity near plants
- ☐ Comments/other:

Figure 5. Knowing how quickly a disease develops can provide useful diagnostic information. Some diseases, like fire blight, progress very rapidly..

Figure 6. Symptoms of some diseases initially develop only on new growth (Photo: Phomopsis canker on blueberry).

Figure 7. Examine lower trunk for evidence of discoloration, sunken areas, or ooze that may be indicative of a crown and root rot disease (Photo: Phytophthora root and crown rot of apple).

Step 4: Identify the Symptoms & Possible Cause

(More than one may apply)

Leaf Symptoms

- ☐ Rapid death, blight
  - Fungal or bacterial leaf blight disease (e.g., fire blight)
  - Stem canker, crown rot (e.g., raspberry spur blight, anthracnose)
  - Root/crown-related disease (e.g., Phytophthora root rot, strawberry black rot)
  - Cultural or environmental factors
- ☐ Leaf spots, blotches, lesions
  - Fungal or bacterial leaf spot (e.g., frogeye leaf spot, rust)
  - Nutritional (e.g., interveinal spots develop with iron deficiency)
  - Herbicide injury
- ☐ Defoliation, premature leaf drop
  - Fungal or bacteria leaf spot diseases (e.g., leaf and cane rust, cherry leaf spot)
  - Root/crown-related disease (e.g., root/collar rot, anthracnose)
  - Root/crown-related abiotic problem (e.g., equipment or mechanical damage)
- ☐ Discoloration (e.g., yellowing, chlorosis, reddening)
  - Root/crown-related disease (e.g., Phytophthora root/crown rot)
  - Root/crown-related abiotic problem (e.g., equipment or mechanical damage)
  - Nutritional deficiency or excess
  - Insects & pests (e.g., aphids, European red mite)
- ☐ Wilting, drooping
  - Root/crown-related disease (e.g., anthracnose, Phytophthora root rot)
  - Root/crown-related abiotic problem (e.g., equipment or mechanical damage)
  - Drought
- ☐ Fuzzy or powdery growth
  - Upper surface of leaf (e.g., powdery mildew)
  - Underside of leaf (e.g., Botrytis, downy mildew)
- ☐ Sooty black growth covering surfaces
  - Fungal growth on honeydew excretions of some insects (e.g., aphids)
- ☐ Scorch, burn, brown leaf margins
  - Fungal disease (e.g., strawberry leaf scorch)
  - Stem canker/crown rot (e.g., bacterial canker, perennial canker)
  - Root/crown-related disease (e.g., strawberry black rot, Phytophthora root rot)
  - Root/crown-related abiotic problem(e.g., equipment or mechanical damage)
  - Excessive fertilizer
  - Drought
- ☐ Distorted, twisted, or curled leaves
  - Fungal disease (e.g., peach leaf curl)
  - Environmental problems (e.g., cold)
  - Herbicide injury
  - Nutritional deficiency
  - Insect injury (e.g., aphids, blackberry psyllid)
- ☐ Mosaic or mottling
  - Viral disease (e.g., blackberry chlorotic ringspot virus, impatiens necrotic spot virus)
  - Herbicide injury
- ☐ Stunted, undersized foliage
  - Root/crown-related disease (e.g., strawberry red stele, Phytophthora root/collar rot)
  - Root-related abiotic issues (e.g., equipment or mechanical damage)
  - Cultural/environmental issues
  - Nutritional deficiency
  - Insects & pests (e.g., spider mite)
- ☐ Bumps, growths
  - Fungal disease (e.g., peach leaf curl)
  - Insects (e.g., grape phylloxera)
- ☐ Holes in leaves
  - Leaf spot disease (e.g., cherry leaf spot, raspberry leaf spot)
  - Hail damage
  - Insects (e.g., flea beetle, Japanese beetle)
- ☐ Sticky substance on surface
  - Honeydew from some insects (e.g., aphids, scale)

Figure 8. Mosaic or mottling symptoms include abnormal color variations across leaves, stems, flowers, and fruit (Photo: Impatiens necrotic spot virus of blackberry).
Figure 9. Fluffy or powdery growth on leaves may indicate a fungal infection (Photo: Grape downy mildew).

Step 4: Identify the Symptoms & Possible Cause (cont'd)

(More than one may apply)

Fruit Symptoms

- ☐ Decay, rots
  - Fungal disease (e.g., apple bitter rot, peach brown rot)
  - Water molds (e.g., strawberry leather rot)
- ☐ Fruit spots, specks, lesions
  - Bacterial disease (e.g., peach bacterial spot)
  - Fungal disease (e.g., ripe rot, anthracnose)
  - Sunscald, freeze damage, herbicide
- ☐ Cracks, wounds
  - Sunscald, freeze injury, overripening, mechanical damage, harvest damage, overwatering
  - Insects (e.g., apple maggot, coddling moth)
- ☐ Scabs
  - Fungal disease (e.g., apple and peach scab)
  - Insects (e.g., thrips)
- ☐ Ringspots and/or mosaic patterns
  - Viral disease (e.g., blueberry ringspot virus)
  - Insects (e.g., aphids)
- ☐ Distortions
  - Disease (e.g., plum pockets)
  - Herbicides, cold damage, trellising
  - Insects (e.g., aphids, brown, marmorated stink bug)

Figure 10. Take note if symptoms are restricted to fruit or if similar symptoms also appear on leaves (Photo: scab of peach).

Figure 11. Look closely at decaying fruit for the presence of fungal structures, which indicate an infectious disease. Here, pycnidia form in concentric rings within infected areas (Photo: black rot of grape).

Figure 12. Fruit damage may resemble predation or mechanical damage, requiring a closer look to identify the issue (Photo: strawberry anthracnose)

Figure 13. Plum pockets results in fruit distortion.

Brnches/Stems/Trunk Symptoms

- ☐ Dieback, slow decline, thinning canopy
  - Root/crown-related disease (e.g., black rot, Phytophthora root/crown rot)
  - Root-related abiotic issues (e.g., equipment or mechanical damage)
  - Environmental stress
  - Transplant shock
  - Insects (e.g., oriental fruit moth, raspberry crown borer
- ☐ Cankers, lesions
  - Fungal or bacterial disease (e.g., raspberry cane blight, fire blight)
  - Mechanical injury (e.g., tillers, equipment)
- ☐ Cracks, wounds, loose bark
  - Wood decay
  - Sunscald or freeze injury
  - Insects (e.g., raspberry cane borer, lesser peachtree borer)
  - Mechanical injury (e.g., tillers, equipment)
- ☐ Galls, swellings, burl
  - Fungal disease (e.g., black knot, rusts)
  - Bacterial disease (e.g., crown gall)
  - Insects (e.g., grape cane gallmaker, rednecked cane borer)
- ☐ Staining or streaking of inner stem tissue
  - Bacterial disease (e.g., fire blight)
  - Insects (e.g., San Jose scale)
- ☐ Holes or insect tunnels, frass
  - Borers (e.g., dogwood borer, peachtree borer)
- ☐ Mushrooms present at lower trunk (e.g., Armillaria root rot)
- ☐ Oozing sap
  - Fungal or bacterial diseases (e.g., bacterial canker, perennial canker
  - Physical injury

Figure 14. The presence of mushrooms at the base of trunks or in root zones can be indicative of a root rot disease (Photo: Armillaria root rot of peach).

Figure 15. Galls often appear dry and cracked (Photo: black knot of plum).

Figure 16. Cankers are localized necrotic (dead) areas that impede water and nutrient flow. Cankers may or may not ooze sap (Photo: fire blight of apple).

Step 4: Identify the Symptoms & Possible Cause (cont'd)

(More than one may apply)

Root Symptoms

- ☐ Black lesions, browning, root decay
  - Root/crown-related abiotic problems (e.g., excessive mulch, poor drainage, flooding, improper planting)
  - Root/crown-related disease (e.g., black rot, Phytophthora root rot)
- ☐ Mushrooms present in root zone (e.g., Armillaria root rot)
- ☐ Restricted roots, stunted roots
  - Compaction
  - Girdling root
  - Improper planting practices
  - Hard pan or underlying rock layer

Figure 17. Diagnosing what is going on above ground may require an investigation into what is going on below ground. Digging up roots or whole plants with roots intact can reveal the underlying cause of symptoms such as wilt and dieback (Photo: Phytophthora root rot of raspberry).

Step 5: Conclusion

After assessing the affected plant(s) and surrounding area, it may be necessary to contact a local Cooperative Extension Service office for assistance. For difficult diagnoses, the Extension office may elect to submit the sample to the UK Plant Disease Diagnostic Lab. Information gathered using this guide, along with plant samples, photographs, and submission form, can be very helpful in making a definitive diagnosis.

Before collecting samples to submit for diagnosis, see *Submitting Plant Specimens for Disease Diagnosis* (PPFS-GEN-09).

Resources

- Plant Pathology Extension Publications
http://plantpathology.ca.uky.edu/extension/publications
- Entomology Extension Publications
https://entomology.ca.uky.edu/entfacts
- Horticulture Extension Publications
http://www.uky.edu/hort/
- Submitting Plant Specimens for Disease Diagnosis (PPFS-GEN-09)
https://plantpathology.ca.uky.edu/files/ppfs-gen-09.pdf
- Kentucky Mesonet (Western Kentucky University)
http://www.kymesonet.org/

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