

**UK** UNIVERSITY OF KENTUCKY  
College of Agriculture

**Plant Diseases  
in  
Kentucky**

**Plant Disease Diagnostic Laboratory  
Summary**

**2008**

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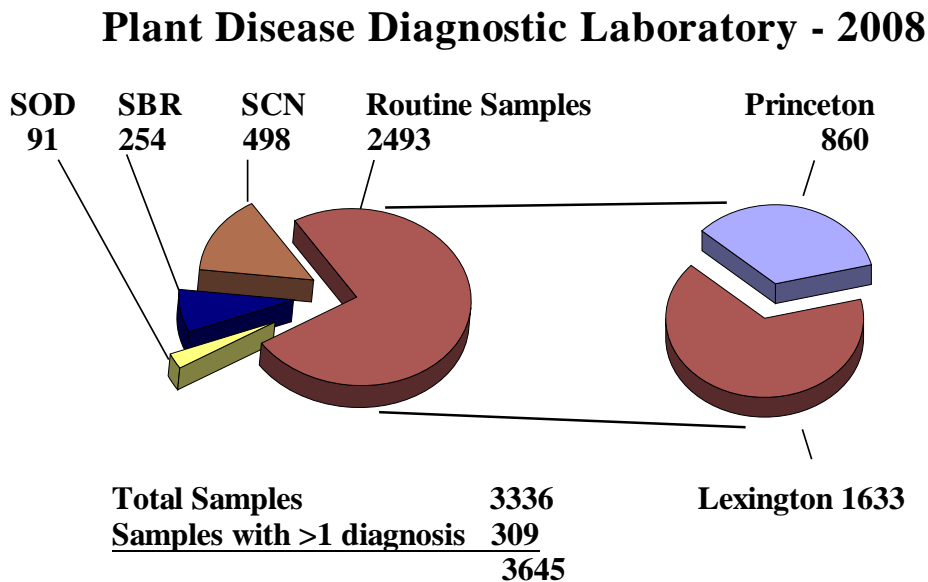
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## INTRODUCTION

The Plant Disease Diagnostic Laboratory (Lexington and Princeton) handled 2838 plant samples and 498 nematode soil samples during 2008. Plant samples with more than one problem numbered 309 bringing the total number of actual diagnoses to 3645. The Lexington Laboratory diagnosed 1724 specimens. Of that number there were 1633 routine plant samples; and 91 samples from commercial nurseries from the survey work for the occurrence of the Sudden Oak Death (SOD) pathogen. The SOD samples are included in the total number of samples in Figure 1 below, within the totals for rhododendron and viburnum samples, and a summary report on page 24. The Princeton Laboratory's specimens totaled 1612: of that number 860 were plant samples; 254 were Soybean Rust (SBR) sentinel plot samples; and 498 were soil samples submitted exclusively for soybean cyst nematode analysis. The SBR samples are included in the total number of samples in Figure 1 below and in the rest of this summary. In addition to the specimens processed in the laboratory, 173 cases were also submitted in 2008 through the Digital Consulting System for consultation by 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. 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 the new 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 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 normal temperatures and rainfall

Temperatures for the period averaged 32.7 degrees across the state which was 0.4 degrees below normal. High temperatures averaged 42 in the West and 42 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 26 degrees in the West to 27 degrees in the East. Departure from normal low temperature ranged from 2 degrees above normal in the West to 4 degrees above normal in the East.

Rainfall for the period totaled 3.12 inches statewide which was 0.60 inches below normal. Rainfall totals by climate division, West 2.74 inches, Central 3.93 inches, Bluegrass 3.19 inches and East 2.79 inches, which was 0.96, 0.09, 0.26 and 0.91 inches respectively below normal, respectively.

### **February:** Normal temperatures and above normal rainfall

Temperatures for the period averaged 37.6 degrees across the state which was 0 degrees from normal and 4.9 degrees higher than the previous month. High temperatures averaged from 46 in the West to 47 in the East. Departure from normal high temperatures ranged from 5 degrees below normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 31 degrees in the West to 32 degrees in the East. Departure from normal low temperature ranged from 4 degrees above normal in the West to 6 degrees above normal in the East.

Rainfall for the period totaled 4.28 inches statewide which was 0.56 inches above normal. Rainfall totals by climate division, West 5.20 inches, Central 4.03 inches, Bluegrass 4.84 inches and East 3.38 inches, which was respectively 1.16 inches above normal, 0.10 inches below normal, 1.40 inches above normal and 0.09 inches below normal, respectively.

### **March:** Above normal rainfall and below normal temperatures

Moderate La Nina conditions left their mark on the Bluegrass State as above normal rainfall was reported for the second month in a row. Several heavy rainfall events created periodic flooding situations across the Commonwealth, especially along the Ohio River.

Temperatures for the period averaged 44.5 degrees across the state which was 2 degrees below normal and 6.9 degrees above the previous month. High temperatures averaged from 56 in the West to 55 in the East. Departure from normal high temperatures ranged from 5 degrees below normal in the West to 1 degree 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 2 degrees above normal in the West to 2 degrees above normal in the East.

Rainfall for the period totaled 6.81 inches statewide which was 2.14 inches above normal. Rainfall

totals by climate division, West 8.64 inches, Central 7.39 inches, Bluegrass 7.03 inches and East 4.83 inches, which was 3.96, 2.52, 2.68 and 0.43 inches respectively above normal, respectively.

**April:** Above normal rainfall and normal temperatures

Temperatures for the period averaged 56 degrees across the state which was normal for this month. High temperatures averaged from 67 in the West to 67 in the East. Departure from normal high temperatures ranged from 5 degrees below normal in the West to 1 degree above normal in the East. Low temperatures averaged from 46 degrees in the West to 47 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.

Rainfall for the period totaled 5.59 inches statewide which was 1.32 inches above normal. Rainfall totals by climate division, West 7.21 inches, Central 6.15 inches, Bluegrass 5.23 inches and East 4.19 inches, which was 2.68, 1.95, 1.34 and 0.37 inches respectively above normal, respectively.

**May:** Below Normal Temperatures and Normal Rainfall

After receiving copious amounts of rainfall for 3 straight months, the Commonwealth experienced moderating rainfall with normal rain totals being reported in May. Temperatures continued to be mild in 2008. Above normal temperatures had not been reported for a monthly period yet this year.

Temperatures for the period averaged 62 degrees across the state which was 3 degrees below normal and 6 degrees above the previous month. High temperatures averaged from 75 in the West to 73 in the East. Departure from normal high temperatures ranged from 6 degrees below normal in the West to 3 degrees below normal in the East. Low temperatures averaged from 54 degrees in the West to 52 degrees in the East. Departure from normal low temperature was 3 degrees below normal in the West and 3 degrees below normal in the East.

Rainfall for the period totaled 5.00 inches statewide which was 0 inches from normal. Rainfall totals by climate division, West 6.10 inches, Central 6.05 inches, Bluegrass 4.98 inches and East 3.37 inches, which was respectively 1.12 inches above normal, 0.79 inches above normal, 0.07 inches above normal and 1.48 inches below normal, respectively.

**June:** Above normal temperatures and below normal rainfall

Temperatures for the period averaged 75 degrees across the state which was 2 degrees above normal and 13 degrees warmer than the previous period. High temperatures averaged from 87 in the West to 85 in the East. Departure from normal high temperatures ranged from 0 degrees from normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 67 degrees in the West to 64 degrees in the East. Departure from normal low temperature ranged from 3 degrees above normal in the West to 2 degrees above normal in the East.

Rainfall for the period totaled 3.59 inches statewide which was 0.66 inches below normal. Rainfall totals by climate division, West 3.00 inches, Central 2.31 inches, Bluegrass 5.05 inches and East 4.00 inches, which was respectively 0.99 inches below normal, 2.05 inches below normal, 0.70 inches above normal and 0.33 inches below normal, respectively.

**July:** Below normal temperatures and above normal rainfall

Temperatures for the period averaged 75 degrees across the state which was 1 degree below normal. High temperatures averaged from 89 in the West to 86 in the East. Departure from normal high temperatures ranged from 1 degree below normal in the West to 0 degrees from normal in the East. Low temperatures averaged from 67 degrees in the West to 65 degrees in the East. Departure from normal low temperature ranged from 1 degree above normal in the West to 0 degrees from normal in the East.

Rainfall for the period totaled 5.11 inches statewide which was 0.72 inches above normal. Rainfall totals by climate division, West 5.71 inches, Central 5.59 inches, Bluegrass 4.00 inches and East 5.05 inches, which was respectively 1.60 inches above normal, 1.08 inches above normal, 0.52 inches below normal and 0.60 inches above normal, respectively.

**August:** Below normal temperatures and rainfall

Temperatures for the period averaged 74 degrees across the state which was 1 degree below normal. High temperatures averaged from 87 in the West to 85 in the East. Departure from normal high temperatures ranged from 0 degrees from normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 64 degrees in the West to 63 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 1.61 inches statewide which was 1.99 inches below normal. Rainfall totals by climate division, West 0.86 inches, Central 0.88 inches, Bluegrass 1.62 inches and East 2.72 inches, which was 2.33, 2.64, 2.10 and 1.19 inches respectively below normal, respectively.

**September:** Below normal rainfall and above normal temperatures

September proved to be an exceptionally dry month which continued a drying trend that had been seen throughout much of the summer. In fact, moderate to severe drought conditions returned to the majority of the Commonwealth during the final week of the period. The period of August 1 to September 30, 2008, was the 2nd driest for that time frame in the past 114 years.

Temperatures for the period averaged 71 degrees across the state which was 3 degrees above normal. High temperatures averaged from 84 in the West to 84 in the East. Departure from normal high temperatures ranged from 3 degrees above normal in the West to 6 degrees above normal in the East. Low temperatures averaged from 60 degrees in the West to 60 degrees in the East. Departure from normal low temperature ranged from 2 degrees above normal in the West to 5 degrees above normal in the East.

Rainfall for the period totaled 1.07 inches statewide which was 2.41 inches below normal. Rainfall totals by climate division, West 1.00 inches, Central 1.33 inches, Bluegrass 0.99 inches and East 0.99 inches, which was 2.37, 2.57, 2.27 and 2.42 inches respectively below normal, respectively.

**October:** Normal Temperatures and Below Normal Rainfall

The dry weather pattern continued in the Commonwealth during October with below normal rainfall being reported for the 4th time in the past 5 months. Although rainfall amounts were below normal, the Bluegrass State did receive more rain than the previous 2 months as several frontal systems swept through the region.

Temperatures for the period averaged 57 degrees across the state which was 0 degrees from normal. High temperatures averaged from 71 in the West to 69 in the East. Departure from normal high temperatures ranged from 1 degree above normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 46 degrees in the West to 45 degrees in the East. Departure from normal low temperatures ranged from 1 degree below normal in the West to 1 degree below normal in the East.

Rainfall for the period totaled 2.51 inches statewide which was 0.55 inches below normal. Rainfall totals by climate division, West 3.08 inches, Central 3.13 inches, Bluegrass 1.75 inches and East 2.12 inches, which was 0.09, 0.07, 1.18 and 0.81 inches respectively below normal, respectively.

**November:** Below normal temperatures and rainfall

Temperatures for the period averaged 43 degrees across the state which was 4 degrees below normal. High temperatures averaged from 55 in the West to 53 in the East. Departure from normal high temperatures ranged from 5 degrees below normal in the West to 3 degrees below normal in the East. Low temperatures averaged from 35 degrees in the West to 34 degrees in the East. Departure from normal low temperature ranged from 3 degrees below normal in the West to 0 degrees from normal in the East.

Rainfall for the period totaled 2.67 inches statewide which was 1.37 inches below normal. Rainfall totals by climate division, West 2.57 inches, Central 2.23 inches, Bluegrass 2.59 inches and East 3.11 inches, which was 1.95, 2.07, 1.08 and 0.63 inches respectively below normal, respectively.

**December:** Near Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 37 degrees across the state which was 0 degrees from normal. High temperatures averaged from 45 in the West to 46 in the East. Departure from normal high temperatures ranged from 1 degrees below normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 28 degrees in the West to 29 degrees in the East. Departure from normal low temperature ranged from 1 degree below normal in the West to 6 degrees above normal in the East.

Rainfall for the period totaled 6.41 inches statewide which was 2.13 inches above normal. Rainfall totals by climate division, West 6.74 inches, Central 7.07 inches, Bluegrass 5.58 inches and East 6.24 inches, which was 2.16, 2.25, 1.61 and 2.37 inches respectively above normal, respectively.

## CROP SUMMARIES

**Tobacco:** The number of tobacco samples for 2008 (326) dropped below last year's total (374) which were down significantly from 2006 (536) and 2005 (528) and was the lowest total since accurate records started to be recorded in 1976. After four consecutive years of being first to report Blue Mold (*Peronospora tabacina*) in the U.S., Kentucky relinquished this dubious honor to Florida. Also there were only two blue mold samples confirmed through lab samples. The number of Black Shank (*Phytophthora parasitica* var. *nicotianae*) samples was significantly less than the last two years. The number of cases of Tomato Spotted Wilt virus were down significantly from last year. Target Spot (*Thanatephorus cucumeris*) continued to be a significant problem in the field.

### **Other agronomic crops:**

**Corn:** A few samples with ear/kernel rot were the only samples with a primary diagnosis caused by a pathogenic organism.

**Soybean:** Australasian Soybean Rust (SBR; *Phakopsora pachyrhizi*) was detected in Kentucky, October 16, 2008, nearly a month after last year's date, September 20, 2007. The fungus was found on soybean leaves within the sentinel plot located in Ballard Co. In all, SBR was found on 4 samples; all soybeans, none on kudzu.

**Small Grains:** There were several samples of Wheat Streak Mosaic Virus which had symptoms similar to what are usually seen with Wheat Spindle Streak Mosaic Virus (WSSMV). It is speculated that the abundant volunteer corn crop in the late summer and fall of 2007 was the green bridge needed for the pathogen and vector to survive and move to the wheat crop.

**Forages:** There were a low level of diseases in the forage crop samples sent to the laboratory. We did find Leaf Rust on two samples of Switchgrass from biomass research plots in the Lexington area.

### ***Fruit and Vegetable Plant Disease Observations:***

Diagnosing fruit and vegetable diseases involves a great deal of research into the possible causes of the problems. Most visual diagnoses include 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 immunosorbant assay (ELISA), polymerase chain reaction (PCR) assay, electron microscopy, nematode extraction, or soil pH and soluble salts tests. Diagnoses which require consultation with UK faculty plant pathologists and horticulturists and which need culturing, ELISA, or PCR are common for commercial fruits and vegetables. The Extension plant pathology group has tested protocols in our laboratory for PCR detection of several pathogens of interest to fruit and vegetable growers. These include the difficult-to-diagnose pathogens causing bacterial wilt of cucurbits, bacterial leaf spot of pepper, cucurbit yellow vine decline, and Pierce's disease of grape. The laboratory also has a role in monitoring pathogen resistance to fungicides and bactericides. These exceptional measures are efforts well spent because fruits and vegetables are high-value crops. Computer-based laboratory records are maintained to provide information used for conducting plant disease surveys, identifying new disease outbreaks, and formulating educational programs. New homeland security rules now require reporting of all diagnoses of plant diseases to USDA-APHIS on a real-time basis.

The 2008 growing season was better than the 2007 season. January had lower-than-normal temperatures and precipitation. February began with destructive severe weather that produced one of the highest tornado totals for a single weather event that the Commonwealth has experienced. A couple of winter weather systems that created an icy situation across the state caused significant branch breakage to many trees and larger woody plants. In March, there were several heavy rainfall events which created periodic flooding across the Commonwealth, especially along the Ohio River. The first part of April continued with above-average rainfall (the period from October 1, 2007, through April 19, 2008, was the wettest ever recorded during that time in Louisville with 41.28 inches of rain), but the latter half of the month was relatively dry. Temperatures for April were average. May saw below-normal temperatures and normal rainfall. In June temperatures were above normal and rainfall below normal. There were below-normal temperatures and above-normal rainfall in July, but the end of the month saw the beginning of a significant dry period across the state which continued through October. The period of August 1 to September 30, 2008, was the second driest for that time frame in the past 114 years.

The abundant rainfall at bud break and beyond provided optimum conditions for many diseases such as scab, cedar-apple rust and bitter rot of apple, black rot of grape, anthracnose of strawberry, leaf curl of peach, and plum pockets to be widespread. In vegetable crops, foliar diseases were also quite common early to mid-season but tapered off significantly during the dry weather in mid- to late summer.

### ***New, Emerging, and Problematic Fruit and Vegetable Diseases in Kentucky:***

Grape crown gall caused by *Agrobacterium vitis* continues to affect vineyards, particularly in vines with freeze injury or other wounding.

Plum pockets disease (*Taphrina communis*) was an unusual find. Although the related disease, peach leaf curl, is a common occurrence, plum pockets is seen less often in Kentucky, and leaf/twig infections, as were found this year, are seen even more infrequently. Leaves and developing shoots become thickened, curled, and deformed; infected fruits are much larger than normal and hollow.

Some cucurbit crops, particularly cucumber and summer squash, had poor fruit production and uneven development due to poor pollination. Although certain environmental conditions can adversely



affect pollination, the most likely scenario for many commercial growers and home gardeners this year was inadequate pollinator populations.

Tomato yellow leaf curl virus was diagnosed for only the second time in Kentucky. This virus is vectored by *Bemisia* species of whitefly, and both vector and virus are not known to overwinter in Kentucky. Prompt destruction of infected plants is needed to prevent possible overwintering of this disease in greenhouses.

Tobacco mosaic virus (TMV) is being seen in tomato plantings more frequently due to the rise in popularity of heirloom tomato varieties, most of which have no resistance to TMV. Some commercially grown tomato varieties are also susceptible to TMV. The virus spreads easily via mechanical transmission. At least one commercial producer saw extensive TMV infection throughout a large planting.

Spinach white rust (*Albugo occidentalis*) was diagnosed from a home garden planting. This disease is favored by cool temperatures and high humidity. It is not common in Kentucky.

Sclerotinia fruit rot (*Sclerotinia sclerotiorum*), favored by cool, moist weather, was found in a commercial cucumber planting.

### **Tree Fruit Diseases:**

**Pome Fruits:** Common foliar diseases of apple were abundant this year, particularly apple scab (*Venturia inaequalis*), cedar-apple rust (*Gymnosporangium juniperi-virginianae*), and frog-eye leaf spot (*Botryosphaeria obtusa*). *Botryosphaeria* branch cankers were also common on apple. Most fire blight (*Erwinia amylovora*) infections of apple and pear occurred on April 9 and 10 with symptoms appearing about one month later. A number of cases of bitter rot (*Glomerella cingulata*) were diagnosed as late-season apple fruit rot symptoms became visible.

**Stone Fruits:** Scab (*Cladosporium carpophilum*) and brown rot (*Monilinia fructicola*) were diagnosed on apricot and peach, while brown rot was also seen on cherry. Spring rains favored the development of peach leaf curl (*Taphrina deformans*), and the related disease plum pockets (*Taphrina communis*) was also diagnosed (see above).

### **Small Fruit Diseases:**

**Grapes:** Foliar diseases were common due to wet spring weather and high humidity throughout the season. Black rot (*Guignardia bidwellii*) was quite common; anthracnose (*Elsinoe ampelina*), Phomopsis cane and leaf spot (*Phomopsis viticola*), powdery mildew (*Uncinula necator*), and downy mildew (*Plasmopara viticola*) were diagnosed. Crown gall (*Agrobacterium vitis*) continues to damage certain plantings.

**Brambles:** Cane blight (*Leptosphaeria coniothyrium*) and spur blight (*Didymella applanata*) were both diagnosed on blackberry canes. Double blossom disease, also known as rosette (*Cercospora rubi*), was diagnosed in a number of blackberry samples. Enlargement of the sepals and flower buds is a characteristic, early-season symptom of the disease; infected canes fail to fruit and eventually die back.

**Blueberries:** Root and collar rot caused by *Phytophthora* spp. and twig blight (*Botryosphaeria dothidea*) were diagnosed.

**Strawberries:** Diseases were common, including leaf spot (*Mycosphaerella fragariae*) as well as a case of black seed disease caused by the same fungus, leaf blight (*Phomopsis obscurans*), anthracnose (*Colletotrichum acutatum*) causing foliar symptoms, crown rot and fruit decay, angular leaf spot (*Xanthomonas fragariae*), black root rot (various fungi), and crown rot (*Phytophthora cactorum*).

### **Vegetable diseases:**

**Vegetable transplants:** *Pythium* (*Pythium* sp.) root rot and/ or damping off were seen in vegetable transplants, including cabbage, lettuce, and tomato.

**Beans:** Foliar diseases including Ascochyta leaf spot (*Phoma exigua*), Cercospora leaf spot (*Cercospora* sp.), and common bacterial blight (*Xanthomonas phaseoli*) and foliar and pod infections of anthracnose (*Glomerella lindemuthianum*) were favored by wet weather early in the growing season and high humidity throughout the summer. Root diseases (*Rhizoctonia* sp., *Fusarium* sp., *Pythium* sp.) and southern blight (*Sclerotium rolfsii*) were also observed on bean.

**Cucurbits:** Bacterial wilt (*Erwinia tracheiphila*), which is vectored primarily by the striped cucumber beetle (*Acalymma vittatum*), was problematic in cucurbit crops this year, particularly in cucumber and melon fields. Anthracnose (*Colletotrichum orbiculare*), Alternaria leaf blight (*Alternaria cucumerina*), and powdery mildew (*Podosphaera xanthii* and *Erysiphe cichoracearum*) were common foliar diseases in all cucurbit crops. Powdery mildew pressure was extremely high on pumpkin, squash, and even watermelon. Gummy stem blight (*Didymella bryoniae*) was problematic in certain fields, particularly in watermelon and cantaloupe. Aphid-vectored viruses (zucchini yellow mosaic virus and the potyvirus complex) were also diagnosed on cucurbits.

**Tomatoes:** Diseases of tomato were abundant in 2008. Foliar diseases such as early blight (*Alternaria solani*), Septoria leaf spot (*Septoria lycopersici*), bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*), and bacterial speck (*Pseudomonas syringae* pv. *tomato*) were common this year even though dry conditions starting in midsummer prevented high levels of late-season disease. Timber rot (*Sclerotinia sclerotiorum*) was diagnosed from several locations, as were southern blight (*Sclerotium rolfsii*) and root knot nematode (*Meloidogyne incognita*). Bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*) was found in some commercial plantings. Fusarium wilt (*Fusarium oxysporum* f. sp. *lycopersici*) was diagnosed a number of times, most often in home garden plantings and heirloom or older varieties lacking wilt resistance. Tobacco mosaic virus, tomato spotted wilt virus, and tomato yellow leaf curl virus were diagnosed.

**Peppers:** Bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) was the most common disease of pepper this year. Anthracnose (*Colletotrichum gloeosporioides*), southern blight (*Sclerotium rolfsii*), and alfalfa mosaic virus were also seen.

**Other vegetables:** Drop (*Sclerotinia* sp.) and gray mold (*Botrytis cinerea*) were diagnosed on lettuce in high tunnel production systems. Bacterial soft rot (*Erwinia chrysanthemi* pv. *zoeae*) was diagnosed on sweet corn from several home gardens. Common scab (*Streptomyces scabies*) and Verticillium wilt (*Verticillium* sp.) were diagnosed on potato. Spinach white rust (*Albugo occidentalis*) was an unusual find.

### **Landscape Plant Disease Observations:**

Plant diseases play a significant role in production and maintenance of landscape plants in Kentucky. The first step in appropriate pest management in the landscape and nursery is an accurate diagnosis of the problem. The U.K. Plant Disease Diagnostic Laboratory assists the landscape industry of Kentucky in this effort. To serve their clients effectively, landscape industry professionals, such as arborists, nursery operators, and landscape installation and maintenance organizations need to be aware of recent plant disease history and the implications for landscape maintenance. As previously mentioned, making a diagnosis involves a great deal of research into the possible causes of the plant problem, and many types of testing may be necessary. Like fruit and vegetable samples, the variety of ornamental plant samples received makes diagnosis more difficult.

To assist County Extension Agents in dealing with plant disease issues, we also rely on our digital consulting system utilizing photographic images. When the system is used to assist in diagnosis, the images can help us determine where and how agents should collect samples for submission to the laboratory. The digital consulting system is especially useful in providing advice about landscape tree and shrub diseases and disorders because whole plants are difficult to send to the laboratory. Of the 173 cases in 2008, 36% dealt with landscape and nursery plants.

The 2008 growing season was kinder than the 2007 season, but not by a lot. January had slightly lower-than-normal temperatures and precipitation. February began with destructive severe weather that produced one of the highest tornado totals from a single weather event that the Commonwealth has experienced. A couple of winter weather systems that created an icy situation across the state caused significant branch breakage to many trees and large shrubs. In March there were several heavy rainfall events that created periodic flooding across the Commonwealth, especially along the Ohio River. The first part of April continued with above-average rainfall (the period from October 1, 2007, through April 19, 2008, was the wettest ever recorded during that time in Louisville, with 41.28 inches of rain), but the latter half of the month was relatively dry. Temperatures for April were average. May saw below-normal temperatures and normal rainfall. In June temperatures were above normal and rainfall below normal. Temperatures were below normal and rainfall was above normal in July, but the end of the month saw the beginning of a significant dry period across the state, which has continued through October. The period of August 1 to September 30, 2008, was the second driest for that time frame in the past 114 years.

The abundant rainfall at budbreak and beyond provided optimum conditions for many diseases like scab, anthracnose, black spot of rose, cedar/apple and cedar/quince rusts to be widespread. Bark cracking was also noted in some woody trees and shrubs, due to the 2007 spring freeze and summer-long drought.

Landscape plant diseases were common this year and included those favored by wet spring weather (e.g., leaf spot diseases) and those enhanced by drought conditions in 2007 and 2008 (e.g., cankers, wilts). The following important or unusual diseases were observed:

***Deciduous trees:***

- Ash, buckeye, chestnut, maple oak and sycamore anthracnose (*Discula*, *Glomerella*, *Kabatiella*, *Apiognomonina*) and dogwood spot anthracnose (*Elsinoe*).
- Crabapple scab (*Venturia*)
- Honeylocust and redbud leaf spot (*Cercospora*); birch leaf spot (*Gloeosporium*)
- Dogwood, oak, and crapemyrtle powdery mildew (*Microsphaera*, *Phyllactinia*)
- Witchhazel leaf blotch(*Phyllosticta*)
- Serviceberry rust (*Gymnosporangium*)
- Oak leaf blister (*Taphrina*) and Actinopelte leaf spot (*Tubakia*)
- Flowering pear, serviceberry, and flowering crabapple fire blight (*Erwinia*)
- Birch, elm, maple, oak, redbud and willow cankers (*Botryosphaeria*, *Cytospora*, *Phomopsis*)
- Maple and oak bacterial leaf scorch (*Xylella*)
- Redbud and yellowwood wilt (*Verticillium*)
- Dutch elm disease (*Ophiostoma*)
- Dogwood root/crown rot (*Phytophthora*)
- Serviceberry root rot (*Armillaria*)

***Needle Evergreens:***

- Leyland cypress blight (Seridium) and canker (Botryosphaeria)
- Pine tip blight (Diplodia) and needle spot (Mycosphaerella)
- Spruce needle cast/blight (Rhizosphaeria and Stigmina)
- Taxus root rot (Phytophthora)
- White pine and spruce root and collar rot (Phytophthora)
- White pine and spruce canker (Cytospora)
- White pine decline (physiological)

***Shrubs:***

- Boxwood canker (Pseudonectria)
- Euonymus powdery mildew (Erysiphe)
- Holly black root rot (Thielaviopsis) and canker (Botryosphaeria)
- Hydrangea bacterial leaf spot (Xanthomonas) and fungal leaf spot (Cercospora)
- Hazelnut [filbert] blight (Anisogramma)
- Cherrylaurel root rot (Phytophthora)
- Tree peony root rot (Armillaria)
- Hibiscus Southern blight (Sclerotium)
- Rose black spot (Diplocarpon), blight (Botrytis), spot anthracnose (Sphaceloma) and rosette (possible virus, leaf curl mite-transmitted)

***Herbaceous Annuals and Perennials:***

- Hollyhock rust (Puccinia)
- Chrysanthemum, petunia, and snapdragon root rots (Pythium)
- Coreopsis, impatiens, vinca, and petunia root/crown rots (Rhizoctonia)
- Daylily leaf streak (Aureobasidium) and thrips injury
- Petunia black root rot (Thielaviopsis)
- Pachysandra stem canker and blight (Volutella)
- Phlox crown rot (Fusarium)
- Hosta root rot (Phytophthora) and foliar nematodes (Aphelenchoides)
- Osteospermum and zinnia blights (Botrytis)
- Geranium bacterial blight (Xanthomonas)
- Vinca canker (Phoma)
- Portulaca virus symptoms from the papaya mosaic virus
- Peony blight (Phytophthora)

***A Shift in Sample Types:***

As noted above, the number of tobacco samples for 2008 (326) was the lowest total since accurate records started to be recorded in 1976. 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 vegetable samples. An increasing number of these samples are of plant types which are less common and therefore require more work, testing, and time to provide an accurate diagnosis. Along with the diversification of crops, we are seeing a diversification of diseases.

### ***Disease Monitoring:***

In addition to the day-to-day diagnosis of samples, monitoring of several organisms and the diseases they cause is conducted by 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*

Copper-resistant bacterial speck of tomatoes caused by *Pseudomonas syringae* pv. *tomato*

In addition to those mentioned above and the work with Asian soybean rust and Sudden oak death, the detection of soybean cyst nematodes in new areas of the state and in soil on commercial ornamental stock for export (e.g., to Canada and California) is also conducted.

### ***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 specialists in conducting research in turf, ornamentals, corn, tobacco, forages, and fruits as well as with the Soybean rust sentinel plot in Lexington. Bernadette Amsden conducted laboratory research on vegetables, tobacco, and ornamentals, including conducting diagnostic tests (PCR, ELISA, etc.) on many plant samples. Terry Yielding works in Princeton and looked at all the Asian Soybean Rust samples as well as worked with Soybean Cyst Nematode analysis. Mary Rachel Ray provided very capable, part-time assistance in the Princeton Laboratory. Brenda Kennedy, research technician, worked her first full year in Princeton with plot research and overseeing the Soybean Cyst Nematode and Asian Soybean Rust work.

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 and IPM/PDDL Surveys. Tom Priddy, Biosystems and Ag. Engineering - Meteorology, and his staff provided information for the summary of weather conditions for 2008.

Support from the Kentucky Integrated Pest Management Program for supplemental funding of additional diagnostic testing 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 2008. 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 DIAGNOSES<sup>1</sup> BY CROP CATEGORY AND CAUSAL AGENT TYPE.**

<b>Crop Category</b>	<b>Abiotic Problems</b>	<b>Biotic<sup>2</sup> Problems</b>	<b>Chemical Injury</b>	<b>Inadequate Specimen</b>	<b>Insect Injury</b>	<b>Other<sup>3</sup></b>	<b>Total Diagnoses</b>
<b><u>Agronomic</u></b>							
<b>Corn</b>	27	5	7	2	6	6	53
<b>Forages</b>	13	12	0	2	2	5	34
<b>Small grains</b>	10	22	1	0	1	7	41
<b>Soybeans</b>	57	531*	15	2	10	252*	867
<b>Tobacco</b>	119	177	30	4	3	42	375
<b><u>Fruit</u></b>							
<b>Small fruit</b>	21	56	4	1	7	30	119
<b>Tree fruit</b>	15	107	5	2	23	12	164
<b><u>Herbs</u></b>							
	6	6	0	1	4	1	18
<b><u>Identifications</u></b>							
	0	46	0	0	0	2	48
<b><u>Ornamentals</u></b>							
<b>Herbaceous and</b>							
<b>Houseplants</b>	47	85	8	2	27	38	207
<b>Turfgrass</b>	16	54	1	4	1	42	118
<b>Woody</b>	261	302**	44	8	170	292**	1077
<b><u>Vegetables</u></b>							
	88	207	43	24	46	78	486
<b><u>Miscellaneous</u></b>							
	5	1	0	0	1	31***	38
<b>Total</b>	<b>685</b>	<b>1611</b>	<b>158</b>	<b>52</b>	<b>301</b>	<b>838</b>	<b>3645</b>

<sup>1</sup> All counts and totals include primary diagnoses plus secondary diagnoses.

<sup>2</sup> Refer to Table 2 for a further breakdown of this category.

<sup>3</sup> "Other" includes the causal agent categories: No disease and Unknown.

\* Numbers include 4 soybean samples with and 222 soybean samples without Asian Soybean Rust from the SBR sentinel plot system; and 484 soil samples with and 14 soil samples without Soybean Cyst Nematodes.

\*\*Numbers include 91 SOD samples with 22 problems caused by fungi and 69 with no diseases.

\*\*\*Number includes 28 Kudzu samples without Asian Soybean Rust from the SBR sentinel plot system.

**Table 2. SUMMARY OF BIOTIC PROBLEMS<sup>1</sup> BY CROP CATEGORY.**

<b>Crop Category</b>	<b>Bacterial</b>	<b>Fungal</b>	<b>Nematode</b>	<b>Virus</b>	<b>Other<sup>2</sup></b>
<b><u>Agronomic</u></b>					
<b>Corn</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Forages</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Small grains</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>12</b>	<b>0</b>
<b>Soybeans</b>	<b>1</b>	<b>36*</b>	<b>490**</b>	<b>4</b>	<b>0</b>
<b>Tobacco</b>	<b>3</b>	<b>149</b>	<b>2</b>	<b>23</b>	<b>0</b>
<b><u>Fruit</u></b>					
<b>Small fruit</b>	<b>4</b>	<b>51</b>	<b>0</b>	<b>1</b>	<b>0</b>
<b>Tree fruit</b>	<b>19</b>	<b>84</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b><u>Herbs</u></b>					
	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b><u>Identifications</u></b>					
	<b>0</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>31</b>
<b><u>Ornamentals</u></b>					
<b><u>Herbaceous and</u></b>					
<b>Houseplants</b>	<b>7</b>	<b>73</b>	<b>1</b>	<b>4</b>	<b>0</b>
<b>Turfgrass</b>	<b>0</b>	<b>54</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Woody</b>	<b>47</b>	<b>243***</b>	<b>0</b>	<b>2</b>	<b>10</b>
<b><u>Vegetables</u></b>					
	<b>59</b>	<b>126</b>	<b>2</b>	<b>19</b>	<b>1</b>
<b><u>Miscellaneous</u></b>					
	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>141</b>	<b>864</b>	<b>495</b>	<b>65</b>	<b>46</b>

<sup>1</sup> All counts and totals include primary diagnoses plus secondary diagnoses.

<sup>2</sup> Other includes these categories: Animal (rodent and bird damage), Plant (plant identifications or parasitic plant) and Algae, Lichen and Phytoplasma.

\* Number includes 4 soybean samples with Asian Soybean Rust from the SBR sentinel plot system.

\*\*Number includes 484 soil samples with Soybean Cyst Nematodes.

\*\*\*Number includes 22 SOD samples with problems caused by fungi.

**Table 3. NUMBER OF PLANT SAMPLES BY CROP CATEGORY**

<b>Crop Category</b>	<b>Number of Plant Specimens</b>	<b>Percentage of Total Plant Specimens</b>
<b>Agronomic (-Tobacco + 226 Soybean SBRs)</b>	<b>446</b>	<b>15.7</b>
<b>Tobacco</b>	<b>326</b>	<b>11.5</b>
<b>Fruit</b>	<b>247</b>	<b>8.7</b>
<b>Herbs</b>	<b>14</b>	<b>0.5</b>
<b>Identifications</b>	<b>48</b>	<b>1.7</b>
<b>Ornamentals (+91 SODs)</b>	<b>1272</b>	<b>44.8</b>
<b>Vegetables</b>	<b>447</b>	<b>15.8</b>
<b>Miscellaneous (includes 28 Kudzu SBRs)</b>	<b>38</b>	<b>1.3</b>
<b>Total Plant Samples (includes SBRs and SODs)</b>	<b>2838</b>	<b>100.0</b>



**Table 4.**

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

<b>Crop Category and Crop</b>	<b>Number of Primary Diagnoses<sup>1</sup></b>	<b>Number of Secondary Diagnoses<sup>2</sup></b>	<b>Total Diagnoses<sup>3</sup></b>
<b><u>Agronomic</u></b>			
Corn	44	9	53
Forages	26	8	34
Small grains	35	6	41
Soybeans	839*	28	867
Tobacco	326	49	375
<b><u>Fruit</u></b>			
Small fruit	105	14	119
Tree fruit	142	22	164
<b><u>Herbs</u></b>			
	14	4	18
<b><u>Identifications</u></b>			
	48	0	48
<b><u>Ornamentals</u></b>			
<b>Herbaceous and</b>			
Houseplants	179	28	207
Turfgrass	114	4	118
Woody**	979	98	1077
<b><u>Vegetables</u></b>			
	447	39	486
<b><u>Miscellaneous***</u></b>			
	38	0	38
<b><u>Total</u></b>	<b>3336</b>	<b>309</b>	<b>3645</b>

<sup>1</sup> The number of primary diagnoses corresponds to the number of different specimens examined.

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

<sup>3</sup> Total diagnoses equals the number of primary plus the number of secondary diagnoses.

\* Soybean plant samples + 498 SCN soil samples + 226 SBR samples

\*\*Numbers include 91 SOD samples

\*\*\*Numbers include 28 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 <sup>1</sup>	Non-Ext <sup>2</sup>	Ext <sup>1</sup>	Non-Ext <sup>2</sup>	Ext <sup>1</sup>	Non-Ext <sup>2</sup>	Ext <sup>1</sup>	Non-Ext <sup>2</sup>
<b><u>Agronomic</u></b>								
Corn	42	2	0	0	0	0	0	0
Forages	20	0	0	0	0	6	0	0
Small grains	29	4	0	0	0	2	0	0
Soybeans	101	6	0	0	1	7	0	0
Tobacco	285	24	0	0	0	15	0	2
<b><u>Fruit</u></b>								
Small Fruit	47	1	43	5	1	8	0	0
Tree Fruit	13	2	121	4	0	2	0	0
<b><u>Herbs</u></b>								
	8	0	5	0	0	1	0	0
<b><u>Identifications</u></b>								
	2	4	22	2	0	0	2	16
<b><u>Ornamental</u></b>								
Herbaceous and								
Houseplants	78	15	71	10	0	1	3	1
Turfgrass	12	26	43	3	0	0	6	24
Woody	104	81	651	24	0	9	14	5
<b><u>Vegetable</u></b>								
	146	4	268	9	6	12	2	0
<b><u>Miscellaneous</u></b>								
	4	2	3	0	0	1	0	0
<b><u>Total</u></b>	<b>891</b>	<b>171</b>	<b>1227</b>	<b>57</b>	<b>8</b>	<b>64</b>	<b>27</b>	<b>48</b>
<b><u>Total/Grower Type</u></b>	<b>1062</b>		<b>1284</b>		<b>72</b>		<b>75</b>	

**Total number of routine samples received = 2493**

<sup>1</sup> Ext = Extension samples submitted via County Extension Agents or Extension Specialists.

<sup>2</sup> 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	0	0	4	0	10
Entomology Department	1	2	18	5	2	28
Horticulture Department	0	1	5	0	5	11
Plant & Soil Sciences Department	31	0	10	0	5	46
					<u>Total</u>	<b>95</b>
					<u>Total number of routine plant specimens</u>	<b>2493</b>
					<u>Percent of specimens referred outside Diagnostic Lab for diagnosis</u>	<b>3.8</b>

\* 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\*.**

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<b>Test</b>	<b>Number of Tests</b>
<b>Polymerase Chain Reaction (PCR)</b>	<b>13</b>
<b>Culturing</b>	<b>16</b>
<b>Enzyme-linked Immunosorbent Assay (ELISA) (133 routine plant samples +91 SOD)</b>	<b>224</b>
<b>Microscope (902 routine plant samples +254 SBR)</b>	<b>1156</b>
<b>Nematode extraction Soybean cyst nematode (SCN)</b>	<b>498</b>
<b>Soil tests</b>	<b>97</b>
<b>Visual</b>	<b>1324</b>
<hr/>	
<b>Total</b>	<b>3336</b>

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**\* Based on 2493 routine plant samples, 254 SBR, 498 SCN, and 91 SOD samples = 3336.**

**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).<sup>1</sup>**

<b>COUNTY</b>	<b>Total</b>	<b>Agronomic<sup>2</sup></b>	<b>Tobacco</b>	<b>Fruit</b>	<b>Ornamental</b>	<b>Vegetable</b>	<b>Other</b>
ADAIR	20	2	9	3	4	2	0
ALLEN	10	1	1	2	0	6	0
ANDERSON	15	3	1	1	8	2	0
BALLARD	12	2	2	2	4	2	0
BARREN	18	5	5	1	6	1	0
BATH	13	5	3	2	2	0	1
BELL	5	0	0	1	0	4	0
BOONE	33	1	1	1	19	9	2
BOURBON	21	7	3	2	8	1	0
BOYD	8	0	0	1	4	3	0
BOYLE	43	1	5	1	30	5	1
BRACKEN	3	1	0	0	2	0	0
BREATHITT	10	0	1	1	1	7	0
BRECKINRIDGE	73	6	37	6	16	8	0
BULLITT	16	0	1	3	11	1	0
BUTLER	7	1	1	0	2	3	0
CALDWELL	47	7	4	9	18	8	1
CALLOWAY	49	3	8	7	21	8	1
CAMPBELL	14	0	0	1	11	2	0
CARLISLE	9	3	0	0	6	0	0
CARROLL	6	0	3	0	3	0	0
CARTER	6	0	1	0	4	1	0
CASEY	26	3	3	3	2	15	0
CHRISTIAN	74	11	13	2	25	22	1
CLARK	17	0	4	3	5	5	0
CLAY	4	0	0	0	4	0	0
CLINTON	2	2	0	0	0	0	0
CRITTENDEN	11	2	0	1	4	4	0
CUMBERLAND	11	0	1	4	5	1	0
DAVIESS	93	14	8	9	50	11	1
EDMONSON	19	1	5	0	3	10	0
ELLIOTT	4	0	0	3	0	1	0
ESTILL	14	2	1	1	5	5	0
FA YETTE	295	13	28	20	180	30	24
FLEMING	28	9	6	4	5	3	1
FLOYD	1	0	0	0	1	0	0
FRANKLIN	70	0	0	5	43	18	4
FULTON	4	3	0	0	1	0	0
GALLATIN	3	0	0	0	1	0	2
GARRARD	9	0	1	0	7	1	0
GRANT	14	2	0	5	2	4	1
GRAVES	23	5	6	1	9	2	0
GRAYSON	31	3	0	1	17	9	0
GREEN	10	0	5	2	3	0	0
GREENUP	12	0	0	1	7	4	0
HANCOCK	5	1	0	1	1	2	0
HARDIN	18	1	0	0	17	0	0
HARLAN	6	0	0	2	3	1	0
HARRISON	15	0	5	0	3	7	0
HART	4	0	2	0	1	1	0
HENDERSON	39	6	7	4	16	6	0
HENRY	18	0	9	4	3	1	1
HICKMAN	13	5	0	2	4	2	0
HOPKINS	7	1	1	0	5	0	0
JACKSON	14	0	1	3	10	0	0
JEFFERSON	34	0	0	0	29	5	0
JESSAMINE	18	1	3	1	13	0	0
JOHNSON	0	0	0	0	0	0	0
KENTON	19	0	1	1	13	3	0
KNOTT	0	0	0	0	0	0	0
KNOX	1	0	0	0	1	0	0

COUNTY	Total	Agronomic <sup>2</sup>	Tobacco	Fruit	Ornamental	Vegetable	Other
LARUE	8	1	4	0	3	0	0
LAUREL	27	1	1	6	17	1	1
LAWRENCE	17	0	0	5	5	7	0
LEE	0	0	0	0	0	0	0
LESLIE	0	0	0	0	0	0	0
LETCHER	5	0	0	3	0	2	0
LEWIS	12	4	2	3	2	1	0
LINCOLN	33	4	4	2	10	13	0
LIVINGSTON	5	0	0	2	3	0	0
LOGAN	59	9	10	7	19	8	1
LYON	22	2	4	1	12	3	0
McCRACKEN	40	6	0	1	16	16	1
McCREARY	0	0	0	0	0	0	0
McLEAN	4	3	1	0	0	0	0
MADISON	35	2	6	2	21	4	0
MAGOFFIN	0	0	0	0	0	0	0
MARION	21	2	10	1	7	1	0
MARSHALL	30	2	0	3	21	4	0
MARTIN	7	0	0	5	2	0	0
MASON	0	0	0	0	0	0	0
MEADE	20	1	4	1	12	2	0
MENIFEE	10	0	0	3	4	3	0
MERCER	41	1	1	6	28	5	0
METCALFE	12	1	1	1	2	7	0
MONROE	11	0	2	2	7	0	0
MONTGOMERY	32	1	6	4	9	12	0
MORGAN	34	0	8	7	3	16	0
MUHLENBERG	13	3	4	1	3	2	0
NELSON	19	0	1	6	8	4	0
NICHOLAS	5	1	2	0	1	1	0
OHIO	0	0	0	0	0	0	0
OLDHAM	32	2	0	0	23	6	1
OWEN	7	3	1	1	1	1	0
OWSLEY	0	0	0	0	0	0	0
PENDELTON	0	0	0	0	0	0	0
PERRY	9	0	0	1	5	3	0
PIKE	1	0	0	0	1	0	0
POWELL	1	0	0	0	0	1	0
PULASKI	37	3	7	2	12	4	9
ROBERTSON	9	0	3	3	2	1	0
ROCKCASTLE	2	0	0	1	1	0	0
ROWAN	5	0	1	0	3	1	0
RUSSELL	11	3	0	1	3	1	3
SCOTT	21	0	0	1	19	0	1
SHELBY	48	3	8	4	31	1	1
SIMPSON	36	7	3	5	12	7	2
SPENCER	15	0	0	0	14	1	0
TAYLOR	12	2	1	0	8	1	0
TODD	39	10	8	4	12	5	0
TRIGG	32	0	3	0	23	3	3
TRIMBLE	10	2	4	1	1	2	0
UNION	8	2	0	2	4	0	0
WARREN	98	0	2	8	60	22	6
WASHINGTON	11	1	5	1	3	1	0
WAYNE	14	1	1	0	2	10	0
WEBSTER	10	2	1	2	1	4	0
WHITLEY	19	2	0	4	9	3	1
WOLFE	10	0	0	1	2	7	0
WOODFORD	41	0	7	4	28	2	0
Out-of-State (none)	14	0	3	2	8	1	0
<b>TOTALS</b>	<b>2493</b>	<b>220</b>	<b>326</b>	<b>247</b>	<b>1181</b>	<b>447</b>	<b>72</b>

<sup>1</sup> Does not include SBR, SCN, or SOD samples

<sup>2</sup> 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 EXTENSION SPECIALISTS, DIAGNOSTICIANS OR RESEARCHERS WERE INVOLVED IN MAKING A PRIMARY DIAGNOSIS AND THE NUMBER OF CASES IN WHICH THEY SERVED AS CONSULTANTS.**

Specialists, Researchers, Diagnosticians	Department	Number of cases	
		Primary Diagnosis <sup>1</sup>	Consultations <sup>2</sup>
<b>LEXINGTON</b>			
Beale, JW (Diagnostician)	Plant Pathology	1214	60
Berberich, SG	Horticulture	0	1
Bessin, RT	Entomology	2	3
Durham, RE	Horticulture	1	0
Dutton, SR	Horticulture	0	1
Fountain, WM	Horticulture	5	1
Fulcher, AF	Horticulture (grad student)	0	3
Geneve, RL	Horticulture	0	1
Green, JD	Plant & Soil Sciences	36	3
Grove, JH	Plant & Soil Sciences	1	1
Hartman, JR	Plant Pathology	0	14
Lee, CD	Plant & Soil Sciences	3	6
Long, SJ	Plant Pathology	406	2
Palmer, GK	Plant & Soil Sciences	2	1
Paratley, RD	Forestry	2	0
Pearce, BC	Plant & Soil Sciences	2	9
Powell, AJ	Plant & Soil Sciences	2	1
Schwab, GJ	Plant & Soil Sciences	1	0
Seebold, KW	Plant Pathology	12	14
Smigell, CG	Horticulture	0	1
Strang, JG	Horticulture	1	2
Townsend, LH	Entomology	25	2
Vincelli, P	Plant Pathology	20	7
Witt, WW	Plant & Soil Sciences	1	0
<b>PRINCETON</b>			
Bachi, PR (Diagnostician)	Plant Pathology	789	31
Bailey, WA	Plant & Soil Sciences	15	11
Dunwell, WC	Horticulture	7	20
Herbek, JH	Plant & Soil Sciences	3	1
Hershman, DE	Plant Pathology	4	3
Johnson, DW	Entomology	5	8
Kennedy, BS	Plant Pathology	1	1
Lacefield, GD	Plant & Soil Sciences	2	1
Masabni, JG	Horticulture	7	6
Martin, JR	Plant & Soil Sciences	9	5
Murdock, LW	Plant & Soil Sciences	8	4
Yielding, TL	Plant Pathology	252	0

<sup>1</sup> The specialist or diagnostician making the primary diagnosis.

<sup>2</sup> 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.

**173 cases were submitted in 2008 by a total of 49 submitters.  
Cases came from a total of 45 counties.**

<b>Plant/Crop</b>	<b>CountOfPlant/Crop</b>
Corn	9
Forage crop	4
Forest tree	3
Herbaceous ornamental	7
Landscape shrub	11
Landscape tree	44
other (Fungal ID)	1
other (Insect ID)	1
other (Plant ID)	2
Small fruit	12
Small grain	5
Soybean	12
Tobacco	12
Tree fruit	15
Turf grass	3
Vegetable	34



## National Nursery Survey for *Phytophthora ramorum* in Kentucky, 2008

*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-571, <http://www.ca.uky.edu/agc/pubs/pr/pr571/pr571.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 on the West Coast in California and Oregon. This disease, first observed in California in the mid 1990s, causes the widespread death of many oak and tanoak species. Other hosts for this pathogen include camellia, rhododendron, viburnum, lilac, and mountain laurel. Regulations and quarantines have been established to limit the spread of this pathogen, but concerns still remain about potential movement in contaminated nursery stock. Methods of long distance spread of the pathogen include moving plants, plant parts, soil, and water. *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 37-82°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.

The National Nursery Survey for *P. ramorum* in Kentucky was continued through the 2008 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 USDAAPHIS, has been ongoing each year since 2004 (1). Procedures for collecting and testing followed protocols established by the USDA-APHIS-PPQ. Twenty nurseries in Central and Western Kentucky were inspected. Ninety-one samples with foliar symptoms suggestive of general *Phytophthora* infection were collected from 10 counties: Calloway, Daviess, Graves, Hancock, Hardin, Henderson, Hopkins, Jefferson, Oldham, and Union. These samples were double-bagged and sent to the Plant Disease Diagnostic Lab (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 these samples at the PDDL. DNA was then extracted from samples testing positive for general *Phytophthora* infection and were sent to USDA-APHIS approved testing laboratories for further identification via polymerase chain reaction (PCR).

### Results and Discussion

Of the 91 total samples collected throughout the state, 22 tested positive for infection by *Phytophthora* species. Extracted DNA from these samples was sent to the USDA-APHIS approved laboratory in Florida or Maryland 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.

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>AGRONOMIC CROPS</b>					
<b><u>CORN</u></b>					
<b>CORN (Zea) (includes Popcorn)</b>					
	Bacterial stalk rot	- Erwinia	0	1	1
	Chemical injury	- herbicide	4	1	5
		- unknown	1	0	1
	Cultural	- improper depth	0	1	1
	Ear/Kernel rot	- Fusarium	2	0	2
		- Stenocarpella	1	0	1
	Environmental stresses		5	0	5
	Inadequate specimen, no disease		8		8
	Insect injury		6	0	6
	Nutritional	- acid soil	1	0	1
		- general	1	0	1
		- magnesium deficiency	4	0	4
		- nitrogen deficiency	2	0	2
		- phosphorus deficiency	2	0	2
		- potassium deficiency	2	4	6
		- zinc deficiency	2	0	2
	Pollination problem	- unknown	0	1	1
	Purple leaf sheath	- complex	1	0	1
	Tassel ear	- genetic	1	0	1
<b><u>FORAGES</u></b>					
<b>ALFALFA (Medicago)</b>					
	Crown rot	- Rhizoctonia	1	0	1
	Crown/Stem rot	- Sclerotinia	1	0	1
	Environmental stresses		2	1	3
	Inadequate specimen, no disease		5		5
	Insect injury		0	2	2
	Leaf spot	- Stemphylium	0	1	1
	Nutritional	- acid soil	1	0	1
		- boron deficiency	2	1	3
		- nitrogen deficiency	1	1	2
		- potassium deficiency	2	0	2
	Powdery mildew	- oidium	1	0	1
	Root/Crown rot	- Fusarium	0	1	1
		- Rhizoctonia	1	0	1
	Stem canker	- Rhizoctonia	1	0	1
	Summer black stem	- Cercospora	2	0	2
<b>ORCHARDGRASS (Dactylis)</b>					
	Environmental	- drought	1	0	1
<b>RYE (Secale)</b>					
	No disease		1		1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>SWITCHGRASS (Panicum)</b>					
	Environmental	- drought	1	0	1
	Leaf spot	- Bipolaris	0	1	1
	No disease		1		1
	Rust	- Puccinia	2	0	2
<b><u>SOYBEAN</u></b>					
<b>SOYBEAN (Glycine)</b>					
	Air pollution	- ozone	1	0	1
	Asian soybean rust	- Phakopsora	4	0	4
	Blight	- Fusarium	1	0	1
	Brown spot	- Septoria	0	2	2
	Bud blight	- Tobacco ringspot virus	1	0	1
	Charcoal rot	- Macrophomina	1	1	2
	Chemical injury	- growth regulator	9	0	9
		- herbicide	4	0	4
		- unknown	2	0	2
	Damping-off	- Pythium	1	0	1
	Downy mildew	- Peronospora	2	6	8
	Environmental stresses		4	5	9
	Frogeye	- Cercospora	1	0	1
	Inadequate specimen, no disease		240		240
	Insect injury		4	5	9
	Leaf blotch	- unknown	2	0	2
	Nutritional	- general	2	0	2
		- manganese deficiency	1	0	1
		- nitrogen deficiency	2	0	2
		- potassium deficiency	36	3	39
		- soluble salts	2	0	2
	Powdery mildew	- oidium	1	0	1
	Root knot nematode	- Meloidogyne	1	0	1
	Root rot	- Pythium	0	1	1
		- Rhizoctonia	1	1	2
	Root/stem rot	- Phytophthora	3	0	3
		- Rhizoctonia	1	0	1
	Soybean cyst nematode	- Heterodera			
		on plant samples	0	4	4
		* in soil samples	484		484
		* absent in soil samples	14		14
		(*soil submitted to Nematode Analysis Laboratory)			
	Stem canker	- Diaporthe	1	0	1
	Stunting	- unknown	1	0	1
	Sudden death	- Fusarium	8	0	8
	Virus	- Alfalfa mosaic	1	0	1
		- Bean pod mottle	1	0	1
		- unknown	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<u>SMALL GRAINS</u>					
MILLET (Panicum)					
Gray leaf spot	-	Pyricularia	1	0	1
OAT (Avena)					
Nutritional	-	nitrogen deficiency	1	0	1
SORGHUM (Sorghum)					
No disease			1		1
WHEAT (Triticum)					
Chemical injury	-	herbicide	1	0	1
Common bunt	-	Tilletia	1	0	1
Environmental stresses			4	0	4
Flecking	-	physiological	1	0	1
Head blight	-	Fusarium	1	0	1
Insect injury			0	1	1
Leaf spot	-	Septoria	0	1	1
No disease			6		6
Nutritional	-	nitrogen deficiency	3	0	3
	-	phosphorus deficiency	1	0	1
Sharp eyespot	-	Rhizoctonia	1	0	1
Speckled leaf blotch	-	Septoria	0	2	2
Take-all	-	Gaeumannomyces	2	1	3
Virus	-	Barley yellow dwarf	1	1	2
	-	Soilborne wheat mosaic	1	0	1
	-	Wheat streak mosaic	6	0	6
	-	Wheat spindle streak mosaic	3	0	3

CROP	DIAGNOSIS	CAUSAL AGENT			
<b><u>TOBACCO</u></b>					
<b>TOBACCO (Nicotiana)</b>					
	Bacterial soft rot	- Erwinia	2	0	2
	Black root rot	- Thielaviopsis	1	0	1
	Black shank	- Phytophthora	63	0	63
	Blue mold	- Peronospora	2	0	2
	Brown spot	- Alternaria	2	0	2
	Chemical injury	- burn	4	0	4
		- fungicide	2	2	4
		- growth regulator	13	0	13
		- herbicide	4	1	5
		- unknown	4	0	4
	Collar rot	- Sclerotinia	4	0	4
	Cultural	- high temperature	4	0	4
		- transplant shock	7	3	10
	Damping-off	- Rhizoctonia	2	3	5
	Environmental	- weather scald	6	0	6
		- wet feet	10	2	12
		- others	9	4	13
	Frenching	- metabolites	2	0	2
	Frogeye	- Cercospora	3	2	5
	Hollow stalk	- Erwinia	1	0	1
	Improper curing	- greening	1	0	1
		- piebald	1	0	1
	Inadequate specimen, no disease		46		46
	Insect injury		2	1	3
	Mold	- Alternaria	0	1	1
	Nutritional	- acid soil	18	1	19
		- fertilizer burn	5	0	5
		- general	2	2	4
		- manganese toxicity	14	0	14
		- nitrogen deficiency	3	1	4
		- potassium deficiency	5	1	6
		- soluble salts	4	8	12
		- temp. phosphorus def.	1	0	1
		- physiological	1	0	1
	Root knot nematode	- Meloidogyne	2	0	2
	Root rot	- Pythium	25	1	26
	Root/stem rot	- Rhizoctonia	0	2	2
	Sooty mold	- species	1	0	1
	Sore shin	- Rhizoctonia	5	7	12
	Stem rot	- Pythium	0	1	1
	Target spot	- Rhizoctonia	14	6	20
	Virus	- Alfalfa mosaic	2	0	2
		- Cucumber mosaic	2	0	2
		- Tobacco mosaic	2	0	2
		- Tobacco ringspot	1	0	1
		- Tobacco streak	6	0	6
		- Tomato spotted wilt	8	0	8
		- unknown	1	1	2
	Weather fleck	- ozone	2	0	2
	Wilt	- Fusarium	4	0	4

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>FRUIT CROPS</b>					
<b><u>SMALL FRUITS</u></b>					
<b>BLUEBERRY (Vaccinium)</b>					
	Cultural	- transplant shock	1	0	1
	Environmental	- stress	0	1	1
	Flyspeck	- Schizothyrium	0	1	1
	Inadequate specimen, no disease		8		8
	Insect injury		1	0	1
	Nutritional	- acid soil	1	1	2
		- iron deficiency	1	0	1
	Root rot	- Phytophthora	2	0	2
	Sooty blotch	- Gloeodes	1	0	1
	Stem blight	- Botryosphaeria	1	0	1
<b>BRAMBLES - BLACKBERRY, and RASPBERRY (Rubus)</b>					
	Cane blight	- Leptosphaeria	2	0	2
	Double blossom	- Cercospora	2	0	2
	Environmental stresses		4	0	4
	Insect injury		4	1	5
	No disease		7		7
	Spur blight	- Didymella	0	1	1
	Virus	- unknown	1	0	1
<b>GOJI BERRY (Lycium)</b>					
	No disease		1		1
<b>GRAPE (Vitis)</b>					
	Anthraxnose	- Elsinoe	5	2	7
	Black rot	- Guignardia	15	0	15
	Cane blight/Leaf spot	- Phomopsis	1	1	2
	Chemical injury	- growth regulator	1	0	1
		- insecticide	1	0	1
	Crown gall	- Agrobacterium	1	1	2
	Downy mildew	- Plasmopora	1	0	1
	Environmental stresses		4	0	4
	Insect injury		2	0	2
	Leaf scorch	- unknown	1	0	1
	Nutritional	- general	1	0	1
	Powdery mildew	- Uncinula	1	0	1
	Root rot	- Rhizoctonia	1	0	1
<b>STRAWBERRY (Fragaria)</b>					
	Angular leaf spot	- Xanthomonas	2	0	2
	Anthraxnose	- Colletotrichum	3	0	3
	Black root	- complex	1	0	1
	Black seed	- Mycosphaerella	1	0	1
	Chemical injury	- herbicide	1	0	1
	Crown rot	- Phytophthora	2	0	2
	Leaf blight	- Phomopsis	0	2	2
	Leaf spot	- Mycosphaerella	3	1	4
	No disease		3		3

CROP	DIAGNOSIS	CAUSAL AGENT			
<u>TREE FRUITS</u>					
<b>APPLE (Malus)</b>					
	Bitter rot	- Glomerella	6	0	6
	Blotch	- Phyllosticta	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Cedar apple rust	- Gymnosporangium	19	2	21
	Chemical injury	- burn	2	0	2
		- herbicide	1	0	1
	Collar rot	- Phytophthora	1	0	1
	Cultural	- transplant shock	1	0	1
	Environmental	- drought	1	0	1
	Fire blight	- Erwinia	13	2	15
	Flyspeck	- Schizothyrium	0	1	1
	Frogeye	- Botryosphaeria	6	4	10
	Inadequate specimen, no disease		5		5
	Insect injury		7	3	10
	Scab	- Venturia	4	0	4
	Sooty blotch	- Gloeodes	1	2	3
<b>CHERRY (Prunus)</b>					
	Bacterial canker	- Pseudomonas	1	0	1
	Black knot	- Apiosporina	2	0	2
	Brown rot	- Monilinia	1	0	1
	Powdery mildew	- Podosphaera	1	0	1
	Root rot	- Phytophthora	1	0	1
<b>FIG (Ficus)</b>					
	No disease		1		1
<b>PEACH and APRICOT (Prunus)</b>					
	Bacterial spot	- Xanthomonas	1	0	1
	Brown rot	- Monilinia	3	0	3
	Canker	- Cytospora	1	0	1
	Inadequate specimen, no disease		6		6
	Insect injury		6	3	9
	Leaf curl	- Taphrina	10	1	11
	Nutritional	- nitrogen deficiency	4	0	4
	Scab	- Cladosporium	1	2	3
<b>PEAR (Pyrus)</b>					
	Bitter rot	- Glomerella	1	0	1
	Blight	- Pseudomonas	1	0	1
	Fire blight	- Erwinia	2	0	2
<b>PECAN (Carya)</b>					
	Insect injury		1	0	1
	No disease		2		2
	Scab	- Cladosporium	2	0	2
<b>PLUM (Prunus)</b>					
	Black knot	- Apiosporina	4	0	4
	Plum pockets	- Taphrina	2	0	2

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>HERBS</b>					
<b>BASIL (Ocimum)</b>					
	Environmental	- sunscald	1	0	1
	Insect injury		1	0	1
	Nutritional	- fertilizer burn	0	1	1
	Root/Stem rot	- Rhizoctonia	1	0	1
<b>FEVERFEW (Tanacetum)</b>					
	Stem rot	- Sclerotinia	1	0	1
<b>GINSENG (Panax)</b>					
	Leaf blight	- Alternaria	1	0	1
<b>OREGANO (Origanum)</b>					
	Insect injury		1	0	1
	Nutritional	- fertilizer burn	0	1	1
	Root rot	- Pythium	1	0	1
<b>ROSEMARY (Rosmarinus)</b>					
	Inadequate specimen		1		1
	Insect injury		2	0	2
	Root rot	- Pythium	1	0	1
<b>SAGE (Salvia)</b>					
	Environmental stresses		1	1	2
	No disease		1		1
	Root rot	- Pythium	1	0	1
<b>MISCELLANEOUS</b>					
<b>ARABIDOPSIS (Arabidopsis)</b>					
	Nutritional	- soluble salts	1	0	1
<b>KUDZU (Pueraria) (part of survey work for Asian Soybean Rust)</b>					
	No disease		28		28
<b>POTTING MIX</b>					
	Fungal		1	0	1
<b>SOIL</b>					
	No disease		2		2
	Nutritional	- high pH	1	0	1
		- soluble salts	2	0	2
<b>WATER</b>					
	No disease		1		1
<b>WOOD</b>					
	Insect injury		1	0	1



## IDENTIFICATIONS

## FUNGAL IDENTIFICATIONS

Chlorophyllum	-	molybdites	1	1
Ganoderma	-	species	1	1
Lepiota	-	cepaestipes	1	1
Oxyporus	-	latemarginatus	1	1
Panaeolus	-	foeniseccii	1	1
Phaeolus	-	schweinitzii	1	1
Pluerotus	-	species	1	1
Polyporus	-	squamosus	1	1
Scleroderma	-	species	1	1
Slime mold	-	species	1	1
Sphaerobolus	-	species	1	1
Trametes	-	species	1	1
	-	versicolor	1	1
Trichoderma	-	species	1	1

## PLANT IDENTIFICATIONS

Acer	-	rubrum	2	2
Carya	-	cordiformis	1	1
Castanea	-	mollissima	1	1
	-	species	1	1
Celtis	-	occidentalis	1	1
Conium	-	maculatum	1	1
Daucus	-	carota	1	1
Dioda	-	virginiana	1	1
Dispyros	-	virginiana	1	1
Inadequate specimen			4	4
Laminacea	-	species	1	1
Liverwort	-	species	3	3
Malus	-	species	1	1
Medicago	-	sativa	1	1
Panicum	-	dichotomoflorum	1	1
Paulownia	-	tomentosa	1	1
Pedilanthus	-	tithymaloides	1	1
Pinus	-	virginiana	1	1
Pseudotsuga	-	menziesii	1	1
Quercus	-	alba	1	1
	-	muehlenbergii	1	1
Ranunculus	-	species	1	1
Rosa	-	multiflora	1	1
Rumex	-	crispus	1	1
Silene	-	latifolia	1	1
Taxus	-	species	1	1
Tibouchina	-	species	1	1
Ulmus	-	species	1	1

CROP	DIAGNOSIS	CAUSAL AGENT	#
<b>ORNAMENTALS</b>			
<b><u>HERBACEOUS ORNAMENTALS and INDOOR PLANTS</u></b>			
<b>AFRICAN VIOLET (Saintpaulia)</b>			
No disease			1
<b>ALOE (Aloe)</b>			
Cultural	- overwatering		1
Insect injury			1
<b>ASTILBE (Astilbe)</b>			
Environmental	- wet feet		1
<b>BEGONIA (Begonia)</b>			
No disease			1
<b>BIDENS (Bidens)</b>			
Insect injury			1
<b>BISHOP'S WEED (Aegopodium)</b>			
No disease			1
<b>BLEEDING HEART (Dicentra)</b>			
Virus	- Tobacco rattle		1
<b>CACTUS (Cereus)</b>			
Bacterial soft rot	- Erwinia		1
<b>CALIBRACHOA (Calibrachoa)</b>			
Insect injury			2
No disease			1
Nutritional	- iron deficiency		1
Powdery mildew	- Oidium		1
<b>CANE (Arundinaria)</b>			
Senescence	- natural		1
<b>CHRYSANTHEMUM (Chrysanthemum)</b>			
Insect injury			1
No disease			2
Nutritional	- soluble salts		3
Root/Stem rot	- Pythium		4
Wilt	- Fusarium		2
<b>COLUMBINE (Aquilegia)</b>			
Environmental	- cold injury		1
<b>CONVOLVULUS (Convolvulus)</b>			
No disease			1
<b>COREOPSIS (Coreopsis)</b>			
Crown rot	- Rhizoctonia		1

CROP	DIAGNOSIS	CAUSAL AGENT			
CYCLAMEN (Cyclamen)					
	Insect injury		1	0	1
DAFFODIL (Narcissus)					
	Bud blast	- environmental	1	0	1
DAHLIA (Dahlia)					
	Insect injury		2	1	3
DAYLILY (Hemerocallis)					
	Air pollution	- sulfur dioxide	1	0	1
	Environmental	- drought	1	0	1
	Insect injury		1	0	1
	Leaf streak	- Aureobasidium	1	1	2
	No disease		2		2
DRACAENA (Dracaena)					
	Anthracnose	- Colletotrichum	1	0	1
	Cultural	- Oedema	1	0	1
	Environmental	- unknown	1	0	1
	No disease		1		1
	Nutritional	- nitrogen deficiency	1	0	1
ERYNGIUM (Eryngium)					
	Environmental	- wet feet	1	0	1
FERN (Nephrolepis)					
	Nutritional	- soluble salts	1	0	1
FICUS (Fig)					
	Insect injury		1	0	1
	No disease		1		1
GARDENIA (Gardenia)					
	No disease		1		1
	Root rot	- Pythium	1	0	1
GAURA (Gaura)					
	No disease		1		1
GERANIUM (Pelargonium)					
	Cultural	- oedema	1	1	2
	Inadequate specimen, no disease		4		4
	Nutritional	- iron deficiency	1	0	1
		- nitrogen deficiency	1	0	1
	Virus	- unknown	1	0	1
HOLLYHOCK (Althaea)					
	Chemical injury	- growth regulator	1	0	1
	Leaf spot	- Cercospora	1	0	1
	Rust	- Puccinia	2	0	2

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>HOSTA (Hosta)</b>					
	Environmental	- sunscald	1	0	1
	Foliar nematode	- Aphelenchoides	1	0	1
	No disease		2		2
	Root rot	- Phytophthora	1	0	1
<b>IMPATIENS (Impatiens)</b>					
	Insect injury		1	1	2
	Root rot	- Pythium	0	1	1
		- Rhizoctonia	1	0	1
<b>IRIS (Iris)</b>					
	Bacterial soft rot	- Erwinia	1	0	1
	Leaf spot	- Heterosporium	2	0	2
<b>IVY (Hedera)</b>					
	Bacterial spot	- Xanthomonas	1	0	1
	Nutritional	- pH high	1	0	1
<b>JADE PLANT (Crassula)</b>					
	Nutritional	- soluble salts	1	0	1
<b>LEMON (Citrus)</b>					
	Nutritional	- general	1	0	1
<b>LILY (Lilium)</b>					
	No disease		2		2
	Root rot	- Pythium	1	0	1
<b>LIRIOPE (Liriope)</b>					
	Anthraxnose	- Colletotrichum	1	0	1
	Environmental	- stress	1	0	1
<b>LISIANTHUS (Eustoma)</b>					
	Chemical injury	- unknown	1	0	1
<b>LOBELIA (Lobelia)</b>					
	No disease		1		1
	Southern blight	- Sclerotium	1	0	1
<b>LUPINE (Lupinus)</b>					
	Nutritional	- general	1	0	1
<b>MALLOW (Malva)</b>					
	No disease		1		1
<b>MANDEVILLA (Mandevilla)</b>					
	Cultural	- overwatering	0	1	1
	Insect injury		1	0	1
<b>MARIGOLD (Tagetes)</b>					
	Insect injury		1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
ORCHID (unknown)					
	Root rot	- Pythium	1	0	1
ORNAMENTAL GRASS (Unknown)					
	Root rot	- Rhizoctonia	1	0	1
OSTEOSPERMUM (Osteospermum)					
	Gray mold	- Botrytis	1	0	1
	No disease		1		1
PACHYSANDRA (Pachysandra)					
	Leaf/Stem blight	- Volutella	2	0	2
PALM (Arecaceae)					
	Insect injury		2	0	2
PANSY (Viola)					
	No disease		1		1
PEONY (Paeonia)					
	Blight	- Phytophthora	2	0	2
	Crown rot	- Rhizoctonia	1	0	1
	Environmental stresses		2	0	2
	Leaf blotch	- Cladosporium	1	1	2
	No disease		1		1
	Powdery mildew	- Oidium	0	1	1
	Red spot	- Cladosporium	0	1	1
	Root rot	- Armillaria	1	0	1
PERIWINKLE (Vinca)					
	Canker/Dieback	- Phoma	1	0	1
	Root/Crown rot	- Fusarium	0	1	1
		- Rhizoctonia	1	0	1
PETUNIA (Petunia)					
	Air pollution	- sulfur dioxide	1	0	1
	Black root rot	- Thielaviopsis	1	1	2
	Chemical injury	- unknown	1	0	1
	Crown rot	- Fusarium	1	0	1
		- Rhizoctonia	0	1	1
	Mutation	- genetic	2	0	2
	No disease		2		2
	Nutritional	- fertilizer burn	0	1	1
		- general	2	0	2
		- nitrogen deficiency	2	0	2
		- phosphorus deficiency	0	1	1
		- soluble salts	1	0	1
	Root rot	- Pythium	6	3	9
	Root/Stem rot	- Rhizoctonia	5	0	5
	Web blight	- Rhizoctonia	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>PHLOX (Phlox)</b>					
	Chemical injury	- growth regulator	0	1	1
	Crown rot	- Fusarium	1	0	1
	Powdery mildew	- Erysiphe	2	0	2
		- Oidium	1	0	1
<b>POINSETTIA (Euphorbia)</b>					
	Chemical injury	- growth regulator	2	0	2
	Insect injury		0	1	1
	No disease		1		1
	Nutritional	- calcium deficiency	0	1	1
	Root rot	- Pythium	2	0	2
		- Rhizoctonia	0	1	1
<b>PORTULACA (Portulaca)</b>					
	Insect injury		1	1	2
	Virus	- Papaya mosaic	2	0	2
<b>PRIMROSE (Oenothera)</b>					
	Insect injury		1	0	1
	No disease		1		1
<b>RUBBER PLANT (Ficus)</b>					
	Insect injury		1	0	1
	No disease		1		1
<b>SALVIA (Salvia)</b>					
	Insect injury		1	0	1
	No disease		1		1
<b>SANSEVIERA (Sansevieria)</b>					
	No disease		1		1
<b>SCHEFFLERA (Brassaia)</b>					
	Environmental	- stress	0	1	1
	Insect injury		2	0	2
	No disease		1		1
<b>SEDUM (Sedum)</b>					
	No disease		1		1
<b>SILVER PLUME GRASS (Saccharum)</b>					
	Nutritional	- nitrogen deficiency	1	0	1
	Root rot	- Pythium	0	1	1
<b>SNAPDRAGON (Antirrhinum)</b>					
	Root rot	- Pythium	1	0	1
<b>SPATHIPHYLLUM (Spathiphyllum)</b>					
	Environmental	- stress	1	0	1
	No disease		1		1
<b>TICKSEED (Coreopsis)</b>					
	Environmental	- stress	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>UNKNOWN (Unknown)</b>					
	Insect injury		1	0	1
	No disease		1		1
<b>VERBENA (Verbena)</b>					
	Air pollution	- sulfur dioxide	0	1	1
	Chemical injury	- herbicide	1	0	1
		- insecticide	1	0	1
	Insect injury		0	1	1
	Leaf spot	- Cercospora	1	0	1
	Nutritional	- fertilizer burn	2	0	2
<b>VINCA (Vinca)</b>					
	Black root rot	- Thielaviopsis	1	0	1
	No disease		1		1
	Root/Stem rot	- Rhizoctonia	1	0	1
<b>YELLOW STAR CREEPER (unknown)</b>					
	Inadequate specimen		1		1
<b>ZINNIA (Zinnia)</b>					
	Bacterial spot	- Xanthomonas	1	1	2
	Chemical injury	- growth regulator	1	0	1
	Gray mold	- Botrytis	1	0	1
<b><u>TURFGRASS</u></b>					
<b>BENTGRASS (Agrostis)</b>					
	Anthraxnose	- Colletotrichum	4	0	4
	Brown patch	- Rhizoctonia	2	0	2
	Dollar spot	- Sclerotinia	2	0	2
	Inadequate specimen, no disease		19		19
	Nutritional	- fertilizer burn	1	0	1
	Root disfunction	- Pythium	4	0	4
	Root rot	- Pythium	4	0	4
	Take-all patch	- Gaeumannomyces	3	0	3
<b>BERMUDAGRASS (Cynodon)</b>					
	Inadequate specimen, no disease		3		3
	Insect injury		1	0	1
	Root rot	- Pythium	1	0	1
	Smut	- Ustilago	2	0	2
	Spring dead spot	- Ophiosphaerella	1	0	1
<b>BLUEGRASS (Poa)</b>					
	Brown patch	- Rhizoctonia	0	1	1
	Cultural	- heavy thatch	1	1	2
	Environmental	- compaction	2	0	2
	No disease		1		1
	Root rot	- Pythium	1	0	1
	Rust	- Puccinia	1	0	1
	Summer patch	- Magnaporthe	4	0	4

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>FESCUE (Festuca)</b>					
	Blight	- Pythium	1	0	1
	Brown patch	- Rhizoctonia	4	0	4
	Chemical	- unknown	1	0	1
	Cultural	- heavy thatch	2	0	2
	Dollar spot	- Sclerotinia	1	0	1
	Inadequate specimen, no disease		12		12
	Red thread	- Laetisaria	1	0	1
	Root rot	- Pythium	1	0	1
	Senescence	- natural	1	1	2
	Slime mold	- species	3	0	3
	Summer patch	- Magnaporthe	1	0	1
	Yellow patch	- Rhizoctonia	1	0	1
<b>ORCHARDGRASS (Dactylis)</b>					
	Leaf streak	- Cercosporidium	1	0	1
<b>RYEGRASS (Lolium)</b>					
	No disease		2		2
<b>TURF (unspecified)</b>					
	Brown patch	- Rhizoctonia	1	0	1
	Environmental	- stress	1	0	1
	No disease		6		6
	Nutritional	- nitrogen deficiency	1	0	1
	Physical injury	- mowing	2	0	2
	Powdery mildew	- Oidium	1	0	1
	Red thread	- Laetisaria	1	0	1
	Root rot	- Pythium	1	0	1
	Senescence	- natural	1	0	1
	Slime mold	- species	1	0	1
<b>ZOYSIA (Zoysia)</b>					
	Brown patch	- Rhizoctonia	1	0	1
	Large patch	- Rhizoctonia	1	0	1
	No disease		3	0	3
	Root decline	- Gaeumannomyces	2	0	2



CROP	DIAGNOSIS	CAUSAL AGENT			
<b><u>WOODY ORNAMENTALS</u></b>					
<b>ARBORVITAE (Thuja)</b>					
	Cultural	- transplant shock	5	0	5
	Environmental	- winter drying	2	0	2
	Inadequate specimen, no disease		9		9
	Insect injury		5	0	5
	Root rot	- Phytophthora	1	0	1
	Twig blight	- Phoma	0	1	1
<b>ASH (Fraxinus)</b>					
	Anthracnose	- Apiognomonina	2	0	2
	Insect injury		1	1	2
	No disease		2		2
	Wood rot	- Basidiomycete	1	0	1
<b>AZALEA - See listing under RHODODENDRON</b>					
<b>BALDCYPRESS (Taxodium)</b>					
	Environmental	- drought	1	0	1
	Insect injury		2	0	2
<b>BARBERRY (Berberis)</b>					
	Inadequate specimen		1		1
<b>BEECH (Fagus)</b>					
	Insect injury		2	0	2
	Leaf spot	- Gloeosporium	1	0	1
		- Phyllosticta	0	1	1
	No disease		2		2
<b>BIRCH (Betula)</b>					
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- herbicide	2	0	2
	Insect injury		3	1	4
	Leaf spot	- Cryptocline	2	0	2
		- fungal	0	1	1
		- Gloeosporium	4	0	4
	No disease		1		1
	Tatters	- environmental	1	0	1
<b>BLACK GUM (Tupelo)</b>					
	Environmental	- sunscald	0	1	1
	Insect injury		3	0	3
<b>BOXELDER (Acer)</b>					
	Chemical injury	- growth regulator	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>BOXWOOD (Buxus)</b>					
	Black root rot	- Thielaviopsis	1	0	1
	Canker	- Pseudonectria	4	0	4
	Cultural	- transplant shock	1	0	1
	Environmental stresses		6	2	8
	Insect injury		6	2	8
	No disease		6		6
	Nutritional	- acid soil	1	0	1
		- manganese toxicity	1	0	1
	Root rot	- Rhizoctonia	1	0	1
<b>BUCKEYE (Aesculus)</b>					
	Anthraxnose	- Glomerella	1	0	1
	No disease		1		1
<b>BUDDLEIA (Buddleia)</b>					
	Insect injury		2	0	2
<b>CHAMAECYPARIS (Chamaecyparis)</b>					
	Cultural	- transplant shock	1	0	1
	No disease		1		1
<b>CHERRY (Prunus)</b>					
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	2	0	2
	Decline	- unknown	3	0	3
	Environmental	- freeze injury	2	0	2
	Insect injury		4	0	4
	No disease		8		8
<b>CHERRYLAUREL (Prunus)</b>					
	Cultural	- oedema	1	0	1
		- transplant shock	1	0	1
	Insect injury		1	1	2
	No disease		2		2
	Root rot	- Phytophthora	1	0	1
<b>CHESTNUT (Castanea)</b>					
	Anthraxnose	- Glomerella	1	0	1
	Canker	- Cryptodiaporthe	1	0	1
	Root rot	- Phytophthora	2	0	2
<b>CLEMATIS (Clematis)</b>					
	No disease		2		2
<b>COTONEASTER (Cotoneaster)</b>					
	Decline	- unknown	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			#
<b>CRABAPPLE (Malus)</b>					
	Cultural	- improper depth	0	2	2
	Environmental stresses		4	0	4
	Fire blight	- Erwinia	2	0	2
	Frogeye	- Botryosphaeria	1	0	1
	Inadequate specimen, no disease		2		2
	Root/Collar rot	- Phytophthora	0	1	1
	Scab	- Venturia	13	0	13
<b>CRAPE MYRTLE (Lagerstroemia)</b>					
	No disease		1		1
	Powdery mildew	- Oidium	3	0	3
<b>CYPRESS (Cupressocyparis)</b>					
	Insect injury		1	0	1
<b>CRYPTOMERIA (Cryptomeria)</b>					
	No disease		2		2
<b>DAWN REDWOOD (Metasequoia)</b>					
	Cultural	- transplant shock	1	0	1
	No disease		1		1
<b>DOGWOOD (Cornus)</b>					
	Chemical injury	- growth regulator	3	0	3
		- herbicide	1	0	1
	Cultural	- transplant shock	5	1	6
	Decline	- unknown	2	0	2
	Environmental stresses		4	1	5
	Insect injury		2	0	2
	Leaf scorch	- unknown	3	0	3
	Leaf spot	- Septoria	2	0	2
	No disease		5		5
	Nutritional	- acid soil	1	0	1
	Powdery mildew	- Microsphaera	2	0	2
	Root rot	- Phytophthora	1	0	1
		- Pythium	1	0	1
	Sooty mold	- species	0	1	1
	Spot anthracnose	- Elsinoe	2	1	3
<b>ELAEAGNUS (Elaeagnus)</b>					
	Insect injury		1	0	1
	No disease		1		1
<b>ELM (Ulmus)</b>					
	Canker	- Botryosphaeria	1	0	1
		- Phomopsis	1	0	1
	Decline	- environmental	1	0	1
	Dutch elm disease	- Ophiostoma	2	0	2
	Environmental	- freeze	1	1	2
	Insect injury		1	0	1
	No disease		4		4
	Physical injury	- unknown	2	0	2
	Sooty mold	- species	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>EUONYMUS (Euonymus)</b>					
	Anthracnose	- Gloeosporium	1	0	1
	Crown gall	- Agrobacterium	1	0	1
	Cultural	- oedema	1	0	1
	Inadequate specimen, no disease		6		6
	Insect injury		8	1	9
	Powdery mildew	- Microsphaera	2	3	5
<b>FILBERT (Corylus)</b>					
	Cultural	- transplant shock	1	0	1
<b>FIR (Abies)</b>					
	No disease		1		1
	Root rot	- Phytophthora	1	0	1
<b>FORSYTHIA (Forsythia)</b>					
	Cultural	- transplant shock	1	0	1
	Environmental	- freeze	1	0	1
	Gall	- Phomopsis	2	0	2
<b>FRINGETREE (Chionanthus)</b>					
	Chemical injury	- unknown	1	0	1
<b>GINKGO (Ginkgo)</b>					
	Cultural	- transplant shock	1	0	1
<b>HACKBERRY (Celtis)</b>					
	Insect injury		1	1	2
<b>HAWTHORN (Crataegus)</b>					
	Cedar/Quince rust	- Gymnosporangium	1	0	1
	Chemical injury	- growth regulator	1	0	1
<b>HAZELNUT (Corylus)</b>					
	Blight	- Anisogramma	1	0	1
<b>HEMLOCK (Tsuga)</b>					
	Environmental	- drought	2	0	2
	Inadequate specimen, no disease		7		7
	Insect injury		1	0	1
	Lichen	- species	1	0	1
<b>HIBISCUS (Hibiscus)</b>					
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	1	0	1
	No disease		2		2
	Southern blight	- Sclerotium	1	0	1
<b>HICKORY (Carya)</b>					
	Decline	- unknown	1	0	1
	Insect injury		2	0	2

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>HOLLY and INKBERRY (Ilex)</b>					
	Black root rot	- Thielaviopsis	9	0	9
	Cultural	- transplant shock	3	1	4
	Decline	- unknown	5	0	5
	Environmental stresses		8	1	9
	Insect injury		3	3	6
	No disease		19		19
	Nutritional	- general	1	0	1
	Root rot	- Rhizoctonia	2	1	3
	Senescence	- natural	1	0	1
<b>HONEYLOCUST (Gleditsia)</b>					
	Insect injury		1	0	1
	Leaf spot	- Cercospora	0	1	1
	No disease		2		2
<b>HONEYSUCKLE (Lonicera)</b>					
	No disease		1		1
	Sooty mold	- species	1	0	1
<b>HORNBEAM (Ostrya)</b>					
	Environmental	- freeze	1	0	1
	Insect injury		1	0	1
<b>HYDRANGEA (Hydrangea)</b>					
	Bacterial spot	- Xanthomonas	2	0	2
	Chemical injury	- growth regulator	1	0	1
	Environmental stresses		2	1	3
	Leaf spot	- Cercospora	1	0	1
	No disease		3		3
	Root rot	- Pythium	2	0	2
		- Rhizoctonia	0	1	1
<b>JUNIPER and RED CEDAR (Juniperus)</b>					
	Cedar/Quince rust	- Gymnosporangium	1	0	1
	Cultural	- overwatering	1	0	1
		- transplant shock	1	0	1
	Environmental stresses		2	1	3
	Insect injury		1	0	1
	Lichen	- species	0	1	1
	No disease		8		8
	Root rot	- Rhizoctonia	0	1	1
	Twig blight	- Kabatina	1	0	1
		- Phomopsis	1	0	1
<b>KERRIA (Kerria)</b>					
	Leaf/Twig blight	- Blumeriella	1	0	1
<b>KY COFFEETREE (Gymnocladus)</b>					
	No disease		2		2
<b>LEUCOTHOE (Leucothoe)</b>					
	No disease		1		1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>LEYLAND CYPRESS (X Cupressocyparis)</b>					
Canker	-	Botryosphaeria	1	0	1
	-	Seiridium	1	0	1
Dieback	-	unknown	1	0	1
Environmental stresses			2	0	3
No disease			1		1
<b>LILAC (Syringa)</b>					
Cultural	-	transplant shock	1	0	1
Insect injury			1	0	1
Leaf spot	-	Alternaria	1	0	1
	-	Phyllosticta	0	1	1
No disease			5		5
Physical injury	-	unknown	1	0	1
<b>LOCUST (Robinia)</b>					
No disease			1		1
<b>MAGNOLIA (Magnolia)</b>					
Chemical injury	-	growth regulator	2	0	2
Cultural	-	transplant shock	1	0	1
Dieback	-	unknown	1	0	1
Environmental stresses			2	0	2
Leaf scorch	-	winter drying	6	0	6
No disease			4		4
<b>MAHONIA (Mahonia)</b>					
Chemical injury	-	growth regulator	1	0	1
<b>MAPLE (Acer)</b>					
Air pollution	-	ozone	1	0	1
Anthracnose	-	Aureobasidium	1	0	1
	-	Discula	8	0	8
	-	Kabatiella	3	0	3
	-	Xylella	2	0	2
Bacterial scorch	-	Xylella	2	0	2
Canker	-	Botryosphaeria	1	1	2
	-	Hypoxyton	1	0	1
Chemical injury	-	growth regulator	4	0	4
	-	herbicide	1	0	1
	-	unknown	1	0	1
Cultural	-	transplant shock	3	0	3
Decline	-	unknown	1	0	1
Environmental stresses			7	1	8
Inadequate specimen, no disease			19		19
Insect injury			10	3	13
Leaf scorch	-	unknown	3	0	3
Leaf spot	-	Phyllosticta	1	1	2
Nutritional	-	iron deficiency	1	0	1
	-	manganese deficiency	1	0	1
Physical injury	-	rodent	3	0	3
Sooty mold	-	species	0	1	1
Tar spot	-	Rhytisma	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>MIMOSA (Albizzia)</b>					
	Chemical injury	- growth regulator	1	0	1
	No disease		1		1
	Wood decay	- Basidiomycete	1	0	1
<b>MOCKORANGE (Philadelphus)</b>					
	Environmental	- stress	1	0	1
	Insect injury		1		1
<b>NANDINA (Nandina)</b>					
	Cultural	- transplant shock	1	0	1
	Environmental	- stress	1	0	1
	Nutritional	- acid soil	1	0	1
<b>NINEBARK (Physocarpus)</b>					
	No disease		1		1
<b>OAK (Quercus)</b>					
	Anthracnose	- Apiognomonina	4	0	4
	Bacterial scorch	- Xylella	24	0	24
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- growth regulator	5	1	6
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	1	0	1
	Environmental stresses		3	1	4
	Insect injury		26	6	32
	Leaf blister	- Taphrina	2	0	2
	Leaf spot	- Elsinoe	1	0	1
		- Marssonina	0	1	1
		- Tubakia	5	7	12
	No disease		14		14
	Nutritional	- iron deficiency	11	0	11
	Physical injury	- unknown	1	0	1
	Powdery mildew	- Oidium	1	0	1
		- species	2	1	3
	Wood decay	- Basidiomycete	1	0	1
<b>PAGODATREE (Sophora)</b>					
	Wood decay	- Schizophyllum	1	0	1
<b>PAWPAW (Asimina)</b>					
	Leaf spot	- fungal	1	0	1
<b>PEACH (Prunus)</b>					
	No disease		1		1
	Root/Collar rot	- Phytophthora	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT				#
<b>PEAR (Pyrus)</b>						
	Bacterial spot	- Pseudomonas	1	0		1
	Cedar/Quince rust	- Gymnosporangium	0	1		1
	Chemical injury	- growth regulator	2	0		2
	Cultural	- transplant shock	2	0		2
	Decline	- unknown	10	0		10
	Environmental stresses		10	0		10
	Fire blight	- Erwinia	13	1		14
	Insect injury		1	2		3
	No disease		2			2
<b>PHOTINIA (Photinia)</b>						
	Decline	- unknown	1	0		1
	Leaf spot	- fungal	1	0		1
<b>PIERIS (Pieris)</b>						
	No disease		1			1
<b>PINE (Pinus)</b>						
	Brown spot	- Mycosphaerella	1	1		2
	Canker	- Cytospora	2	0		2
	Cultural	- transplant shock	5	0		5
	Environmental stresses		2	1		3
	Inadequate specimen, no disease		9			9
	Insect injury		6	2		8
	Needle drop	- normal	1	0		1
	Root rot	- Phytophthora	2	0		2
	Tip blight	- Sphaeropsis	4	0		4
	White pine decline	- environmental	13	0		13
<b>PLUM (Prunus)</b>						
	Algae	- species	1	0		1
	Black knot	- Apiosporina	7	0		7
	Environmental	- freeze	1	0		1
	Lichen	- species	0	1		1
<b>PRIVET (Ligustrum)</b>						
	Decline	- unknown	1	0		1
<b>REDBUD (Cercis)</b>						
	Canker	- Botryosphaeria	1	0		1
	Chemical injury	- growth regulator	1	0		1
	Cultural	- transplant shock	2	0		2
	Decline	- unknown	1	0		1
	Environmental	- cold injury	1	0		1
	Insect injury		3	0		3
	Leaf blotch	- Monochaetia	0	1		1
	Leaf spot	- Cercospora	2	0		2
	No disease		1			1
	Physical injury	- unknown	1	0		1
	Wilt	- Verticillium	1	0		1



CROP	DIAGNOSIS	CAUSAL AGENT			
<b>RHODODENDRON and AZALEA (Rhododendron)</b>					
	Cultural	- transplant shock	7	0	7
	Decline	- unknown	1	0	1
	Environmental stresses		4	1	5
	Inadequate specimen, no disease		27		27
	Insect injury		10	2	12
	Leaf blight	- Phytophthora	20	0	20
	Leaf scorch	- winter drying	1	0	1
	Nutritional	- iron deficiency	2	0	2
		- pH high	0	1	1
		- soluble salts	1	0	1
<b>ROSE (Rosa)</b>					
	Black spot	- Diplocarpon	7	1	8
	Blight	- Botrytis	1	0	1
	Canker	- Coniothyrium	0	1	1
		- unknown	1	0	1
	Chemical injury	- growth regulator	2	0	2
		- herbicide	3	0	3
		- unknown	2	0	2
	Cultural	- transplant shock	2	0	2
	Dieback	- unknown	2	0	2
	Environmental stresses		2	1	3
	Insect injury		11	2	13
	No disease		5		5
	Nutritional	- acid soil	1	0	1
		- general	1	1	2
	Physical injury	- deer	1	0	1
	Powdery mildew	- Sphaerotheca	0	1	1
	Spot anthracnose	- Sphaceloma	1	0	1
	Virus	- Rose rosette	2	0	2
<b>SERVICEBERRY (Amelanchier)</b>					
	Fire blight	- Erwinia	1	0	1
	Insect injury		1	0	1
	No disease		2		2
	Root rot	- Armillaria	1	0	1
	Rust	- Gymnosporangium	1	0	1
<b>SPIREA (Spiraea)</b>					
	Chemical injury	- herbicide	1	0	1
	Decline	- unknown	1	0	1
	Environmental	- stress	1	0	1
	Leaf spot	- Phyllosticta	0	1	1
	No disease		1		1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>SPRUCE (Picea)</b>					
	Canker	- Cytospora	2	0	2
	Chemical injury	- unknown	2	0	2
	Cultural	- transplant shock	6	1	7
	Decline	- unknown	1	0	1
	Environmental stresses		1	2	3
	Insect injury		14	3	17
	Needle blight	- Stigmina	3	0	3
	Needle cast	- Rhizosphaera	6	0	6
	Root rot	- Phytophthora	1	0	1
	Sooty mold	- species	1	0	1
<b>SUMAC (Rhus)</b>					
	Leaf blister	- Taphrina	1	0	1
<b>SWEETGUM (Liquidambar)</b>					
	Decline	- environmental	1	0	1
	No disease		2		2
<b>SWEETSPIRE (Itea)</b>					
	Cultural	- transplant shock	1	0	1
<b>SYCAMORE (Platanus)</b>					
	Anthracnose	- Apiognomonina	2	0	2
	Powdery mildew	- Microsphaera	1	0	1
<b>TAXUS (Taxus)</b>					
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	2	0	2
	Environmental	- stress	2	0	2
	No disease		12		12
	Root rot	- Phytophthora	3	0	3
<b>TULIPTREE (Liriodendron)</b>					
	Cultural	- transplant shock	1	0	1
	Insect injury		2	0	2
	No disease		2		2
<b>UNKNOWN (Unknown)</b>					
	No disease		2		2
<b>VIBURNUM (Viburnum)</b>					
	Cultural	- planted too deep	0	1	1
	Leaf blight	- Phytophthora	2	0	2
	No disease		47		47
	Root rot	- Phytophthora	1	0	1
<b>WALNUT (Juglans)</b>					
	Insect injury		1	0	1
<b>WEIGELA (Weigela)</b>					
	Environmental	- stress	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>WILLOW (Salix)</b>					
	Canker	- Cytospora	1	0	1
	Leaf spot	- Cercospora	1	0	1
		- fungal	1	0	1
	No disease		2		2
<b>WITCH HAZEL (Hamamelis)</b>					
	Canker	- unknown	1	0	1
	Leaf blotch	- Phyllosticta	2	0	2
<b>YELLOWWOOD (Cladrastis)</b>					
	Leaf spot	- unknown	0	1	1
	Wilt	- Verticillium	1	0	1

#### VEGETABLES

<b>ASPARAGUS (Asparagus)</b>					
	No disease		2	0	2
<b>BEAN (Phaseolus)</b>					
	Air pollution	- ozone	1	0	1
	Anthracnose	- Colletotrichum	3	0	3
	Chemical injury	- growth regulator	2	0	2
		- herbicide	2	0	2
		- unknown	1	0	1
	Common blight	- Xanthomonas	2	0	2
	Environmental	- sunscald	2	0	2
	Inadequate specimen, no disease		6		6
	Insect injury		6	1	7
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Ascochyta	1	0	1
		- Cercospora	0	1	1
		- Phyllosticta	1	0	1
	Nutritional	- general	1	0	1
		- soluble salts	1	0	1
	Root rot	- Pythium	1		
	Root/stem rot	- Fusarium	1	0	1
		- Rhizoctonia	3	1	4
	Rust	- Uromyces	1	0	1
	Southern blight	- Sclerotium	3	0	3
	Virus	- Bean common mosaic	1	0	1
	Yeast spot	- Nematosporea	0	1	1

CABBAGE - See listing under CRUCIFERS

CANTALOUPE - See listing under CUCURBITS

CAULIFLOWER - See listing under CRUCIFERS

CROP	DIAGNOSIS	CAUSAL AGENT			
<b>CORN, SWEET (Zea)</b>					
	Bacterial stalk rot	- Erwinia	3	0	3
	Insect injury		2	1	3
	No disease		3		3
	Nutritional	- phosphorus deficiency	1	0	1
		- potassium deficiency	1	1	2
		- soluble salts	1	0	1
		- zinc deficiency	1	0	1
<b>CRUCIFERS - CABBAGE, CAULIFLOWER, KALE, and TURNIP (Brassica)</b>					
	Bacterial soft rot	- Erwinia	0	1	1
	Chemical injury	- growth regulator	1	0	1
	Environmental	- hollow stalk	1	0	1
	Inadequate specimen, no disease		3		3
	Insect injury		2	0	2
	Wire stem	- Rhizoctonia	1	0	1
<b>CUCUMBER - See listing under CUCURBITS</b>					
<b>CUCURBITS - CANTALOUPE, CUCUMBER, MELON (Cucumis), PUMPKIN, SQUASH (Cucurbita) and WATERMELON (Citrulus)</b>					
	Air pollution	- ozone	1	0	1
	Anthracnose	- Colletotrichum	3	0	3
	Bacterial wilt	- Erwinia	15	0	15
	Chemical injury	- growth regulator	1	0	1
		- herbicide	1	0	1
		- unknown	2	0	2
	Environmental stresses		7	0	7
	Fruit decay	- Fusarium	2	0	1
	Fruit rot	- Sclerotinia	1	0	1
	Gummy stem blight	- Didymella	2	0	2
	Inadequate specimen, no disease		32		32
	Insect injury		7	0	7
	Leaf blight	- Alternaria	3	1	4
	Nutritional	- fertilizer burn	1	0	1
		- general	4	0	4
		- magnesium deficiency	4	0	4
		- soluble salts	1	0	1
	Physical injury	- plastic	1	0	1
	Pollination problem	- no bees	5	0	5
	Powdery mildew	- Erysiphe	1	0	1
		- Oidium	2	0	2
		- Sphaerotheca	2	0	2
	Root knot nematode	- Meloidogyne	1	0	1
	Root rot	- Pythium	1	0	1
	Stem rot	- Erwinia	1	0	1
		- Pythium	1	0	1
	Root/stem rot	- Rhizoctonia	1	0	1
	Virus	- potyvirus	4	1	5
		- unknown	1	0	1
		- Zucchini yellow mosaic	1	0	1
	Wet rot	- Choanephora	1	0	1
	Wilt	- Fusarium	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			#
EGGPLANT (Solanum)					
	No disease		1		1
KALE - See listing under CRUCIFERS					
LETTUCE (Lactuca)					
	Damping-off	- Pythium	1	0	1
	Drop	- Sclerotinia	2	0	2
	Gray mold	- Botrytis	1	0	1
ONION (Allium)					
	Gray mold	- Botrytis	0	1	1
	No disease		1		1
	Physical injury	- unknown	1	0	1
PEA (Pisum)					
	Chemical injury	- growth regulator	1	0	1
	No disease		2		2
	Senescence	- natural	1	0	1
PEPPER (Capsicum)					
	Anthraxnose	- Colletotrichum	1	0	1
	Bacterial spot	- Xanthomonas	11	0	11
	Blight	- Phytophthora	1	0	1
	Blossom end rot	- calcium deficiency/dry	3	0	3
	Chemical injury	- growth regulator	1	0	1
		- herbicide	1	0	1
	Environmental stresses		1	1	2
	Inadequate specimen, no disease		6		6
	Nutritional	- fertilizer burn	1	0	1
		- soluble salts	3	0	3
	Root rot	- Pythium	5	0	5
	Root/stem rot	- Rhizoctonia	1	0	1
	Southern blight	- Sclerotium	3	1	4
	Stem injury	- wind	1	0	1
	Virus	- Alfalfa mosaic	2	0	2
		- unknown	1	0	1
POTATO (Solanum)					
	Dry rot	- Fusarium	1	1	2
	Inadequate specimen, no disease		7		7
	Insect injury		1	2	3
	Jelly end rot	- physiological	1	1	2
	Root/Stem rot	- Rhizoctonia	2	0	12
	Scab	- Streptomyces	4	0	4
	Wilt	- Verticillium	1	0	1
PUMPKIN - See listing under CUCURBITS					
RHUBARB (Rheum)					
	Bacterial crown rot	- Erwinia	1	0	1
	Root/Crown rot	- Rhizoctonia	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT			
SPINACH (Spinacia)					
White rust	-	Albugo	1	0	1
SQUASH - See listing under CUCURBITS					
SWEETPOTATO (Ipomoea)					
Mollusk	-	slug	1	0	1
Scurf	-	Monilochaetes	1	0	1
TOMATO (Lycopersicon)					
Bacterial canker	-	Clavibacter	2	0	2
Bacterial speck	-	Pseudomonas	2	0	2
Bacterial spot	-	Xanthomonas	17	0	17
Blossom drop	-	poor pollination	2	0	2
Blossom end rot	-	calcium deficiency/dry	4	1	5
Catfacing	-	environmental	1	0	1
	-	unknown	1	0	1
Chemical injury	-	burn	0	1	1
	-	growth regulator	17	3	20
	-	herbicide	7	1	8
	-	unknown	1	0	1
Damping-off	-	Pythium	1	1	2
Early blight	-	Alternaria	5	0	5
Environmental stresses			8	1	9
Inadequate specimen, no disease			39		39
Insect injury			16	4	20
Leaf curl	-	unknown	0	1	1
Leaf roll	-	physiological	1	0	1
Leaf scorch	-	unknown	0	1	1
Leaf spot	-	Phoma	0	1	1
	-	Septoria	11	2	13
Nutritional	-	fertilizer burn	1	1	2
	-	general	1	0	1
	-	magnesium deficiency	0	1	1
	-	nitrogen deficiency	2	0	12
	-	phosphorus deficiency	2	0	2
	-	potassium deficiency	1	0	1
	-	soluble salts	7	0	7
Physical injury	-	unknown	1	0	1
Pith necrosis	-	Pseudomonas	1	0	1
Root knot nematode	-	Meloidogyne	1	0	1
Root rot	-	Pythium	9	0	9
Root/stem rot	-	Rhizoctonia	3	0	3
Southern blight	-	Sclerotium	3	0	3
Stem injury	-	unknown	0	1	1
Stem rot	-	Botrytis	1	0	1
	-	Fusarium	1	0	1
	-	Sclerotinia	7	0	7
Virus	-	Tobacco mosaic	4	0	4
	-	Tomato spotted wilt	3	0	3
	-	Tomato yellow leaf curl	1	0	1
Walnut wilt	-	juglone	1	0	1
Wilt	-	Fusarium	10	1	7
Yellow shoulder	-	unknown	1	0	1

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**CROP****DIAGNOSIS****CAUSAL AGENT**#

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**TURNIP - See listing under CRUCIFERS****WATERMELON - See listing under CUCURBITS**  
-----**TOTALS****3336****309****3645**