



Plant Diseases in Kentucky

**Plant Disease Diagnostic Laboratory
Summary**

2010

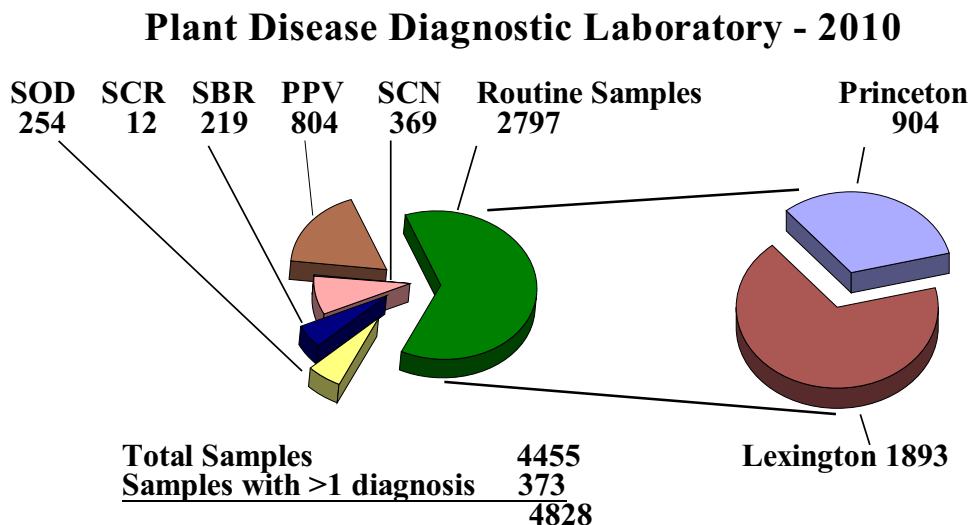
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INTRODUCTION

The Plant Disease Diagnostic Laboratory (Lexington and Princeton) handled 4086 plant samples and 369 nematode soil samples during 2010. Plant samples with more than one problem numbered 373 bringing the total number of actual diagnoses to 4828. The Lexington Laboratory diagnosed 2951 specimens. Of that number there were 1893 routine plant samples, 804 from the Plum Pox Virus survey, and 254 samples from commercial nurseries from the survey work for the Sudden Oak Death (SOD) pathogen. The Plum Pox Virus Survey samples are included in the total number of samples in Figure 1 below, within the Fruit Tree section of his report, and in a summary report on page 28. 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 1504: of that number 904 were routine plant samples, 219 were Soybean Rust (SBR) sentinel plot samples, 12 were Southern Corn Rust (SCR) survey samples, and 369 were soil samples submitted exclusively for soybean cyst nematode analysis. The SBR samples are included in Figure 1 below and in the summaries for soybean and kudzu. The SCR samples are included in Figure 1 below and in the summary for corn. In addition to the specimens processed in the laboratory, 176 cases were also submitted in 2010 through the web-based UK Digital Consulting System for consultation with the Diagnosticians and Extension Specialists (see Table 10, page 22). 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. The Extension plant pathology group has tested protocols for PCR detection of several pathogens. The laboratory also has a role in monitoring pathogen resistance to fungicides and bactericides. 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. Our laboratories currently 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

January: Below Average Temperatures and Just Below Normal Precipitation

Temperatures for the period averaged 30 degrees across the state which was 3 degrees below normal and 6 degrees cooler than the previous month. High temperatures averaged from 38 in the West to 37 in the East. Departure from normal high temperatures ranged from 5 degrees below normal in the West to 2 degrees below normal in the East. Low temperatures averaged from 23 degrees in the West to 24 degrees in the East. Departure from normal low temperature ranged from 1 degree below normal in the West to 1 degree above normal in the East.

Precipitation (liq. equ.) for the period totaled 3.58 inches statewide which was 0.19 inches below normal. Precipitation totals by climate division: West 3.20 inches, Central 3.98 inches, Bluegrass 2.67 inches and East 4.18 inches, which was -0.23, +0.06, -0.44 and +0.17 inches from normal, respectively.

February: Below Normal Temperature and Below Normal Precipitation

Temperatures for the period averaged 30 degrees across the state which was 7 degrees below normal and was identical to January's average temperature. High temperatures averaged from 39 in the West to 37 in the East. Departure from normal high temperatures ranged from 11 degrees below normal in the West to 8 degrees below normal in the East. Low temperatures averaged from 24 degrees in the West to 24 degrees in the East. Departure from normal low temperature ranged from 3 degrees below normal in the West to 1 degree below normal in the East.

Precipitation (liq. equ.) for the period totaled 2.34 inches statewide which was 1.42 inches below normal. Precipitation totals by climate division: West 1.51 inches, Central 2.62 inches, Bluegrass 2.00 inches and East 2.99 inches, which was 1.31, 0.47, 0.69 and 0.32 inches below normal, respectively.

March: Near Normal Temperature and Below Normal Precipitation

Temperatures for the period averaged 46 degrees across the state which was 0 degrees from normal. High temperatures averaged from 57 in the West to 56 in the East. Departure from normal high temperatures ranged from 3 degrees below normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 38 degrees in the West to 36 degrees in the East. Departure from normal low temperature ranged from 3 degrees above normal in the West to 3 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 2.74 inches statewide which was 1.85 inches below normal. Precipitation totals by climate division: West 3.78 inches, Central 2.42 inches, Bluegrass 1.99 inches and East 2.58 inches, which was 0.90, 2.45, 2.36 and 1.82 inches below normal, respectively.

April: Above Normal Rainfall and Below Normal Rainfall

Temperatures for the period averaged 60 degrees across the state which was 4 degrees above normal. High temperatures averaged from 73 in the West to 72 in the East. Departure from normal high temperatures ranged from 3 degrees above normal in the West to 7 degrees above normal in the East. Low temperatures averaged from 50 degrees in the West to 46 degrees in the East. Departure from normal low temperature ranged from 4 degrees above normal in the West to 2 degrees above normal in the East.

Rainfall for the period totaled 3.12 inches statewide which was 1.07 inches below normal. Rainfall totals by climate division, West 3.70 inches, Central 3.82 inches, Bluegrass 2.19 inches and East 2.81 inches, which was 0.83, 0.38, 1.70 and 1.11 inches below normal, respectively.

May: Normal Temperature and Above Normal Rainfall

May 2010 was the first month since October 2009 that was above normal in rainfall for the state as a whole. The main reason for the wet month was the first two days of the month, when record rain fell in the state.

Temperatures for the period averaged 67 degrees across the state which was 3 degrees above normal. High temperatures averaged from 78 in the West to 76 in the East. Departure from normal high temperatures ranged from 2 degrees below normal in the West to 1 degree above normal in the East. Low temperatures averaged from 60 degrees in the West to 57 degrees in the East. Departure from normal low temperature ranged from 4 degrees above normal in the West to 2 degrees above normal in the East.

Rainfall for the period totaled 8.01 inches statewide which was 2.96 inches above normal. Rainfall totals by climate division: West 6.09 inches, Central 10.54 inches, Bluegrass 10.22 inches and East 6.67 inches, which was 1.10, 5.27, 4.60 and 1.82 inches above normal, respectively.

June: Above Normal Temperature and Slightly Below Normal Rainfall

June 2010 was the 4th warmest on record, mostly caused by a strong upper ridge over the southeast which pumped plenty of warm air into the Commonwealth.

Temperatures for the period averaged 77 degrees across the state which was 5 degrees above normal. High temperatures averaged from 89 in the West to 86 in the East. Departure from normal high temperatures ranged from 2 degrees above normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 70 degrees in the West to 67 degrees in the East. Departure from normal low temperature ranged from 7 degrees above normal in the West to 5 degrees above normal in the East.

Rainfall for the period totaled 3.89 inches statewide which was 0.45 inches below normal. Rainfall totals by climate division: West 2.69 inches, Central 4.10 inches, Bluegrass 4.73 inches and East 4.10 inches, which was -0.65, 0.02, +0.49 and -0.04 inches from normal, respectively.

July: Above Normal Temperature and Slightly Above Normal Rainfall

Temperatures for the period averaged 79 degrees across the state which was 3 degrees above normal. High temperatures averaged from 91 in the West to 87 in the East. Departure from normal high temperatures ranged from 2 degrees above normal in the West to 1 degree above normal in the East. Low temperatures averaged from 71 degrees in the West to 68 degrees in the East. Departure from normal low temperature ranged from 5 degrees above normal in the West to 3 degrees above normal in the East.

Rainfall for the period totaled 4.50 inches statewide which was 0.03 inches above normal. Rainfall totals by climate division: West 2.12 inches, Central 5.09 inches, Bluegrass 5.51 inches and East 5.23 inches, which was -1.35, +0.43, +0.60 and +0.29 inches from normal, respectively.

August: Above Normal Temperature and Below Normal Rainfall

August 2010 was one of the warmest on record, and the average for the month was the 8th warmest for the state as a whole.

Temperatures for the period averaged 78 degrees across the state which was 3 degrees above normal. High temperatures averaged from 93 in the West to 87 in the East. Departure from normal high temperatures ranged from 5 degrees above normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 69 degrees in the West to 66 degrees in the East. Departure from normal low temperature ranged from 4 degrees above normal in the West to 4 degrees above normal in the East.

Rainfall for the period totaled 3.31 inches statewide which was 0.39 inches below normal. Rainfall totals by climate division: West 2.12 inches, Central 3.79 inches, Bluegrass 1.38 inches and East 5.18 inches, which was -0.65, +0.39, -1.80 and +1.13 inches from normal, respectively.

September: Above Normal Temperature and Below Normal Rainfall

For many locations across the Commonwealth this was a September to remember.

Temperatures for the period averaged 70 degrees across the state which was 2 degrees above normal. High temperatures averaged from 85 in the West to 81 in the East. Departure from normal high temperatures ranged from 4 degrees above normal in the West to 4 degrees above normal in the East. Low temperatures averaged from 58 degrees in the West to 57 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 1 degree above normal in the

East.

Rainfall for the period totaled 1.72 inches statewide which was 1.77 inches below normal. Rainfall totals by climate division: West 1.60 inches, Central 1.34 inches, Bluegrass 1.24 inches and East 2.42 inches, which was 1.01, 1.22, 1.27 and 0.33 inches below normal, respectively.

October: Above Normal Temperature and Below Normal Rainfall

Temperatures for the period averaged 58 degrees across the state which was 1 degree above normal. High temperatures averaged from 75 in the West to 71 in the East. Departure from normal high temperatures ranged from 4 degrees above normal in the West to 4 degrees above normal in the East. Low temperatures averaged from 44 degrees in the West to 44 degrees in the East. Departure from normal low temperature ranged from 4 degrees below normal in the West to 2 degrees below normal in the East.

Rainfall for the period totaled 1.71 inches statewide which was 1.41 inches below normal. Rainfall totals by climate division: West 1.58 inches, Central 1.72 inches, Bluegrass 1.45 inches and East 1.99 inches, which was 0.77, 0.60, 0.73 and 0.34 inches below normal, respectively.

November: Above Normal Temperature and Above Normal Precipitation

Temperatures for the period averaged 48 degrees across the state which was 2 degrees above normal. High temperatures averaged from 59 in the West to 59 in the East. Departure from normal high temperatures ranged from 1 degree below normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 37 degrees in the West to 36 degrees in the East. Departure from normal low temperature ranged from 1 degree below normal in the West to 2 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 4.64 inches statewide which was 0.61 inches above normal. Precipitation totals by climate division: West 5.44 inches, Central 5.29 inches, Bluegrass 4.07 inches and East 3.94 inches, which was 0.98, 1.00, 0.40 and 0.21 inches from normal, respectively.

December: Below Normal Temperature and Below Normal Precipitation

Temperatures for the period averaged 28.4 degrees across the state which was 8.8 degrees cooler than normal and 16 degrees cooler than the previous period. High temperatures averaged from 38.8 in the West to 35.0 in the East. Departure from normal high temperatures ranged from 8.3 degrees cooler than normal in the West to 12.7 degrees cooler than normal in the East. Low temperatures averaged from 21.4 degrees in the West to 21.7 degrees in the East. Departure from normal low temperature ranged from 7.7 degrees cooler than normal in the West to 5.3 degrees cooler than normal in the East.

Precipitation (liq. equ.) for the period totaled 3.13 inches statewide which was 1.1 inches below normal and 74.0% of normal. Precipitation totals by climate division: West 2.82 inches, Central 3.51 inches, Bluegrass 2.58 inches and East 3.61 inches, which was 1.77, 1.08, 1.12 and 0.44 inches below normal, respectively.

CROP SUMMARIES

Tobacco: The number of tobacco samples for 2010 (357) was slightly lower than last year's total (364) and very near the average for the last 4 years. There have been fewer tobacco samples in the last four years than in 2006 (536) and 2005 (528), 2005 being the first year of the Tobacco Quota Buyout Program. For the third year in a row, Kentucky was not the first state with 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, 2010 was the lightest continental epidemic since full-season forecasts began in 1996. Nineteen counties in six states reported blue mold, including North Carolina (12 counties), Virginia (1 county), Kentucky (1), Pennsylvania (2), Connecticut (2), and Massachusetts (1). Hot, dry weather kept blue mold in check with Kentucky's only confirmed cases being in Shelby Co. starting July 30.

Even with the record hot and dry weather there were slightly over twice as many samples with black shank (*Phytophthora parasitica* var. *nicotianae*) (112 samples) as in the cool and wet year of 2009 (47 samples). The number of cases of tomato spotted wilt virus (TSWV) were again very low (3 samples). Frogeye leaf spot (*Cercospora nicotianae*) (31 samples) became a significant problem in the field with the many instances of fog and dews occurring.

Other agronomic crops:

Corn: A few samples (3) with southern rust (*Puccinia polysora*) were found through the survey for this disease but overall corn diseases were very light in 2010. The hot, dry weather pushed potassium deficiency (6 samples) into the top spot for number of diseases/disorders in corn.

Soybean: For the first year since it was first ever detected in Kentucky, 2005, Australasian soybean rust (SBR; *Phakopsora pachyrhizi*) was not detected in Kentucky. The hot, dry weather provided excellent conditions for charcoal rot (*Macrophomina phaseolina*) (7 samples) over much of the soybean growing acreage.

Small Grains: Overall diseases on small grains were scarce but wheat soilborne mosaic virus (WSBMV) (2 samples) and barley yellow dwarf virus (BWDV) (1 sample) were the most common diseases of wheat samples sent to the Plant Disease Diagnostic Laboratory.

Forages: Among forages, orchardgrass had the the most common disease, which was brown stripe (*Cercosporidium graminus*) (4 samples), then followed by summer black stem (*Cercospora medicaginis*) of alfalfa (2 samples).

Fruit and Vegetable Plant Disease Observations:

Of the more than 3,100 plant specimens examined to date in 2010, approximately 30% were fruits and vegetables, and 40% of those were from commercial growers. Although the growers are not charged for plant disease diagnoses at U.K., the estimated direct annual expenditure to support diagnosis of fruit and vegetable specimens by the laboratory exceeds \$25,000, excluding U.K. physical plant overhead costs. During recent years we have acquired funds from Kentucky Integrated Pest Management and the Southern Plant Diagnostic Network to help defray some of the laboratory operating costs. In addition to receiving physical diagnostic samples, approximately 33% of digital cases received in 2010 involved fruit and vegetable diseases and disorders.

The 2010 growing season in Kentucky was a fairly good one for most fruit crops; disease pressure was higher in most vegetable crops than for fruits, although drier weather in 2010 made for a less disease-conducive season in general than in 2009. Harvest dates ran as much as two weeks earlier than normal due to warmer temperatures.

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

Diseases caused by Oomycete pathogens--Phytophthora and Pythium diseases of roots/crown, foliar Phytophthora blights and downy mildews--can be problematic in most years in locations with wet soils, heavy irrigation, or susceptible crops grown in shade. Persistent cool, wet weather throughout much of the 2009 growing season allowed build-up of inoculum, particularly of soilborne oomycetes, giving rise to continued oomycete problems in 2010. Heavy rains in May 2010 promoted infections of many crops. Notable examples included:

Late blight (*Phytophthora infestans*) was officially diagnosed (in the PDDL) on tomato samples from 6 Kentucky counties (as opposed to 25 counties in 2009). Its presence in tomato seedlings from several large retail centers might have proven disastrous, but dry weather prevented widespread disease development in home gardens which can serve as inoculum for commercial plantings. Late blight was found in one commercial potato field which had had late blight the previous year. Phytophthora root and collar rot (*Phytophthora* spp.) was extremely common in bramble and blueberry plantings, and in some apple orchards. Of bramble samples submitted to the PDDL, more than one-quarter were confirmed to have Phytophthora root/collar rot; approximately one-half of blueberry samples submitted were infected with Phytophthora root/collar rot.

Pythium blight (*Pythium* spp.) of aerial plant parts included fruit rots of pepper, tomato and zucchini; and stem blight of bean.

Tree Fruit Diseases:

Pome Fruits: Moderate levels of cedar-apple rust (*Gymnosporangium juniperi-virginianae*) and frog-eye leaf spot (*Botryosphaeria obtusa*) were observed in apple. Fire blight (*Erwinia amylovora*) also occurred at moderate levels on both apple and pear; some locations had more severe fire blight outbreaks. Fruit rots—including black rot (*Botryosphaeria obtusa*), white rot (*Botryosphaeria dothidea*) and bitter rot (*Glomerella cingulata*)---were common late in the season. A few samples of Phytophthora collar rot were submitted for laboratory confirmation. Although some orchards may have experienced scab infections, no samples of apple scab (*Venturia inaequalis*) from fruit trees were submitted to either PDDL location.

Stone Fruits: Leaf spot diseases of cherry caused by the fungus *Coccomyces hiemalis* and the bacterium *Xanthomonas campestris* pv. *pruni* were seen frequently. Scab (*Cladosporium carpophilum*) was diagnosed on apricot and peach, and brown rot (*Monilinia fructicola*) was diagnosed on apricot, cherry, peach and plum. Spring rains favored the development of peach leaf curl (*Taphrina deformans*), and the related disease plum pockets (*Taphrina communis*) was again diagnosed this year, as it was in 2008 and 2009.

Small Fruit Diseases:

Grapes: Anthracnose (*Elsinoe ampelina*) was more common than usual this year, 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 was Isariopsis leaf blight (*Pseudocercospora vitis* [syn. *Isariopsis clavispora*]) in a single location.

Brambles: More samples than usual were confirmed as infected with root and collar rot caused by *Phytophthora* spp.; both blackberry and raspberry were affected (see above). Cane blight (*Leptosphaeria coniothyrium*) was diagnosed on both blackberry and raspberry canes. Orange rust (*Gynnoconia nitens*) and cane and leaf rust (*Kuehneola uredinis*), as well as double blossom disease (*Cercospora rubi*), were diagnosed on blackberry samples. Other fungal leaf spot diseases were minimal on brambles this year.

Blueberries: Root and collar rot caused by *Phytophthora* spp. was diagnosed frequently on blueberry; in fact, one half of the blueberry samples submitted to the Lexington PDDL had *Phytophthora* root/collar rot (see above). Leaf spot (*Phyllosticta* spp.) was also diagnosed several times.

Strawberries: *Phytophthora* diseases were common, including red stele (*Phytophthora fragariae*), leather rot (*Phytophthora cactorum*) and root/crown rot (*Phytophthora* spp.). Leaf blight (*Phomopsis obscurans*), anthracnose (*Colletotrichum acutatum*), and gray mold (*Botrytis cinerea*) fruit infections were diagnosed. Petiole rot, another phase of *Botrytis* blight, was seen in April; this phase of disease is more common in states further south and is atypical in Kentucky.

Vegetable Diseases:

Beans: Foliar diseases including angular leaf spot (*Phaeoisariopsis griseola*) and *Cercospora* leaf spot (*Cercospora* sp.), and pod infections of anthracnose (*Glomerella lindemuthianum*) were common due to early wet weather and high humidity. 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: Diseases were fairly infrequent with wirestem (*Rhizoctonia solani*) and *Phytophthora* root/stem rot (*Phytophthora* sp.) being the most common.

Cucurbits: Bacterial wilt (*Erwinia tracheiphila*), which is vectored primarily by the striped cucumber beetle (*Acalymma vittatum*), occurred in many melon fields, causing widespread plant loss in some locations. A wide variety of fungal foliar/vine diseases were common in all cucurbit crops: anthracnose (*Colletotrichum orbiculare*), *Alternaria* leaf blight (*Alternaria cucumerina*), powdery mildew (*Podosphaera xanthii* and *Erysiphe cichoracerarum*), downy mildew (*Pseudoperonospora cubensis*), gummy stem blight (*Didymella bryoniae*) and *Plectosporium* blight (*Plectosporium tabacinum*). Oomycete fruit rots—*Pythium* rot (*Pythium* sp.) on zucchini and *Phytophthora* rot (*Phytophthora capsici*) on pumpkin—were diagnosed, but only on a few occasions.

Peppers: Southern blight (*Sclerotium rolfsii*) was the most commonly diagnosed disease of pepper during this growing season. Although the disease was not widespread in general, significant outbreaks of bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) occurred in a few locations on commercial peppers; follow-up testing with molecular diagnostic techniques (PCR and sequencing) allowed confirmation of the bacterial species and pathovar.

Tomatoes: Late blight in tomato (*Phytophthora infestans*) reappeared at alarming frequency early in the season; most cases were seedlings for sale in retail settings, but the disease was also found in commercial fields which had experienced outbreaks of late blight last year. Drier, hotter weather beginning in midsummer prevented a repeat of the late blight epidemic of 2009 (see above). Foliar diseases such as early blight (*Alternaria solani*), *Septoria* leaf spot (*Septoria lycopersici*), leaf mold (*Fulvia fulva*), bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) and bacterial speck (*Pseudomonas syringae* pv. *tomato*) were common; also common were stem/vascular problems such as southern blight (*Sclerotium rolfsii*), bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*)

and Fusarium wilt (*Fusarium oxysporum*).

Other vegetables: Increased commercial production of onion resulted in more onion samples than usual; of note were diagnoses of purple blotch (*Alternaria porri*), pink root (*Phoma terrestris*) and sour skin (*Burkholderia cepacia*). Crazy top (*Sclerophthora macrospora*) occurred in sweet corn in a few locations in which flooding occurred soon after planting/plant emergence. Late blight (*Phytophthora infestans*) was diagnosed on potato in at least one commercial field.

Landscape Plant Disease Observations:

Of the more than 3,100 plant specimens examined to date in 2010, 36% were landscape ornamentals. Of those, 31% were commercial samples from nursery or greenhouse production systems, or from professional landscape companies. In 2010, approximately 40% of digital consulting cases dealt with landscape and nursery plants.

Landscape plant diseases ranged from root rots favored by wet soils last summer and at times this spring to canker and vascular diseases enhanced by late summer heat and drought stress. Many of the foliar diseases that typically infect during wet, cool weather at leaf emergence and expansion, e.g., anthracnose, apple scab, were less common than in many years. The following important or unusual diseases were observed:

Deciduous trees:

- Flowering pear and flowering crabapple fire blight (*Erwinia*)
- Flowering cherry leaf spot (*Coccomyces*)
- Flowering crabapple frog-eye leaf spot (*Botryosphaeria*)
- Flowering crabapple scab (*Venturia*)
- Flowering plum and flowering cherry black knot (*Apiosporina*)
- Flowering plum pockets (*Taphrina*)
- Serviceberry cedar/quince rust (*Gymnosporangium*)
- Blackgum and willow cankers (*Botryosphaeria*)
- Ash, maple and oak bacterial leaf scorch (*Xylella*)
- Maple tuliptree and catalpa wilt (*Verticillium*)
- Oak anthracnose (*Apiognomonina*), often on white oak with jumping oak gall
- Willow leaf spot (*Cercospora*)
- Dutch elm disease (*Ophiostoma*)
- Oak, flowering plum and sassafras root rot (*Phytophthora*)

Needle Evergreens:

- Juniper twig blights (*Kabatina*, *Phomopsis*)
- Juniper cedar/apple rust (*Gymnosporangium*)
- Pine needle spot/blight (*Dothistroma*, *Mycosphaerella*)
- Pine needle rust (*Coleosporium*)
- Pine tip blight (*Sphaeropsis*)
- Spruce needle cast/blight (*Rhizosphaera*, *Stigmina*)
- Arborvitae, fir, juniper, pine, spruce and taxus root rot (*Phytophthora*)

Shrubs:

- Azalea leaf/flower gall (*Exobasidium*)
- Boxwood canker (*Pseudonectria*)
- Cherrylaurel bacterial leaf spot (*Xanthomonas*) and fungal leaf spot (*Cercospora*)
- Cherrylaurel, forsythia, rhododendron and viburnum root rot (*Phytophthora*)
- Holly black root rot (*Thielaviopsis*)
- Hydrangea fungal leaf spot (*Cercospora*)
- Photinia and hawthorn leaf spot (*Entomosporium*)
- Rhododendron and lilac canker (*Botryosphaeria*)
- Rose rosette (virus)

Herbaceous Annuals and Perennials:

- Begonia crown rot (*Sclerotinia*)
- Calibrachoa crown rot (*Sclerotinia*) and virus infection (tobacco mosaic virus)
- Chrysanthemum root/crown rot (*Pythium*) and wilt (*Fusarium*)
- European Ginger [*Asarum europaeum*] black root rot (*Thielaviopsis*)
- Hollyhock rust (*Puccinia*)
- Liriope crown rot (*Phytophthora*)
- Petunia root/crown rots (*Rhizoctonia*, *Pythium*, *Phytophthora*)
- Sedum crown rot (*Phytophthora*)
- Snapdragon virus (impatiens necrotic spot virus)

A Shift in Sample Types:

Continuing the trend of recent years, the number of tobacco samples for 2010 (357) was very low. 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, the following organisms and the diseases they cause are monitored more carefully in the diagnostic laboratory during the year:

Pierce's disease of grapes caused by *Xylella fastidiosa*

Grape crown gall caused by *Agrobacterium tumefaciens*

Cucurbit yellow vine disease caused by *Serratia marsecens*

Root, stem and fruit diseases of solanaceous and cucurbit vegetables caused by *Phytophthora* spp.

Bacterial canker of peppers caused by *Clavibacter michiganensis* subsp. *michiganensis*

Furthermore, surveys for Asian soybean rust, sudden oak death, plum pox virus, 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 also 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.

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 as part of our duties under the Department of Homeland Security. 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, ELISA, etc.) 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 looked at the vast majority of the Asian soybean rust samples as well as worked with soybean cyst nematode analysis. Renee Laurent 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 thousands of diagnostic forms.

Tom Priddy, Biosystems and Ag. Engineering - Meteorology, and his staff provided information for the summary of weather conditions for 2010.

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 and support from the Pesticide Safety Education Program for reference books is gratefully acknowledged.

We also wish to thank the College of Agriculture's extension specialists and researchers who served as consultants to the diagnostic laboratory in 2010. Their services ranged from making diagnoses to assisting the diagnosticians with plant, insect, weed or pesticide questions. These individuals are too numerous to mention here (see Table 9) but we are grateful nonetheless to each for their valuable assistance.

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	31	38 ^a	6	0	3	12 ^a	90
Forages	5	13	0	0	0	4	22
Small grains	1	7	0	0	2	4	14
Soybeans	12	384 ^b	5	0	7	208 ⁷	616
Tobacco	83	238	25	9	5	40	400
<u>Fruit</u>							
Small fruit	25	111	7	9	12	25	189
Tree fruit	30	150	4	5	40	818 ^c	1047
<u>Herbs</u>							
	0	9	0	2	3	4	18
<u>Identifications</u>							
	0	30	0	2	0	0	32
<u>Ornamentals</u>							
<u>Herbaceous and</u>							
Houseplants	41	121	5	6	22	34	229
Turfgrass	28	93	0	1	2	22	146
Woody	260	465 ^d	28	16	221	380 ^d	1370
<u>Vegetables</u>							
	123	320	42	25	42	68	620
<u>Miscellaneous</u>							
	2	2	1	0	0	30 ^e	35
Total	641	1981	123	75	359	1649	4828

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 10 Corn samples in Southern Corn rust survey with problems caused by fungi and 2 with no diseases.

^b Numbers include 0 soybean samples with and 193 soybean samples without Asian Soybean Rust from the SBR sentinel plot system; and 361 soil samples with and 8 soil samples without Soybean Cyst Nematodes.

^c Numbers include 804 tree fruit samples without Plum pox virus (PPV survey).

^d Numbers include 254 SOD samples with 75 problems caused by fungi and 179 with no diseases.

^e Number includes 26 Kudzu samples, all without Asian Soybean Rust from the SBR sentinel plot system.

Table 2. SUMMARY OF BIOTIC PROBLEMS¹ BY CROP CATEGORY

Crop Category	Bacterial	Fungal	Nematode	Virus	Other²
<u>Agronomic</u>					
Corn	0	38^a	0	0	0
Forages	0	13	0	0	0
Small grains	0	4	0	3	0
Soybeans	0	23	361^b	0	0
Tobacco	17	214	0	7	0
<u>Fruit</u>					
Small fruit	2	109	0	0	0
Tree fruit	48	99	0	0	3
<u>Herbs</u>					
	0	9	0	0	0
<u>Identifications</u>					
	0	10	0	0	20
<u>Ornamentals</u>					
<u>Herbaceous and Houseplants</u>					
	6	105	1	8	1
<u>Turfgrass</u>					
	5	88	0	0	0
<u>Woody</u>					
	51	400^c	0	8	6
<u>Vegetables</u>					
	57	246	3	14	0
<u>Miscellaneous</u>					
	0	2	0	0	0
Total	186	1360	365	40	40

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 Algae, Lichen and Phytoplasma.

^a Number includes 10 Corn samples in Southern Corn rust survey with problems caused by fungi.

^b Number includes 361 soil samples with Soybean Cyst Nematodes.

^c Number includes 75 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 + 193 Soybean SBRs, +12 SCR-Cs)	345	8.4
Tobacco	357	8.7
Fruit (+ 804 Tree Fruit PPVs)	1175	28.8
Herbs	17	0.4
Identifications	32	0.8
Ornamentals (+ 254 SODs)	1578	38.6
Vegetables	547	13.4
Miscellaneous (+ 26 Kudzu SBRs)	35	0.9
Total Plant Samples (w/ PPVs, SBRs, SCR-Cs, & SODs)	4086	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	77 ^a	13	90
Forages	17	5	22
Small grains	13	1	14
Soybeans	607 ^b	9	616
Tobacco	357	43	400
<u>Fruit</u>			
Small fruit	162	27	189
Tree fruit	1013 ^c	341	1354
<u>Herbs</u>			
	17	1	18
<u>Identifications</u>			
	32	na	32
<u>Ornamentals</u>			
<u>Herbaceous and Houseplants</u>			
	204	25	229
Turfgrass	126	20	146
Woody	1248 ^d	122	1370
<u>Vegetables</u>			
	547	73	620
<u>Miscellaneous</u>			
	35 ^e	0	35
Total	4455	373	4828

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 12 Corn samples in Southern Corn rust survey

^b Soybean plant samples + 369 SCN soil samples + 193 SBR soybean samples

^c Numbers include 804 tree fruit samples without Plum pox virus (PPV survey).

^d Numbers include 254 SOD samples

^e Numbers include 26 Kudzu samples from the SBR sentinel plot system.

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

Crop Group	Grower Type							
	Commercial		Homeowner		Research		Institution	
	Ext ¹	Non-Ext ²	Ext ¹	Non-Ext ²	Ext ¹	Non-Ext ²	Ext ¹	Non-Ext ²
<u>Agronomic</u>								
Corn	52	8	0	0	3	2	0	0
Forages	14	2	0	0	1	0	0	0
Small grains	6	1	0	0	6	0	0	0
Soybeans	38	6	0	0	0	1	0	0
Tobacco	328	22	0	0	0	7	0	0
<u>Fruit</u>								
Small Fruit	66	7	75	4	1	9	0	0
Tree Fruit	29	1	172	5	2	0	0	0
<u>Herbs</u>								
	7	0	10	0	0	0	0	0
<u>Identifications</u>								
	2	0	19	5	0	0	0	6
<u>Ornamental</u>								
Herbaceous and								
Houseplants	79	12	77	6	0	22	4	4
Turfgrass	15	27	46	1	0	1	13	23
Woody	118	87	707	30	0	18	25	9
<u>Vegetable</u>								
	221	8	295	5	2	13	2	1
<u>Miscellaneous</u>								
	0	1	5	1	0	0	1	1
<u>Total</u>	975	182	1406	57	24	64	45	44
<u>Total/Grower Type</u>	1157		1463		88		89	

Total number of routine samples received = 2797¹ 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.	6	1	0	4	0	11
Entomology Department	4	6	19	2	0	31
Horticulture Department	0	2	1	1	1	5
Plant & Soil Sciences Department	24	0	2	4	1	31
					Total	78
					Total number of routine plant specimens	2797
					Percent of specimens referred outside Diagnostic Lab for diagnosis	2.8

* 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	13
Enzyme-linked Immunosorbent Assay (ELISA) (247 routine plant samples, +254 SOD, +804 PPV)	1305
Microscope (1458 routine plant samples + 219 SBR)	1677
Nematode extraction Soybean cyst nematode (SCN)	369
Soil tests	46
Visual	1037
Total	4455

* Based on 2797 routine plant samples, 804 PPV, 219 SBR, 369 SCN, 12 SCR-C, and 254 SOD samples = 4455.

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	20	1	11	1	4	3	0
ALLEN	8	0	1	3	2	2	0
ANDERSON	9	1	0	2	3	1	0
BALLARD	7	1	1	2	2	1	0
BARREN	53	4	5	7	22	15	0
BATH	13	0	5	4	3	1	0
BELL	6	0	0	3	3	0	0
BOONE	36	0	0	2	24	9	1
BOURBON	17	2	3	2	6	3	1
BOYD	28	1	0	1	17	9	0
BOYLE	47	2	6	2	32	4	1
BRACKEN	11	4	3	0	2	2	0
BREATHITT	5	0	0	2	0	3	0
BRECKINRIDGE	67	4	31	5	16	10	1
BULLITT	11	0	1	1	7	2	0
BUTLER	7	1	1	2	1	2	0
CALDWELL	47	3	7	8	19	5	5
CALLOWAY	52	4	16	5	18	9	0
CAMPBELL	32	0	0	3	24	4	1
CARLISLE	3	2	1	0	0	0	0
CARROLL	5	0	3	0	1	1	0
CARTER	7	0	0	0	6	0	1
CASEY	29	0	6	7	8	8	0
CHRISTIAN	96	6	16	8	30	35	1
CLARK	22	0	5	0	12	4	1
CLAY	12	0	0	7	4	1	0
CLINTON	6	0	1	1	2	2	0
CRITTENDEN	11	0	0	1	7	3	0
CUMBERLAND	22	0	0	10	9	3	0
DAVISS	114	6	14	8	51	34	1
EDMONSON	22	2	9	4	4	3	0
ELLIOTT	15	0	1	6	4	4	0
ESTILL	19	0	0	2	12	4	1
FAYETTE	341	12	17	19	254	28	11
FLEMING	25	3	11	3	4	4	0
FLOYD	0	0	0	0	0	0	0
FRANKLIN	65	0	2	6	38	9	0
FULTON	3	1	0	1	0	1	0
GALLATIN	2	0	0	0	1	1	0
GARRARD	20	0	3	1	14	2	0
GRANT	5	0	0	4	1	0	0
GRAVES	19	2	7	6	1	2	1
GRAYSON	7	0	2	3	2	0	0
GREEN	11	1	5	1	4	0	0
GREENUP	4	0	0	0	3	1	0
HANCOCK	14	1	2	4	5	2	0
HARDIN	11	7	0	0	4	0	0
HARLAN	10	0	0	2	7	1	0
HARRISON	22	1	0	8	4	8	1
HART	18	1	5	7	2	3	0
HENDERSON	49	2	2	10	26	9	0
HENRY	26	0	10	4	4	7	1
HICKMAN	6	0	0	2	0	4	0
HOPKINS	15	2	5	1	4	3	0
JACKSON	16	2	0	8	1	3	2
JEFFERSON	50	0	0	2	38	7	3
JESSAMINE	13	0	2	0	8	3	0
JOHNSON	0	0	0	0	0	0	0
KENTON	16	0	0	1	9	6	0
KNOTT	2	0	0	0	2	0	0
KNOX	2	0	0	0	2	0	0

COUNTY	Total	Agronomic ²	Tobacco	Fruit	Ornamental	Vegetable	Other
LARUE	24	0	6	4	4	10	0
LAUREL	34	0	0	9	13	9	3
LAWRENCE	15	0	0	5	8	1	1
LEE	6	0	0	0	4	2	0
LESLIE	0	0	0	0	0	0	0
LETCHER	14	0	0	2	6	6	0
LEWIS	13	2	5	3	1	2	0
LINCOLN	39	4	4	4	9	18	0
LIVINGSTON	9	1	0	4	4	0	0
LOGAN	8	2	2	0	2	2	0
LYON	12	0	0	2	8	2	0
McCRACKEN	77	0	0	7	51	16	3
McCREARY	0	0	0	0	0	0	0
McLEAN	2	0	0	0	1	1	0
MADISON	34	3	3	3	19	6	0
MAGOFFIN	0	0	0	0	0	0	0
MARION	36	4	11	2	6	13	0
MARSHALL	42	2	1	2	28	9	0
MARTIN	3	0	0	2	1	0	0
MASON	27	3	7	1	11	5	0
MEADE	17	2	1	2	8	4	0
MENIFEE	4	0	0	1	2	1	0
MERCER	44	1	2	13	20	6	2
METCALFE	18	0	3	12	2	1	0
MONROE	7	0	1	1	2	3	0
MONTGOMERY	43	2	2	3	25	8	3
MORGAN	17	0	2	8	2	5	0
MUHLENBERG	27	2	1	7	11	6	0
NELSON	35	0	1	2	25	7	0
NICHOLAS	6	0	2	2	2	0	0
OHIO	3	1	2	0	0	0	0
OLDHAM	35	4	0	2	24	3	2
OWEN	2	0	0	0	0	2	0
OWSLEY	3	0	3	0	0	0	0
PENDELTON	0	0	0	0	0	0	0
PERRY	9	0	0	1	4	4	0
PIKE	24	0	0	9	12	3	0
POWELL	9	0	0	1	4	4	0
PULASKI	28	2	1	3	13	6	3
ROBERTSON	6	1	0	4	1	0	0
ROCKCASTLE	1	0	0	0	1	0	0
ROWAN	12	0	3	1	5	3	0
RUSSELL	26	4	1	4	4	12	1
SCOTT	27	2	4	1	18	1	1
SHELBY	13	0	6	0	6	1	0
SIMPSON	26	4	3	3	9	6	1
SPENCER	16	0	4	2	7	2	1
TAYLOR	24	3	5	1	11	4	0
TODD	40	4	16	7	4	9	0
TRIGG	23	1	6	3	11	2	0
TRIMBLE	10	0	2	2	5	1	0
UNION	11	1	0	1	5	4	0
WARREN	89	1	6	12	55	13	2
WASHINGTON	21	0	3	1	16	1	0
WAYNE	10	2	1	1	3	3	0
WEBSTER	16	0	2	3	7	4	0
WHITLEY	19	0	2	3	7	7	0
WOLFE	4	0	0	0	0	4	0
WOODFORD	34	3	9	1	13	7	1
Out-of-State	11	0	3	0	4	4	0
TOTALS	2797	140	357	371	1324	547	58

¹ Does not include PPV, SBR, SCN, SCR-C, or SOD samples

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 Consultations ²	Number of cases	
		Primary Diagnosis ¹	
LEXINGTON			
Beale, JW (Diagnostician)	Plant Pathology	2477	3
Bessin, RT	Entomology	5	2
B, S	Plant Pathology	0	1
Coolong, TW	Horticulture	0	5
Dutton, SR	Horticulture	1	2
Finneseth, CH	Regulatory Services	1	0
Fulcher, A	Horticulture	0	1
Green, JD	Plant & Soil Sciences	13	8
Hartman, JR	Plant Pathology	8	9
Lee, CD	Plant & Soil Sciences	1	2
Long, SJ	Plant Pathology	418	7
Paratley, RD	Forestry	1	0
Pearce, RC	Plant & Soil Sciences	7	8
Schwab, GJ	Plant & Soil Sciences	1	10
Seebold, KW	Plant Pathology	7	12
Strang, JG	Horticulture	3	4
Townsend, LH	Entomology	43	14
Vincelli, P	Plant Pathology	18	7
Wilson, PE	Horticulture	0	1
PRINCETON			
Bachi, PR (Diagnostician)	Plant Pathology	990	34
Bailey, WA	Plant & Soil Sciences	13	17
Dunwell, WC	Horticulture	6	17
Edgington, S	CABI-England (visiting)	0	2
Herbek, JH	Plant & Soil Sciences	3	1
Hershman, DE	Plant Pathology	2	3
Johnson, DW	Entomology	3	3
Lacefield, GD	Plant & Soil Sciences	1	1
Martin, JR	Plant & Soil Sciences	11	5
Murdock, LW	Plant & Soil Sciences	10	5
Yielding, TL	Plant Pathology	219	0

¹ The specialist or diagnostician making the primary diagnosis. Number includes all plant samples and 176 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.

176 cases were submitted in 2010 by a total of 49 submitters.

Cases came from a total of 45 counties.

DCS Cases 2010	
Crop	Count
Corn	3
Forest tree	1
Herbaceous ornamental	7
Landscape shrub	16
Landscape tree	52
other (home and unknown vine)	2
Small fruit	11
Soybean	4
Tobacco	19
Tree fruit	18
Turf grass	9
Vegetable	34

National Nursery Survey for *Phytophthora ramorum* in Kentucky, 2010

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

Note: A more complete report of this work can be found in the UK Agricultural Experiment Station publication, PR-621, <http://www.ca.uky.edu/agc/pubs/pr/pr621/pr621.pdf>

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 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 of this pathogen include camellia, rhododendron, viburnum, lilac, and mountain laurel. Regulations and quarantines have been established to limit the spread of *P. ramorum*, but concerns remain about potential movement in contaminated nursery stock. Methods of long-distance spread of the pathogen include moving of plants, plant parts, soil, and water. *P. ramorum* infection and symptom expression takes place when the leaves, shoots, and stems are wet for 12 hours a day for 10 days or more at temperatures between 370 and 820 F. The Appalachian region is considered to be a high-risk area for the establishment of *P. ramorum* because appropriate weather conditions often occur and because several native plant species in the region are identified as hosts.¹

The National Nursery Survey for *P. ramorum* in Kentucky was continued through the 2010 growing season. 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, and the USDA-APHIS, has been ongoing each year since 2004. Procedures for collecting and testing followed protocols established by the USDA-APHIS-PPQ. This year, samples consisted of leaves showing symptoms in or around commercial nurseries and on rhododendron leaves used as “baits” in irrigation ditches, ponds, or other bodies of water in or around the nursery. The water-baiting technique has been used in forest settings, but this is the first year it has been used in the nursery survey in Kentucky. A total of 204 samples were collected as apart of the survey. One hundred seventy-four foliage samples with symptoms suggestive of general *Phytophthora* infection were collected from 40 commercial nurseries, and 30 samples from water baiting were collected at 15 of those same nurseries. Nurseries surveyed were located across the state in 25 counties: Boone, Boyle, Breathitt, Bullitt, Calloway, Clark, Daviess, Fayette, Franklin, Graves, Grayson, Henderson, Hopkins, Jefferson, Jessamine, Kenton, Laurel, Marshall, McCracken, Mercer, Muhlenberg, Nelson, Shelby, Union, and Whitley. All samples collected were double-bagged and sent to the UK Plant Disease Diagnostic Laboratory (PDDL) in Lexington for testing. An immunological assay (ELISA) was used to detect the presence of proteins typical of several species of *Phytophthora* as an initial screen of samples at the Lexington PDDL. DNA was then extracted from samples testing positive 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 174 plant samples collected, 39 tested positive for infection by *Phytophthora* species; of the 30 water-baited samples, 23 tested positive for infection by *Phytophthora* species, bringing the total number of positive samples to 62. Extracted DNA from these 62 samples was sent to USDA-APHIS approved testing laboratories for further testing via polymerase chain reaction (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.

Literature Cited

- 1 De Sa, P.B., J. Hartman, J. Lensing, J. 1. Collins, C. Harper, J. Obrycki. 2007. National Nursery Survey for *Phytophthora ramorum* in Kentucky. Research Report of the Nursery and Landscape Program. Agricultural Experiment Station. University of Kentucky. PR-554. P26-27.

National Plum Pox Virus (PPV) Survey in Kentucky, 2010

*Julie Beale and Sara Long, Chlodys Johnstone, and Leighia Eggett, Department of Plant Pathology;
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Note: A more complete report of this work can be found in the UK Agricultural Experiment Station publication, PR-608, <http://www.ca.uky.edu/agc/pubs/pr/pr608/pr608.pdf>

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

Background

Plum Pox Virus (PPV) is one of the most devastating diseases of stone fruits worldwide. Peach, nectarine, plum, apricot and related ornamental plants can become infected with this disease. A wide range of symptoms are apparent with PPV infection, including ring spots, blotching and malformation of the leaves and fruit. Aphids are the primary tree-to-tree vector of this pathogen, while transport of nursery stock likely contributes to long distance spread. Although common in Europe since the early 1900s, this disease has only been confirmed in the United States three times. It was first detected in a Pennsylvania orchard in 1999. In 2006, it was found in a commercial orchard in New York and in a single tree in Michigan.¹ Eradication programs were implemented in all of these locations to stop the spread of the virus and its aphid vector. However, because of the most recent finds, funding of a national survey in 2010 was a high priority for the USDA-APHIS.

Nature of the Work

Implementation of this survey for Kentucky was a collaborative effort between the Department of Plant Pathology and the Office of the State Entomologist (Department of Entomology) at the University of Kentucky. Procedures for collecting and testing followed protocols established by the USDA-APHIS-PPQ. Samples were collected in June from seven orchards from across the state. Orchards sampled were located in Bourbon, Caldwell, Daviess, Scott, Trimble, Warren and Woodford counties. Non-symptomatic peach leaves were collected from 25 percent of the trees at each orchard in the survey. These samples were bagged and delivered to the Plant Disease Diagnostic Lab (PDDL) in Lexington for testing. An immunological assay (ELISA) was used to detect the presence of the virus.

Results

A total of 804 foliar samples were collected and submitted to the PDDL. Each of these samples was tested via ELISA for the presence of PPV. All of the samples collected within the state were negative for PPV.

Literature Cited

- 1 "Plum Pox." USDA-APHIS-PPQ Fact Sheet. March 2009.
http://www.aphis.usda.gov/publications/plant_health/content/printable_version/fs_rev_plumpox_2009.pdf

<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)					
	Anthracnose	- Colletotrichum	1	0	1
	Brown spot	- Physoderma	3	0	3
	Chemical injury	- herbicide	5	0	5
		- unknown	1	0	1
	Crazy top	- Sclerophthora	1	0	0
	Ear/Kernel rot	- Fusarium	0	2	2
		- Gibberella	1	0	1
		- Stenocarpella	2	0	2
		- Trichoderma	3	0	3
	Environmental stresses		4	2	6
	Gray leaf spot	- Cercospora	3	2	5
	Insect injury		2	1	3
	Leaf streak	- Diplodia	0	1	1
	No disease		12		12
	Northern corn leaf blight	- Setosphaeria	1	0	1
	Nutritional	- acid soil	1	0	1
		- boron deficiency	1	0	1
		- fertilizer burn	1	0	1
		- low pH	3	0	3
		- magnesium deficiency	1	1	2
		- nitrogen deficiency	0	1	1
		- phosphorus deficiency	2	2	4
		- potassium deficiency	6	0	6
		- zinc deficiency	2	0	2
	Popped kernel	- environmental	1	0	1
	Purple leaf sheath	- complex	1	0	1
	Root rot	- Fusarium	0	1	1
		- Pythium	1	0	1
	Rust, common	- Puccinia	6	0	6
	Rust, southern	- Puccinia	4	0	4
<u>FORAGES</u>					
ALFALFA (Medicago)					
	No disease		2		2
	Nutritional	- potassium deficiency	1	0	1
		- unknown	0	1	1
	Root rot	- Aphanomyces	1	0	1
		- Pythium	1	0	1
	Summer black stem	- Cercospora	2	0	2
ORCHARDGRASS (Dactylis)					
	Anthracnose	- Collectotrichum	0	1	1
	Brown stripe	- Cercosporidium	4	1	5
	Environmental stresses		3	0	3
	No disease		2		2
TIMOTHY (Phleum)					
	Brown stripe	- Cercosporidium	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>SOYBEAN</u>					
SOYBEAN (Glycine)					
	Charcoal rot	- Macrophomina	7	0	7
	Chemical injury	- growth regulator	3	0	3
		- herbicide	2	0	2
	Downy mildew	- Peronospora	1	8	18
	Environmental stresses		2	0	2
	Frogeye	- Cercospora	2	2	4
	Insect injury		4	3	7
	Leaf blight	- Cercospora	1	0	1
	Leaf spot	- Cercospora	2	0	2
	No disease		7		7
	(samples without Asian Soybean Rust)		193		193
	Nutritional	- manganese deficiency	1	1	2
		- poor nodulation	1	0	1
		- potassium deficiency	6	1	7
	Root/stem rot	- Rhizoctonia	1	1	2
	Soybean cyst nematode	- Heterodera			
		on plant samples	0	0	0
		* in soil samples	361		361
		* absent in soil samples	8		8
		(*soil submitted to Nematode Analysis Laboratory)			
	Stem rot	- Fusarium	0	1	1
	Sudden death	- Fusarium	1	0	1
<u>SMALL GRAINS</u>					
SORGHUM (Sorghum)					
	Blight	- Aspergillus	0	1	1
	Gray mold	- Botrytis	1	0	1
	Insect injury		1		1
	No disease		1		1
WHEAT (Triticum)					
	Insect injury		1	0	1
	No disease		3		3
	Nutritional	- nitrogen deficiency	1	0	1
	Powdery mildew	- Erysiphe	1	0	1
	Root rot	- Rhizoctonia	1	0	1
	Virus	- Barley yellow dwarf	1	0	1
		- Wheat soilborne mosaic	2	0	2

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<u>TOBACCO</u>						
TOBACCO (Nicotiana)						
	Air pollution	- unknown	1	0	1	
	Angular leaf spot	- Pseudomonas	4	0	4	
	Bacterial soft rot	- Erwinia	1	0	1	
	Black leg	- Erwinia	3	1	4	
	Black shank	- Phytophthora	110	2	112	
	Blue mold	- Peronospora	1	0	1	
	Chemical injury	- bleach	1	0	1	
		- fungicide	5	2	7	
		- growth regulator	6	0	6	
		- herbicide	6	1	7	
		- sucker agent	1	0	1	
		- unknown	3	0	3	
	Collar rot	- Sclerotinia	3	0	3	
	Cultural	- compaction	0	1	1	
		- spiral root	0	2	2	
		- improper light	1	0	1	
		- transplant shock	11	1	12	
		- wet feet	3	0	3	
	Damping-off	- Rhizoctonia	3	1	4	
	Environmental	- cold injury	7	0	7	
		- compaction	4	0	4	
		- weather scald	6	1	7	
		- wet feet	5	2	12	
		- others	6	1	7	
		- metabolites	2	0	2	
	Frogeye	- Cercospora	28	3	31	
	Hollow stalk	- Erwinia	4	4	8	
	Inadequate specimen, no disease		49		49	
	Insect injury		4	1	5	
	Leaf scorch	- unknown	1	0	1	
	Nutritional	- boron deficiency	2	0	2	
		- fertilizer burn	2	1	3	
		- general	3	1	4	
		- manganese toxicity	2	0	2	
		- nitrogen deficiency	3	2	5	
		- potassium deficiency	5	0	5	
		- soluble salts	5	2	7	
		- temp. phosphorus def.	4	0	4	
		Root rot	- Pythium	11	1	12
		Root/stem rot	- Fusarium	1	0	1
	- Rhizoctonia		3	3	6	
	- unknown		1	0	1	
	Sore shin	- Rhizoctonia	7	7	14	
	Stem rot	- Pythium	6	1	7	
	Target spot	- Rhizoctonia	7	3	10	
	Storage mold	- fungal	1	0	1	
	Virus	- Alfalfa mosaic	2	0	2	
		- Tobacco mosaic	2	0	2	
		- Tomato spotted wilt	2	1	2	
	Weather fleck	- ozone	1	0	1	
	Wilt	- Fusarium	10	0	10	

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FRUIT CROPS					
<u>SMALL FRUITS</u>					
BLUEBERRY (Vaccinium)					
	Crown gall	- Agrobacterium	1	0	1
	Cultural	- transplant shock	2	0	2
	Dieback	- unknown	2	0	2
	Environmental stresses		3	0	3
	Fruit rot	- Phyllosticta	0	1	1
	Inadequate specimen, no disease		14		14
	Insect		0	1	1
	Leaf spot	- Phyllosticta	2	0	2
	Mosaic	- unknown	1	0	1
	Nutritional	- iron deficiency	1	0	1
		- pH high	0	1	1
	Root rot	- Phytophthora	20	1	21
BRAMBLES - BLACKBERRY, and RASPBERRY (Rubus)					
	Anthracnose	- Colletotrichum	0	1	1
	Cane blight	- Leptosphaeria	2	0	2
	Cane/leaf rust	- Kuehneola	1	0	1
	Dieback	- unknown	1	0	1
	Double blossom	- Cercospora	1	0	1
	Environmental	- stresses	1	0	1
		- white druplet	2	0	2
	Inadequate specimen, no disease		5		5
	Insect injury		4	0	4
	Leaf spot	- Cercospora	1	1	2
		- Phyllosticta	2	0	2
		- unknown	1	0	1
	Nutritional	- iron deficiency	0	1	1
	Orange rust	- Gymnoconia	1	0	1
	Root/Crown rot	- Phytophthora	8	3	11
	Spur blight	- Didymella	3	0	3
CURRANT (Ribes)					
	Cultural	- transplant shock	1	0	1
GRAPE (Vitis)					
	Anthracnose	- Elsinoe	9	3	12
	Black rot	- Guignardia	16	0	16
	Cane blight/spot	- Phomopsis	2	0	2
	Chemical injury	- growth regulator	4	2	6
	Crown gall	- Agrobacterium	1	0	1
	Dieback	- Eutypa	1	0	1
	Downy mildew	- Plasmopara	2	2	4
	Environmental	- freeze injury	1	0	1
	Inadequate specimen, no disease		12		12
	Insect injury		3	3	6
	Leaf spot	- Pseudocercospora	2	0	2
	Physiological	- rupestris speckle	1	0	1
	Pollination problem	- unknown	1	0	1
	Powdery mildew	- Uncinula	1	0	1

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<u>SMALL FRUITS (continued)</u>					
STRAWBERRY (Fragaria)					
	Anthracnose	- Colletotrichum	3	0	3
	Brown cap	- unknown	1	0	1
	Dieback	- unknown	0	1	1
	Environmental	- freeze injury	1	0	1
	Gray mold	- Botrytis	0	3	3
	Insect injury		1	0	1
	Leaf blight	- Phomopsis	5	1	6
	Leaf spot	- Mycosphaerella	2	0	2
	Leather rot	- Phytophthora	4	0	4
	No disease		3		3
	Nutritional	- fertilizer burn	1	0	1
		-			
		- potassium deficiency	0	1	1
		- soluble salts	0	1	1
	Petiole rot	- Botrytis	1	0	1
	Poor fruit set	- unknown	1	0	1
	Root rot	- Pythium	1	0	1
		- Rhizoctonia	1	0	1
	Root/crown rot	- Phytophthora	4	0	4
<u>TREE FRUITS</u>					
APPLE (Malus)					
	Bark damage	- unknown	1	0	1
	Bitter pit	- calcium deficiency	1	0	1
	Bitter rot	- Glomerella	1	1	2
	Black rot	- Botryosphaeria	3	1	4
	Canker	- Botryosphaeria	1	0	1
	Cedar apple rust	- Gymnosporangium	12	6	18
	Chemical injury	- unknown	1	0	1
	Collar rot	- Phytophthora	1	0	1
	Environmental stresses		3	0	3
	Fire blight	- Erwinia	42	0	42
	Flyspeck	- Schizothyrium	0	1	1
	Frogeye	- Botryosphaeria	7	1	8
	Inadequate specimen, no disease		9		9
	Insect injury		11	4	15
	Lichen	- species	2	0	2
	Physical injury	- unknown	1	0	1
	Physical injury	- vole	1	0	1
	Pollination problem	- unknown	3	0	3
	Root/collar rot	- Phytophthora	1	0	1
	Water core	- physiological	1	0	1
	White rot	- Botryosphaeria	1	1	2
	Wood decay	- Schizophyllum	0	1	1

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<u>TREE FRUITS</u> (continued)					
CHERRY (Prunus)					
	Bacterial spot	- Xanthomonas	1	0	1
	Brown rot	- Monilinia	4	0	4
	Crown gall	- Agrobacterium	1	0	1
	Cultural	- transplant shock	1	0	1
	Dieback	- unknown	1	0	1
	Insect injury		1	0	1
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Blumeriella	2	0	2
FIG (Ficus)					
	Environmental	- cold injury	1	0	1
PAWPAW (Asimina)					
	Leaf spot	- Phyllosticta	1	0	1
PEACH, APRICOT and NECTARINE (Prunus)					
	Bacterial spot	- Xanthomonas	1	0	1
	Brown rot	- Monilinia	4	1	5
	Chemical injury	- herbicide	1	0	1
	Cultural	- transplant shock	5	1	6
	Decline	- unknown	2	0	2
	Environmental stresses		2	0	2
	Gummosis	- injury	1	0	1
	Inadequate specimen, no disease		4		4
	(No disease, 804 of 804 Peach samples for Plum Pox Virus survey)		804		804
	Insect injury		10	2	12
	Leaf curl	- Taphrina	10	0	10
	Nutritional	- nitrogen deficiency	4	0	4
	Root rot	- Phytophthora	2	0	2
	Scab	- Cladosporium	2	6	8
	Virus	- unknown	1	0	1
PEAR (Pyrus)					
	Chemical injury	- unknown	1	0	1
	Fire blight	- Erwinia	4	0	4
	Flyspeck	- Schizothyrium	1	0	1
	Fruit decay	- fungal	0	1	1
	Insect injury		1	0	1
	Leaf spot	- Phyllosticta	0	1	1
	No disease		4		4
	Sooty blotch	- Gloeodes	0	1	1
PECAN (Carya)					
	Inadequate specimen		1		1
	Insect injury		9	0	9
	Nut decay	- fungal	0	3	3
	Scab	- Cladosporium	2	0	2

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<u>TREE FRUITS</u> (continued)					
PLUM (Prunus)					
	Black knot	- Apiosporina	6	0	6
	Brown rot	- Monilinia	3	0	3
	Decline	- unknown	1	0	1
	Insect injury		2	0	2
	No disease		1		1
	Plum pockets	- Taphrina	1	0	1
PLUMCOT (Plum x apricot)					
	Chemical injury	- unknown	1	0	1
<u>HERBS</u>					
BASIL (Ocimum)					
	Damping-off	- Rhizoctonia	1	0	1
	Downy mildew	- Peronospora	1	0	1
	No disease		1		1
	Root/stem rot	- Rhizoctonia	1	0	1
GINGER (Zingiber)					
	Black root rot	- Thielaviopsis	2	0	2
	Leaf spot	- Cercospora	1	0	1
GINSENG (Panax)					
	Leaf blight	- Alternaria	1	0	1
HOPS (Humulus)					
	No disease		1		1
LEMON BALM (Melissa)					
	No disease		1		1
MINT (Mentha)					
	Insect injury		1	0	1
	Rust	- Puccinia	1	0	1
ROSEMARY (Rosmarinus)					
	Inadequate specimen, no disease		2		2
SAGE (Salvia)					
	Insect injury		1	1	2
SWEET WOODRUFF (Galium)					
	Bacterial scorch	- Xylella	1	0	1
THYME (Thymus)					
	Anthracnose	- Colletotrichum	1	0	1
	Inadequate specimen		1		1

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<u>MISCELLANEOUS</u>					
PIGWEED (Amaranthus)					
	No disease		1		1
KUDZU (Pueraria) (part of survey work for Asian Soybean Rust)					
	No disease		26		26
SOIL					
	Hydrophobic fungi	- Basidiomycete	1	0	1
	No disease		3		3
	Nutritional	- pH high	1	0	1
		- pH low	1	0	1
WEEDS (various)					
	Chemical injury	- herbicide	1	0	1
WOOD					
	Wood decay	- Basidiomycete	1	0	1
<u>IDENTIFICATIONS</u>					
FUNGAL IDENTIFICATIONS					
	Basidiomycete	- species	1		1
	Calvatia	- species	1		1
	Coprinus	- species	1		1
	Fungi imperfecti	- unknown	1		1
	Hymenogastreales	- species	1		1
	Lepiota	- species	1		1
	Nidula	- candida	1		1
	Omphalotus	- olearius	1		1
	Slime mold	- species	1		1
	Sooty mold	- species	1		1
PLANT IDENTIFICATIONS					
	Acer	- negundo	1		1
	Algae	- species	1		1
	Allium	- vineale	1		1
	Clerodendron	- trichotomum	1		1
	Cucumis	- melo	1		1
		- species	1		1
	Cynodon	- species	1		1
	Euonymus	- fortunei	1		1
	Fraxinus	- americana	1		1
	Gossypium	- hirsutum	1		1
	Inadequate specimen		2		2
	Lagerstromia	- indica	1		1
	Nostoc	- species	2		2
	Picea	- abies	1		1
	Polygonatum	- biflorum	1		1
	Prunus	- serotina	1		1
	Rubus	- phoenicolasius	1		1
	Solidago	- species	1		1
	Unknown	- unknown	1		1
	Viburnum	- prunifolium	1		1

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ORNAMENTALS					
<u>HERBACEOUS ORNAMENTALS and INDOOR PLANTS</u>					
ACHILLEA (Achillea)	Insect injury		1	1	2
AFRICAN VIOLET (Saintpaulia)	Bacterial soft rot	- Erwinia	1	0	1
ALOE (Aloe)	No disease		1		1
ARABIDOPSIS (Arabidopsis)	Nutritional	- soluble salts	1	0	1
	No disease		1		1
	Virus	- Impatiens necrotic spot	1	0	1
ARMERIA (Armeria)	No disease		1		1
ASTER (Aster)	Insect injury		1	0	1
BACOPA (Bacopa)	Cultural	- oedema	1	0	1
	Insect injury		0	1	1
BEAN (ornamental)	Leaf spot	- Cercospora	1	0	1
BEGONIA (Begonia)	Cultural	- oedema	1	0	1
	Stem rot	- Sclerotinia	1	0	1
BELLS OF IRELAND (Moluccella)	No disease		1		1
BERGENIA (Bergenia)	Anthracnose	- Colletotrichum	1	0	1
	No disease		1		1
CACTUS (Schlumbergera)	Insect injury		1	0	1
CALIBRACHOA (Calibrachoa)	Environmental	- improper light	0	1	1
		- wet feet	1	0	1
	Inadequate specimen		1		1
	Insect injury		1	0	1
	Root rot	- Pythium	2	0	2
	Stem rot	- Sclerotinia	1	0	1
	Virus	- Tobacco mosaic	3	0	3

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CANNA (Canna)	Inadequate specimen		1		1
CATTLEYA (Cattleya)	No disease		1		1
CARYOPTERIS (Caryopteris)	Root rot	- Pythium	1	0	1
CATHARANTHUS (Catharanthus)	Root rot	- Pythium	1	0	1
CENTAUREA (Centaurea)	Leaf spot	- Cercospora	1	0	1
CEREUS (Cereus)	Environmental	- sunscald	1	0	1
CHRYSANTHEMUM (Chrysanthemum)	Bacterial blight	- Erwinia	1	0	1
	Bacterial leaf spot	- Pseudomonas	1	0	1
	Chemical injury	- fungicide	1	0	1
	Environmental	- stress	1	0	1
	Inadequate specimen, no disease		5		5
	Insect injury		4	1	5
	Leaf spot	- Alternaria	0	1	1
	Nutritional	- general	4	2	6
		- iron deficiency	3	2	5
		- soluble salts	1	0	1
	Root/stem rot	- Pythium	11	1	12
		- Rhizoctonia	1	1	2
	Wilt	- Fusarium	4	1	5
COCKSCOMB (Celosia)	Fasciation	- phytoplasma	1	0	1
COFFEE PLANT (Coffea)	No disease		1	0	1
COLEUS (Coleus)	Gray mold	- Botrytis	1	0	1
CONE FLOWER (Echinacea)	Air pollution	- ozone	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Insect injury		1	0	1
	No disease		1		1
CORAL BELLS (Heuchera)	No disease		2		2

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COREOPSIS (Coreopsis)					
	Chemical injury	- growth regulator	1	0	1
	No disease		1		1
	Powdery mildew	- Golovinomyces	1	0	1
	Root rot	- Pythium	1	0	1
DAHLIA (Dahlia)					
	Cultural	- wet feet	0	1	1
	Nutritional	- general	1	0	1
DAISY (Dimorphotheca)					
	Root rot	- Rhizoctonia	1	0	1
DAYLILY (Hemerocallis)					
	Anthracnose	- Collectotrichum	1	0	1
	Leaf streak	- Aureobasidium	1	0	1
DELPHINIUM (Delphinium)					
	No disease		1		1
DIANTHUS (Dianthus)					
	No disease		1		1
DIASCIA (Diascia)					
	Web blight	- Rhizoctonia	1	0	1
EUPATORIUM (Eupatorium)					
	Stem blight	- Phomopsis	1	0	1
FERN (Asplenium and Nephrolepis, respectively)					
	Bacterial blight	- Pseudomonas	1	0	1
	Environmental	- stress	1	0	1
GAILLARDIA (Gaillardia)					
	No disease		1	0	1
GERANIUM (Pelargonium)					
	Black leg	- Pythium	1	0	1
	Cultural	- oedema	1	0	1
	Leaf spot	- Alternaria	1	0	1
	No disease		2		2
	Nutritional	- general	0	1	1
		- iron toxicity	1	0	1
		- soluble salts	1	1	2
GERBER DAISY (Gerbera)					
	Powdery mildew	- oidium	1	0	1
GEUM (Geum)					
	Root rot	- Rhizoctonia	1	0	1
GLOXINIA (Gloxinia)					
	Insect injury		0	1	1
	Virus	- Impatiens necrotic spot	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
HOLLYHOCK (Althaea)					
	Rust	- Puccinia	4	0	4
HOSTA (Hosta)					
	Anthracnose	- Collectotrichum	2	0	2
	Environmental	- stress	1	0	1
	Insect injury		1	0	1
	Slime mold	- species	1	0	1
IBERIS (Iberis)					
	Root/crown rot	- Rhizoctonia	1	0	1
IMPATIENS (Impatiens)					
	Environmental	- sunscauld	2	0	2
	Nutritional	- general	1	0	1
	Virus	- Impatiens necrotic spot	1	0	1
IRIS (Iris)					
	Cultural	- improper light	1	0	1
IVY (Hedera)					
	Anthracnose	- Collectotrichum	1	0	1
	Bacterial spot	- Xanthomonas	2	0	2
	Environmental	- wet feet	1	0	1
	Leaf scorch	- environmental	1	0	1
	Leaf spot	- Phyllosticta	0	1	1
		- unknown	1	0	1
	No disease		1		1
	Root rot	- Rhizoctonia	2	0	2
LADY'S MANTLE (Alchimilla)					
	Cultural	- transplant shock	1	0	1
LAVENDER (Lavandula)					
	No disease		1		1
LILY (Lilium)					
	Insect injury		2	0	2
	No disease		1		1
	Root rot	- Pythium	1	0	1
		- Rhizoctonia	0	1	1
LIRIOPE (Liriope)					
	Crown rot	- Phytophthora	3	0	3
MANDEVILLA (Mandevilla)					
	Insect injury		1	0	1
MARIGOLD (Tagetes)					
	No disease		1		1
	Nutritional	- soluble salts	1	0	1
NORFOLK ISLAND PINE (Araucaria)					
	Anthracnose	- Colletotrichum	1	0	1

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ORCHID (Dendrobium)					
	No disease		1		1
OXALIS (Oxalis)					
	Inadequate specimen		1		1
PACHYSANDRA (Pachysandra)					
	Stem/leaf blight	- Volutella	1	0	1
PEONY (Paeonia)					
	Anthracnose	- Gloeosporium	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Leaf spot	- Cercospora	0	1	1
	No disease		1		1
	Powdery mildew	- Erysiphe	2	0	2
	Root/crown rot	- Phytophthora	1	0	1
PETUNIA (Petunia)					
	Black root rot	- Thielaviopsis	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Environmental	- cold injury	1	0	1
	Gray mold	- Botrytis	1	0	2
	Insect injury		1	0	1
	Root/crown rot	- Phytophthora	1	0	1
	Root knot nematode	- Meloidogyne	0	1	1
	Root/stem rot	- Pythium	7	0	7
		- Rhizoctonia	3	3	6
PHILODENDRON (Philodendron)					
	Inadequate specimen		1		1
PHLOX (Phlox)					
	Anthracnose	- Colletotrichum	1	0	1
	Inadequate specimen		1		1
	Southern blight	- Sclerotium	1	0	1
POINSETTIA (Euphorbia)					
	Insect injury		1	0	1
	No disease		1		1
	Nutritional	- soluble salts	1	0	1
	Root rot	- Pythium	1	0	1
POTHOS (Pothos)					
	Insect injury		1	0	1
RUBBER PLANT (Ficus)					
	Insect injury		1	0	1
RUDBECKIA (Rudbeckia)					
	Southern blight	- Sclerotium	2	0	2
RUSSIAN SAGE (Petrovskia)					
	No disease		1		1

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SALVIA (Salvia)	Stem rot	- Macrophomina	1	0	1
SCHEFFLERA (Brassaia)	Insect injury		2		2
SEDUM (Sedum)	Environmental stresses		1	0	1
	Root rot	- Rhizoctonia	1	0	1
	Root/stem rot	- Phytophthora	2	0	2
SHASTA DAISY (Chrysanthemum)	Leaf/stem spot	- Alternaria	1	0	1
	Petal blight	- Botrytis	0	1	1
SNAPDRAGON (Antirrhinum)	Gray mold	- Botrytis	1	0	1
	Virus	- Impatiens necrotic spot	2	0	2
SOLIDAGO (Solidago)	No disease		1		1
SPATHIPHYLLUM (Spathiphyllum)	No disease		1		1
STREPTOCARPUS (Streptocarpus)	No disease		1		1
THUNBERGIA (Thunbergia)	Leaf spot	- unknown	1	0	1
VERBENA (Verbena)	No disease		1		1
VINCA (Vinca)	Anthracnose	- Colletotrichum	0	1	1
	Canker/Dieback	- Phoma	2	0	2
	Insect injury		1	0	1
	No disease		1		1
	Physical injury	- unknown	1	0	1
	Root rot	- Pythium	1	0	1

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<u>TURFGRASS</u>					
BENTGRASS (Agrostis)					
	Anthracnose	- Colletotrichum	2	0	2
	Black layer	- bacterial	2	3	5
	Blight	- Pythium	4	0	4
	Brown patch	- Rhizoctonia	2	1	3
	Copper spot	- Gloeocercospora	1	0	1
	Cultural	- heavy thatch	3	2	5
	Environmental stresses		10	2	12
	No disease		9		9
	Root rot	- Pythium	10	5	15
	Snow mold	- fungal	1	0	1
	Summer patch	- Magnaporthe	0	1	1
	Take-all patch	- Gaeumannomyces	11	1	12
BERMUDAGRASS (Cynodon)					
	Environmental	- stresses	1	0	1
	Leaf spot	- Curvularia	1	0	1
	No disease		1		1
	Pink patch	- Limonomyces	1	0	1
	Rust	- Puccinia	1	0	1
	Spring dead spot	- Ophiosphaerella	1	0	1
BLUEGRASS (Poa)					
	Brown patch	- Rhizoctonia	1	0	1
	No disease		5		5
	Red thread	- Laetisaria	1	0	1
	Summer patch	- Magnaporthe	5	0	5
	Yellow patch	- Rhizoctonia	1	0	1
FESCUE (Festuca)					
	Brown patch	- Rhizoctonia	18	1	19
	Cultural	- heavy thatch	1	0	1
	Environmental stresses		5	1	6
	Fading out	- Curvularia	0	1	1
	Gray leaf spot	- Pyricularia	1	0	1
	No disease		2		2
	Physical injury	- mower	1	0	1
	Red thread	- Laetisaria	1	0	1
	Rust	- Puccinia	0	1	1
	Summer patch	- Magnaporthe	1	0	1
	Yellow patch	- Rhizoctonia	1	0	1
RYEGRASS (Lolium)					
	Blight	- Pythium	1	0	1
	Gray leaf spot	- Pyricularia	1	0	1
	Leaf spot	- Bipolaris	1	0	1
	Melting out	- Drechslera	1	0	1
	Microdochium patch	- Microdochium	1	0	1
	Root decline	- Gaeumannomyces	1	0	1

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TURF (unspecified)					
	Brown patch	- Rhizoctonia	3	0	3
	Environmental	- high temperature	2	0	2
	Inadequate specimen, no disease		6		6
	Insect injury		2		2
	Red thread	- Laetisaria	1	0	1
<u>WOODY ORNAMENTALS</u>					
ARBORVITAE (Thuja)					
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	3	0	3
	Environmental stresses		4	0	4
	Insect injury		1	5	6
	Needle drop	- normal	2	0	2
	No disease		6		6
	Root rot	- Phytophthora	5	0	5
ASH (Fraxinus)					
	Anthraco-nose	- Apiognomon-ia	1	0	1
	Bacterial scorch	- Xylella	1	0	1
	Insect injury		5	1	6
	Leaf spot	- Mycosphaerella	1	0	1
		- Phyllosticta	1	0	1
		- Tubakia	1	0	1
		- unknown	2	0	2
	No disease		6		6
ASPEN (Populus)					
	Anthraco-nose	- Colletotrichum	1	0	1
AZALEA - See listing under RHODODENDRON					
BALDCYPRESS (Taxodium)					
	Cultural	- transplant shock	2	0	2
	Insect injury		1	0	1
	No disease		1		1
BARBERRY (Berberis)					
	Cultural	- transplant shock	1	0	1
BAY LAUREL (Laurus)					
	No disease		2		2
BEECH (Fagus)					
	Insect injury		1	0	1
	No disease		1		1
	Sooty mold	- Scorias	1	0	1
	Wood decay	- Basidiomycete	1	0	1
BIRCH (Betula)					
	Insect injury		4	0	4
	Leaf spot	- Septoria	1	0	1

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BLACK GUM (Tupelo)					
	Bacterial soft rot	- bacterial	1	0	1
	Canker	- Botryosphaeria	1	0	1
	No disease		3		3
BOXWOOD (Buxus)					
	Anthracnose	- Colletotrichum	1	0	1
	Canker	- Pseudonectria	2	6	8
	Cultural	- transplant shock	5	1	6
	Decline	- unknown	1	0	1
	Environmental stresses		12	2	14
	Inadequate specimen, no disease		5		5
	Insect injury		7	2	9
	Nutritional	- soluble salts	1	0	1
	Physical injury	- snow	1	0	1
	Root rot	- Pythium	1	0	1
		- Phytophthora	0	1	1
		- Rhizoctonia	0	1	1
BUCKEYE (Aesculus)					
	Insect injury		1	0	1
	Leaf blotch	- Guignardia	0	1	1
BUCKTHORN (Rhamnus)					
	Rust	- Puccinia	1	0	1
BUTTERFLY BUSH (Buddleia)					
	No disease		1		1
CAMELLIA (Camellia)					
	No disease		4		4
CATALPA (Catalpa)					
	Wilt	- Verticillium	1	0	1
CEDAR (Cedrus)					
	Cedar/Apple rust	- Gymnosporangium	1	0	1
	Environmental	- cold injury	1	0	1
	Tip blight	- Pestalotiopsis	0	1	1
	Twig blight	- Phomopsis	1	0	1
		- fungal	0	1	1
CHAMAECYPARIS (Chamaecyparis)					
	Cultural	- transplant shock	1	0	1
	Environmental	- wet feet	1	0	1
CHERRY (Prunus)					
	Bacterial spot	- Xanthomonas	1	0	1
	Black knot	- Apiosporina	1	0	1
	Dieback	- unknown	1	0	1
	Insect injury		1	0	1
	Leaf spot	- Blumeriella	2	0	2
	No disease		4		4

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CHERRYLAUREL (Prunus)					
	Bacterial spot	- Xanthomonas	3	0	3
	Cultural	- transplant shock	2	0	2
	Environmental stresses		4	2	6
	Insect injury		3	0	3
	Leaf spot	- Cercospora	1	0	1
	No disease		1		1
	Root/Collar rot	- Phytophthora	3	0	3
CHESTNUT (Castanea)					
	Blight	- Cryphonectria	1	0	1
	Root rot	- Phytophthora	1	0	1
CHINAFIR (Cunninghamia)					
	Environmental	- stresses	1	0	1
CLEMATIS (Clematis)					
	Environmental	- frost injury	1	0	1
	No disease		2		2
COTONEASTER (Cotoneaster)					
	Insect injury		2	0	2
	No disease		1		1
	Leaf spot	- Phyllosticta	0	1	1
CRABAPPLE (Malus)					
	Canker	- Botryosphaeria	0	1	1
	Cedar/Apple rust	- Gymnosporangium	1	0	1
	Fire blight	- Erwinia	3	0	3
	Frogeye	- Botryosphaeria	2	0	2
	No disease		1		1
	Scab	- Venturia	2	0	2
CRYPTOMERIA (Cryptomeria)					
	No disease		1		1
DOGWOOD (Cornus)					
	Anthrachnose	- Discula	3	0	3
	Bacterial spot	- bacterial	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- growth regulator	3	0	3
	Cultural	- transplant shock	4	0	4
	Dieback	- unknown	2	0	2
	Environmental	- stress	2	0	2
	Insect injury		1	1	2
	Leaf scorch	- unknown	3	0	3
	Lichen	- species	0	1	1
	No disease		9		9
	Powdery mildew	- Erysiphe	3	1	4
DOUGLAS FIR (Pseudotsuga)					
	Canker	- Phomopsis	1	0	1

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ELM (Ulmus)					
	Anthracnose	- Glomerella	2	0	2
	Dieback	- unknown	1	0	1
	Dutch elm disease	- Ophiostoma	1	0	1
	Leaf spot	- Alternaria	1	0	1
	No disease		4		4
EUONYMUS (Euonymus)					
	Chemical injury	- growth regulator	1	0	1
	Crown gall	- Agrobacterium	1	0	1
	Cultural	- wet feet	1	0	1
	Environmental	- stress	1	0	1
	Insect injury		16	0	16
	No disease		3	0	3
	Powdery mildew	- Microsphaera	0	1	1
FILBERT (Corylus)					
	Anthracnose	- Colletotrichum	1	1	2
	Insect injury		1	0	1
FIR (Abies)					
	Insect injury		1	0	1
	No disease		2		2
	Root/Collar rot	- Phytophthora	3	0	3
FORSYTHIA (Forsythia)					
	Chemical injury	- growth regulator	1	0	1
		- unknown	0	1	1
	Dieback	- unknown	1	0	1
	Gall	- Phomopsis	2	0	2
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Cercospora	0	1	1
	Root/Crown rot	- Phytophthora	3	0	3
FRINGETREE (Chionanthus)					
	No disease		1		1
GINKGO (Ginkgo)					
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	1	0	1
GOLDENRAINTREE (Koelreuteria)					
	Environmental	- lightning	1	0	1
HAWTHORN (Crataegus)					
	Cedar/Hawthorn rust	- Gymnosporangium	1	0	1
	Cedar/Quince rust	- Gymnosporangium	1	0	1
	Insect injury		1	0	1
	Leaf spot	- Entomosporium	1	0	1
HEMLOCK (Tsuga)					
	Blight	- Botrytis	1	0	1
	Insect injury		1	0	1
	Root rot	- Phytophthora	1	0	1

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HEPTACODIUM (Heptacodium)					
	Environmental	- high temperature	1	0	1
HIBISCUS (Hibiscus)					
	Bacterial spot	- bacterial	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Crown/Stem rot	- Fusarium	1	0	1
	Insect injury		2	0	2
	No disease		1	0	1
	Nutritional	- soluble salts	0	1	1
HOLLY (Ilex)					
	Black root rot	- Thielaviopsis	11	1	12
	Canker	- Cytospora	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- oedema	2	0	2
		- transplant shock	2	0	2
	Decline	- unknown	2	1	3
	Environmental stresses		8	1	9
	Inadequate specimen, no disease		16		16
	Insect injury		21	4	25
	Leaf spot	- Cercospora	1	0	1
		- fungal	1	0	1
	Nutritional	- iron deficiency	0	1	1
	Sooty mold	- species	1	3	4
HONEYLOCUST (Gleditsia)					
	Cultural	- transplant shock	1	0	1
	Insect injury		4	0	4
	Leaf spot	- Cercospora	1	1	2
	No disease		2		2
HONEYSUCKLE (Lonicera)					
	Chemical injury	- growth regulator	1	0	1
	Insect injury		1	0	1
	No disease		1		1
HORNBEAM (Carpinus)					
	Environmental	- stress	1	0	1
	No disease		1		1
HYDRANGEA (Hydrangea)					
	Cultural	- wet feet	1	0	1
	Environmental	- stress	1	0	1
	Gray mold	- Botrytis	1	0	1
	Inadequate specimen, no disease		3		3
	Insect injury		1	0	1
	Leaf scorch	- environmental	1	1	2
	Leaf spot	- Cercospora	11	1	12
		- Phoma	2	0	2

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ITEA (Itea)					
	Insect injury		1	0	1
	Leaf spot	- Phyllosticta	1	0	1
	Root/Crown rot	- Phytophthora	1	0	1
JUNIPER and RED CEDAR (Juniperus)					
	Cedar/Quince rust	- Gymnosporangium	5	0	5
	Environmental stresses		3	0	3
	Insect injury		3	1	4
	No disease		4		4
	Physical injury	- unknown	1	0	1
	Root/Crown rot	- Phytophthora	3	0	3
	Tip blight	- Pestalotiopsis	1	0	1
	Twig blight	- Kabatina	2	0	2
		- Phomopsis	2	0	2
KERRIA (Kerria)					
	Twig blight	- Phomopsis	1	0	1
LARCH (Larix)					
	Cultural	- transplant shock	1	0	1
LEYLAND CYPRESS (X Cupressocyparis)					
	Cultural	- transplant shock	1	0	1
	Environmental stresses		4	0	4
	No disease		5		5
	Physical injury	- string	1	0	1
LILAC (Syringa)					
	Bacterial scorch	- Xylella	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Cultural	- transplant shock	1	0	1
	Environmental	- stress	1	0	1
	No disease		3		3
	Nutritional	- general	1	0	1
	Powdery mildew	- Erysiphe	3	1	4
MAGNOLIA (Magnolia)					
	Bacterial spot	- bacterial	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	2	1	3
	Environmental stresses		8	0	8
	Inadequate specimen, no disease		4		4
	Insect injury		3	0	3
	Nutritional	- iron deficiency	1	0	1
	Sooty mold	- species	0	1	1
	Wilt	- Verticillium	1	0	1

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MAPLE and BOXELDER (Acer)					
Anthracnose	-	Aureobasidium	1	0	1
	-	Discula	1	0	1
	-	Kabatiella	1	0	1
Bacterial scorch	-	Xylella	1	0	1
Chemical injury	-	growth regulator	1	0	1
Crown rot	-	Armillaria	1	0	1
Cultural	-	insufficient water	1	0	1
	-	transplant shock	8	0	8
Decline	-	unknown	3	0	3
Environmental stresses			8	0	8
Insect injury			13	4	17
Leaf spot	-	fungal	1	0	1
	-	Phloeospora	2	0	2
	-	Phyllosticta	1	1	2
	-	Tubakia	1	0	1
No disease			18		18
Nutritional	-	iron deficiency	1	0	1
Physical injury	-	rodent	1	0	1
Sooty mold	-	species	1	0	1
Tar spot	-	Rhytisma	1	0	1
Wilt	-	Verticillium	1	0	1
MIMOSA (Albizzia)					
Insect injury			1	0	1
MOUNTAIN LAUREL (Kalmia)					
Decline	-	unknown	1	0	1
Insect injury			0	1	1
Leaf blight	-	Phytophthora	1	0	1
No disease			5		5
Root rot	-	Phytophthora	2	0	2
MULBERRY (Morus)					
Insect injury			2	0	2
Leaf spot	-	Phloeospora	1	0	1
No disease			1		1
NANDINA (Nandina)					
Physical injury	-	rodent	1	0	1

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OAK (Quercus)					
	Anthracnose	- <i>Apiognomonina</i>	16	1	17
	Bacterial scorch	- <i>Xylella</i>	16	0	16
	Canker	- <i>Botryosphaeria</i>	1	1	2
	Chemical injury	- growth regulator	5	0	5
	Cultural	- transplant shock	2	0	2
	Environmental stresses		3	0	3
	Inadequate specimen, no disease		18		18
	Insect injury		32	13	45
	Leaf spot	- <i>Phyllosticta</i>	1	0	1
		- <i>Tubakia</i>	13	6	19
	Nutritional	- iron deficiency	2	0	2
	Powdery mildew	- species	4	0	4
	Root rot	- <i>Phytophthora</i>	1	0	1
	Spot anthracnose	- <i>Elsinoe</i>	1	0	1
	Wood decay	- complex	0	1	1
PARROTIA (Parrotia)					
	Environmental	- Cold injury	1	0	1
	No disease		1		1
PEACH (Prunus)					
	Inadequate specimen, no disease		3		3
	Insect injury		1	0	1
PEAR (Pyrus)					
	Chemical injury	- growth regulator	1	0	1
	Decline	- unknown	1	0	1
	Environmental stresses		11	1	12
	Fire blight	- <i>Erwinia</i>	17	1	18
	Insect injury		3	3	6
	Leaf spot	- fungal	1	0	1
		- <i>Pestalotiopsis</i>	1	0	1
	No disease		3		3
PERSIMMON (Diospyros)					
	Insect injury		1	0	1
	Leaf spot	- <i>Isariopsis</i>	1	0	1
PHOTINIA (Photinia)					
	Environmental stresses		1	1	2
	Leaf spot	- <i>Entomosporium</i>	2	0	2
		- fungal	1	0	1
PIERIS (Pieris)					
	Cultural	- transplant shock	1	1	2
	Environmental	- winter drying	1	0	1
	Leaf blight	- <i>Phytophthora</i>	4	0	4
	No disease		15		15

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PINE (Pinus)					
	Brown spot	- Mycosphaerella	3	2	5
	Cultural	- transplant shock	7	0	7
	Damping-off	- Fusarium	1	0	1
	Dieback	- unknown	2	0	2
	Inadequate specimen, no disease		11		11
	Insect injury		5	0	5
	Needle blight	- Dothistroma	1	1	2
	Needle rust	- Coleosporium	4	0	4
	Physical injury	- bird	1	0	1
	Root rot	- Phytophthora	1	0	1
	Tip blight	- Diplodia	7	0	7
	White pine decline	- environmental	6	0	6
	White pine root decline	- Verticicladiella	1	0	1
PLUM (Prunus)					
	Black knot	- Apiosporina	2	0	2
	Dieback	- unknown	1	0	1
	Insect injury		1	0	1
	No disease		1		1
	Plum pockets	- Taphrina	1	0	1
	Root rot	- Phytophthora	1	0	1
PRIVET (Ligustrum)					
	Decline	- unknown	1	0	1
PYRACANTHA (Pyracantha)					
	Nutritional	- iron deficiency	1	0	1
REDBUD (Cercis)					
	Anthracnose	- Kabatiella	1	0	1
	Decline	- unknown	1	0	1
	Insect injury		1	0	1
	No disease		2		2
	Wilt	- Verticillium	1	0	1
RHODODENDRON and AZALEA (Rhododendron)					
	Canker	- Botryosphaeria	2	0	2
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	3	0	3
	Environmental stresses		2	0	2
	Insect injury		5	2	7
	Leaf blight	- Phytophthora	67	0	67
	Leaf/Flower gall	- Exobasidium	3	0	3
	Lichen	- species	1	0	1
	No disease		96		96
	Nutritional	- iron deficiency	1	0	1
		- pH high	1	0	1
	Root rot	- Phytophthora	4	0	4

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ROSE (Rosa)					
	Black spot	- Diplocarpon	5	0	5
	Blight	- Botrytis	1	0	1
	Canker	- Coniothyrium	1	0	1
	Chemical injury	- growth regulator	2	0	2
		- herbicide	4	0	4
	Cultural	- transplant shock	2	0	2
		- wet feet	0	1	1
	Downy mildew	- Peronospora	1	0	1
	Environmental stresses		2	2	4
	Inadequate specimen, no disease		7		7
	Insect injury		7	0	7
	Leaf spot	- Pseudocercospora	0	1	1
	Nutritional	- fertilizer burn	1	0	1
		- general	1	2	3
	Powdery mildew	- Podosphaera	1	1	2
	Root rot	- Phytophthora	1	0	1
	Virus	- Rose rosette	6	1	7
		- unknown	1	0	1
SASSAFRAS (Sassafras)					
	Root rot	- Phytophthora	1	0	1
SERVICEBERRY (Amelanchier)					
	Cedar/Quince rust	- Gymnosporangium	1	0	1
	Environmental	- cold injury	0	1	1
	Fire blight	- Erwinia	1	0	1
SILVERBELL (Halesia)					
	No disease		1		1
SPIREA (Spiraea)					
	No disease		1		1
SPRUCE (Picea)					
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	5	0	5
	Decline	- unknown	3	0	3
	Environmental stresses		6	0	6
	Inadequate specimen, no disease		30		30
	Insect injury		13	4	17
	Needle blight	- Stigmina	15	1	16
	Needle cast	- Rhizosphaera	17	0	17
	Needle decay	- Pestalotiopsis	0	1	1
	Physical injury	- topping	0	1	1
	Root rot	- Phytophthora	2	0	2
	Tip blight	- Diplodia	1	0	1
ST. JOHN'S WORT (Hypericum)					
	Cultural	- planted too deep	1	0	1
	Dieback	- unknown	1	0	1
SUMAC (Rhus)					
	Insect injury		1	0	1

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SWEETGUM (Liquidambar)					
	Chemical injury	- growth regulator	1	0	1
	No disease		1		1
SYCAMORE and PLANETREE (Platanus)					
	Anthracnose	- Apiognomonina	2	0	2
	Insect injury		1	0	1
	Powdery mildew	- Oidium	1	0	1
TAXUS (Taxus)					
	Canker	- Pestalotia	1	0	1
	Cultural	- transplant shock	1	0	1
	Dieback	- unknown	4	0	4
	Inadequate specimen, no disease		9		9
	Insect injury		1	1	2
	Physical injury	- pruning	1	0	1
	Root rot	- Phytophthora	10	0	10
TULIPTREE (Liriodendron)					
	Environmental stresses		2	0	2
	Girdling root	- cultural	1	0	1
	No disease		2		2
	Wilt	- Verticillium	1	0	1
VIBURNUM (Viburnum)					
	Dieback	- unknown	1	0	1
	Environmental stresses		2	0	2
	Leaf blight	- Phytophthora	3	0	3
	No disease		67		67
	Root/Collar rot	- Phytophthora	3	0	3
WALNUT (Juglans)					
	Bacterial blight	- Xanthomonas	1	0	1
	Bunch disease	- Phytoplasma	1	0	1
	Environmental stresses		4	0	4
	Insect injury		3	1	4
	Nut decay	- fungal	0	2	2
		- Fusarium	1	0	1
		- Trichothecium	1	0	1
	Nut drop	- unknown	0	1	1
	Leaf spot	- Mycosphaerella	1	0	1
WEIGELA (Weigela)					
	No disease		1		1
WILLOW (Salix)					
	Canker	- Botryosphaeria	1	0	1
		- Cytospora	1	0	1
	Insect injury		4	0	4
	Leaf spot	- Cercospora	1	0	1
	No disease		1		1
YELLOWWOOD (Cladrastis)					
	Cultural	- transplant shock	1	0	1

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VEGETABLES					
ASPARAGUS (Asparagus)					
	Crown rot	- Fusarium	1	0	1
	No disease		1		1
BEAN (Phaseolus)					
	Air pollution	- ozone	1	0	1
	Angular leaf spot	- Phaeoisariopsis	2	0	2
	Anthracnose	- Colletotrichum	3	0	3
	Ashy stem blight	- Macrophomina	1	0	1
	Black root rot	- Thielaviopsis	1	0	1
	Environmental	- sunscald	1	0	1
	Inadequate specimen, no disease		9		9
	Insect injury		5	3	8
	Leaf spot	- Cercospora	2	1	3
		- Phoma	0	1	1
	Nutritional	- general	0	1	1
	Poor fruit set	- unknown	1	0	1
	Root/stem rot	- fungal	0	1	1
		- Rhizoctonia	6	1	7
	Rust	- Uromyces	0	1	1
	Southern blight	- Sclerotium	6	0	6
	Stem blight	- Pythium	1	0	1
	Stem rot	- Fusarium	1	0	1
		- Rhizoctonia	2	1	3
	Virus	- unknown	3	1	4
	Wilt	- Fusarium	1	0	1
BEET (Beta)					
	Root knot nematode	- Meloidogyne	1	0	1
BROCCOLI - See listing under CRUCIFERS					
CABBAGE - See listing under CRUCIFERS					
CANTALOUPE - See listing under CUCURBITS					
CARROT (Daucus)					
	Leaf spot	- Cercospora	1	0	1
	Environmental	- compaction	0	1	1
CORN, SWEET (Zea)					
	Chemical injury	- herbicide	1	0	1
	Crazy top	- Sclerophthora	1	0	1
	Environmental	- compaction	1	0	1
	Inadequate specimen, no disease		2		2
	Insect injury		3	0	3
	Mutation	- genetic	1	0	1
	Nutritional	- fertilizer burn	3	0	3
		- phosphorus deficiency	0	1	1
	Root/Stem rot	- Rhizoctonia	1	0	1
	Smut	- Ustilago	1	0	1

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CRUCIFERS - BROCCOLI, and CABBAGE (Brassica)					
	Environmental	- stress	1	0	1
	Leaf spot	- Alternaria	0	1	1
	No disease		3		3
	Nutritional	- general	1	0	1
	Root/Stem rot	- Phytophthora	1	0	1
	Root rot	- Pythium	1	0	1
	Stem rot	- Alternaria	1	0	1
	Virus	- unknown	1	0	1
	Wire stem	- Rhizoctonia	3	0	3
CUCUMBER - See listing under CUCURBITS					
CUCURBITS - CANTALOUPE, CUCUMBER, MELON (Cucumis), GOURD, PUMPKIN, SQUASH (Cucurbita) and WATERMELON (Citrullus)					
	Angular leaf spot	- Pseudomonas	1	0	1
	Anthracnose	- Colletotrichum	7	0	7
	Bacterial soft rot	- Erwinia	1	0	1
	Bacterial spot	- bacterial	1	0	1
	Bacterial wilt	- Erwinia	6	0	6
	Blight	- Plectosporium	3	0	3
	Chemical injury	- herbicide	1	0	1
	Cultural	- insufficient water	1	0	1
		- transplant shock	2	0	2
	Downy mildew	- Pseudoperonospora	1	0	1
	Environmental stresses		4	1	5
	Fruit decay	- Fusarium	1	1	2
	Fruit rot	- Phytophthora	1	0	1
		- Pythium	1	0	1
	Gummy stem blight	- Didymella	2	1	3
	Inadequate specimen, no disease		29		29
	Insect injury		6	6	12
	Leaf blight	- Alternaria	2	2	4
	Leaf scorch	- unknown	1	1	2
	Leaf spot	- Cercospora	1	1	2
	Nutritional	- magnesium deficiency	2	0	2
		- nitrogen deficiency	1	0	1
	Physical injury	- unknown	2	1	3
	Pollination problem	- unknown	1	0	1
	Powdery mildew	- Oidium	1	0	1
		- Sphaerotheca	2	0	1
	Root rot	- Pythium	7	1	8
	Root/stem rot	- Rhizoctonia	3	0	3
	Stem girdling	- physical injury	1	0	1
	Virus	- potyvirus	1	1	2
		- unknown	2	0	2

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EGGPLANT (Solanum)					
	Insect injury		1	0	1
	Leaf spot	- Septoria	1	0	1
KALE - See listing under CRUCIFERS					
LETTUCE (Lactuca)					
	Drop	- Sclerotinia	1	0	1
	No disease		1		1
ONION (Allium)					
	Bacterial soft rot	- Erwinia	0	1	1
	Black mold	- Aspergillus	1	0	1
	Environmental	- hail injury	1	0	1
	No disease		2		2
	Pink root	- Phoma	0	1	1
	Purple blotch	- Alternaria	3	0	3
	Root rot	- Pythium	1	0	1
		- Rhizoctonia	1	0	1
	Sour skin	- Pseudomonas	1	1	2
PEA (Pisum)					
	Anthracnose	- Colletotrichum	0	1	1
	Root rot	- Pythium	0	1	1
		- Rhizoctonia	1	0	1
	Root/Stem rot	- fungal			
PEPPER (Capsicum)					
	Bacterial spot	- Xanthomonas	17	0	17
	Blossom end rot	- calcium deficiency/dry	4	0	4
	Chemical injury	- growth regulator	1	0	1
		- unknown	1	0	1
	Environmental stresses		3	0	3
	Fruit rot	- Pythium	1	0	1
	Inadequate specimen, no disease		5		5
	Insect injury		1	0	1
	Nutritional	- fertilizer burn	1	0	1
		- general	2	0	2
		- nitrogen deficiency	1	0	1
		- potassium deficiency	1	0	1
	Physical injury	- unknown	1	0	1
	Root rot	- Pythium	1	0	1
	Southern blight	- Sclerotium	9	0	9
	Stem rot	- Fusarium	1	0	1
	Wilt	- fungal	1	0	1

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POTATO (Solanum)					
	Bacterial soft rot	- Erwinia	1	1	2
	Black dot	- Colletotrichum	1	0	1
	Black leg	- Erwinia	1	0	1
	Brown spot	- Alternaria	0	1	1
	Chemical injury	- herbicide	1	0	1
	Dry rot	- Fusarium	3	0	3
	Insect injury		2	0	2
	Late blight	- Phytophthora	2	0	2
	No disease		4		4
	Scab	- Streptomyces	4	0	4
	Stem rot	- Rhizoctonia	0	1	1
	Wilt	- Fusarium	1	0	1
PUMPKIN - See listing under CUCURBITS					
RHUBARB (Rheum)					
	Root/Crown rot	- Phytophthora	3	0	3
	Inadequate specimen, no disease		3		3
SQUASH - See listing under CUCURBITS					
SWEETPOTATO (Ipomoea)					
	Bacterial soft rot	- Erwinia	1	0	1
	Environmental	- growth crack	1	1	2
	Root rot	- Fusarium	1	0	1
	Scurf	- Monilochaetes	1	2	3
	Wilt	- Fusarium	1	0	1
SWISS CHARD (Beta)					
	Inadequate specimen		1		1

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TOMATO (Lycopersicon)					
	Air pollution	- ethylene	2	0	2
	Anthracnose	- Colletotrichum	2	0	2
	Bacterial canker	- Clavibacter	7	0	7
	Bacterial speck	- Pseudomonas	4	0	4
	Bacterial spot	- Xanthomonas	4	2	6
	Blossom end rot	- calcium deficiency/dry	8	0	8
	Buckeye rot	- Phytophthora	1	0	1
	Catfacing	- environmental	2	3	5
	Chemical injury	- growth regulator	27	1	28
		- herbicide	5	0	5
		- unknown	3	0	3
	Cultural	- various	3	0	3
	Early blight	- Alternaria	21	0	21
	Environmental stresses		9	1	10
	Flower abortion	- unknown	1	0	1
	Fruit distortion	- unknown	1	0	1
	Fruit rot	- Pythium	2	0	2
		- unknown	2	0	2
	Fruit spot	- physiological	0	1	1
	Gray mold	- Botrytis	4	2	6
	Growth crack	- physiological	1	1	2
	Inadequate specimen, no disease		33		33
	Insect injury		7	8	15
	Late blight	- Phytophthora	16	0	16
	Leaf scorch	- unknown	4	1	5
	Leaf mold	- Fulvia	7	0	7
	Leaf spot	- Septoria	35	4	39
	Nutritional	- excessive nitrogen	1	0	1
		- general	7	0	7
		- magnesium deficiency	3	2	5
		- nitrogen deficiency	2	1	3
		- pH high	0	1	1
		- phosphorus deficiency	0	1	1
		- potassium deficiency	2	0	2
		- soluble salts	5	1	6
	Physical injury	- unknown	3	0	3
	Pith necrosis	- Pseudomonas	2	0	2
	Root knot nematode	- Meloidogyne	2	0	2
	Root rot	- Pythium	8	1	9
		- Rhizoctonia	1	2	3
	Southern blight	- Sclerotium	8	0	8
	Stem girdling	- physical injury	3	0	3
	Stem rot	- Sclerotinia	6	0	6
	Target spot	- Corynespora	2	0	2
	Virus	- Tobacco mosaic	2	0	2
		- Tomato spotted wilt	3	0	3
	Walnut wilt	- juglone	1	0	1
	Wilt	- Fusarium	5	0	5
	Yellow shoulder	- unknown	1	0	1

WATERMELON - See listing under CUCURBITS

TOTALS 4010 373 4828