



Plant Diseases in Kentucky

**Plant Disease Diagnostic Laboratory
Summary**

2011

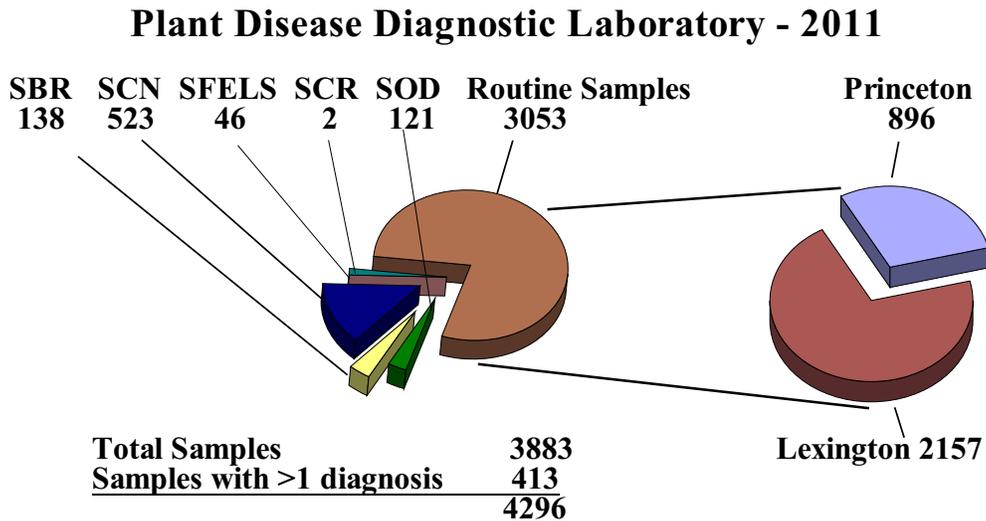
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INTRODUCTION

The Plant Disease Diagnostic Laboratory (Lexington and Princeton) handled 3360 plant samples and 523 nematode soil samples during 2011. Plant samples with more than one problem numbered 413 bringing the total number of actual diagnoses to 4296. The Lexington Laboratory diagnosed 2278 specimens. Of that number there were 2157 routine plant samples and 121 samples from commercial nurseries from the survey work for the Sudden Oak Death (SOD) pathogen. The SOD samples are included in the total number of samples in Figure 1 below, within the totals for the various woody plant samples, and in a summary report on page 21. The Princeton Laboratory's specimens totaled 1605: of that number 896 were routine plant samples, 138 were Soybean Rust (SBR) sentinel plot samples, 46 were soybean leaf samples for the frogeye fungicide resistance study (SFELS), 2 were Southern Corn Rust (SCR) survey samples, and 523 were soil samples submitted exclusively for soybean cyst nematode (SCN) analysis. The SBR samples are included in Figure 1 below and in the summaries for soybean. The SCR samples are included in Figure 1 below and in the summary for corn. In addition to the specimens processed in the laboratory, 221 cases were also submitted in 2011 through the web-based UK Digital Consulting System for consultation with the Diagnosticians and Extension Specialists (see Table 10, page 20). Plant samples plus SCN samples are summarized in Figure 1 below:



NATURE OF WORK

Plant disease diagnosis is an ongoing educational and research activity of the U.K. Department of Plant Pathology. We maintain two branches of the Plant Disease Diagnostic Laboratory, one on the U.K. campus in Lexington, and one at the U.K. Research and Education Center in Princeton.

Making a diagnosis involves a great deal of research into the possible causes of the plant problem. Most visual diagnoses involve microscopy to determine what plant parts are affected and to identify the microbe(s) involved. In addition, many specimens require special tests such as moist chamber incubation, culturing, enzyme-linked immunosorbent assay (ELISA), electron microscopy, nematode extraction, or soil pH and soluble salts tests. The laboratory also uses the polymerase-chain-reaction (PCR) technique for identification of certain pathogens.

Computer-based laboratory records are maintained to provide information used for conducting plant disease surveys, identifying new disease outbreaks, and formulating educational programs. In addition, information from the laboratory forms the basis for timely news of plant disease problems through the Kentucky Pest News newsletter, radio and television tapes, and plant health care

workshops. Both laboratories meet Homeland Security rules that require reporting of all diagnoses of plant diseases to USDA-APHIS on a real-time basis. To assist County Extension Agents and Specialists in dealing with plant disease issues, we also operate a web-based UK Digital Consulting System utilizing photographic images. The images can be used to help determine how and where best to collect samples for submission to the laboratory, as well as general or specific advice on a wide range of topics.

WEATHER SUMMARY

Above normal rainfall in almost every month made 2011 the wettest year on record in Kentucky.

January: Below Normal Temperature and Below Normal Precipitation

Temperatures for the period averaged 30 degrees across the state which was 3 degrees cooler than normal. High temperatures averaged from 38 in the West to 38 in the East. Departure from normal high temperatures ranged from 5 degrees cooler than normal in the West to 6 degrees cooler than normal in the East. Low temperatures averaged from 17 degrees in the West to 24 degrees in the East. Departure from normal low temperature ranged from 8 degrees cooler than normal in the West to 1 degree warmer than normal in the East.

Precipitation (liq. equ.) for the period totaled 2.08 inches statewide which was 1.54 inches below normal and 58% of normal. Precipitation totals by climate division, West 1.84 inches, Central 2.12 inches, Bluegrass 1.78 inches and East 2.60 inches, which was 1.96, 1.74, 1.34 and 1.08 inches below normal.

February: Above Normal Temperature and Above Normal Precipitation

Temperatures for the period averaged 40 degrees across the state which was 2 degrees warmer than normal. High temperatures averaged from 48 in the West to 51 in the East. Departure from normal high temperatures ranged from 1 degree cooler than normal in the West to 2 degrees warmer than normal in the East. Low temperatures averaged from 32 degrees in the West to 32 degrees in the East. Departure from normal low temperature ranged from 3 degrees warmer than normal in the West to 6 degrees warmer than normal in the East.

Precipitation (liq. equ.) for the period totaled 5.61 inches statewide which was 1.69 inches above normal and 143% of normal. Precipitation totals by climate division, West 5.76 inches, Central 6.36 inches, Bluegrass 5.88 inches and East 4.44 inches, which was 1.40, 2.11, 2.48 and 0.75 inches above normal.

March: Above Normal Temperature and Above Normal Precipitation

Temperatures for the period averaged 49 degrees across the state which was 2 degrees warmer than normal. High temperatures averaged from 58 in the West to 57 in the East. Departure from normal high temperatures ranged from 2 degrees cooler than normal in the West to 2 degrees cooler than normal in the East. Low temperatures averaged from 42 degrees in the West to 39 degrees in the East. Departure from normal low temperature ranged from 5 degrees warmer than normal in the West to 6 degrees warmer than normal in the East.

Precipitation (liq. equ.) for the period totaled 4.58 inches statewide which was 0.27 inches above normal and 106% of normal. Precipitation totals by climate division, West 4.86 inches, Central 4.56 inches, Bluegrass 4.24 inches and East 4.68 inches, which was 0.27, 0.02, 0.35 and 0.46 inches above normal.

April: Above Normal Temperature and Above Normal Rainfall

Temperatures for the period averaged 60 degrees across the state which was 4 degrees warmer than normal. High temperatures averaged from 72 in the West to 72 in the East. Departure from normal high temperatures ranged from 3 degrees warmer than normal in the West to 4 degrees warmer than normal in the East. Low temperatures averaged from 52 degrees in the West to 49 degrees in the East. Departure from normal low temperature ranged from 6 degrees warmer than normal in the West to 9 degrees warmer than normal in the East.

April 2011 was the wettest April ever recorded in the Commonwealth.

Rainfall for the period totaled 12.04 inches statewide which was 7.7 inches above normal and 277% of normal. Rainfall totals by climate division, West 13.98 inches, Central 12.36 inches, Bluegrass 12.64 inches and East 9.18 inches, which was 9.06, 7.93, 8.68 and 5.13 inches above normal.

May: Near Normal Temperature and Above Normal Rainfall

Temperatures for the period averaged 64 degrees across the state which was 0 degrees from normal. High temperatures averaged from 75 in the West to 73 in the East. Departure from normal high temperatures ranged from 3 degrees cooler than normal in the West to 3 degrees cooler than normal in the East. Low temperatures averaged from 57 degrees in the West to 54 degrees in the East. Departure from normal low temperature ranged from 2 degrees warmer than normal in the West to 5 degrees warmer than normal in the East.

Rainfall for the period totaled 6.87 inches statewide which was 2.11 inches above normal and 144% of normal. Rainfall totals by climate division, West 7.73 inches, Central 7.24 inches, Bluegrass 6.84 inches and East 5.67 inches, which was 2.8, 2.27, 2.34 and 1.02 inches above normal.

June: Above Normal Temperature and Above Normal Rainfall

Temperatures for the period averaged 74 degrees across the state which was 2 degrees warmer. High temperatures averaged from 87 in the West to 83 in the East. Departure from normal high temperatures ranged from 1 degree warmer than normal in the West to 0 degrees from normal in the East. Low temperatures averaged from 68 degrees in the West to 63 degrees in the East. Departure from normal low temperature ranged from 5 degrees warmer than normal in the West to 4 degrees warmer than normal in the East.

Rainfall for the period totaled 5.29 inches statewide which was 0.87 inches above normal and 120% of normal. Rainfall totals by climate division, West 5.64 inches, Central 5.43 inches, Bluegrass 5.13 inches and East 4.98 inches, which was 1.33, 1, 0.7 and 0.48 inches above normal.

July: Above Normal Temperature and Below Normal Rainfall

Temperatures for the period averaged 80 degrees across the state which was 4 degrees warmer than normal and 6 degrees warmer than the previous period. High temperatures averaged from 91 in the West to 87 in the East. Departure from normal high temperatures ranged from 2 degrees warmer than normal in the West to 0 degrees from normal in the East. Low temperatures averaged from 72 degrees in the West to 69 degrees in the East. Departure from normal low temperature ranged from 5 degrees warmer than normal in the West to 6 degrees warmer than normal in the East.

Rainfall for the period totaled 3.91 inches statewide which was 0.29 inches below normal and 93% of normal. Rainfall totals by climate division, West 3.20 inches, Central 3.76 inches, Bluegrass 3.42 inches and East 5.27 inches, which was -0.90, -0.49, -0.70 and 0.92 inches respectively from normal.

August: Near Normal Temperature and Below Normal Rainfall

Temperatures for the period averaged 76 degrees across the state which was near normal. High temperatures averaged from 89 in the West to 85 in the East. Departure from normal high temperatures ranged from 1 degree warmer than normal in the West to 1 degree cooler than normal in the East. Low temperatures averaged from 67 degrees in the West to 64 degrees in the East. Departure from normal low temperature ranged from 1 degree warmer than normal in the West to 2 degrees warmer than normal in the East.

Rainfall for the period totaled 2.19 inches statewide which was 1.6 inches below normal and 58% of normal. Rainfall totals by climate division, West 2.20 inches, Central 1.47 inches, Bluegrass 2.49 inches and East 2.60 inches, which was 1.32, 2.3, 1.28 and 1.5 inches below normal.

September: Below Normal Temperature and Above Normal Rainfall

Temperatures for the period averaged 66 degrees across the state which was 3 degrees cooler than normal. High temperatures averaged from 77 in the West to 74 in the East. Departure from normal high temperatures ranged from 5 degrees cooler than normal in the West to 6 degrees cooler than normal in the East. Low temperatures averaged from 57 degrees in the West to 57 degrees in the East. Departure from normal low temperature ranged from 1 degree cooler than normal in the West to 2 degrees warmer than normal in the East.

Rainfall for the period totaled 5.52 inches statewide which was 2 inches above normal and 157% of normal. Rainfall totals by climate division, West 5.25 inches, Central 5.75 inches, Bluegrass 5.91

inches and East 5.18 inches, which was 1.74, 1.88, 2.69 and 1.7 inches above normal.

October: Below Normal Temperature and Below Normal Rainfall

Temperatures for the period averaged 56 degrees across the state which was 2 degrees cooler than normal. High temperatures averaged from 70 in the West to 67 in the East. Departure from normal high temperatures ranged from 2 degrees cooler than normal in the West to 3 degrees cooler than normal in the East. Low temperatures averaged from 46 degrees in the West to 45 degrees in the East. Departure from normal low temperature ranged from 1 degree cooler than normal in the West to 2 degrees warmer than normal in the East.

Rainfall for the period totaled 2.83 inches statewide which was 0.47 inches below normal and 88% of normal. Rainfall totals by climate division, West 1.85 inches, Central 1.99 inches, Bluegrass 3.63 inches and East 3.82 inches, which was -1.54, -1.30, 0.64 and 0.72 inches respectively from normal.

November: Above Normal Temperature and Above Normal Precipitation

Temperatures for the period averaged 51 degrees across the state which was 3 degrees warmer than normal and 6 degrees cooler than the previous period. High temperatures averaged from 60 in the West to 61 in the East. Departure from normal high temperatures ranged from near normal in the West to 2 degrees warmer than normal in the East. Low temperatures averaged from 44 degrees in the West to 39 degrees in the East. Departure from normal low temperature ranged from 5 degrees warmer than normal in the West to 4 degrees warmer than normal in the East.

Precipitation for the period totaled 7.83 inches statewide which was 3.97 inches above normal and 203% of normal. Precipitation totals by climate division, West 9.30 inches, Central 8.60 inches, Bluegrass 7.25 inches and East 6.16 inches, which was 4.84, 4.54, 3.87 and 2.62 inches above normal.

December: Above Normal Temperatures and Above Normal Rainfall

Temperatures for the period averaged 42 degrees across the state which was 4 degrees warmer than normal. High temperatures averaged from 50 in the West to 52 in the East. Departure from normal high temperatures ranged from 2 degrees warmer than normal in the West to 4 degrees warmer than normal in the East. Low temperatures averaged from 34 degrees in the West to 34 degrees in the East. Departure from normal low temperature ranged from 4 degrees warmer than normal in the West to 6 degrees warmer than normal in the East.

Precipitation (liq. equ.) for the period totaled 5.59 inches statewide which was 1.14 inches above normal and 126% of normal. Precipitation totals by climate division, West 6.27 inches, Central 4.69 inches, Bluegrass 5.42 inches and East 5.96 inches, which was 1.39, -0.13, 1.55 and 1.73 inches respectively from normal.

CROP SUMMARIES

Tobacco: The number of tobacco samples for 2011 (254) was significantly lower than last year's total (357) and the lowest total for any year since 1971. There have been fewer tobacco samples in the last five years than in 2006 (536) and 2005 (528), 2005 being the first year of the Tobacco Quota Buyout Program. For the first time since 1978, Kentucky did not have a confirmed case of blue mold (*Peronospora tabacina*). For the United States, in terms of the number of counties with confirmed blue mold, and likely also in terms of disease incidence and impacts, 2011 was the lightest epidemic since full-season forecasts began in 1996. 2010 had ~~also~~ been the lightest since 1996 when KY only had one confirmed case. In 2011 only three U.S. counties reported blue mold; Chester and Lancaster in PA, and Hampden in MA. There were no reports from any other growing regions in North America for 2011.

Even with the record wet weather there were only 34 samples with black shank (*Phytophthora parasitica* var. *nicotianae*). Frogeye leaf spot (*Cercospora nicotianae*) (13 samples) was the second most commonly diagnosed tobacco disease behind black shank. The number of cases of tomato spotted wilt virus (TSWV) were again very low (4 samples).

Other agronomic crops:

Corn: Ear/kernel rots were the number one disease, and overall corn diseases were very light in 2011. Potassium deficiency (14 samples) was seen more frequently than other diseases/disorders due to hot, dry weather in July and August.

Soybean: For the second year in a row since it was first detected in Kentucky (2005), Australasian soybean rust (SBR; *Phakopsora pachyrhizi*) was not detected in Kentucky. Late season hot, dry weather provided excellent conditions for charcoal rot (*Macrophomina phaseolina*) (10 samples) while frogeye (*Cercospora soja*) was the number one disease of soybean (11 samples).

Small Grains: Overall, diseases on small grains were scarce but wheat soilborne mosaic virus (SBWMV) (2 samples) and wheat spindle streak mosaic virus (WSSMV) (2 samples) were the most common diseases diagnosed on wheat samples.

Forages: Among forages, alfalfa had the most common diseases; crown/stem rot (*Sclerotinia trifoliorum*) (2 samples) and summer black stem (*Cercospora medicaginis*) (2 samples).

Fruit and Vegetable Plant Disease Observations:

Approximately 30% of samples in 2011 were fruits and vegetables and nearly half of those were from commercial growers. Although growers are not charged for plant-disease diagnoses at UK, the estimated direct annual expenditure to support diagnosis of fruit and vegetable specimens by the laboratory exceeds \$25,000, excluding UK physical plant overhead costs. Funds from the National Plant Diagnostic Network have helped to help defray some of the laboratory operating costs, however, a 25-percent cut in these funds during the 2010-2011 fiscal year was challenging. In 2011, 31 percent of digital cases involved fruit and vegetable diseases and disorders.

New, Emerging, and Problematic Fruit and Vegetable Diseases in Kentucky

Anthraxnose crown rot (*Colletotrichum fragariae*) was diagnosed on strawberry in multiple locations during the fall planting season. Large losses soon after planting were reported on the Camarosa variety with more limited disease incidence on Chandler. Many plants were removed immediately, but because the pathogen can overwinter in infected plants and debris, growers must be prepared to manage all phases of anthracnose next spring.

Bacterial fruit blotch (*Acidovorax avenae* subsp. *citrulli*) was diagnosed in watermelon as an isolated occurrence (one farm affected).

Pythium blight (*Pythium* spp.) of aerial plant parts was enhanced by frequent rains throughout the early part of the summer. Stem blights of bean and potato as well as cottony leak fruit rot on watermelon were observed.

Cercospora leaf spots (*Cercospora* sp.), favored by high humidity, were seen on many specialty vegetable crops produced for the fresh market in Kentucky, including asparagus, celery, horseradish, lettuce, and potato.

Tree Fruit Diseases:

Pome Fruits: While levels of apple scab (*Venturia inaequalis*) and cedar-apple rust (*Gymnosporangium juniperi-virginianae*) were low to moderate, frogeye leaf spot (*Botryosphaeria obtusa*) was observed at higher levels in apple and was seen slightly earlier in the season than usual, beginning in early May. Fire blight (*Erwinia amylovora*) also occurred at low levels on both apple and pear. Fruit rots—including white rot (*Botryosphaeria dothidea*) and bitter rot (*Glomerella cingulata*)—occurred late in the season. The physiological condition bitter pit was seen on apple as well. A single but severe case of thread blight (*Corticium stevensii*) was diagnosed on apple, indicating a humid, shaded orchard setting.

Stone Fruits: Leaf spot diseases of cherry caused by the fungus *Coccomyces hiemalis* and the bacterium *Xanthomonas campestris* pv. *pruni* were seen frequently, with occasional bacterial spot also occurring on other Prunus species, including peach and plum. Brown rot (*Monilinia fructicola*) was diagnosed on cherry, nectarine, peach and plum. Spring rains favored the development of peach leaf curl (*Taphrina deformans*) in some areas, but this disease was not as widespread as in the previous several years.

Small Fruit Diseases:

Grapes: Anthracnose (*Elsinoe ampelina*) was more common than usual for the second year in a row, while black rot (*Guignardia bidwellii*) and Phomopsis cane and leaf spot (*Phomopsis viticola*) were seen at normal levels. Downy mildew (*Plasmopara viticola*) and powdery mildew (*Uncinula necator*) developed later in the season. An unusual find from 2010, Isariopsis leaf blight (*Pseudocercospora vitis* [syn. *Isariopsis clavispora*]), was seen again this year in multiple locations.

Brambles: Cane blight (*Leptosphaeria coniothyrium*), double blossom disease (*Cercospora rubi*), and root and collar rot (*Phytophthora* spp.) were diagnosed on brambles (blackberry and/or raspberry) samples. High temperatures promoted the physiological disorder known as “white drupelet” in which scattered drupelets within an aggregate expand to a normal size but fail to ripen.

Blueberries: Root and collar rot caused by *Phytophthora* spp. and stem dieback from species of the *Botryosphaeria* fungus were diagnosed occasionally on blueberry.

Strawberries: The most significant problem on strawberry was the crown rot phase of anthracnose (*Colletotrichum fragariae*), as noted above. Leather rot (*Phytophthora cactorum*) and leaf blight (*Phomopsis obscurans*) also were diagnosed.

Vegetable Diseases:

Beans: Foliar diseases including angular leaf spot (*Phaeoisariopsis griseola*) and common bacterial blight (*Xanthomonas campestris* pv. *phaseoli*) were common due to early wet weather and high humidity throughout the summer. Root rot (*Rhizoctonia solani*) occurred in many early plantings in home gardens, but later high temperatures favored southern blight (*Sclerotium rolfsii*), which was particularly common. One case each of ashy stem blight (*Macrophomina phaseolina*) and Pythium stem blight (*Pythium* sp.) was diagnosed (see above).

Cole crops: Bottom rot (*Rhizoctonia solani*) and stem rot (*Sclerotinia sclerotiorum*) were diagnosed in cabbage, and black rot (*Xanthomonas campestris* pv. *campestris*) was diagnosed in kale from several home-garden plantings.

Cucurbits: High humidity promoted foliar and vine diseases in cucurbits, in particular anthracnose (*Colletotrichum orbiculare*), Alternaria leaf blight (*Alternaria cucumerina*) and gummy stem blight (*Didymella bryoniae*). Downy mildew (*Pseudoperonospora cubensis*) developed only very late in the season in scattered areas. A single case of yellow vine decline was confirmed on zucchini via PCR assay. In addition to the bacterial fruit blotch (see above), fruit rots caused by oomycetes also were observed on watermelon, including Pythium cottony leak (*Pythium* sp.) and Phytophthora rot (*Phytophthora capsici*).

Peppers: Occasional cases of southern blight (*Sclerotium rolfsii*) and bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) were diagnosed on pepper.

Potatoes: Pythium rot (*Pythium* sp.) was seen on aboveground stems of potato (see above), while pink rot (*Phytophthora nicotianae*) and southern blight (*Sclerotium rolfsii*) were observed on tubers. Hot weather conditions favor both of the latter tuber diseases. Cases of common scab (*Streptomyces* sp.) and Fusarium dry rot (*Fusarium* sp.) also were seen.

Tomatoes: Foliar diseases such as early blight (*Alternaria solani*) and Septoria leaf spot (*Septoria lycopersici*) were common, while leaf mold (*Fulvia fulva*) and target spot (*Corynespora cassiicola*) were observed in a few cases where humidity was extremely high. Timber rot (*Sclerotinia sclerotiorum*) was fairly common in the early part of the season; also common were stem/vascular problems such as southern blight (*Sclerotium rolfsii*), bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*), and Fusarium wilt (*Fusarium oxysporum*). Physiological disorders included many cases of yellow shoulders and a diagnosis of fruit pox and gold fleck from the same farm; all are related to environmental conditions during fruit development and maturation.

Other vegetables: Cercospora leaf spots were seen in a number of vegetable crops (see above). Other vegetable diseases included Pythium root rot (*Pythium* sp.) on onion and an unusual find of white rot (*Sclerotium cepivorum*) on garlic.

Landscape Plant Disease Observations:

Approximately 52% of samples were landscape ornamental plants, with 28% of those submitted from commercial nursery or greenhouse production systems, or from professional landscape companies. In 2011, 54% of digital consulting requests involved landscape and nursery plants.

Early season rains and cool temperatures were favorable for the development of a number of foliar diseases such as anthracnose on various shade trees. High humidity throughout the summer promoted fungal leaf spots caused by species of *Cercospora* and related fungi on a number of landscape hosts. Needle cast/blights on spruce were extremely common. These needle disease occurrences may be traced to favorable conditions for infections in early 2010, as the two most common needle disease pathogens in Kentucky have life cycles that may be greater than 12 months. In general, diagnoses of root rots - particularly those caused by oomycete pathogens - were slightly fewer than in the previous two years.

The following important or unusual diseases were observed:

Deciduous trees:

- Beech, blackgum and redbud canker (*Botryosphaeria*)
- Flowering cherry fungal leaf spot (*Coccomyces*) and bacterial leaf spot (*Xanthomonas*)
- Flowering crabapple scab (*Venturia*)
- Dogwood anthracnose (*Discula*) and spot anthracnose (*Elsinoe*)
- Ash, beech, elm, maple, oak and tuliptree anthracnose (various fungi)
- Oak bacterial leaf scorch (*Xylella*)
- Linden spot anthracnose (*Elsinoe*)
- Honeylocust, pecan, redbud, willow and yellowwood leaf spot (*Cercospora*)
- Walnut leaf spot (*Phloeospora*)

Needle Evergreens:

- Arborvitae twig blights (*Botrytis*, *Pestalotia*)
- Leyland cypress canker (*Seiridium*)
- Pine needle spot/blight (*Dothistroma*, *Mycosphaerella*)
- Pine tip blight (*Sphaeropsis*)
- Spruce needle cast/blight (*Rhizosphaera*, *Stigmina*)
- Arborvitae, juniper, pine, spruce and taxus root rot (*Phytophthora*)

Shrubs:

- Boxwood canker (*Pseudonectria*)
- Cherrylaurel bacterial leaf spot (*Xanthomonas*)
- Crapemyrtle leaf spot (*Cercospora*)
- Euonymus stem blight (*Sclerotinia*)
- Hawthorn cedar-quince rust (*Gymnosporangium*)
- Holly black root rot (*Thielaviopsis*)
- Hydrangea fungal leaf spot (*Cercospora*) and bacterial leaf spot (*Xanthomonas*)
- Rhododendron canker (*Botryosphaeria*) and stem blight (*Phomopsis*)
- Rose rosette (virus)
- Azalea, cherrylaurel, forsythia and rhododendron root rot (*Phytophthora*)

Herbaceous Annuals and Perennials:

- Catharanthus black root rot (*Thielaviopsis*)
- Chrysanthemum root/crown rot (*Pythium*, *Rhizoctonia*)
- Chrysanthemum web blight (*Rhizoctonia*)
- Geranium bacterial blight (*Xanthomonas*)
- Impatiens leaf spot (*Alternaria*)
- Hollyhock rust (*Puccinia*)
- Hosta southern blight (*Sclerotium*)
- Liriope crown rot (*Phytophthora*)
- Mandevilla southern [bacterial] wilt (*Ralstonia*)
- Peony stem blights (*Botrytis*, *Phytophthora*, and *Sclerotinia*)
- Petunia black root rot (*Thielaviopsis*)
- Petunia root/crown rot (*Pythium*)
- Zinnia leaf spot (*Alternaria*)

A Shift in Sample Types:

The number of tobacco samples for 2011 (254) was at its lowest level since 1971. Continuing the trend of recent years, overall tobacco samples have been much lower than historical levels prior to 2000. This drop in the number of tobacco samples has been mostly offset by increases in the number of woody and herbaceous ornamental samples, both commercial and homeowner, as well as commercial fruit and vegetable samples. An increasing number of these samples are of plant types which are less common and therefore require more effort, testing and time to provide an accurate diagnosis. Along with the diversification of crops, we are seeing a diversification of diseases.

Disease and Pesticide Resistance Monitoring:

In addition to the diagnosis of routine plant samples, additional monitoring for the following high priority diseases/pathogens is conducted in the diagnostic laboratory:

- Pierce's disease of grapes caused by *Xylella fastidiosa*
- Grape crown gall caused by *Agrobacterium tumefaciens* or *A. vitis*
- Cucurbit yellow vine disease caused by *Serratia marsescens*
- Bacterial fruit blotch of watermelon caused by *Acidovorax avenae* subsp. *citrulli*
- Root, stem and fruit diseases of solanaceous and cucurbit vegetables caused by *Phytophthora* spp.
- Bacterial canker of peppers caused by *Clavibacter michiganensis* subsp. *michiganensis*
- Thousand Cankers disease of walnuts caused by *Geosmithia morbida*

Furthermore, surveys for Asian soybean rust, sudden oak death, southern corn rust and the tests to detect soybean cyst nematodes in new areas of the state and in soil on commercial ornamental stock for export (e.g., to Canada and California) are also conducted.

The diagnostic laboratory plays a role in monitoring pathogen resistance to fungicides and bactericides. Some examples include:

- Copper-resistant bacterial speck of tomatoes caused by *Pseudomonas syringae* pv. *tomato*
- Thiophanate-methyl and QoI (=strobilurin) fungicide-resistant anthracnose of turfgrasses caused by *Colletotrichum graminicola*
- Thiophanate-methyl and/or DMI fungicide-resistant dollar spot of turfgrasses caused by *Sclerotinia homeocarpa*
- QoI (=strobilurin) fungicide-resistant gray leaf spot of turfgrasses caused by *Pyricularia grisea*
- Phenylamide fungicide-resistant Pythium blight of turfgrasses caused by *Pythium* spp.
- QoI (=strobilurin) fungicide-resistant frog-eye leaf spot of soybean caused by *Cercospora sojina*

Educational Resource:

A major activity of the laboratory is to serve as an educational resource to County Extension Agents and Extension Specialists for assistance in the diagnosis of plant diseases--common, complex, and new.

ACKNOWLEDGMENTS

Sara Long works in the Lexington laboratory as a full-time Diagnostic Assistant. Her main responsibility is to fulfill the laboratory's data transmission requirements for the National Plant Diagnostic Network. In addition, Sara provided much-needed assistance to the Lexington laboratory in sample triage, diagnostic and technical support.

Technicians within the department of Plant Pathology continued to make significant contributions. Ed Dixon, research technician in Lexington, worked with Drs. John Hartman, Paul Vincelli, and Kenny Seebold in conducting research in turf, ornamentals, corn, tobacco, forages and fruits as well as with the soybean rust sentinel plot in Lexington. Bernadette Amsden, also in Lexington, conducted laboratory research on vegetables, fruits, tobacco and ornamentals, including conducting diagnostic tests (PCR) on many plant samples. Brenda Kennedy, research technician in Princeton, worked with Dr. Don Hershman in conducting research in soybean and wheat as well as oversaw the soybean cyst nematode and Asian soybean rust work. Terry Yielding worked in Princeton and examined the vast majority of the Asian soybean rust samples as well as worked with soybean cyst nematode analysis. Aaron Yielding and Meagan Amburgey provided very capable, part-time assistance in the Princeton Laboratory.

Thanks also go to Mindy Thompson in Lexington and Mary Ann Kelley and Stephanie Farmer in Princeton for their work in mailing diagnostic forms. The summary of weather conditions for 2011 was prepared by Tom Priddy, Biosystems and Ag. Engineering - Meteorology and his staff and was much appreciated.

Support from the Kentucky Integrated Pest Management Program and from the Southern Plant Diagnostic Network for supplemental funding of additional diagnostic testing, supplies and part-time laboratory assistance is gratefully acknowledged.

We thank the College of Agriculture's extension specialists and researchers who served as consultants to the diagnostic laboratory in 2011. Their services ranged from making diagnoses to assisting the diagnosticians with plant, insect, weed or pesticide questions. These individuals are listed in too numerous to mention here (see Table 9) but we are grateful nonetheless to each for their valuable assistance.

Thanks also go to several county ANR (Ag and Natural Resources) agents for cooperating on the survey projects for Asian soybean rust (SBR) and Southern Corn Rust (SCR) in the form of surveying and/or sending samples for our use.

Dr. John Hartman retired during 2011 after many years of service to many groups in Kentucky. Dr. Nicole Ward joined our group in August, 2011 and will take over responsibility for nursery, forest and landscape plants as well as fruit crops.

EXPLANATORY REMARKS

As you examine the main body of this report, you will notice three columns of numbers following the diagnosis and causal agent sections. The first column indicates the number of primary diagnoses, the second column contains the number of secondary diagnoses and the third column is the total of the previous two. The primary diagnosis is the main, or frequently, the only problem observed on a plant sample. If a second problem of equal or lesser importance was observed, it was entered as the secondary diagnosis. Occasionally, a problem may have only been diagnosed as a secondary problem, and not as a primary problem for this year thus a zero (0) will appear in the primary diagnosis column. Referrals and consultations: Insect problems were generally identified or verified by a specialist in the Entomology Department. Chemical injuries on all commercially grown crops were diagnosed by a weed control specialist or by the crop specialist in the Agronomy or Horticulture Departments. On a number of occasions we also consulted with crop specialists in other departments to diagnose or verify abiotic problems.

Table 1.**SUMMARY OF DIAGNOSES¹ BY CROP CATEGORY AND CAUSAL AGENT TYPE**

Crop Category	Abiotic Problems	Biotic² Problems	Chemical Injury	Inadequate Specimen	Insect Injury	Other³	Total Diagnoses
<u>Agronomic</u>							
Corn	37	19 ^a	7	0	4	7 ^a	74
Forages	10	14	0	0	2	4	30
Small grains	6	16	1	0	2	4	29
Soybeans	25	583 ^b	6	2	8	196 ^b	820
Tobacco	122	118	26	1	3	34	304
<u>Fruit</u>							
Small fruit	33	91	6	2	14	29	175
Tree fruit	38	100	3	2	38	19	200
<u>Herbs</u>							
	1	5	0	0	1	0	7
<u>Identifications</u>							
	0	43	0	2	0	0	45
<u>Ornamentals</u>							
<u>Herbaceous and</u>							
Houseplants	43	107	6	6	28	33	223
Turfgrass	6	79	0	5	5	27	122
Woody	343	554 ^c	105	14	215	362 ^c	1593
<u>Vegetables</u>							
	142	310	55	22	51	78	658
<u>Miscellaneous</u>							
	1	2	0	1	2	10	16
<u>Total</u>							
	807	2041	215	57	373	803	4296

¹ All counts and totals include primary diagnoses plus secondary diagnoses.

² Refer to Table 2 for a further breakdown of this category.

³ "Other" includes the causal agent categories: No disease and Unknown.

^a Numbers include 2 Corn samples in Southern Corn Rust survey with problems caused by fungi.

^b Numbers include 0 soybean samples with and 138 soybean samples without Asian Soybean Rust from the SBR sentinel plot system; 46 soybean leaf samples with the fungal disease frogeye leaf spot (SFELS), and 487 soil samples with and 36 soil samples without Soybean Cyst Nematodes.

^c Numbers include 121 SOD samples with 60 problems caused by fungi and 61 with no diseases.

Table 2. SUMMARY OF BIOTIC PROBLEMS¹ BY CROP CATEGORY

Crop Category	Bacterial	Fungal	Nematode	Virus	Other ²
Agronomic					
Corn	1	18 ^a	0	0	0
Forages	0	14	0	0	0
Small grains	1	11	0	4	0
Soybeans	0	93 ^b	490 ^c	0	0
Tobacco	9	99	2	8	0
Fruit					
Small fruit	2	88	0	1	0
Tree fruit	16	80	0	0	4
Herbs					
	0	5	0	0	0
Identifications					
	0	21	0	0	22
Ornamentals					
Herbaceous and Houseplants					
	6	95	0	4	2
Turfgrass	0	79	0	0	0
Woody	39	482 ^d	4	19	10
Vegetables					
	62	238	2	7	1
Miscellaneous					
	0	2	0	0	0
Total	136	1325	498	43	39

¹ All counts and totals include primary diagnoses plus secondary diagnoses.

² Other includes these categories: Animal (rodent and bird damage), Plant (plant identifications or parasitic plant) and Algæ, Lichen and Phytoplasma.

^a Number includes 2 Corn samples in Southern Corn rust survey (SCR) with problems caused by fungi.

^b Number includes 46 soybean leaf samples with the fungal disease frogeye leaf spot (SFELS).

^c Number includes 487 soil samples with Soybean Cyst Nematodes (SCN).

^d Number includes 60 Sudden Oak Death (SOD) samples with problems caused by fungi.

Table 3. NUMBER OF PLANT SAMPLES BY CROP CATEGORY

Crop Category	Number of Plant Specimens	Percentage of Total Plant Specimens
Agronomic (-Tobacco +138 SBRs, +46 SFELS, +2 SCR)	392	11.7
Tobacco	254	7.6
Fruit	320	9.5
Herbs	6	0.2
Identifications	45	1.3
Ornamentals (+ 121 SODs)	1751	52.1
Vegetables	578	17.2
Miscellaneous	14	0.4
Total Plant Samples (w/ SBRs, SFELS, SCR, & SODs)	3360	100

Table 4.**SUMMARY OF DIAGNOSES BY CROP CATEGORY AND CROP**

Crop Category and Crop	Number of Primary Diagnoses¹	Number of Secondary Diagnoses²	Total Diagnoses³
<u>Agronomic</u>			
Corn	60 ^a	14	74
Forages	24	6	30
Small grains	26	3	29
Soybeans	805 ^b	15	820
Tobacco	254	50	304
<u>Fruit</u>			
Small fruit	153	22	175
Tree fruit	167	33	200
<u>Herbs</u>			
	6	1	7
<u>Identifications</u>			
	45	na	45
<u>Ornamentals</u>			
<u>Herbaceous and Houseplants</u>			
	193	30	223
Turfgrass	112	10	122
Woody	1444 ^c	149	1593
<u>Vegetables</u>			
	578	80	658
<u>Miscellaneous</u>			
	16	0	16
<u>Total</u>	3883	413	4296

¹ The number of primary diagnoses corresponds to the number of different specimens examined.

² If a second problem was evident on the plant specimen it was considered the secondary diagnosis. See "Explanatory Remarks."

³ Total diagnoses equals the number of primary plus the number of secondary diagnoses.

^a Number includes 2 Corn samples in SCR survey

^b Soybean plant samples + 523 SCN soil samples + 138 SBR soybean samples + 46 SFELS samples

^c Numbers include 121 SOD samples

Table 5.**SUMMARY OF ROUTINE SAMPLES RECEIVED BY GROWER TYPE AND CROP GROUP**

Crop Group	Grower Type							
	Commercial		Homeowner		Research		Institution	
	Ext¹	Non-Ext²	Ext¹	Non-Ext²	Ext¹	Non-Ext²	Ext¹	Non-Ext²
<u>Agronomic</u>								
Corn	42	11	0	0	0	5	0	0
Forages	21	1	0	0	0	2	0	0
Small grains	16	6	0	0	0	3	1	0
Soybeans	87	5	0	0	4	2	0	0
Tobacco	228	20	0	0	1	5	0	0
<u>Fruit</u>								
Small Fruit	67	4	79	1	2	0	0	0
Tree Fruit	24	0	133	4	5	0	1	0
<u>Herbs</u>								
	5	0	1	0	0	0	0	0
<u>Identifications</u>								
	2	3	33	1	0	0	2	4
<u>Ornamental</u>								
Herbaceous and								
Houseplants	75	17	89	3	0	5	2	2
Turfgrass	20	19	44	2	0	5	6	16
Woody	201	135	922	32	0	7	17	9
<u>Vegetable</u>								
	285	3	253	8	7	16	6	0
<u>Miscellaneous</u>								
	2	0	5	2	0	4	2	1
Total	1075	224	1559	53	19	54	37	32
Total/Grower Type	1299		1612		73		69	

Total number of routine samples received = 3053¹ Ext = Extension samples submitted via County Extension Agents or Extension Specialists.² Non-Ext = Non-extension samples submitted directly by the grower or other non-extension clients.

Table 6.

**NUMBER OF ROUTINE SAMPLES REFERRED TO OTHER DEPARTMENTS,
UK LABORATORY FACILITIES OR OUTSIDE AGENCIES FOR DIAGNOSIS***

Department, Facility or outside agency	Crop Category					Total
	Agronomic	Fruit	Ornamental	Vegetable	Other	
Agdia, Inc.	5	0	0	10	0	15
Entomology Department	5	5	21	5	1	37
Horticulture Department	0	1	0	2	1	4
Plant & Soil Sciences Department	24	1	5	4	2	36
University of Illinois	1	0	0	0	0	1
USDA APHIS	0	0	2	0	0	2
					Total	95
					Total number of routine plant specimens	3053
					Percent of specimens referred outside Diagnostic Lab for diagnosis	3.1

* Numbers do not reflect the total number of diagnoses and/or consultations conducted by other departments (See Table 9).

Table 7.

**SPECIAL LABORATORY TESTS PERFORMED
BY PLANT DISEASE DIAGNOSTIC LABORATORY***

Test	Number of Tests
Polymerase Chain Reaction (PCR)	8
Culturing	29
Enzyme-linked Immunosorbent Assay (ELISA) (214 routine plant samples, +121 SOD)	335
Microscope (1566 routine plant samples + 138 SBR + 46 SFELS + 2 SCR)	1752
Nematode extraction	
Pinewood nematode (PWN)	8
Soybean cyst nematode (SCN)	523
Soil tests	65
Visual	1162
Bioassay	1
Total	3883

*** Based on 3053 routine plant samples, 138 SBR, 523 SCN, 2 SCR, 46 SFELS, and 121 SOD samples = 3883.**

Note: Some samples may have required more than one test but only the definitive test was recorded.

Table 8.**NUMBER OF ROUTINE PLANT SAMPLES RECEIVED BY COUNTY AND CROP CATEGORY
(KY AND OUT-OF-STATE SOURCES)¹**

COUNTY	Total	Agronomic ²	Tobacco	Fruit	Ornamental	Vegetable	Other
ADAIR	23	4	2	2	7	8	0
ALLEN	20	1	0	3	1	15	0
ANDERSON	24	1	1	3	16	3	0
BALLARD	8	8	0	0	0	0	0
BARREN	54	1	2	10	24	16	1
BATH	8	0	1	0	5	2	0
BELL	13	0	0	2	4	5	2
BOONE	55	2	0	2	43	7	1
BOURBON	30	3	1	5	12	8	1
BOYD	24	0	0	1	18	5	0
BOYLE	40	1	1	2	32	3	1
BRACKEN	2	0	0	0	1	0	1
BREATHITT	11	0	0	1	3	7	0
BRECKINRIDGE	52	3	24	4	9	12	0
BULLITT	15	3	0	0	11	1	0
BUTLER	10	4	0	1	3	1	1
CALDWELL (+UKREC)	96	42	6	10	28	6	4
CALLOWAY	40	3	4	4	23	6	0
CAMPBELL	34	0	0	0	33	1	0
CARLISLE	6	2	1	0	3	0	0
CARROLL	18	0	2	3	11	2	0
CARTER	9	0	0	0	6	3	0
CASEY	31	3	2	1	2	23	0
CHRISTIAN	113	27	16	5	23	41	1
CLARK	34	2	7	5	24	6	0
CLAY	9	0	2	3	3	1	0
CLINTON	6	0	1	1	2	2	0
CRITTENDEN	13	2	0	3	7	0	1
CUMBERLAND	13	0	0	7	5	1	0
DAVISS	114	9	12	7	59	27	0
EDMONSON	9	4	1	2	1	1	0
ELLIOTT	12	1	1	2	3	5	0
ESTILL	15	0	0	0	14	1	0
FAYETTE (+Lex. campus)	375	15	8	13	297	31	11
FLEMING	19	4	8	0	5	2	0
FLOYD	4	0	0	0	2	2	0
FRANKLIN	89	1	4	9	59	14	2
FULTON	14	13	0	1	0	0	0
GALLATIN	2	0	1	0	1	0	0
GARRARD	19	1	2	3	10	2	1
GRANT	13	1	1	2	4	2	3
GRAVES	49	22	13	9	3	2	0
GRAYSON	8	0	0	2	5	1	0
GREEN	6	0	3	1	1	0	1
GREENUP	1	0	0	1	0	0	0
HANCOCK	6	0	2	0	2	1	1
HARDIN	13	6	0	2	3	1	1
HARLAN	10	0	0	7	3	0	0
HARRISON	13	0	1	0	3	8	1
HART	7	0	1	1	0	5	0
HENDERSON	55	25	3	6	13	8	0
HENRY	26	0	7	4	8	7	0
HICKMAN	5	4	0	0	0	1	0
HOPKINS	17	2	0	3	9	2	1
JACKSON	14	1	3	1	6	3	0
JEFFERSON	116	0	0	9	95	8	4
JESSAMINE	15	0	1	0	13	1	0
JOHNSON	0	0	0	0	0	0	0
KENTON	28	0	0	0	26	2	0
KNOTT	5	0	0	1	4	0	0
KNOX	0	0	0	0	0	0	0

COUNTY	Total	Agronomic ²	Tobacco	Fruit	Ornamental	Vegetable	Other
LARUE	16	0	1	0	11	4	0
LAUREL	39	0	1	9	23	6	0
LAWRENCE	10	0	0	1	5	4	0
LEE	3	0	0	0	2	1	0
LESLIE	0	0	0	0	0	0	0
LETCHER	7	0	0	3	2	1	1
LEWIS	20	5	4	1	5	5	0
LINCOLN	41	4	2	2	8	25	0
LIVINGSTON	7	0	0	1	6	0	0
LOGAN	30	6	5	6	8	5	0
LYON	22	2	2	3	10	5	0
McCRACKEN	60	2	2	12	35	4	5
McCREARY	0	0	0	0	0	0	0
McLEAN	8	2	1	0	4	1	0
MADISON	39	1	1	5	23	6	3
MAGOFFIN	5	0	0	2	2	1	0
MARION	18	5	6	0	4	3	0
MARSHALL	38	0	1	2	25	10	0
MARTIN	1	0	0	0	1	0	0
MASON	28	1	2	1	19	5	0
MEADE	11	2	0	0	5	4	0
MENIFEE	14	1	0	4	6	2	1
MERCER	43	0	0	7	30	5	1
METCALFE	23	0	8	6	4	5	0
MONROE	10	1	2	2	4	1	0
MONTGOMERY	44	0	0	4	24	13	3
MORGAN	17	0	2	5	4	6	0
MUHLENBERG	30	15	4	2	4	5	0
NELSON	36	1	0	2	28	3	2
NICHOLAS	11	1	6	0	3	1	0
OHIO	0	0	0	0	0	0	0
OLDHAM	61	1	0	3	43	14	0
OWEN	8	1	2	3	2	0	0
OWSLEY	3	0	2	0	1	0	0
PENDELTON	9	1	1	3	3	1	0
PERRY	5	0	0	0	4	1	0
PIKE	21	0	0	3	10	8	0
POWELL	3	0	0	0	0	3	0
PULASKI	32	0	1	4	18	8	1
ROBERTSON	11	0	0	5	4	2	0
ROCKCASTLE	1	0	0	1	0	0	0
ROWAN	16	0	1	3	6	6	0
RUSSELL	22	1	0	6	12	3	0
SCOTT	66	2	6	5	45	7	1
SHELBY	24	1	7	1	6	9	0
SIMPSON	18	2	2	1	10	3	0
SPENCER	18	1	1	0	12	4	0
TAYLOR	19	2	3	1	9	4	0
TODD	52	19	10	4	9	10	0
TRIGG	46	21	6	0	10	5	4
TRIMBLE	6	1	3	0	2	0	0
UNION	7	3	0	1	3	0	0
WARREN	84	7	0	15	50	11	1
WASHINGTON	21	0	1	2	17	1	0
WAYNE	19	2	1	6	7	2	1
WEBSTER	15	6	1	4	2	2	0
WHITLEY	16	0	0	1	4	9	2
WOLFE	7	0	1	2	2	2	0
WOODFORD	42	4	7	2	23	5	1
Out-of-State	9	0	3	0	1	5	0
TOTALS	3193	346	254	320	1630	578	65

¹ Does include SBR (138) and SCR (2) survey samples but not SCN (mixed specialist research and county samples), SFELS (collected by researchers), or SOD samples (collected by nursery inspectors).

² Agronomic crops include corn, soybeans, forages, and small grains but in this particular case, it excludes tobacco.

Table 9.

THE NUMBER OF CASES IN WHICH UK EXTENSION SPECIALISTS, DIAGNOSTICIANS OR RESEARCHERS WERE INVOLVED IN MAKING A PRIMARY DIAGNOSIS AND THE NUMBER OF CASES IN WHICH THEY SERVED AS CONSULTANTS.

Specialists, Researchers, Diagnosticians	Department	Number of cases	
		Primary Diagnosis ¹	Consultations ²
LEXINGTON			
Beale, JW (Diagnostician)	Plant Pathology	1609	15
Bessin, RT	Entomology	4	5
Coolong, TW	Horticulture	1	6
Dutton, SR	Horticulture	0	2
Green, JD	Plant & Soil Sciences	19	21
Hartman, JR	Plant Pathology	0	2
Lee, CD	Plant & Soil Sciences	10	4
Long, SJ	Plant Pathology	604	0
Pearce, RC	Plant & Soil Sciences	10	4
Seebold, KW	Plant Pathology	11	15
Schnelle, RS	Horticulture	0	1
Smith, SR	Plant & Soil Sciences	0	1
Strang, JG	Horticulture	4	5
Townsend, LH	Entomology	53	4
Vincelli, P	Plant Pathology	14	0
Ward, NA	Plant Pathology	0	7
Williams, DW	Plant & Soil Sciences	1	0
PRINCETON			
Bachi, PR (Diagnostician)	Plant Pathology	987	32
Bailey, WA	Plant & Soil Sciences	25	18
Dunwell, WC	Horticulture	10	16
Herbek, JH	Plant & Soil Sciences	3	0
Hershman, DE	Plant Pathology	4	6
Johnson, DW	Entomology	4	4
Kennedy, BS	Plant Pathology	57	0
Lacefield, GD	Plant & Soil Sciences	3	1
Martin, JR	Plant & Soil Sciences	7	1
Murdock, LW	Plant & Soil Sciences	4	4
Yielding, TL	Plant Pathology	136	0

¹ The specialist or diagnostician making the primary diagnosis. Number includes all plant samples and 221 cases from the Digital Consulting System.

² In some cases, more than one person was consulted, however, only one name can be entered into the computer database. Therefore, these numbers may indicate fewer consultations than were actually performed.

Table 10.**DIGITAL CONSULTING SYSTEM**

To assist County Extension Agents and Specialists in dealing with plant disease, insect, and weed issues, we also operate a web-based Digital Consulting System utilizing photographic images. The images can be used to help determine how and where best to collect samples for submission to the laboratory, as well as general or specific advice on a wide range of topics.

The system is also useful for Homeland Security purposes because the topic possibilities are not limited to plants and because specialists in other states can be brought into the system as a consultant on a case-by-case basis with limited access to only the case in question.

221 cases were submitted in 2011 by a total of 42 submitters.

Cases came from a total of 42 counties.

DCS Cases 2011	
Crop	Count
Corn	5
Forage crop	1
Herb	1
Herbaceous ornamental	16
Indoor plant	1
Insect ID	2
Landscape shrub	17
Landscape tree	87
Mushroom ID	2
Small fruit	18
Soybean	6
Tobacco	6
Tree fruit	18
Turf grass	4
Vegetable	36
Weed	1

National Nursery Survey for *Phytophthora ramorum* in Kentucky, 2011

Julie Beale and Sara Long, Department of Plant Pathology;
Janet Lensing, Katie Kittrell, Jennie Condra, and John Obrycki, Department of Entomology

Acknowledgments: Thanks to John Obrycki (Dept. of Entomology) for providing funding for part of this work, and to all the nursery owners for their collaboration.

Nature of Work

Phytophthora ramorum, the cause of Ramorum blight and sudden oak death, continues to be a problem on the west coast in California and Oregon. This disease, first observed in California in the mid 1990s, causes the widespread death of many oak and tanoak species. Other hosts for this pathogen include: camellia, rhododendron, viburnum, mountain laurel and many others. A complete host list can be found at: http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/. Symptoms of *P. ramorum* infection on these hosts vary depending on the species and weather conditions, but include leaf spotting, leaf tip necrosis and twig dieback. Regulations and quarantines have been established to limit the spread of this pathogen, but concerns still remain about potential movement in contaminated nursery stock. Methods of long distance spread of the pathogen include moving plants, plant parts, soil and water. The Appalachian region is considered to be a high risk area for the establishment of *P. ramorum* because several of the native plant species in the region are identified as hosts and appropriate weather conditions occur often.

The nursery survey for *P. ramorum* in Kentucky was continued through the 2011 growing season as part of the Cooperative Agricultural Pest Survey (CAPS) program. This survey, a collaborative effort between the Department of Plant Pathology and the Office of the State Entomologist (Department of Entomology) at the University of Kentucky, has been ongoing each year since 2004 and utilizes protocols for collecting and testing established by the USDA-APHIS-PPQ. A total of 121 samples with foliar symptoms suggestive of general *Phytophthora* infection were collected from nurseries and home gardens in ten counties: Boone, Boyle, Campbell, Fayette, Franklin, Henderson, Jefferson, Kenton, Laurel and Lee. These samples were double bagged and sent to the Plant Disease Diagnostic Laboratory (PDDL) in Lexington for testing. An immunological test, enzyme-linked immunosorbent assay (ELISA), was used at the Lexington PDDL as an initial screen of all samples collected. This assay detects the presence of proteins typical of several plant pathogens in the genus *Phytophthora*, including *P. ramorum*. DNA was then extracted from samples testing positive via ELISA for general *Phytophthora* infection. Extracted DNA samples were sent to USDA-APHIS approved testing laboratories for further identification via polymerase chain reaction (PCR).

Results and Discussion

Of the 121 total samples collected throughout the state, 60 tested ELISA positive for infection by *Phytophthora* species. Although this is a much higher percentage of positive samples than in past nursery surveys, wet weather during sample collection in late spring /early summer was very conducive to the development of foliar disease caused by various *Phytophthora* species. Extracted DNA from the 60 ELISA positive samples was sent to USDA-APHIS approved testing laboratories for species identification through PCR. The *P. ramorum* PCR test for each of these samples was negative. *Phytophthora ramorum* was NOT found in the state of Kentucky this growing season. Results are summarized in Table 1.

Table 1. Number and type of plants sampled and results of ELISA assays for *Phytophthora* in general and PCR for *Phytophthora ramorum* during the nursery survey for *Phytophthora ramorum* in Kentucky in 2011.

Plant Species	Number of Samples	ELISA positive- <i>Phytophthora</i> sp.	PCR positive- <i>P. ramorum</i>
Rhododendron	70	41	0
Pieris	27	17	0
Viburnum	18	2	0
Camellia	4	0	0
Kalmia (Mt. Laurel)	1	0	0
Azalea	1	0	0
Total	121	60	0

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
AGRONOMIC CROPS					
<u>CORN</u>					
CORN (Zea) (includes Popcorn)					
	Brown spot	- Physoderma	2	0	2
	Charcoal rot	- Macrophomina	1	0	1
	Chemical injury	- herbicide	6	0	6
		- unknown	1	0	1
	Cultural	- improper depth	1	0	1
	Damping-off	- Pythium	1	0	1
	Ear/Kernel rot	- Diplodia	1	0	1
		- Fusarium	1	0	1
		- Stenocarpella	2	0	2
		- Trichoderma	1	2	3
	Environmental stresses		7	3	10
	Genetic	- unknown	1	0	1
	Gray leaf spot	- Cercospora	1	0	1
	Holcus spot	- Pseudomonas	0	1	1
	Insect injury		4	0	4
	Nematode	- Pratylenchus	0	1	1
	No disease		7		7
	Nutritional	- acid soil	1	1	2
		- magnesium deficiency	1	0	1
		- phosphorus deficiency	1	2	3
		- potassium deficiency	14	1	15
		- zinc deficiency	1	2	3
	Physical injury	- unknown	1	0	1
	Root rot	- Fusarium	1	0	1
		- Pythium	1	0	1
	Rust, common	- Puccinia	2	0	2
	Smut	- Ustilago	0	1	1
<u>FORAGES</u>					
ALFALFA (Medicago)					
	Crown rot	- Fusarium	1	0	1
		- Rhizoctonia	1	0	1
	Crown/stem rot	- Sclerotinia	2	0	2
	Environmental stresses		3	2	5
	Insect injury		0	2	2
	Leaf spot	- Leptosphaerulina	1	0	1
	No disease		2		2
	Nutritional	- potassium deficiency	1	0	1
	Root rot	- Phytophthora	1	0	1
		- Pythium	1	0	1
		- Rhizoctonia	1	0	1
	Summer black stem	- Cercospora	2	1	3

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
BERMUDAGRASS (Cynodon)	No disease		1		1
FESCUE (Festuca)	Nutritional	- nitrogen deficiency	1	0	1
MISCANTHUS (Miscanthus)	Environmental	- compaction	1	0	1
ORCHARDGRASS (Dactylis)	Anthracnose	- Collectotrichum	1	0	1
	Leaf streak	- Cercosporidium	1	1	2
	Nutritional	- potassium deficiency	1	0	1
SUDANGRASS (Sorghum)	Environmental	- compaction	1	0	1
TIMOTHY (Phleum)	No disease		1		1
<u>SOYBEAN</u>					
SOYBEAN (Glycine)	Anthracnose	- Colletotrichum	0	1	1
	Brown spot	- Septoria	1	1	2
	Charcoal rot	- Macrophomina	10	1	11
	Chemical injury	- growth regulator	3	0	3
		- herbicide	1	0	1
		- unknown	1	1	2
	Damping-off	- Fusarium	1	0	1
	Downy mildew	- Peronospora	3	1	4
	Environmental stresses		5	1	6
	Foliar blight	- Rhizoctonia	1	0	1
	Frogeye	- Cercospora	11	1	12
	(SFELS samples)		46		46
	Inadequate specimen, no disease		23		23
	(samples without Asian Soybean Rust)		138		138
	Insect injury		5	3	8
	Leaf blight	- Cercospora	3	0	3
	Leaf blotch	- unknown	1	0	1
	Leaf spot	- Septoria	0	1	1
	Nutritional	- general	1	0	1
		- manganese deficiency	1	0	1
		- molybdenum	1	0	1
		- phosphorus deficiency	1	0	1
		- poor nodulation	1	0	1
		- potassium deficiency	13	0	13
	Root rot	- Rhizoctonia	3	0	3
	Root/stem rot	- Phytophthora	1	1	2
		- Rhizoctonia	2	0	2

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
(SOYBEAN, con't)					
Soybean cyst nematode	- Heterodera				
	on plant samples		0	3	3
	* in soil samples		487		487
	* absent in soil samples		36		36
(*soil submitted to Nematode Analysis Laboratory)					
Stem canker	- Diaporthe		2	0	2
Stunting	- unknown		1	0	1
Sudden death	- Fusarium		1	0	1
Wilt	- Fusarium		1	0	1
<u>SMALL GRAINS</u>					
SORGHUM (Sorghum)					
Charcoal rot	- Macrophomina		1	0	1
No disease			1		1
WHEAT (Triticum)					
Bacterial streak	- Xanthomonas		1	0	1
Chemical injury	- unknown		2	0	2
Common bunt	- Tilletia		1	0	1
Environmental stresses			3	0	3
Flecking	- physiological		1	0	1
Glume blotch	- Stagonospora		1	0	1
Head blight	- Fusarium		2	0	2
Insect injury			2	0	2
Leaf blotch	- Stagonospora		1	2	3
Leaf spot	- Ascochyta		0	1	1
No disease			3		3
Nutritional	- acid soil		1	0	1
Take-all	- Gaeumannomyces		1	0	1
Virus	- Wheat soilborne mosaic		2	0	2
	- Wheat spindle streak mosaic		2	0	2

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<u>TOBACCO</u>						
TOBACCO (Nicotiana)						
	Angular leaf spot	- Pseudomonas	5	0	5	
	Bacterial soft rot	- Erwinia	1	0	1	
	Bacterial stalk rot	- Erwinia	1	0	1	
	Black shank	- Phytophthora	34	0	34	
	Brown spot	- Alternaria	0	2	2	
	Charcoal rot	- Macrophomina	0	1	1	
	Chemical injury	- fungicide	1	1	2	
		- growth regulator	5	0	5	
		- herbicide	8	0	8	
		- peroxide	2	0	2	
		- sucker agent	1	0	1	
		- unknown	7	1	8	
		Cultural	- transplant shock	10	2	12
		Damping-off	- Rhizoctonia	2	1	3
	Environmental	- cold injury	2	0	2	
		- compaction	6	1	7	
		- lightning	3	1	4	
		- others	7	3	10	
	Frenching	- metabolites	1	0	1	
	Frogeye	- Cercospora	13	2	15	
	Hollow stalk	- Erwinia	1	1	2	
	Improper curing	- greening	5	0	5	
	Inadequate specimen, no disease		35		35	
	Insect injury		3	0	3	
	Leaf breakdown	- physiological	3	2	5	
		Nutritional	- acid soil	1	1	2
		- boron deficiency	4	0	4	
		- fertilizer burn	2	0	2	
		- general	4	6	10	
		- manganese toxicity	10	5	15	
		- nitrogen deficiency	5	0	5	
		- potassium deficiency	13	1	14	
		- soluble salts	2	0	2	
		- temp. phosphorus def.	7	2	9	
	Root knot nematode	- Meloidogyne	1	1	2	
	Root rot	- Pythium	9	1	10	
	Sore shin	- Rhizoctonia	5	4	9	
	Stem girdling	- unknown	3	0	3	
	Stem rot	- Pythium	5	2	7	
	Storage mold	- Sepsedonium	1	0	1	
	Target spot	- Rhizoctonia	7	4	11	
	Virus	- Tobacco mosaic	1	0	1	
		- Tobacco ringspot	1	0	1	
		- Tomato spotted wilt	4	1	5	
		- unknown	1	0	1	
	Weather fleck	- ozone	7	0	7	
	Wilt	- Fusarium	2	1	3	

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FRUIT CROPS					
<u>SMALL FRUITS</u>					
BLUEBERRY (Vaccinium)					
	Anthracnose	- Gloeosporium	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Environmental stresses		3	1	4
	Inadequate specimen, no disease		9		9
	Insect injury		2	0	2
	Leaf scorch	- unknown	2	0	2
	Nutritional	- acid soil	1	0	1
		- general	2	1	3
		- iron deficiency	0	2	2
		- pH high	3	0	3
	Poor pollination	- unknown	1	0	1
	Root rot	- Phytophthora	7	2	9
	Sooty blotch	- Gloeodes	0	1	1
	Stem blight	- Botryosphaeria	1	0	1
BRAMBLES - BLACKBERRY, and RASPBERRY (Rubus)					
	Cane blight	- Leptosphaeria	2	0	2
	Double blossom	- Cercospora	4	0	4
	Environmental stresses		3	1	4
	Insect injury		3	2	5
	No disease		12		12
	Root/Crown rot	- Phytophthora	3	0	3
	Spur blight	- Didymella	1	0	1
	Virus	- unknown	1	0	1
	White druplet	- physiological	2	0	2
GRAPE (Vitis)					
	Anthracnose	- Elsinoe	13	1	14
	Bitter rot	- Melanconium	0	1	1
	Black rot	- Guignardia	18	1	19
	Cane blight/spot	- Phomopsis	3	0	3
	Chemical injury	- growth regulator	5	0	5
		- unknown	1	0	1
	Crown gall	- Agrobacterium	2	0	2
	Downy mildew	- Plasmopara	1	0	1
	Environmental stresses		5	0	5
	Insect injury		2	4	6
	Leaf blight	- Isariopsis	2	2	4
	No disease		9		9
	Physical injury	- unknown	1	1	2
	Powdery mildew	- Uncinula	1	0	1
	Root rot	- Phytophthora	1	0	1
	Sour bunch rot	- various organisms	2	0	2

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STRAWBERRY (Fragaria)					
	Anthracnose	- Colletotrichum	10	0	10
	Black root	- Rhizoctonia	1	0	1
	Crown rot	- Phytophthora	0	1	1
	Gray mold	- Botrytis	0	1	1
	Insect injury		1	0	1
	Leaf blight	- Phomopsis	2	0	2
	Leaf spot	- Mycosphaerella	2	0	2
	Leather rot	- Phytophthora	1	0	1
	No disease		1		1
	Nutritional	- general	1	0	1
	Root/crown rot	- Phytophthora	1	0	1
<u>TREE FRUITS</u>					
APPLE (Malus)					
	Bitter pit	- calcium deficiency	1	1	2
	Bitter rot	- Glomerella	2	0	2
	Burr knot	- unknown	1	0	1
	Canker	- Botryosphaeria	0	2	2
	Cedar apple rust	- Gymnosporangium	6	3	9
	Chemical injury	- unknown	1	0	1
	Cultural	- transplant shock	3	0	3
	Fire blight	- Erwinia	5	0	5
	Flyspeck	- Schizothyrium	0	1	1
	Frogeye	- Botryosphaeria	7	1	8
	Insect injury		6	3	9
	Internal breakdown	- storage	1	0	1
	Jonathan spot	- physiological	3	0	3
	Lichen	- species	1	0	1
	Moldy core	- fungal	1	0	1
	No disease		8		8
	Root/collar rot	- Phytophthora	3	0	3
	Scab	- Venturia	2	0	2
	Sooty blotch	- Gloeodes	1	0	1
	Thread blight	- Corticium	1	0	1
	White rot	- Botryosphaeria	2	0	2
CHERRY (Prunus)					
	Bacterial spot	- Xanthomonas	3	0	3
	Brown rot	- Monilinia	2	0	2
	Decline	- unknown	1	0	1
	Environmental	- frost injury	1	0	1
	Insect injury		1	0	1
	Leaf spot	- Blumeriella	5	0	5
	No disease		2		2

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FIG (Ficus)	Inadequate specimen		1		1
GRAPEFRUIT (Citrus)	No disease		1		1
LEMON (Citrus)	Insect injury		2	0	2
PAWPAW (Asimina)	Leaf spot	- Cercospora	1	0	1
PEACH, APRICOT and NECTARINE (Prunus)	Bacterial spot	- Xanthomonas	3	2	5
	Brown rot	- Monilinia	4	3	7
	Cultural	- transplant shock	1	2	3
	Decline	- unknown	1	0	1
	Gummosis	- unknown	1	0	1
	Inadequate specimen, no disease		5		5
	Insect injury		13	5	18
	Leaf curl	- Taphrina	10	0	10
	No disease		4		4
	Nutritional	- general	1	0	1
		- nitrogen deficiency	4	2	6
	Physical injury	- bird	1	1	2
		- hail	1	0	1
	Scab	- Cladosporium	6	1	7
	Shot hole	- unknown	1	0	1
PEAR (Pyrus)	Black rot	- Botryosphaeria	0	1	1
	Brown rot	- Monilinia	1	0	1
	Chemical injury	- herbicide	2	0	2
	Cultural	- transplant shock	1	0	1
	Environmental stresses		2	0	2
	Fire blight	- Erwinia	2	0	2
	Fruit decay	- fungal	1	0	1
		- physiological	1	0	1
	Leaf spot	- fungal	1	0	1
	Lichen	- species	1	0	1
	No disease		3		3
	White rot	- Botryosphaeria	1	0	1
PECAN (Carya)	Environmental stresses		0	5	5
	Insect injury		8	0	8
	Leaf spot	- Cercospora	1	0	1
	Poor kernel fill	- unknown	1	0	1
	Scab	- Cladosporium	1	0	1

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PLUM (Prunus)					
	Bacterial spot	- Xanthomonas	1	0	1
	Black knot	- Apiosporina	2	0	2
	Brown rot	- Monilinia	2	0	2
	Decline	- unknown	2	0	2
	No disease		1		1
WALNUT (Juglans)					
	Anthracnose	- Gnomonia	1	0	1
<u>HERBS</u>					
BASIL (Ocimum)					
	Environmental	- cold injury	1	0	1
GARLIC (Allium)					
	Insect injury		1	0	1
GINSENG (Panax)					
	Root rot	- Cyclindrocarpon	1	0	1
HORSERADISH (Armoracia)					
	Leaf spot	- Cercospora	1	0	1
LAVENDER (Lavandula)					
	Root rot	- Phytophthora	1	0	1
THYME (Thymus)					
	Web blight	- Rhizoctonia	1	0	1
<u>MISCELLANEOUS</u>					
HORSENETTLE (Solanum)					
	No disease		1		1
PIGWEEED (Amaranthus)					
	Root rot	- Pythium	1	0	1
SOIL					
	No disease		6		6
	Nutritional	- acid soil	1	0	1
UNKNOWN					
	Insect specimen or problem		2		2
	Inadequate specimen, no disease		4		4
WILDRYE (Elymus)					
	Rust	- Puccinia	1	0	1

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<u>IDENTIFICATIONS</u>					
FUNGAL IDENTIFICATIONS					
	Calvatia	- cyathiformis	1		1
	Chlorophyllum	- molybdites	1		1
	Clitocybe	- species	1		1
	Coprinus	- species	2		2
	Ganoderma	- species	1		1
	Gasteromycete	- species	1		1
	Gyrodon	- meruliodes	1		1
	Gyromitra	- species	1		1
	Inadequate specimen		2		2
	Inonotus	- species	1		1
	Laetiporus	- sulphureus	1		1
	Phlebia	- species	1		1
	Pleurotus	- ostreatus	1		1
	Polyporus	- squamosus	1		1
	Poria	- species	1		1
	Psathyrella	- species	1		1
	Schizophyllum	- commune	1		1
	Slime mold	- species	3		3
	Sphaeropsidales	- species	1		1
LICHEN IDENTIFICATIONS					
	Lichen	- species	1		1
PLANT IDENTIFICATIONS					
	Acer	- saccharum	1		1
	Aesculus	- species	1		1
	Agrotis	- stolonifera	1		1
	Ampelopsis	- brevipedunculata	1		1
	Cynodon	- species	1		1
	Hyssop	- officinalis	1		1
	Ilex	- cornuta	1		1
	Lonicera	- maackii	1		1
		- species	1		1
	Maclura	- pomifera	1		1
	Magnolia	- stellata	1		1
	Moss	- species	1		1
	Muhlenbergia	- schreberi	1		1
	Nicotiana	- glauca	1		1
	Nostoc	- species	1		1
	Passiflora	- lutea	1		1
	Pyrus	- species	1		1
	Quercus	- species	1		1
	Unknown	- unknown	3		3

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ORNAMENTALS					
<u>HERBACEOUS ORNAMENTS and INDOOR PLANTS</u>					
AFRICAN VIOLET (Saintpaulia)					
Root/crown rot	-	fungus	1	0	1
	-	Phytophthora	1	0	1
ANEMONE (Anemone)					
Cultural	-	wet feet	1	0	1
Nutritional	-	soluble salts	1	0	1
ARABIDOPSIS (Arabidopsis)					
Virus	-	Impatiens necrotic spot	1	0	1
ASTER (Aster)					
Stem rot	-	Fusarium	1	0	1
ASTILBE (Astilbe)					
Leaf spot	-	Cercospora	1	0	1
BANANA PLANT (Nymphoides)					
Bacterial soft rot	-	Erwinia	0	1	1
Insect injury			1	0	1
BEAN (ornamental)					
Leaf spot	-	Cercospora	1	0	1
BEGONIA (Begonia)					
Decline	-	unknown	1	0	1
No disease			1		1
Virus	-	unknown	1	0	1
BOUGAINVILLEA (Bougainvillea)					
Nutritional	-	magnesium deficiency	1	0	1
BUCKWHEAT (Fagopyrum)					
No disease			1		1
CACTUS (Cereus)					
Environmental	-	suscaid	1	0	1
CACTUS (Schlumbergera)					
Insect injury			1	0	1
CALADIUM (Caladium)					
Insect injury			1	0	1

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CALIBRACHOA (Calibrachoa)					
	Black root rot	- Thielaviopsis	0	1	1
	Environmental	- cold injury	1	0	1
	No disease		1		1
	Nutritional	- iron deficiency	1	0	1
		- soluble salts	1	0	1
	Root/stem rot	- Pythium	1	1	2
CARYOPTERIS (Caryopteris)					
	No disease		1		1
CATHARANTHUS (Catharanthus)					
	Root/stem rot	- Rhizoctonia	1	0	1
	Stem rot	- Botrytis	0	1	1
CHRYSANTHEMUM (Chrysanthemum)					
	Leaf spot	- Cercospora	0	1	1
	No disease		3		3
	Nutritional	- general	3	0	3
		- iron deficiency	0	1	1
	Root rot	- Rhizoctonia	1	0	1
	Root/stem rot	- Pythium	11	1	12
	Web blight	- Rhizoctonia	4	0	4
	Wilt	- Fusarium	1	0	1
CLEOME (Cleome)					
	Blight	- Sclerotinia	1	0	1
COLEUS (Coleus)					
	No disease		1		1
COLOCASIA (Colocasia)					
	Insect injury		1	1	2
CONE FLOWER (Echinacea)					
	Chemical injury	- growth regulator	1	0	1
CORDYLINE (Cordyline)					
	Insect injury		1	0	1
COREOPSIS (Coreopsis)					
	Environmental	- wet feet	0	1	1
	Nutritional	- soluble salts	1	0	1

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DAHLIA (Dahlia)	No disease		1		1
DAISY (Dimorphotheca)	Decline	- unknown	1	0	1
	Insect injury		0	1	1
	Leaf spot	- Cercospora	1	0	1
		- fungal	1	0	1
DAYLILY (Hemerocallis)	Physical injury	- vole	1	0	1
DESERT ROSE (Adenium)	Cultural	- oedema	1	0	1
DIANTHUS (Dianthus)	Environmental	- wet feet	0	1	1
	Nutritional	- soluble salts	1	0	1
DIEFFENBACHIA (Dieffenbachia)	Leaf scorch	- unknown	1	0	1
DURANTA (Duranta)	Insect injury		1	0	1
EUSTOMA (Eustoma)	Root rot	- Pythium	1	0	1
	Virus	- impatiens necrotic spot	1	0	1
FERN (Unknown [first], Nephrolepis [last 2])	Insect injury		1	0	1
	No disease		1		1
	Nutritional	- soluble salts	1	0	1
FICUS (Ficus)	Insect injury		1	0	1
FUCHSIA (Fuchsia)	No disease		1		1
GARDENIA (Gardenia)	Leaf scorch	- unknown	1	0	1
	No disease		1		1
	Nutritional	- general	1	0	1

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GERANIUM (Pelargonium)					
	Bacterial blight	- Xanthomonas	1	0	1
	Black leg	- Pythium	1	0	1
	Blight	- Botrytis	0	1	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- oedema	1	0	1
	No disease		2		2
	Nutritional	- general	1	0	1
	Root/stem rot	- Pythium	1	2	3
	Stem rot	- Fusarium	1	0	1
		- Sclerotinia	1	0	1
GERBER DAISY (Gerbera)					
	Gray mold	- Botrytis	2	0	2
GINGER (Asarum)					
	Black root rot	- Thielaviopsis	1	0	1
GLADIOLUS (Gladiolus)					
	No disease		1		1
GOLDENROD (Solidago)					
	Insect injury		1	0	1
	Web blight	- Rhizoctonia	1	0	1
GOMPHRENA (Gomphrena)					
	Environmental	- cold injury	1	0	1
	Insect injury		1	1	2
HOLLYHOCK (Althaea)					
	Rust	- Puccinia	4	0	4
HOSTA (Hosta)					
	Environmental	- wet feet	0	1	1
	Insect injury		2	0	2
	Leaf scorch	- environmental	1	0	1
	Nutritional	- soluble salts	1	0	1
	Rusty spots	- unknown	1	0	1
	Southern blight	- Sclerotium	1	0	1
IMPATIENS (Impatiens)					
	Environmental	- cold injury	1	0	1
	Inadequate specimen, no disease		3		3
	Insect injury		1	0	1
	Leaf spot	- Alternaria	3	0	3
	Root rot	- Pythium	1	0	1
IRIS (Iris)					
	Leaf spot	- Mycosphaerella	1	0	1

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IVY (Hedera)					
	Bacterial spot	- Xanthomonas	1	0	1
	Leaf spot	- Phyllosticta	1	1	1
	No disease		1		1
JACOB'S LADDER (Polemonium)					
	Southern blight	- Sclerotium	1	0	1
JASMINE (Jasminum)					
	Insect injury		1	0	1
KAFFIR LILY (Schizostylis)					
	No disease		1		1
LADY'S SLIPPER (Cypripedium)					
	Root/crown rot	- Pythium	1	0	1
LANTANA (Lantana)					
	Decline	- unknown	1	0	1
LILY (Lilium)					
	Inadequate specimen, no disease		4		4
LILY OF THE VALLEY (Convallaria)					
	No disease		1		1
LIRIOPE (Liriope)					
	Crown rot	- Phytophthora	2	0	2
LOBELIA (Lobelia)					
	Decline	- unknown	1	0	1
	Stem rot	- Sclerotinia	1	0	1
MANDEVILLA (Mandevilla)					
	Bacterial wilt	- Ralstonia	2	0	2
	Environmental	- cold injury	1	0	1
MARIGOLD (Tagetes)					
	Insect injury		1	0	1
MELAMPODIUM (Melampodium)					
	Insect injury		1	1	2
NATAL MAHOGANY (Trichelia)					
	No disease		1		1
OSTEOSPERMUM (Osteospermum)					
	Nutritional	- general	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PACHYSANDRA (Pachysandra)					
	Environmental	- wet feet	1	0	1
	Insect injury		1	0	1
	Leaf/stem blight	- Volutella	3	0	3
	Virus	- Alfalfa mosaic	0	1	1
PALM (various)					
	Insect injury		2	1	3
PANSY (Viola)					
	Leaf spot	- Alternaria	1	0	1
PASSIONFLOWER (Passiflora)					
	Root rot	- Pythium	1	0	1
		- Rhizoctonia	0	1	1
PEONY (Paeonia)					
	Blight	- Botrytis	3	0	3
		- Phytophthora	1	0	1
		- Sclerotinia	1	0	1
	Insect injury		1	0	1
	Leaf blight	- Gloeosporium	1	0	1
	Leaf blotch	- Cladosporium	1	0	1
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Cercospora	1	0	1
	No disease		1		1
	Powdery mildew	- Erysiphe	1	1	2
PERIWINKLE (Catharanthus)					
	Black root rot	- Thielaviopsis	1	0	1
	Blight	- Botrytis	0	1	1
	Root/stem rot	- Rhizoctonia	3	0	3
PETUNIA (Petunia)					
	Black root rot	- Thielaviopsis	3	0	3
	Chemical injury	- herbicide	3	0	3
		- unknown	1	0	1
	Dodder	- Cuscuta	1	0	1
	Gray mold	- Botrytis	0	1	1
	No disease		2		2
	Nutritional	- general	2	0	2
		- iron deficiency	1	0	1
		- nitrogen deficiency	1	0	1
		- soluble salts	1	0	1
	Root rot	- Pythium	0	3	3
	Root/stem rot	- Rhizoctonia	1	0	1
	Stem rot	- Sclerotinia	1	0	1
	Wilt	- Fusarium	1	0	1

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PHILODENDRON (Philodendron)	Insect injury		1	0	1
POINSETTIA (Euphorbia)	Inadequate specimen, no disease		2		2
POTHOS (Pothos)	No disease		1		1
RUBBER PLANT (Ficus)	No disease		1		1
RUDBECKIA (Rudbeckia)	Bacterial spot	- unknown	1	0	1
	Inadequate specimen		1		1
SALVIA (Salvia)	No disease		1		1
SNAPDRAGON (Antirrhinum)	Root rot	- Pythium	1	0	1
	Stem rot	- Alternaria	0	1	1
	Virus	- Impatiens necrotic spot	2	0	2
SUNFLOWER (Helianthus)	Root rot	- Pythium	1	0	1
VERBENA (Verbena)	Inadequate specimen, no disease		2		2
VINCA (Vinca)	No disease		1		1
	Wilt	- Phytophthora	1	0	1
VINE (unknown)	No disease		1		1
WANDERING JEW (Tradescantia)	Environmental	- cold injury	1	0	1
ZINNIA (Zinnia)	Insect injury		1	1	2
	Leaf spot	- Alternaria	1	0	1

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<u>TURFGRASS</u>					
BENTGRASS (Agrostis)					
	Anthracnose	- Colletotrichum	3	0	3
	Dollar spot	- Sclerotinia	1	0	1
	Environmental	- wet feet	1	0	1
	Fading out	- Curvularia	1	0	1
	No disease		13		13
	Root dysfunction	- Pythium	2	1	3
	Root rot	- Pythium	7	0	7
	Take-all patch	- Gaeumannomyces	4	1	5
BERMUDAGRASS (Cynodon)					
	No disease		1		1
BLUEGRASS (Poa)					
	Blight	- Pythium	0	1	1
	Brown patch	- Rhizoctonia	0	1	1
	Brown ring patch	- Waitea	1	0	1
	Inadequate specimen, no disease		5		5
	Insect injury		1	1	2
	Root rot	- Pythium	1	0	1
	Summer patch	- Magnaporthe	11	0	11
FESCUE (Festuca)					
	Anthracnose	- Colletotrichum	1	0	1
	Blight	- Ascochyta	1	0	1
	Brown patch	- Rhizoctonia	10	1	11
	Environmental stresses		3	0	3
	Fading out	- Curvularia	0	1	1
	Gray leaf spot	- Pyricularia	1	0	1
	Inadequate specimen, no disease		9		9
	Insect injury		2	1	3
	Rust	- Puccinia	1	0	1
	Summer patch	- Magnaporthe	3	0	3
	Yellow patch	- Rhizoctonia	1	0	1
RYEGRASS (Lolium)					
	Anthracnose	- Colletotrichum	1	0	1
	Brown patch	- Rhizoctonia	1	0	1
	Crown rot	- Rhizoctonia	0	1	1
	Gray leaf spot	- Pyricularia	1	0	1
	Leaf spot	- Curvularia	1	0	1
	Physical injury	- unknown	1	0	1
	Root decline	- Gaeumannomyces	1	0	1
	Root rot	- Pythium	3	0	3

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TURF (unspecified)					
	Blight	- Curvularia	0	1	1
	Large patch	- Rhizoctonia	4	0	4
	Root decline	- Gaeumannomyces	1	0	1
<u>WOODY ORNAMENTALS</u>					
ARALIA (Aralia)					
	Canker	- Botryosphaeria	1	0	1
ARBORVITAE (Thuja)					
	Chemical injury	- deicing salts	1	0	1
		- growth regulator	4	0	4
		- unknown	2	0	2
		- urine	1	0	1
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	1	0	1
	Environmental	- winter injury	9	2	11
	Insect injury		12	1	13
	Leaf blackening	- unknown	1	0	1
	Needle drop	- normal	1	0	1
	No disease		14		14
	Physical injury	- unknown	2	0	2
	Root rot	- Phytophthora	3	0	3
	Tip dieback	- unknown	1	0	1
	Twig blight	- Alternaria	0	1	1
		- Botrytis	1	0	1
		- Pestalotia	1	3	4
		- Phomopsis	0	1	1
ASH (Fraxinus)					
	Anthracnose	- Apiognomonia	5	0	5
	Decline	- unknown	1	0	1
	Environmental	- cold injury	1	0	1
	Insect injury		1	2	3
	Leaf spot	- unknown	3	0	3
	No disease		1		1
AUCUBA (Aucuba)					
	Environmental	- winter injury	1	0	1
AZALEA - See listing under RHODODENDRON					
BALDCYPRESS (Taxodium)					
	No disease		1		1
BARBERRY (Berberis)					
	No disease		1		1

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BEECH (Fagus)					
	Anthracnose	- <i>Apiognomonia</i>	4	0	4
	Canker	- <i>Botryosphaeria</i>	2	0	2
	Decline	- environmental	1	0	1
	Environmental	- lightning	1	0	1
	No disease		1		1
BIRCH (Betula)					
	Cultural	- transplant shock	0	2	2
	Insect injury		3	0	3
	Leaf spot	- <i>Gloeosporium</i>	1	0	1
		- <i>Septoria</i>	2	0	2
	No disease		1		1
	Nutritional	- iron deficiency	1	1	2
BLACK GUM (Tupelo)					
	Canker	- <i>Botryosphaeria</i>	1	0	1
	Environmental stresses		0	1	1
BOXWOOD (Buxus)					
	Canker	- <i>Pseudonectria</i>	14	0	14
	Environmental stresses		8	0	8
	Insect injury		6	5	11
	Leaf blight	- <i>Macrophoma</i>	1	1	2
	Leaf spot	- <i>Marssonina</i>	0	1	1
	No disease		2		2
	Nutritional	- general	1	0	1
	Root rot	- <i>Pythium</i>	1	0	1
BUCKEYE (Aesculus)					
	Leaf blotch	- <i>Guignardia</i>	1	0	1
	Stem rot	- <i>Phytophthora</i>	1	0	1
BUTTERFLY BUSH (Buddleia)					
	Inadequate specimen		1		1
CAMELLIA (Camellia)					
	No disease		4		4
CATALPA (Catalpa)					
	Environmental	- winter injury	1	0	1
	No disease		3		3
	Twig blight	- <i>Pestalotia</i>	1	1	2
CHAMAECYPARIS (Chamaecyparis)					
	Cultural	- transplant shock	1	0	1
	Environmental	- winter injury	2	0	2
	No disease		3		3
	Twig blight	- <i>Pestalotia</i>	1	1	2

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CHERRY (Prunus)					
	Bacterial spot	- Xanthomonas	1	0	1
	Black knot	- Apiosporina	1	0	1
	Cultural	- transplant shock	2	0	2
	Decline	- unknown	3	0	3
	Environmental stresses		1	1	2
	Insect injury		2	0	2
	Leaf spot	- Blumeriella	1	0	1
		- fungal	1	0	1
	No disease		4		4
	Root rot	- Phytophthora	1	0	1
CHERRYLAUREL (Prunus)					
	Bacterial spot	- Xanthomonas	15	2	17
	Cultural	- transplant shock	2	0	2
	Environmental stresses		4	3	7
	Insect injury		2	1	3
	Leaf scorch	- unknown	1	0	1
	No disease		4		4
	Physical injury	- unknown	0	1	1
	Root rot	- Phytophthora	1	0	1
CHESTNUT (Castanea)					
	Canker	- unknown	1	0	1
	Environmental	- wet feet	1	0	1
	Leaf spot	- unknown	1	0	1
CLEMATIS (Clematis)					
	Inadequate specimen		1		1
COTONEASTER (Cotoneaster)					
	Insect injury		1	0	1
CRABAPPLE (Malus)					
	Fire blight	- Erwinia	2	0	2
	Frogeye	- Botryosphaeria	1	0	1
	Inadequate specimen, no disease		3		3
	Scab	- Venturia	6	0	6
CRAPEMYRTLE (Lagerstroemia)					
	Blight	- Botrytis	1	0	1
		- Pestalotia	0	1	1
	Leaf spot	- Cercospora	1	0	1
	No disease		1		1
	Powdery mildew	- Erysiphe	1	0	1
CRYPTOMERIA (Cryptomeria)					
	No disease		1		1

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DOGWOOD (Cornus)					
	Anthracnose	- Discula	2	0	2
	Chemical injury	- growth regulator	2	0	2
	Cultural	- transplant shock	7	0	7
	Decline	- unknown	4	0	4
	Environmental stresses		2	1	3
	Fruit drop	- unknown	1	0	1
	Insect injury		3	1	4
	Leaf scorch	- unknown	4	0	4
	Leaf spot	- Cercospora	1	0	1
		- Septoria	5	1	6
	Lichen	- species	1	0	1
	No disease		7		7
	Nutritional	- magnesium deficiency	0	1	1
	Physiological	- oedema	0	1	1
	Powdery mildew	- Erysiphe	2	1	3
	Root rot	- Phytophthora	1	0	1
	Spot anthracnose	- Elsinoe	10	1	11
DOUGLAS FIR (Pseudotsuga)					
	Decline	- environmental	1	0	1
	Dieback	- Botryosphaeria	1	0	1
ELM (Ulmus)					
	Anthracnose	- Asteroma	2	1	3
	Basidiomycete	- species	1	0	1
	Black spot	- Stegophora	0	1	1
	Canker	- Nectria	1	0	1
	Insect injury		4	0	4
	No disease		4		4
	Root rot	- Phytophthora	1	0	1
EUONYMUS (Euonymus)					
	Chemical injury	- growth regulator	2	0	2
	Crown gall	- Agrobacterium	1	0	1
	Insect injury		4	0	4
	No disease		3	0	3
	Root rot	- Pythium	1	0	1
	Stem blight	- Sclerotinia	1	0	1
FIR (Abies)					
	Decline	- unknown	1	0	1
	Environmental stresses		2	0	2
FORSYTHIA (Forsythia)					
	Chemical injury	- growth regulator	4	0	4
	Gall	- Phomopsis	1	0	1
	No disease		3		3
	Root/Crown rot	- Phytophthora	2	0	2

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GINKGO (Ginkgo)	No disease		1		1
GOLDENRAINTREE (Koelreuteria)	No disease		1		1
HACKBERRY (Celtis)	Insect injury		3	0	3
	No disease		1	0	1
HAWTHORN (Crataegus)	Cedar/Quince rust	- Gymnosporangium	6	1	7
	Insect injury		5	0	5
	Leaf spot	- fungal	0	1	1
	No disease		1		1
HAZELNUT (Corylus)	Blanks	- unknown	1	0	1
	No disease		1		1
HEMLOCK (Tsuga)	Environmental	- drought	1	0	1
	Insect injury		1	0	1
	No disease		4		4
HIBISCUS (Hibiscus)	Chemical injury	- growth regulator	3	0	3
	Environmental stresses		1	1	2
	Inadequate specimen		1		1
	Insect injury		3	0	3
HICKORY (Carya)	Downy spot	- Microstroma	3	0	3
	Gall	- Phomopsis	1	0	1
	Insect injury		1	0	1
	Leaf spot	- Gnomonia	1	0	1
	Wood decay	- unknown	1	0	1
HOLLY (Ilex)	Black root rot	- Thielaviopsis	17	1	18
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	8	0	8
	Environmental stresses		11	0	11
	Insect injury		20	2	22
	No disease		21		21
	Nutritional	- iron deficiency	1	1	2
		- general	2	0	2
	Physical injury	- woodpecker	1	0	1

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HONEYLOCUST (Gleditsia)					
	Cultural	- transplant shock	1	0	1
	Decline	- environmental	1	0	1
	Environmental	- stress	1	0	1
	Leaf spot	- Cercospora	2	0	2
	No disease		2		2
HONEYSUCKLE (Lonicera)					
	No disease		2		2
HORNBEAM (Carpinus)					
	Cultural	- transplant shock	1	0	1
HORSECHESTNUT (Aesculus)					
	Leaf blotch	- Guignardia	1	0	1
HYDRANGEA (Hydrangea)					
	Bacterial spot	- Xanthomonas	5	0	5
	Blight	- Botrytis	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Environmental	- wet feet	1	0	1
	Inadequate specimen, no disease		4		4
	Insect injury		1	0	1
	Leaf scorch	- unknown	1	1	2
	Leaf spot	- Cercospora	6	0	6
	Nutritional	- general	0	1	1
	Root rot	- Armillaria	1	0	1
		- Pythium	1	0	1
ITEA (Itea)					
	Leaf spot	- Phyllosticta	1	0	1
JUNIPER and RED CEDAR (Juniperus)					
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Environmental stresses		1	0	1
	Insect injury		7	0	7
	No disease		8		8
	Root rot	- Phytophthora	2	0	2
	Twig blight	- Phomopsis	1	0	1
LEYLAND CYPRESS (X Cupressocyparis)					
	Canker	- Seiridium	3	0	3
	Cultural	- transplant shock	1	0	1
	Environmental stresses		3	0	3
	No disease		7		7

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LILAC (Syringa)					
	Bacterial scorch	- Xylella	1	0	1
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Environmental	- wet feet	1	1	2
	Inadequate specimen, no disease		6		6
	Insect injury		2	1	2
	Leaf spot	- Phloeospora	1	0	1
		- Phyllosticta	1	0	1
	Nutritional	- soluble salts	1	0	1
	Powdery mildew	- Erysiphe	2	0	2
	Root/Crown rot	- Phytophthora	2	0	2
LINDEN (Tilia)					
	Decline	- environmental	1	0	1
	Insect injury		1	1	2
	Spot anthracnose	- Elsinoe	3	0	3
LOCUST (Robinia)					
	Insect injury		1	0	1
	Leaf spot	- Cercospora	0	1	1
MAGNOLIA (Magnolia)					
	Bacterial spot	- Pseudomonas	1	0	1
	Canker	- Botryosphaeria	1	1	2
	Chemical injury	- growth regulator	3	0	3
		- herbicide	1	0	1
	Cultural	- transplant shock	1	0	1
	Decline	- environmental	1	0	1
	Environmental stresses		11	0	11
	Insect injury		5	0	5
	Leaf scorch	- winter drying	1	0	1
	Leaf spot	- fungal	1	0	1
	No disease		6		6
	Nutritional	- general	2	0	2
	Powdery mildew	- species	1	0	1
	Root rot	- Armillaria	1	0	1
	Sooty mold	- species	0	2	2

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MAPLE and BOXELDER (Acer)					
	Anthracnose	- Aureobasidium	0	1	1
		- Kabatiella	25	1	26
	Canker	- Cytospora	1	0	1
	Cultural	- transplant shock	8	1	9
	Decline	- environmental	4	0	4
		- unknown	7	0	7
	Environmental stresses		6	4	10
	Gall	- Phomopsis	1	0	1
	Inadequate specimen, no disease		21		21
	Insect injury		8	6	14
	Leaf distortion	- unknown	1	0	1
	Leaf drop	- unknown	1	0	1
	Leaf scorch	- unknown	4	0	4
	Leaf spot	- fungal	0	1	1
		- Phloeospora	1	0	1
		- Phyllosticta	11	2	13
	Nutritional	- general	1	0	1
	Physical injury	- unknown	2	0	2
	Root rot	- Phytophthora	1	0	1
	Tar spot	- Rhytisma	1	0	1
	Wilt	- Verticillium	1	0	1
MIMOSA (Albizzia)					
	No disease		2		2
	Wilt	- Fusarium	1	0	1
MOCKORANGE (Philadelphus)					
	Chemical injury	- growth regulator	1	0	1
MT. LAUREL (Kalmia)					
	No disease		1		1
MULBERRY (Morus)					
	Leaf spot	- Phloeospora	2	0	2
	No disease		1		1
NANDINA (Nandina)					
	Environmental	- winter injury	2	0	2
NINEBARK (Physocarpus)					
	Powdery mildew	- species	1	0	1

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OAK (Quercus)					
	Air pollution	- ozone	3	0	3
	Anthracnose	- Apiognomonia	17	0	17
	Bacterial scorch	- Xylella	8	0	8
	Canker	- Botryosphaeria	0	2	2
		- Hypoxylon	1	0	1
	Chemical injury	- growth regulator	5	1	6
	Cultural	- transplant shock	1	0	1
	Decline	- environmental	2	0	2
	Environmental	- stress	0	1	1
	Inadequate specimen, no disease		15		15
	Insect injury		17	4	21
	Leaf blister	- Taphrina	1	0	1
	Leaf scorch	- unknown	0	1	1
	Leaf spot	- Elsinoe	3	1	4
		- fungal	0	1	1
		- Monochaetia	1	0	1
		- Phyllosticta	1	0	1
		- Tubakia	6	2	8
		- unknown	1	0	1
		- species	1	1	2
	Nutritional	- acid soil	1	0	1
		- general	1	0	1
		- iron deficiency	6	1	7
	Physical injury	- rodent	1	0	1
		- squirrel	1	0	1
	Powdery mildew	- Oidium	1	0	1
		- Phyllactinia	4	1	5
	Root rot	- Phytophthora	1	0	1
PALM (Caryota)					
	Insect injury		1	0	1
PAULOWNIA (Paulownia)					
	Chemical injury	- growth regulator	1	0	1
PEAR (Pyrus)					
	Cedar/Apple rust	- Gymnosporangium	1	0	1
	Chemical injury	- unknown	1	0	1
	Decline	- unknown	6	1	7
	Fire blight	- Erwinia	1	0	1
	Leaf scorch	- unknown	1	0	1
	No disease		1		1
	Root rot	- Phytophthora	1	0	1
PERSIMMON (Diospyros)					
	No disease		1		1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PHOTINIA (Photinia)					
	Leaf spot	- unknown	1	0	1
PIERIS (Pieris)					
	Cultural	- transplant shock	2	0	2
	Insect injury		1	0	1
	Leaf blight	- Phytophthora	17	0	17
	No disease		10		10
	Nutritional	- general	1	0	1
PINE (Pinus)					
	Bluestain	- fungal	0	1	1
	Brown spot	- Mycosphaerella	1	0	1
	Chemical injury	- growth regulator	18	0	18
		- herbicide	3	0	3
	Cultural	- transplant shock	3	1	4
	Decline	- unknown	2	0	2
	Environmental stresses		2	2	4
	Insect injury		7	1	8
	No disease		18		18
	Needle blight	- Dothistroma	4	0	4
	Needle cast	- Rhizosphaera	1	0	1
	Needle drop	- normal	2	0	2
	Nutritional	- pH high	1	0	1
	Pinewood nematode	- Bursaphelenchus	4	0	4
	Root/collar rot	- Phytophthora	4	0	4
	Tip blight	- Diplodia	5	0	5
	White pine decline	- environmental	17	0	17
	White pine root decline	- Verticicladiella	1	0	1
PLUM (Prunus)					
	Black knot	- Apiosporina	9	0	9
	Insect injury		2	0	2
POPLAR (Populus)					
	Insect injury		1	0	1
PRIVET (Ligustrum)					
	Environmental	- winter drying	0	1	1
	Insect injury		1	0	1
	Physical injury	- unknown	1	0	1
PYRACANTHA (Pyracantha)					
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Insect injury		0	1	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
REDBUD (Cercis)					
	Anthracnose	- Kabatiella	3	0	3
	Chemical injury	- growth regulator	3	1	4
	Cultural	- transplant shock	2	0	2
	Dieback	- Botryosphaeria	1	0	1
	Environmental	- cold injury	1	0	1
	Inadequate specimen, no disease		4		4
	Insect injury		2	0	2
	Leaf spot	- Pseudocercospora	1	0	1
	Wilt	- Verticillium	2	0	2
RHODODENDRON and AZALEA (Rhododendron)					
	Blight	- Phytophthora	1	0	1
	Canker	- Botryosphaeria	2	0	2
	Cultural	- transplant shock	6	0	6
	Decline	- environmental	1	0	1
		- unknown	3	0	3
	Dieback	- Botryosphaeria	4	1	5
		- Phomopsis	1	0	1
	Environmental	- winter drying	5	2	7
	Insect injury		13	1	14
	Leaf blight	- Phytophthora	41	0	41
	Leaf spot	- Cercospora	1	0	1
		- fungal	0	1	1
		- Phyllosticta	0	1	1
	Lichen	- species	2	0	2
	No disease		33		33
	Nutritional	- general	1	0	1
		- pH high	1	0	1
	Root rot	- Phytophthora	4	1	5
		- Rhizoctonia	1	0	1
ROSE (Rosa)					
	Black spot	- Diplocarpon	7	1	8
	Brown canker	- Cryptosporella	1	0	1
	Bud blight	- Botrytis	1	0	1
	Chemical injury	- growth regulator	8	0	8
		- herbicide	3	0	3
		- unknown	2	0	2
	Cultural	- transplant shock	2	0	2
	Environmental stresses		2	1	3
	Fasciation	- Phytoplasma	1	0	1
	Insect injury		7	3	10
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Cercospora	3	0	3
		- fungal	0	1	1
	No disease		19		19
	Nutritional	- phosphorus deficiency	1	0	1
		- soluble salts	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
ROSE (Rosa) cont					
	Physiological	- oedema	0	1	1
	Powdery mildew	- Podosphaera	0	2	2
	Stem rot	- Botrytis	1	0	1
	Root rot	- Phytophthora	1	0	1
	Virus	- Rose mosaic	1	1	2
		- Rose rosette	17	0	17
SASSAFRAS (Sassafras)					
	Root rot	- Phytophthora	1	0	1
SERVICEBERRY (Amelanchier)					
	No disease		1		1
SMOKETREE (Cotinus)					
	Cultural	- transplant shock	1	0	1
SOURWOOD (Oxydendrum)					
	Cultural	- transplant shock	1	0	1
SPIREA (Spiraea)					
	Cultural	- transplant shock	1	0	1
	Environmental stresses		2	0	2
SPRUCE (Picea)					
	Canker	- Cytospora	1	1	2
	Chemical injury	- growth regulator	29	0	29
		- herbicide	1	0	1
		- unknown	2	0	2
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	3	0	3
	Environmental stresses		5	4	9
	Insect injury		17	5	22
	Needle blight	- Stigmina	13	5	18
	Needle cast	- Rhizosphaera	28	2	30
	No disease		76		76
	Nutritional	- general	0	1	1
		- magnesium deficiency	4	1	5
		- pH high			
	Physical injury	- unknown	1	0	1
	Root rot	- Phytophthora	2	0	2
	Tip dieback	- unknown	1	0	1
SWEETGUM (Liquidambar)					
	Decline	- unknown	1	0	1
	No disease		1		1
	Nutritional	- iron deficiency	2	0	2

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SYCAMORE and PLANETREE (Platanus)					
	Anthracnose	- <i>Apiognomonias</i>	2	0	2
	Insect injury		0	1	1
	Leaf spot	- <i>Phloeospora</i>	1	0	1
	No disease		1		1
TAXUS (Taxus)					
	Bark injury	- unknown	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	1	0	1
	Environmental stresses		3	0	3
	Inadequate specimen, no disease		11		11
	Insect injury		1	0	1
	Root rot	- <i>Phytophthora</i>	6	0	6
	Twig blight	- <i>Pestalotiopsis</i>	1	0	1
TREE OF HEAVEN (Ailanthus)					
	No disease		1		1
TULIPTREE (Liriodendron)					
	Anthracnose	- <i>Gloeosporium</i>	1	0	1
	Environmental stresses		1	1	2
	Insect injury		7	0	7
	Leaf scorch	- unknown	1	0	1
	No disease		5		5
	Sooty mold	- species	3	2	5
	Tar spot	- <i>Rytisma</i>	1	0	1
UNKNOWN					
	No disease		1		1
VIBURNUM (Viburnum)					
	Chemical injury	- growth regulator	2	0	2
	Cultural	- transplant shock	2	0	2
	Insect injury		1	0	1
	Leaf blight	- <i>Phytophthora</i>	2	0	2
	Leaf spot	- <i>Cercospora</i>	0	1	1
	No disease		21		21
	Spot anthracnose	- <i>Elsinoe</i>	1	0	1
WALNUT (Juglans)					
	Bacterial blight	- <i>Xanthomonas</i>	1	0	1
	Inadequate specimen, no disease		3		3
	Insect injury		2	1	3
	Leaf spot	- <i>Phloeospora</i>	2	0	2
	Physical injury	- unknown	1	0	1
	Wetwood	- bacterial	0	1	1

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WEIGELA (Weigela)	No disease		1		1
WILLOW (Salix)	Decline	- unknown	1	0	1
	Environmental	- wet feet	1	0	1
	Fasciation	- unknown	1	0	1
	Leaf spot	- Cercospora	2	1	3
		- unknown	0	1	1
	No disease		1		1
WITCHHAZEL (Hamamelis)	Leaf blotch	- Phyllosticta	1	0	1
YELLOWWOOD (Cladrastis)	Leaf spot	- Cercospora	1	0	1
	No disease		1	0	1
ZELCOVA (Zelcova)	No disease		1		1
VEGETABLES					
ASPARAGUS (Asparagus)	Leaf spot	- Cercospora	1	0	1
BEAN (Phaseolus)	Air pollution	- ozone	0	1	1
	Angular leaf spot	- Phaeoisariopsis	2	0	2
	Ashy stem blight	- Macrophomina	1	0	1
	Bacterial brown spot	- Pseudomonas	1	0	1
	Chemical injury	- herbicide	1	0	1
		- unknown	2	0	2
	Common blight	- Xanthomonas	3	0	3
	Inadequate specimen, no disease		8		8
	Insect injury		7	1	8
	Nutritional	- pH high	1	0	1
	Root/stem rot	- Fusarium	3	1	4
		- Rhizoctonia	2	0	2
	Southern blight	- Sclerotium	2	0	2
	Stem blight	- Pythium	2	0	2
	Stem rot	- Fusarium	2	0	2
		- Rhizoctonia	1	0	1
BOK CHOY - See listing under CRUCIFERS					
BROCCOLI - See listing under CRUCIFERS					

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CABBAGE - See listing under CRUCIFERS					
CANTALOUPE - See listing under CUCURBITS					
CARROT (Daucus)					
	Environmental stresses		1	0	1
CAULIFLOWER -See listing under CRUCIFERS					
CELERY (Apium)					
	Early blight	- Cercospora	1	0	1
	Insect injury		1	0	1
	No disease		1		1
CORN, SWEET (Zea)					
	Bacterial stalk rot	- Erwinia	1	0	1
	Chemical	- herbicide	1	0	1
	Mutation	- genetic	1	0	1
	No disease		3		3
	Northern leaf blight	- Setosphaeria	1	0	1
	Nutritional	- general	1	0	1
		- potassium deficiency	1	0	1
		- zinc deficiency	1	0	1
	Pollination problem	- unknown	1	0	1
	Smut	- Ustilago	1	0	1
CRUCIFERS - BOK CHOY, BROCCOLI, CABBAGE, CAULIFLOWER, TURNIP (Brassica), RADISH (Raphanus)					
	Bacterial soft rot	- Erwinia	0	2	2
	Black spot	- Alternaria	1	0	1
	Bottom rot	- Rhizoctonia	2	0	2
	Environmental stresses		1	1	2
	Insect injury		1	0	1
	Leaf spot	- Alternaria	0	1	1
		- Cercospora	1	0	1
	No disease		4		4
	Nutritional	- boron deficiency	1	0	1
		- nitrogen deficiency	1	0	1
		- potassium deficiency	1	0	1
		- soluble salts	1	0	1
	Root/Stem rot	- Rhizoctonia	1	0	1
	Stem rot	- Fusarium	1	0	1
		- Rhizoctonia	3	1	4
		- Sclerotinia	1	0	1
CUCUMBER - See listing under CUCURBITS					

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
CUCURBITS - CANTALOUPE, CUCUMBER, MELON (Cucumis), GOURD, PUMPKIN, SQUASH (Cucurbita) and WATERMELON (Citrullus)					
	Air pollution	- ozone	0	1	1
	Angular leaf spot	- Pseudomonas	7	0	7
	Anthracnose	- Colletotrichum	5	0	5
	Bacterial fruit blotch	- Acidovorax	2	0	2
	Bacterial soft rot	- Erwinia	1	1	2
	Bacterial spot	- Xanthomonas	1	0	1
	Bacterial wilt	- Erwinia	5	0	5
	Blight	- Phytophthora	1	0	1
	Blossom end rot	- calcium deficiency/dry	3	0	3
	Chemical injury	- herbicide	3	0	3
		- unknown	4	0	4
	Cottony leak	- Pythium	1	0	1
	Crown rot	- Pythium	1	0	1
	Cultural	- overwatering	1	0	1
		- transplant shock	1	0	1
	Downy mildew	- Pseudoperonospora	2	0	2
	Environmental stresses		5	0	5
	Fasciation	- Phytoplasma	1	0	1
	Fruit decay	- Fusarium	0	1	1
	Fruit rot	- Alternaria	1	0	1
		- Fusarium	0	1	1
	Gummy stem blight	- Didymella	4	0	4
	Inadequate specimen, no disease		31		31
	Insect injury		8	1	9
	Leaf blight	- Alternaria	8	1	9
	Leaf scorch	- unknown	1	1	2
	Leaf spot	- Cercospora	1	1	2
	Nutritional	- acid soil	1	0	1
		- general	2	0	2
		- magnesium deficiency	3	1	4
		- molybdenum deficiency	1	0	1
		- potassium deficiency	1	0	1
	Pink root	- Pyrenochaeta	0	1	1
	Pollination problem	- unknown	2	1	3
	Powdery mildew	- Erysiphe	3	0	3
		- Sphaerotheca	3	0	3
	Root rot	- Pythium	7	1	8
		- Rhizoctonia	1	0	1
	Root/Stem rot	- Fusarium	2	0	2
		- Rhizoctonia	1	1	2
	Stem rot	- bacterial	1	0	1
		- Fusarium	1	0	1
	Saved seed	- genetic	1	0	1
	Virus	- poty complex	1	0	1
		- unknown	1	0	1
	Yellow vine decline	- Serratia	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
EGGPLANT (Solanum)					
	Chemical injury	- unknown	1	0	1
	Root rot	- Pythium	2	0	2
	Root/stem rot	- Rhizoctonia	1	0	1
KALE - See listing under CRUCIFERS					
LETTUCE (Lactuca)					
	Bottom rot	- Rhizoctonia	1	0	1
	Environmental	- high temperature	2	0	2
	Insect injury		1	0	1
	Leaf spot	- Cercospora	1	0	1
		- Rhizoctonia	0	1	1
	Nutritional	- boron deficiency	1	0	1
		- general	2	0	2
		- potassium deficiency	1	0	1
	Root rot	- Pythium	0	1	1
OKRA (Abelmoschus)					
	Insect injury		2	0	2
ONION and GARLIC (Allium)					
	Bacterial soft rot	- Erwinia	1	1	2
	Gray mold neck rot	- Botrytis	1	0	1
	Insect injury		0	1	1
	No disease		3		3
	Purple blotch	- Alternaria	1	0	1
	Root rot	- Pythium	3	0	3
	White rot	- Sclerotium	1	0	1
PEA (Pisum)					
	Common blight	- Xanthomonas	1	0	1
	Inadequate specimen		1		1
PEANUT (Arachis)					
	Physiological	- oedema	0	1	1
	Root rot	- Fusarium	2	0	2

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PEPPER (Capsicum)					
	Bacterial spot	- Xanthomonas	11	0	11
	Blossom end rot	- calcium deficiency/dry	0	1	1
	Chemical injury	- growth regulator	1	0	1
		- unknown	3	0	3
	Decline	- unknown	1	0	1
	Early blight	- Alternaria	1	0	1
	Environmental	- sunscald	4	0	4
		- stresses	0	1	1
	Insect injury		4	3	7
	Leaf scorch	- unknown	1	0	1
	No disease		5		5
	Nutritional	- magnesium deficiency	0	1	1
	Physical injury	- mechanical	1	0	1
		- unknown	0	1	1
	Root rot	- Pythium	2	1	3
		- Rhizoctonia	1	0	1
	Root/Stem rot	- Fusarium	1	0	1
		- Pythium	2	0	2
	Southern blight	- Sclerotium	1	0	1
	Stem girdling	- unknown	1	0	1
	Stem rot	- Fusarium	1	0	1
		- Sclerotinia	1	0	1
	Syringae leaf spot	- Pseudomonas	1	0	1
	White rot	- Sclerotinia	1	0	1
	Virus	- poty complex	1	0	1
POTATO (Solanum)					
	Charcoal rot	- Macrophomina	1	0	1
	Chemical injury	- unknown	1	0	1
	Dry rot	- Fusarium	3	0	3
	Insect injury		2	1	3
	Leaf spot	- Cercospora	1	0	1
	Nutritional	- general	1	0	1
	Pink rot	- Phytophthora	1	0	1
	Root rot	- Pythium	1	0	1
	Root/Stem rot	- Pythium	0	1	1
		- Rhizoctonia	1	0	1
	Scab	- Streptomyces	3	0	3
	Southern blight	- Sclerotium	1	0	1
	Stem blight	- Pythium	1	0	1
	Wilt	- Fusarium	1	0	1

PUMPKIN - See listing under CUCURBITS

RADISH - See listing under CRUCIFERS

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
RHUBARB (Rheum)					
	Leaf spot	- Ramularia	1	0	1
SPINACH (Tragopogon)					
	No disease		1		1
SQUASH - See listing under CUCURBITS					
SWEETPOTATO (Ipomoea)					
	Inadequate specimen		1		1
	Intumescense	- physiological	1	0	1
	Scurf	- Monilochaetes	2	0	2
	Slime mold	- species	1	0	1
SWISS CHARD (Beta)					
	Bacterial blight	- Pseudomonas	1	0	1
TOMATO (Lycopersicon)					
	Air pollution	- ethylene	1	0	1
	Anthracnose	- Colletotrichum	2	0	2
	Bacterial canker	- Clavibacter	9	0	9
	Bacterial soft rot	- Erwinia	1	0	1
	Bacterial speck	- Pseudomonas	2	0	2
	Bacterial spot	- Xanthomonas	3	1	4
	Black shoulder	- physiological	1	0	1
	Blight	- Botrytis	2	1	3
	Blossom end rot	- calcium deficiency/dry	3	1	4
	Buckeye rot	- Phytophthora	1	0	1
	Catfacing	- environmental	3	1	4
	Chemical injury	- fungicide	2	0	2
		- growth regulator	26	0	26
		- herbicide	4	0	4
		- unknown	4	2	6
	Cultural	- high temperature	2	0	2
		- oedema	2	0	2
	Early blight	- Alternaria	16	8	24
	Environmental stresses		10	2	12
	Fruit pox	- physiological	1	0	1
	Fruit rot	- Alternaria	1	0	1
		- Pythium	1	0	1
	Gold fleck	- physiological	0	1	1
	Gray mold	- Botrytis	2	1	3
	Growth crack	- physiological	1	1	2
	Inadequate specimen, no disease		42		42
	Insect injury		13	5	18
	Leaf mold	- Fulvia	3	1	4
	Leaf scorch	- unknown	1	1	2
	Leaf spot	- Septoria	25	4	29
	Nailhead spot	- Alternaria	1	0	1

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(TOMATO con't)						
Nutritional	-	acid soil	1	0	1	
	-	excessive nitrogen	2	0	2	
	-	fertilizer burn	2	2	4	
	-	general	15	0	15	
	-	magnesium deficiency	2	1	3	
	-	nitrogen deficiency	5	0	5	
	-	pH high	0	1	1	
	-	phosphorus deficiency	2	0	2	
	-	soluble salts	5	2	7	
	Physical injury	-	various	5	0	5
	Root knot nematode	-	Meloidogyne	2	0	2
	Root rot	-	Pythium	11	0	11
Root/Stem rot	-	Fusarium	3	0	3	
	-	Pythium	4	1	5	
	-	Rhizoctonia	2	4	6	
Rot	-	Phoma	1	0	1	
Southern blight	-	Sclerotium	2	0	2	
Sour rot	-	Geotrichum	0	2	2	
Stem rot	-	Fusarium	2	0	2	
	-	Sclerotinia	7	0	7	
Target spot	-	Corynespora	1	0	1	
Virus	-	Tomato spotted wilt	1	0	1	
	-	unknown	3	0	3	
Walnut wilt	-	juglone	1	0	1	
Wilt	-	Fusarium	6	0	6	
Yellow shoulder	-	unknown	3	0	3	

TURNIP - See under CRUCIFERS

WATERMELON - See listing under CUCURBITS

TOTALS 3883 413 4296