

UK UNIVERSITY OF KENTUCKY
College of Agriculture

**Plant Diseases
in
Kentucky**

**Plant Disease Diagnostic Laboratory
Summary**

2004

by:

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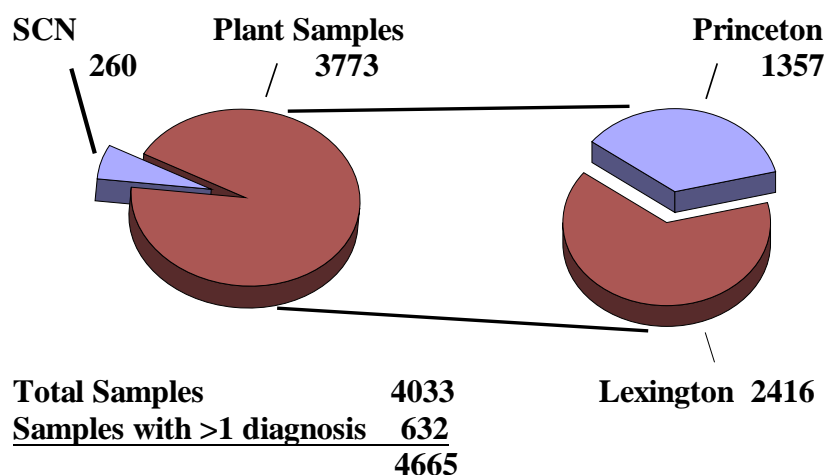
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INTRODUCTION

The Plant Disease Diagnostic Laboratory (Lexington and Princeton) handled 3772 plant samples and 260 nematode soil samples during 2004. Samples with more than one problem numbered 632 bringing the total number of actual diagnoses to 4665. The Lexington Laboratory diagnosed 2416 specimens. Of that number there were 231 Nursery samples and 51 Forest/Parks samples from the survey work for the occurrence of the Sudden Oak Death (SOD) pathogen. These samples were diagnosed as to the cause of symptoms even if the sample did not contain the SOD pathogen, which none did. The Princeton Laboratory's specimens totaled 1621; of this number 1357 were plant samples and 264 were soil samples submitted exclusively for soybean cyst nematode analysis. In addition to the 3773 plant samples processed in the laboratory, 351 cases were also submitted in 2004 through the Digital Consulting System for consultation by the Diagnosticians and Extension Plant Pathology Specialists.

These numbers are summarized in Figure 1 below:

Plant Disease Diagnostic Laboratory - 2004



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 landscape disease problems through the Kentucky Pest News newsletter, radio and television tapes, and plant health care workshops. New homeland security rules now require

reporting of all diagnoses of plant diseases to USDA-APHIS on a real-time basis and our laboratories are working to meet that requirement. 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: Near Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 32.4 degrees across the state which was 0.6 degrees above normal and 5.5 degrees cooler than December 2003. High temperatures averaged from 41 in the West to 41 in the East. Departure from normal high temperatures ranged from 3 degrees below normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 24 degrees in the West to 24 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 2 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 4.04 inches statewide which was 0.66 inches above normal. Precipitation totals by climate division, West 3.51 inches, Central 3.84 inches, Bluegrass 4.24 inches and East 4.46 inches, which was -0.19, -0.18, +0.79 and +0.76 inches, respectively, from normal.

February: Near Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 37.1 degrees across the state which was 0.1 degree below normal and 4.7 degrees warmer than January 2004. High temperatures averaged from 47 in the West to 47 in the East. Departure from normal high temperatures ranged from 4 degrees below normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 27 degrees in the West to 29 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 3 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 2.59 inches statewide which was 1.18 inches below normal. Precipitation totals by climate division, West 2.11 inches, Central 3.01 inches, Bluegrass 1.71 inches and East 3.24 inches, which was 1.94, 1.13, 1.73 and 0.23 inches, respectively, below normal.

March: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 49.2 degrees across the state which was 3.0 degrees above normal and 12.1 degrees warmer than February 2004. High temperatures averaged from 61 in the West to 59 in the East. Departure from normal high temperatures ranged from 0 degrees from normal in the West to 4 degrees above normal in the East. Low temperatures averaged from 41 degrees in the West to 39 degrees in the East. Departure from normal low temperature ranged from 5 degrees above normal in the West to 5 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 4.20 inches statewide which was 0.40 inches below normal. Precipitation totals by climate division, West 4.18 inches, Central 4.68 inches, Bluegrass 3.60 inches and East 4.27 inches, which was 0.50, 0.19, 0.75 and 0.13 inches, respectively, below normal.

April: Near Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 56.0 degrees across the state which was 0.4 degrees above normal and 6.8 degrees warmer than March 2004. High temperatures averaged from 68 in the West to 66 in the East. Departure from normal high temperatures ranged from 3 degrees below normal in the West to 1 degree above normal in the East. Low temperatures averaged from 46 degrees in the West to 46 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.

Precipitation (liq. equ.) for the period totaled 4.79 inches statewide which was 0.70 inches above normal. Precipitation totals by climate division, West 5.02 inches, Central 5.74 inches, Bluegrass 4.22 inches and East 4.26 inches, which was 0.49, 1.54, 0.32 and 0.44 inches, respectively, from normal.

May: Above Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 69.5 degrees across the state which was 5.1 degrees above normal and 13.5 degrees warmer than April 2004. High temperatures averaged from 80 in the West to 79 in the East. Departure from normal high temperatures ranged from 1 degree below normal in the West to 4 degrees above normal in the East. Low temperatures averaged from 61 degrees in the West to 59 degrees in the East. Departure from normal low temperature ranged from 5 degrees above normal in the West to 4 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 9.02 inches statewide which was 4.03 inches above normal. Precipitation totals by climate division, West 7.65 inches, Central 9.90 inches, Bluegrass 9.99 inches and East 8.80 inches, which was 2.66, 4.64, 5.08 and 3.95 inches, respectively, above normal.

June: Normal Temperatures and Near Normal Precipitation

Temperatures for the period averaged 72.5 degrees across the state which was 0.0 degrees from normal and 3.0 degrees warmer than May 2004. High temperatures averaged from 84 in the West to 80 in the East. Departure from normal high temperatures ranged from 3 degrees below normal in the West to 3 degrees below normal in the East. Low temperatures averaged from 64 degrees in the West to 62 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 0 degrees from normal in the East.

Rainfall for the period totaled 4.32 inches statewide which was 0.06 inches above normal. Precipitation totals by climate division, West 3.99 inches, Central 4.36 inches, Bluegrass 4.35 inches and East 4.33 inches, which was -0.48, -0.63, -0.53 and +1.37 inches, respectively, from normal.

July: Below Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 74.7 degrees across the state which was 1.4 degrees below normal. High temperatures averaged from 85 in the West to 84 in the East. Departure from normal high temperatures ranged from 4 degrees below normal in the West to 2 degrees below normal in the East. Low temperatures averaged from 66 degrees in the West to 65 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 0 degrees from normal in the East.

Rainfall for the period totaled 5.46 inches statewide which was 0.99 inches above normal. Precipitation totals by climate division, West 4.54 inches, Central 6.07 inches, Bluegrass 6.65 inches and East 5.05 inches, which was 0.43, 1.55, 2.14 and 0.61 inches, respectively, above normal.

August: 7th Coolest August on Record (past 110 years)

Temperatures for the period averaged 71.6 degrees across the state which was 3.4 degrees below normal. High temperatures averaged from 83 in the West to 81 in the East. Departure from normal high temperatures ranged from 4 degrees below normal in the West to 3 degrees below normal in the East. Low temperatures averaged from 61 degrees in the West to 61 degrees in the East. Departure from normal low temperature ranged from 3 degrees below normal in the West to 1 degree below normal in the East.

Rainfall for the period totaled 4.31 inches statewide which was 0.70 inches above normal. Precipitation totals by climate division, West 3.99 inches, Central 4.37 inches, Bluegrass 4.53 inches and East 4.36 inches, which was 0.80, 0.85, 0.81, and 0.46 inches, respectively, below normal.

September: Above Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 69.1 degrees across the state which was 0.7 degrees above normal. High temperatures averaged from 82 in the West to 79 in the East. Departure from normal high temperatures ranged from 1 degree above normal in the West to 1 degree above normal in the East. Low temperatures averaged from 58 degrees in the West to 59 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 3 degrees above normal in the East.

Rainfall for the period totaled 4.24 inches statewide which was 0.76 inches above normal. Precipitation totals by climate division, West 0.69 inches, Central 3.38 inches, Bluegrass 4.33 inches and East 7.51 inches, which was -2.68, -0.52, +1.07 and +4.10 inches, respectively, from normal.

October: 8th Wettest October on Record (past 110 years)

Temperatures for the period averaged 60.6 degrees across the state which was 4.0 degrees above normal. High temperatures averaged from 72 in the West to 70 in the East. Departure from normal high temperatures ranged from 1 degree above normal in the West to 2 degrees above normal in the East. Low temperatures averaged from 52 degrees in the West to 51 degrees in the East. Departure from normal low temperature ranged from 3 degrees above normal in the West to 6 degrees above normal in the East.

Rainfall for the period totaled 5.00 inches statewide which was 1.87 inches above normal. Precipitation totals by climate division, West 4.58 inches, Central 4.91 inches, Bluegrass 6.28 inches and East 4.52 inches, which was 1.41, 1.71, 3.35 and 1.59 inches, respectively, above normal.

November: 8th Warmest November on Record (past 110 years)

Temperatures for the period averaged 50.7 degrees across the state which was 4.3 degrees above normal. High temperatures averaged from 59 in the West to 59 in the East. Departure from normal high temperatures ranged from 0 degrees from normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 44 degrees in the West to 43 degrees in the East. Departure from normal low temperature ranged from 6 degrees above normal in the West to 10 degrees above normal in the East.

Precipitation for the period totaled 5.23 inches statewide which was 1.14 inches above normal. Precipitation totals by climate division, West 6.50 inches, Central 5.43 inches, Bluegrass 5.52 inches and East 3.92 inches, which was 1.98, 1.14, 1.85 and 0.19 inches, respectively, above normal.

December: Below Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 36.4 degrees across the state which was 0.8 degrees below normal. High temperatures averaged from 45 in the West to 47 in the East. Departure from normal high temperatures ranged from 0 degrees from normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 29 degrees in the West to 32 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 8 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 4.91 inches statewide which was 0.53 inches above normal. Precipitation totals by climate division, West 4.17 inches, Central 5.75 inches, Bluegrass 4.53 inches and East 5.14 inches, which was -0.40, +0.92, +0.55 and +1.28 inches, respectively, from normal.

CROP SUMMARIES

Tobacco:

The number of tobacco samples for 2004 was significantly greater than in 2003 and more comparable to the numbers for 2000 through 2002, which overall have been dramatically lower since 1999. Much of the increase in tobacco samples was due to the incidence of Blue Mold (*Peronospora tabacina*) which was significantly greater than in 2003 which, in turn, was much greater by at least a factor of four over the low years of 2000 through 2002. Black Shank (*Phytophthora parasitica* var. *nicotianae*) samples nearly doubled from 2003 levels due to the wet growing season. The number of cases of Fusarium Wilt Complex tripled from 2003 to 9. The number of cases of Tomato Spotted Wilt virus were much greater than in 2003 but still small compared to 2001 levels. With the Tobacco Buyout Program occurring in late 2004 its effect on the growing of tobacco in the Commonwealth is as yet unknown.

Other agronomic crops:

Corn: The number of corn samples with diseases were relatively few but several cases of Northern Corn Leaf Blight (*Exserohilum turcicum*) were seen due to the unseasonably cool and wet weather.

Soybean: Samples diagnosed with Sudden Death (*Fusarium solani*, A strain) were three times greater than in 2003 due to the wet growing season. Samples diagnosed with Downy mildew (*Peronospora manshurica*) were much higher than normal. With the yield of Soybean Cyst Nematode (*Heterodera glycines*) resistant varieties as good or better than that of susceptible varieties, the impact of SCN has been diminished. Australasian Soybean Rust (*Phakopsora pachyrhizi*) hit the U.S. in early November after the second round of hurricane Ivan. This makes the likelihood if this destructive disease affecting the Commonwealth, and in turn, our diagnostic efforts in the 2005 cropping season.

Small Grains: The number of samples with the Barley Yellow Dwarf Virus were at their highest since 1995.

Forages: Leaf spot diseases were common due to the wet growing conditions.

Fruit and Vegetable Plant Disease Observations:

Diagnosing fruit and vegetable diseases involves a great deal of research into the possible causes of the problem. Most visual diagnoses include microscopy to determine what plant parts are affected and to identify the microbe 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 U.K. faculty plant pathologists and horticulturists, and which need culturing, PCR and ELISA are common for commercial fruits and vegetables. The Extension plant pathology group has tested in our laboratory, protocols for detecting, using PCR, several pathogens of interest to fruit and vegetable growers. These include the difficult to diagnose pathogens causing bacterial wilt, bacterial leaf spot, yellow vine decline and Pierce's disease. 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 for Kentucky.

The 2004 growing season in Kentucky provided mostly cooler than normal temperatures and above normal rainfall, however these observations varied by location. The coldest temperatures occurred in January and ranged from -12F in northern Kentucky to 4F in the west. There were few significant late spring frosts. In central Kentucky, normal temperatures prevailed most months except for above normal

temperatures in March and May and cooler than normal in July and August. Indeed, in this region, there were no days with 90 F or greater temperatures (normal is 17 days). Rainfall in central Kentucky was normal during most months, but was above normal during May - August. In western Kentucky, except for a wet May, rainfall was mostly normal until starting in August, very dry late summer and fall weather prevailed. In eastern Kentucky, May, June, and September were wet, but July and August were dry. With wetness affecting disease development, the percentage of days with rain in Kentucky averaged about 35% statewide during April (43% in some regions), 45% in May (52%), 38% in June (60%), and 38% in July (58%). Thus, there were ample opportunities for rain-based plant disease development.

Results and Discussion

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

- Pierce's disease of grapes caused by *Xylella fastidiosa*
- Grape crown gall caused by *Agrobacterium vitis* emerges with more grapes grown
- Peach fruit rot caused by a species of *Colletotrichum*.
- Cucurbit yellow vine disease caused by *Serratia marsescens*
- 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*
- Bacterial fruit blotch of melons caused by *Acidovorax avenae* subsp. *citrulli*.
- Root knot nematode (*Meloidogyne* spp.) is becoming a major problem on several crops due to reduced crop rotation and use of old tobacco fields as vegetable sites.
- Virus disease incidence, especially in legume crops, could change significantly with recent introduction of the soybean aphid, a virus vector.
- Soybean rust is expected to arrive in the U.S. at anytime and many vegetable legumes are also hosts.

Tree Fruit Diseases

Pome fruits: High levels of apple scab (*Venturia inaequalis*); cedar rusts of apple (*Gymnosporangium juniperi-virginianae*, *G. clavipes*, and *G. globosum*); and frog-eye leaf spot (*Botryosphaeria obtusa*) were observed. With warm spring temperatures, fire blight (*Erwinia amylovora*) was observed frequently, but was not thought to be severe. Sooty blotch (*Peltaster fructicola*, *Geastrum polystigmatis*, *Leptodontium elatius*, and other fungi) and flyspeck (*Zygophiala jamaicensis*) appeared early in the season. Powdery mildew (*Podosphaera leucotricha*) was also frequently observed. Pears were observed with fire blight, leaf spot (*Diplocarpon mespili*), and thread blight (*Corticium stevensii*).

Stone Fruits: Peach leaf curl (*Taphrina deformans*), brown rot (*Monilinia fructicola*), and scab (*Cladosporium carpophilum*) were common. A new and difficult to manage peach fruit rot caused by a species of *Colletotrichum* continues to expand in western Kentucky, appearing more frequently and in more orchards. Brown rot of plums and cherries and cherry leaf spots (*Blumeriella jaapii*) were observed frequently.

Pawpaw: Phyllosticta leaf spot (*Phyllosticta asiminae*) was common and a twig canker (*Fusarium* sp.) associated with ambrosia beetles was observed. A fungal fruit rot was observed late in the season; culture experiments are currently being conducted to identify the causal fungus.

Small Fruit Diseases

Grapes: Black rot (*Guignardia bidwellii*) and anthracnose (*Elsinoe ampelina*), favored by wet spring weather, were widespread, especially in vineyards managed by inexperienced growers. Grape downy mildew (*Plasmopara viticola*) was observed, especially late in the season. No new cases of Pierce's disease (*Xylella fastidiosa*) were found.

Brambles: Blackberry rosette (*Cercospora rubi*) appeared in most regions of the state. Raspberry Phytophthora root and crown rot (*Phytophthora* spp.) was commonly found and could be attributed to the added wetness of the season.

Blueberries: Several kinds of stem canker diseases (*Fusicoccum*, *Phomopsis*, *Botryosphaeria*) were diagnosed on blueberries.

Strawberries: Leaf spot (*Mycosphaerella fragariae*) was frequently observed. Fruit and crown anthracnose (*Colletotrichum acutatum*) was also problematic.

Vegetable Diseases

In accord with a wet spring and a cool, moist summer in most areas of the state, infectious diseases played a significant role in successful production of commercial vegetable crops.

Vegetable transplants. Pythium root rot diseases (*Pythium* spp.) appeared in tomato, cantaloup, squash and pepper fields this year and may have originated in transplant production.

Cole crops. Cabbage black rot (*Xanthomonas campestris* pv. *campestris*) and head rot (*Rhizoctonia solani*) were observed.

Tomatoes. Commercial tomato plantings were infected by several bacterial diseases including bacterial canker (*Clavibacter michiganensis* pv. *michiganensis*), bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*), and bacterial speck (*Pseudomonas syringae* pv. *tomato*). Septoria leaf spot (*Septoria lycopersici*), favored by cool, wet weather was especially widespread this year as was early blight (*Alternaria solani*). Leaf molds (*Cladosporium fulvum*, *Pseudocercospora fuligena*) also occurred in warm, humid environments. Fruit maladies in addition to blossom end rot included the fruit infection stages of the fungal and bacterial leaf diseases listed above and also buckeye rot (*Phytophthora cactorum*) and gray mold (*Botrytis cinerea*). Tomato fruit also experienced other physiological disorders such as stem-end internal greening. Fusarium wilt (*Fusarium oxysporum* f.sp. *lycopercici*), southern stem blight (*Sclerotium rolfsii*) and root knot nematode (*Meloydogyne* sp.) were problems in some fields.

Peppers. Bacterial leaf spot (*Xanthomonas campestris* pv. *vesicatoria*) remains an important problem. Phytophthora stem and fruit rot (*Phytophthora capsici*) was also important this wet season.

Cucurbits. Cucurbits are popular in Kentucky, and their diseases are economically important. Phytophthora root rot, stem rot, leaf blight and fruit rot (*Phytophthora capsici*) are widespread in the state and cause losses in pumpkin, watermelon, squash, and cucumber. Anthracnose (*Colletotrichum* spp.), gummy stem blight/black rot (*Mycosphaerella melonis*), Alternaria leaf spot (*Alternaria cucumerina*) and Microdochium blight (*Plectosporium* sp.) were found at serious levels in fields of several different cucurbit crops. Pumpkin and squash powdery mildew (*Erysiphe cichoracearum*) also caused losses. Bacterial diseases of cucurbits included bacterial wilt (*Erwinia tracheiphila*) and cucurbit yellow vine decline caused by *Serratia marsescens*. However, the incidence of yellow vine decline was lower than in previous years. Foliar disease in cucurbits is often attributed to poor spraying techniques. The causes of poor spraying, even if being sprayed regularly, are poor timing, poor coverage, or use of the wrong fungicides.

Other vegetables. Bean root and stem rot (*Rhizoctonia solani*, *Pythium* spp.), anthracnose (*Colletotrichum lindemuthianum*) and angular leaf spot (*Phaeoisariopsis griseola*) were observed this year.

Growers are urged to bring to the attention of their County Extension Agent any observations of new outbreaks and disease trends in their fields. We want to be especially watchful of the new spectrum of microbes and diseases that may occur with changes in fungicide use patterns from broad-spectrum protectant fungicides such as Manzate and Bravo to new chemicals such as Quadris, Sovran, and Abound, which present a greater risk of pathogen resistance to the fungicide while incurring reduced risks to human health and the environment. For example, we have noted increased bacterial diseases in tomatoes and now want to know if this is due to how we raise our crops, manage other diseases, or import seeds and transplants.

Because fruits and vegetables are high value crops, the plant disease diagnostic laboratory should be a great value to commercial growers. However, many growers are not using the plant disease diagnostic laboratory often enough or they are waiting until their disease problem has become well established. By then, it may be too late to do anything about it, or in some cases to correctly diagnose the sequence of diseases that may have led to the final outcome. Growers need to consult consistently with their County Extension Agents so that appropriate plant specimens are sent to the laboratory in a timely manner. We are urging County Extension Agents to stress in their Extension programming the need for accurate diagnosis of diseases of high-value crops. Growers can work with their Agents to see that Kentucky growers have the best possible information on fruit and vegetable diseases.

Landscape Plant Disease Observations:

As previously mentioned, making a diagnosis involves a great deal of research into the possible causes of the plant problem. 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 almost 700 digital consulting cases, 30-35% dealt with landscape and nursery plants.

The 2004 growing season in Kentucky provided mostly cooler than normal temperatures and above normal rainfall, however these observations varied by location. The coldest temperatures occurred in January and ranged from -12F in northern Kentucky to 4F in the west. There were few significant late spring frosts. In central Kentucky, normal temperatures prevailed most months except for above normal temperatures in March and May and cooler than normal in July and August. Indeed, in this region, there were no days with 90 F or greater temperatures (normal is 17 days). Rainfall in central Kentucky was normal during most months, but was above normal during May - August. In western Kentucky, except for a wet May, rainfall was mostly normal, but turned dry at the end of the summer and into the fall. In eastern Kentucky, May, June, and September were wet, but July and August were dry. With wetness affecting disease development, the percentage of days with rain in Kentucky averaged about 35% statewide during April (43% in some regions), 45% in May (52%), 38% in June (60%), and 38% in July (58%). Thus, there were ample opportunities for rain-based plant disease development.

This year the following important diseases or diseases that were unusual or increased due to the wet weather were observed:

Deciduous trees

- Dogwood powdery mildew (*Microsphaera*, *Phyllactinia*), spot anthracnose (*Elsinoe*)
- Flowering crabapple scab (*Venturia*)
- Hawthorn, serviceberry and crabapple cedar rusts (*Gymnosporangium juniperi-virginianae*, *G. clavipes*, *G. globosum*)
- Magnolia, maple, and smoke tree wilt (*Verticillium*)
- Maple, ash, dogwood, oak redbud and sycamore anthracnose (*Kabatiella*, *Discula*, and *Apiognomonina*)
- Maple leaf spot (*Phyllosticta*)
- Oak bacterial leaf scorch (*Xylella*), Actinopelte leaf spot (*Tubakia*), and leaf blister (*Taphrina*)
- Willow leaf spot (*Cercospora*)

Needle Evergreens

- Juniper tip blight (*Phomopsis*, *Kabatina*) and rusts (*Gymnosporangium*)
- Pine tip blight (*Sphaeropsis*) and needle rust (*Coleosporium*)
- Spruce needle cast (*Rhizosphaera*)

Shrubs

- Azalea leaf and flower gall (*Exobasidium*)
- Crepe myrtle powdery mildew (*Erysiphe*)
- Holly black root rot (*Thielaviopsis*)
- Photinia leaf spot (*Entomosporium*)
- Rose black spot (*Diplocarpon*) and rosette (possible virus, leaf curl mite-transmitted)
- Rhododendron dieback (*Phytophthora*)

Herbaceous Annuals and Perennials

- Asiatic lily, chrysanthemum, daylily, geranium, petunia, rudbeckia, vinca and bedding plants root rots (*Pythium*, *Rhizoctonia*, *Phytophthora*)
- Daylily leaf streak (*Aureobasidium*)
- Impatiens virus (Impatiens Necrotic Spot Virus)
- Downy mildew of helleborus (*Peronospora*) and coreopsis (*Plasmopara*)
- Hosta southern blight (*Sclerotium*)
- Pansy, petunia, geranium, and vinca black root rot (*Thielaviopsis*)
- Vinca aerial blight (*Phytophthora*)

Significance to Industry

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.

A Shift in Sample Types:

As noted above, the number of tobacco samples, although greater in 2004 than in the previous year, 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* emerges with more grapes grown
- 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, 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

In 2004 a full-time Diagnostic Assistant joined the PDDL staff. Ms. Brenda Coe was hired in January 2004 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, Brenda provided much-needed assistance to the Lexington laboratory in sample triage, diagnostic and technical support. She has quickly become an integral part of our team, and as her training in plant disease diagnosis progresses, she has and will continue to aide in the smooth operation of the laboratory.

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, forages, and fruits. Bernadette Amsden conducted laboratory research on tobacco

and ornamentals. Bernadette and Ed both helped in conducting diagnostic tests on many plant samples. Colette Laurent works part-time in Princeton analyzing soybean cyst nematode samples. Claudia Cotton and Siriporn Donnua, summer student from Thailand, provided extra part-time assistance in the Lexington Laboratory (in addition to their primary work of processing Sudden Oak Death survey samples, along with Bernadette Amsden). Mary Rachel Ray provided very capable part-time assistance in the Princeton Laboratory.

Thanks also go to Pat Yancey and Sandie Waddell, staff assistants in Lexington and Princeton, respectively, 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 2004.

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 resource 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 2004. 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 the number of secondary diagnoses and the third column is the total of the previous two. The primary diagnosis is the main, or frequently, the only problem observed on a plant sample. If a second problem of equal or lesser importance was observed, it was entered as the secondary diagnosis. Occasionally, a problem may have only been diagnosed as a secondary problem, and not as a primary problem for this year thus a zero (0) will appear in the primary diagnosis column.

Referrals and consultations: Insect problems were generally identified or verified by a specialist in the Entomology Department. Chemical injuries on all commercially grown crops were diagnosed by a weed control specialist or by the crop specialist in the Agronomy or Horticulture Departments. On a number of occasions we also consulted with crop specialists in other departments to diagnose or verify abiotic problems.

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

Crop Category	Abiotic Problems	Biotic² Problems	Chemical Injury	Inadequate Specimen	Insect Injury	Other³	Total Diagnoses
<u>Agronomic</u>							
Corn	27	32	13	1	9	10	92
Forages	3	24	1	0	4	12	44
Small grains	10	38	0	2	2	1	53
Soybeans	33	153*	13	7	1	212*	419
Tobacco	206	749	49	9	2	54	1069
<u>Fruit</u>							
Small fruit	32	72	11	5	11	34	165
Tree fruit	30	116	2	2	30	19	199
<u>Herbs</u>							
	2	4	0	0	1	2	9
<u>Identifications</u>							
	0	46	0	3	0	2	51
<u>Ornamentals</u>							
Herbaceous and							
Houseplants	71	125	5	9	26	43	279
Turfgrass	25	94	2	3	0	44	168
Woody	370	567	46	15	278	322	1598
<u>Vegetables</u>							
	109	239	34	23	24	45	474
<u>Miscellaneous</u>							
	2	28	0	0	0	15	45
<u>Total</u>							
	920	2287	176	79	388	815	4665

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

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

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

* Numbers include samples from the Nematode Analysis Laboratory, Princeton: 60 with Soybean Cyst Nematodes; 200 without Soybean Cyst Nematodes.

Table 2.**SUMMARY OF BIOTIC PROBLEMS BY CROP CATEGORY.**

Crop Category	Bacterial	Fungal	Nematode	Virus	Other¹
<u>Agronomic</u>					
Corn	4	28	0	0	0
Forages	0	22	0	2	0
Small grains	1	12	0	25	0
Soybeans	2	90	61	0	0
Tobacco	34	661	1	53	0
<u>Fruit</u>					
Small fruit	1	68	0	2	1
Tree fruit	15	96	0	0	5
<u>Herbs</u>					
	1	3	0	0	0
<u>Identifications</u>					
	0	17	0	0	29
<u>Ornamentals</u>					
Herbaceous and Houseplants	5	115	2	1	2
Turfgrass	0	93	0	0	1
Woody	50	501	3	7	6
<u>Vegetables</u>					
	46	182	1	9	1
<u>Miscellaneous</u>					
	0	3	24	1	0
Total	159	1891	91	98	45

¹ Other includes these categories: Animal (rodent and bird damage), Plant (plant identifications), and Algae, Lichen and Phytoplasma.

Table 3.**NUMBER OF PLANT SPECIMENS BY CROP CATEGORY, EXPRESSED AS PERCENTAGES**

Crop Category	Number of Plant Specimens	Percentage of Total Plant Specimens
Agronomic (-Tobacco)	277	7.4
Tobacco	861	22.8
Fruit	313	8.3
Herbs	8	0.2
Identifications	51	1.4
Ornamentals	1811	48.0
Vegetables	413	10.9
Miscellaneous	39	1.0
Total Plant Specimens	3773	100.0

Table 4.

SUMMARY OF DIAGNOSES BY CROP CATEGORY AND CROP.

Crop Category and Crop	Number of Primary Diagnoses¹	Number of Secondary Diagnoses²	Total Diagnoses³
<u>Agronomic</u>			
Corn	80	12	92
Forages	36	8	44
Small grains	44	9	53
Soybeans	377*	42	419
Tobacco	861	208	1069
<u>Fruit</u>			
Small fruit	149	16	165
Tree fruit	164	35	199
<u>Herbs</u>			
	8	1	9
<u>Identifications</u>			
	51	0	51
<u>Ornamentals</u>			
Herbaceous and Houseplants	237	43	280
Turfgrass	153	15	168
Woody	1421	177	1598
<u>Vegetables</u>			
	413	61	474
<u>Miscellaneous</u>			
	39	6	45
<u>Total</u>	4033	633	4666

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

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

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

* Soybean plant samples + 260 Soybean Cyst Nematode samples.

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

Crop Group	Grower Type							
	Commercial		Homeowner		Research		Institution	
	Ext¹	Non-Ext²	Ext¹	Non-Ext²	Ext¹	Non-Ext²	Ext¹	Non-Ext²
<u>Agronomic</u>								
Corn	70	9	0	0	0	1	0	0
Forages	34	2	0	0	0	0	0	0
Small grains	37	4	0	0	0	3	0	0
Soybeans	292	5	0	0	75	5	0	0
Tobacco	817	32	0	0	2	10	0	0
<u>Fruit</u>								
Small Fruit	81	4	60	1	0	3	0	0
Tree Fruit	31	3	124	3	0	2	1	0
<u>Herbs</u>								
	5	0	2	0	0	0	0	1
<u>Identifications</u>								
	12	0	34	3	0	0	1	1
<u>Ornamental</u>								
Herbaceous and								
Houseplants	113	15	74	6	15	6	7	1
Turfgrass	54	21	55	1	0	1	6	15
Woody	263	65	763	28	269	8	19	6
<u>Vegetable</u>								
	204	6	183	7	3	8	2	0
<u>Miscellaneous</u>								
	5	0	2	0	28	1	2	1
<u>Total</u>								
	2018	166	1297	49	392	48	38	25
<u>Total/Grower Type</u>								
	2184		1346		440		63	

Total number of samples received = 4033

¹ Ext = Extension samples submitted via County Extension Agents or Extension Specialists.

² Non-Ext = Non-extension samples submitted directly by the grower or other non-extension clients.

Table 6.

**NUMBER OF SPECIMENS 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.	16	1	1	1	0	19
Agronomy Department	26	0	0	1	1	28
Entomology Department	2	4	36	5	0	47
Horticulture Department	0	3	0	1	1	5
Univ. of Georgia	0	0	0	0	27	27
Waters Agricultural Laboratory	1	0	0	0	0	1
					<u>Total</u>	127
					<u>Total number of specimens</u>	4033
					<u>Percent of specimens referred outside Diagnostic Lab for diagnosis</u>	3.2

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

Table 7.

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

Test	Number of Tests
Polymerase Chain Reaction (PCR)	82
Culturing	104
Enzyme-linked Immunosorbent Assay (ELISA)	357
Chlorine (test strip)	1
Incubation	384
Nematode extraction (total = 267)	
Miscellaneous	5
Pinewood nematode	2
Soybean cyst nematode	260
Soil tests (total = 239)	
pH	100
pH/Soluble Salts	80
Soluble salts	35
Quick nitrate	9
Soluble salts/Quick nitrate	15

Table 8.

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

COUNTY	Total	Agronomic²	Tobacco	Fruit	Ornamental	Vegetable	Other
ADAIR	5	2	2	0	0	1	0
ALLEN	23	2	9	1	3	6	2
ANDERSON	14	3	4	0	7	0	0
BALLARD	39	6	18	2	6	2	5
BARREN	37	7	19	2	8	1	0
BATH	17	0	11	0	5	1	0
BELL	10	0	0	0	6	4	0
BOONE	25	0	4	0	14	3	4
BOURBON	17	2	6	0	6	3	0
BOYD	9	0	2	1	4	2	0
BOYLE	50	1	8	2	35	3	1
BRACKEN	15	0	7	4	4	0	0
BREATHITT	12	1	2	0	2	7	0
BRECKINRIDGE	114	9	62	6	28	8	1
BULLITT	57	0	7	10	32	5	3
BUTLER	12	4	2	3	2	1	0
CALDWELL	76	5	22	18	28	15	3
CALLOWAY	121	8	56	5	47	2	3
CAMPBELL	18	2	4	0	8	3	1
CARLISLE	5	0	3	1	0	1	0
CARROLL	14	0	6	0	7	0	1
CARTER	14	0	8	1	5	0	0
CASEY	11	0	1	3	4	3	0
CHRISTIAN	198	33	25	19	59	61	1
CLARK	27	0	9	0	16	2	0
CLAY	10	0	2	0	5	2	1
CLINTON	16	3	6	0	7	4	0
CRITTENDEN	36	3	1	5	11	15	1
CUMBERLAND	6	0	2	1	3	0	0
DAVIESS	127	10	26	15	53	18	5
EDMONSON	8	0	3	2	1	2	0
ELLIOTT	19	0	6	2	4	7	0
ESTILL	19	2	6	1	4	6	0
FAYETTE	284	6	20	9	223	19	7
FLEMING	33	3	11	2	13	3	1
FLOYD	13	0	0	2	11	0	0
FRANKLIN	41	0	12	4	18	3	4
FULTON	2	0	0	0	1	0	1
GALLATIN	2	1	1	0	0	0	0
GARRARD	13	0	5	0	8	0	0
GRANT	32	0	7	4	17	4	0
GRAVES	42	5	11	7	15	4	0
GRAYSON	24	3	10	4	5	2	0
GREEN	10	3	4	0	3	0	0
GREENUP	37	0	4	13	14	5	1
HANCOCK	16	0	7	2	6	0	1
HARDIN	30	9	8	1	11	1	0
HARLAN	17	0	0	1	14	2	0
HARRISON	9	0	4	0	4	1	0
HART	11	1	8	1	0	0	1
HENDERSON	46	3	7	6	24	6	0
HENRY	38	1	14	7	16	0	0
HICKMAN	6	2	0	2	1	1	0
HOPKINS	45	3	10	1	22	7	2
JACKSON	14	0	3	3	6	1	1
JEFFERSON	48	0	2	0	39	7	0
JESSAMINE	40	0	6	2	31	1	0
JOHNSON	3	0	2	0	1	0	0
KENTON	53	2	2	3	42	3	1
KNOTT	1	0	0	0	0	1	0
KNOX	7	0	2	0	3	0	2

COUNTY	Total	Agronomic ¹	Tobacco	Fruit	Ornamental	Vegetable	Other
LARUE	27	4	9	3	10	2	0
LAUREL	30	0	1	2	16	5	6
LAWRENCE	4	0	3	0	0	1	0
LEE	6	0	0	0	5	1	0
LESLIE	0	0	0	0	0	0	0
LETCHER	10	0	0	1	5	4	0
LEWIS	11	0	7	0	2	2	0
LINCOLN	33	1	7	8	16	1	0
LIVINGSTON	11	3	0	4	2	0	2
LOGAN	64	8	18	11	27	14	0
LYON	13	2	0	1	8	1	1
McCRACKEN	45	2	2	4	26	10	1
McCREARY	6	0	0	1	4	1	0
McLEAN	18	8	4	0	0	5	1
MADISON	41	1	12	1	23	4	0
MAGOFFIN	1	0	1	0	0	0	0
MARION	27	9	4	3	9	2	0
MARSHALL	62	2	2	5	44	8	0
MARTIN	0	0	0	0	0	0	0
MASON	22	0	12	1	7	0	2
MEADE	28	5	5	2	11	4	1
MENIFEE	7	0	5	1	0	1	0
MERCER	19	1	6	0	8	1	3
METCALFE	21	0	11	4	6	0	0
MONROE	31	1	13	4	5	7	0
MONTGOMERY	55	0	25	3	17	7	3
MORGAN	25	0	9	5	5	6	0
MUHLENBERG	26	4	6	1	13	1	1
NELSON	37	2	5	6	17	5	2
NICHOLAS	11	0	6	1	2	1	1
OHIO	10	0	6	0	3	1	0
OLDHAM	14	2	0	1	11	0	0
OWEN	14	0	5	2	6	1	0
OWSLEY	1	0	1	0	0	0	0
PENDELTON	4	1	1	0	1	1	0
PERRY	5	0	2	0	2	1	0
PIKE	2	0	0	1	1	0	0
POWELL	3	0	1	1	1	0	0
PULASKI	41	5	5	3	21	2	5
ROBERTSON	17	0	12	0	4	1	0
ROCKCASTLE	3	1	1	0	1	0	0
ROWAN	12	0	6	0	5	1	0
RUSSELL	28	3	6	4	2	9	5
SCOTT	22	0	9	0	4	8	0
SHELBY	59	7	8	2	40	2	0
SIMPSON	22	4	1	4	9	2	2
SPENCER	11	2	6	0	2	1	0
TAYLOR	25	6	12	2	5	0	0
TODD	53	17	20	8	15	3	0
TRIGG	38	5	12	1	20	6	0
TRIMBLE	20	2	14	1	0	5	0
UNION	22	8	0	6	8	0	0
WARREN	92	9	13	8	57	6	0
WASHINGTON	17	1	7	2	7	0	0
WAYNE	31	5	11	2	4	4	5
WEBSTER	20	0	9	4	4	2	1
WHITLEY	16	0	4	3	8	1	0
WOLFE	6	1	2	0	1	2	0
WOODFORD	40	1	6	7	24	1	0
Out-of-State (Ohio)	3	0	0	0	3	0	0
TOTALS	3134	212	647	279	1550	364	82

¹ Does not include the 282 samples taken in the Sudden Oak Death survey.

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

Table 9.

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

Specialists, Researchers, Diagnosticians	Department	Number of cases	
		Primary Diagnosis ¹	Consultations ²
LEXINGTON			
Anderson, RG	Horticulture	2	9
Barnes, TG	Forestry	0	1
Beale, JW (Diagnostician)	Plant Pathology	1622	27
Bessin, RT	Entomology	7	3
Coe, BL	Plant Pathology	64	0
Conners, T	Forestry	0	1
Durham, RE	Horticulture	0	2
Fountain, WM	Horticulture	1	7
Green, JD	Agronomy	10	12
Hartman, JR	Plant Pathology	70	15
Lee, CD	Agronomy	1	9
Nesmith, WC	Plant Pathology	163	56
Palmer, GK	Agronomy	28	11
Pearce, RC	Agronomy	2	1
Potter, MF	Entomology	0	1
Powell, AJ	Agronomy	1	4
Rowell, AB	Horticulture	3	5
Strang, JG	Horticulture	3	2
Townsend, LH	Entomology	29	14
Vincelli, P	Plant Pathology	142	21
PRINCETON			
Bachi, PR (Diagnostician)	Plant Pathology	1260	16
Bailey, WA	Agronomy	12	9
Dunwell, WC	Horticulture	14	13
Hayden, D	Horticulture	0	1
Herbek, JH	Agronomy	1	2
Hershman, DE	Plant Pathology	7	7
Johnson, DW	Entomology	7	3
Lacefield, GD	Agronomy	3	2
Masabni, JG	Horticulture	7	8
Martin, JR	Agronomy	23	5
Murdock, LW	Agronomy	8	3
Rasnake, M	Agronomy	1	3

¹ The specialist or diagnostician signing the Plant Diagnostic Form was considered the primary diagnoser.

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

Table 10.

DIGITAL CONSULTING SYSTEM

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

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

351 cases were submitted in 2004 by a total of 95 submitters.

Cases came from a total of 86 counties.

Case Type	Count Of Case Type
Animal (goat)	1
Corn	13
Forage crop	7
Forest tree	3
Fungal ID	1
Greenhouse Annuals	1
Herb	1
Herbaceous ornamental	15
Indoor tree	1
Insect ID	2
Landscape shrub	21
Landscape tree	60
Nursery, woody	2
other (Kudzu)	1
Plant ID	3
Small fruit	8
Small grain	3
Soybean	17
Test case	12
Tobacco	102
Tree fruit	6
Turf grass	13
Vegetable	53
Weather affect	2
Weed ID	3

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
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AGRONOMIC CROPS

CORN

CORN (*Zea*) (includes Popcorn)

Chemical injury	- growth regulator	1	0	1
	- herbicide	10	1	11
	- unknown	1	0	1
Damping-off	- Pythium	1	0	1
Ear/Kernel rots	- Aspergillus	1	0	1
	- Fusarium	1	1	2
	- Penicillium	0	1	1
	- Stenocarpella	7	0	7
	- Trichoderma	0	1	1
Environmental	- stresses	5	1	6
Gray leaf spot	- Cercospora	2	0	2
Inadequate specimen, no disease		11		11
Insect injury		6	3	9
Northern leaf blight	- Setosphaeria	5	1	6
Nutritional	- acid soil	2	0	2
	- fertilizer burn	2	0	2
	- magnesium deficiency	3	0	3
	- nitrogen	3	0	3
	- zinc deficiency	9	0	9
Physiological	- green snap	1	0	1
Pollination problem	- genetic	1	0	1
Root rot	- Fusarium	3	0	3
	- Pythium	1	0	1
Rust, common	- Puccinia	0	1	1
Southern leaf blight	- Cochliobolus	0	1	1
Stalk rot	- Fusarium	1	0	1
Stewart's wilt	- Erwinia	2	1	3

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>FORAGES</u>					
ALFALFA (Medicago)					
	Canker	- Rhizoctonia	1	0	1
	Chemical injury	- unknown	1	0	1
	Crown rot	- fungal	1	0	1
	Crown/root rot	- Rhizoctonia	1	1	2
	Crown/stem rot	- Sclerotinia	1	0	1
	Environmental	- stress	1	0	1
	Insect injury		0	4	4
	Leaf spot	- Cercospora	1	0	1
		- Leptosphaerulina	5	1	6
	No disease		6		6
	Nutritional	- general	1	0	1
	Root rot	- Aphanomyces	1	0	1
		- Pythium	4	0	4
		- Rhizoctonia	0	1	1
	Summer black stem	- Cercospora	1	0	1
CLOVER (Trifolium)					
	Leaf spot	- Cercospora	1	0	1
	No disease		2		2
	Insect injury		0	1	1
OAT (Avena)					
	Crown rust	- Puccinia	1	0	1
	Virus	- Barley yellow dwarf	2	0	2
ORCHARDGRASS (Dactylis)					
	Brown stripe	- Cercosporidium	1	1	2
	Environmental	- stress	1	0	1
	No disease		4		4

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>SOYBEAN</u>					
SOYBEAN (Glycine)					
	Apical dominance lost	- unknown	1	0	1
	Bacterial pustule	- Xanthomonas	1	0	1
	Brown spot	- Septoria	3	3	6
	Charcoal rot	- Macrophomina	0	4	4
	Chemical injury	- growth regulator	5	0	5
		- herbicide	7	1	8
	Downy mildew	- Peronospora	8	7	15
	Environmental stresses		4	5	9
	Frogeye	- Cercospora	2	10	12
	Inadequate specimen, no disease		19		19
	Induced chlorosis	- Rhizobium	1	0	1
	Insect injury		0	1	1
	Leaf blight	- Cercospora	0	2	2
	Nutritional	- acid soil	2	0	2
		- manganese deficiency	2	1	3
		- potassium deficiency	18	1	19
		- unknown	1	0	1
	Pod and stem blight	- Diaporthe	2	0	2
	Poor nodulation	- unknown	0	1	1
	Powdery mildew	- Microsphaera	1	1	2
	Root rot	- Fusarium	4	1	5
		- Rhizoctonia	0	3	3
	Root/stem rot	- Phytophthora	2	0	2
		- Rhizoctonia	1	1	2
	Southern blight	- Sclerotium	0	1	1
	Soybean cyst nematode	- Heterodera			
		on plant samples	0	1	1
		* in soil samples	60		60
		* absent in soil samples	200		200
		(*soil submitted to Nematode Analysis Laboratory)			
	Sudden death	- Fusarium	30	0	30

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>SMALL GRAINS</u>					
OAT (Avena)					
	Environmental	- stress	1	0	1
	Rust	- Puccinia	1	0	1
OATGRASS (Arrhenatherum)					
	Rust	- Puccinia	1	0	1
SORGHUM (Sorghum)					
	Root rot	- Pythium	1	0	1
WHEAT (Triticum)					
	Bacterial streak	- Xanthomonas	1	0	1
	Environmental stresses		2	1	3
	Glume blotch	- Septoria	0	1	1
	Head blight	- Fusarium	1	0	1
	Inadequate specimen, no disease		3		3
	Insect injury		2	0	2
	Leaf blotch, speckled	- Septoria	0	1	1
	Nutritional	- acid soil	0	1	1
		- fertilizer burn	1	0	1
		- nitrogen deficiency	1	1	2
	Powdery mildew	- Erysiphe	2	0	2
	Sharp eyespot	- Rhizoctonia	1	0	1
	Smut/loose	- Ustilago	0	1	1
	Straw mold	- Penicillium	1	0	1
	Stripping	- physiological	2	0	2
	Take-all	- Gaumannomyces	1	0	1
	Virus	- Barley yellow dwarf	17	2	19
		- Wheat soilborne mosaic	1	1	2
		- Wheat spindle streak	4	0	4

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>TOBACCO</u>					
TOBACCO (Nicotiana)					
	Air pollution	- sulfur dioxide	1	0	1
	Angular leaf spot	- Pseudomonas	10	5	15
	Bacterial soft rot	- Erwinia	0	2	2
	Black leg	- Erwinia	10	1	11
	Black root rot	- Thielaviopsis	5	0	5
	Black shank	- Phytophthora	175	12	187
	Blue mold	- Peronospora	189	25	214
	Brown spot	- Alternaria	0	1	1
	Chemical injury	- fungicide	10	0	10
		- growth regulator	4	0	4
		- herbicide	18	1	19
		- insecticide	1	0	1
		- spray burn	1	0	1
		- unknown	12	2	14
	Collar rot	- Sclerotinia	2	0	2
	Cultural stresses		14	1	15
	Damping-off	- Rhizoctonia	4	2	6
	Distortion	- genetic	1	0	1
		- unknown	1	0	1
	Early flowering	- environmental	2	0	2
	Environmental	- cold injury	7	2	9
		- compaction	0	5	5
		- driving rain	1	0	1
		- hail injury	1	0	1
		- high temperature	3	0	3
		- lightning	4	0	4
		- low humidity	0	1	1
		- stress	7	0	7
		- weather scald	3	0	3
		- wet feet	1	4	5
	Frenching	- metabolites	5	0	5
	Frogeye	- Cercospora	44	26	70
	Hollow stalk	- Erwinia	2	0	2
	Inadequate specimen, no disease		63		63
	Insect injury		1	1	2
	Leaf spot	- physiological	1	2	3
	Nutritional	- acid soil	11	5	16
		- boron deficiency	1	0	1
		- calcium deficiency	1	1	2
		- fertilizer burn	9	5	14
		- general	18	3	21
		- manganese toxicity	28	4	32
		- nitrogen deficiency	5	3	8
		- phosphorus deficiency	0	1	1
		- potassium deficiency	6	2	8
		- temp. phosphorus def.	8	3	11
	- urea toxicity	1	0	1	
	Physical injury	- unknown	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
(Tobacco, continued)					
	Physiological	- oedema	1	0	1
	Root knot nematode	- Meloidogyne	1	0	1
	Root problem	- unknown	4	0	4
	Root rot	- Pythium	44	12	56
	Root/stem rot	- Rhizoctonia	3	14	17
	Sore shin	- Rhizoctonia	9	18	27
	Stem canker	- Fusarium	3	1	4
	Stem girdling	- Rhizoctonia	5	0	5
	Storage mold	- Aspergillus	2	0	2
		- fungal	2	0	2
		- Penicillium	0	1	1
	Target spot	- Rhizoctonia	30	16	46
	Virus	- Alfalfa mosaic	2	2	4
		- potyvirus	2	0	2
		- Potato Virus Y	2	0	2
		- Tobacco ringspot	6	1	7
		- Tobacco streak	3	0	3
		- Tomato spotted wilt	24	6	30
	Weather fleck	- ozone	12	3	15
	Wilt	- Fusarium	9	0	9

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
FRUIT CROPS					
<u>SMALL FRUITS</u>					
BLUEBERRY (Vaccinium)					
	Anthracnose	- Gloeosporium	3	0	3
	Canker	- Fusicoccum	2	0	2
	Cultural	- transplant shock	2	0	2
	Environmental stresses		4	0	4
	No disease		5		5
	Nutritional	- acid soil	1	1	2
		- iron deficiency	1	0	1
		- manganese deficiency	0	1	1
		- nitrogen deficiency	2	0	2
BRAMBLES - BLACKBERRY, and RASPBERRY (Rubus)					
	Anthracnose	- Elsinoe	2	0	2
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- growth regulator	2	0	2
		- herbicide	1	0	1
		- unknown	1	0	1
	Double blossom	- Cercospora	7	0	7
	Environmental stresses		2	0	2
	Fire blight	- Erwinia	1	0	1
	Insect injury		2	0	2
	Leaf spot	- Septoria	3	0	3
	No disease		9		9
	Poor fruit set	- unknown	1	0	1
	Root rot	- Phytophthora	1	1	2
		- Rhizoctonia	1	0	1
	Rust, leaf	- Phragmidium	0	1	1
	Rust, orange	- Gymnoconia	1	0	1
	Virus	- Tomato ringspot	1	0	1
GRAPE (Vitis)					
	Anthracnose	- Elsinoe	10	1	11
	Bitter rot	- Melanconium	1	0	1
	Black rot	- Guignardia	16	0	16
	Chemical injury	- fungicide	1	0	1
		- growth regulator	3	0	3
		- herbicide	2	0	2
	Decline	- unknown	1	0	1
	Environmental stresses		2	2	4
	Inadequate specimen, no disease		18		18
	Insect injury		5	2	7
	Nutritional	- nitrogen	1	0	1
		- phosphorus	0	1	1
		- potassium	3	0	3
	Physical injury	- bird	1	0	1
	Powdery mildew	- Uncinula	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
STRAWBERRY (Fragaria)					
	Anthracnose	- Colletotrichum	2	1	3
	Chemical injury	- herbicide	1	0	1
	Inadequate specimen, no disease		7		7
	Insect injury		1	1	2
	Leaf spot	- Mycosphaerella	8	2	10
	Nutritional	- acid soil	1	0	1
		- potassium deficiency	0	1	1
	Red stele	- Phytophthora	1	0	1
	Root rot	- Pythium	1	0	1
<u>TREE FRUITS</u>					
APPLE (Malus)					
	Bitter pit	- calcium deficiency	1	1	2
	Bitter rot	- Glomerella	3	0	3
	Cedar apple rust	- Gymnosporangium	21	6	27
	Cedar quince rust	- Gymnosporangium	0	1	1
	Chemical injury	- herbicide	2	0	2
	Cultural stresses		2		2
	Collar rot	- Phytophthora	0	1	1
	Dieback	- unknown	1	0	1
	Fire blight	- Erwinia	10	1	11
	Flyspeck	- Schizothyrium	0	1	1
	Frogeye	- Botryosphaeria	4	1	5
	Insect injury		6	5	11
	No disease		6		6
	Pollination problem	- environmental	1	0	1
	Powdery mildew	- Podosphaera	1	0	1
	Root rot	- Phytophthora	1	0	1
		- Pythium	1	0	1
		- unknown	1	0	1
	Scab	- Venturia	1	2	3
	Sooty blotch	- Gloeodes	1	0	1
	Sooty mold	- species	0	1	1
CHERRY (Prunus)					
	Black knot	- Apiosporina	1	0	1
	Brown rot	- Monilinia	2	0	2
	Environmental	- stress	0	1	1
	Insect injury		1	0	1
	Leaf blight	- Pseudomonas	1	0	1
	Leaf spot	- Blumeriella	2	0	2
		- Coccoomyces	1	0	1
	Lichen	- species	1	0	1
	No disease		3		3
	Root problem	- unknown	1	0	1
	Root rot	- Phytophthora	1	0	1
	Stem canker	- fungal	0	1	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
FIG (Ficus)					
	Environmental	- cold injury	1	0	1
	Insect injury		1	0	1
PAWPAW (Asimina)					
	Leaf spot	- Phyllosticta	2	0	2
	No disease		1		1
PEACH, APRICOT and NECTARINE (Prunus)					
	Anthracnose	- Colletotrichum	1	0	1
	Brown rot	- Monilinia	14	0	14
	Canker	- Leucostoma	1	0	1
	Cultural	- transplant shock	3	0	3
	Environmental	- stress	1	1	2
	Inadequate specimen, no disease		4		4
	Gummosis	- unknown	1	0	1
	Insect injury		4	2	6
	Leaf curl	- Taphrina	6	0	6
	Lichen	- species	1	0	1
	Nutritional	- general	3	0	3
		- nitrogen deficiency	1	0	1
	Powdery mildew	- Podosphaera	1	0	1
	Root rot	- Phytophthora	1	0	1
	Scab	- Cladosporium	1	5	6
PEAR (Pyrus)					
	Canker	- Botryosphaeria	1	0	1
	Fire blight	- Erwinia	3	0	3
	Insect injury		3	0	3
	Leaf spot	- Entomosporium	1	0	1
	No disease		1		1
	Physical injury	- unknown	1	0	1
PECAN (Carya)					
	Insect injury		4	1	5
	No disease		1		1
	Insect injury		0	1	1
	Internal breakdown	- physiological	1	0	1
	Physical injury	- rodent	1	0	1
	Poor kernel fill	- unknown	3	0	3
	Powdery mildew	- Oidium	0	1	1
	Scab	- Cladosporium	1	0	1
PERSIMMON (Diospyros)					
	Leaf spot	- Ramularia	1	0	1
PLUM (Prunus)					
	Black knot	- Apiosporina	1	0	1
	Brown rot	- Monilinia	1	0	1
	Decline	- unknown	2	0	2
	Insect injury		1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<i>(Plum, continued)</i>					
	No disease		3		3
	Root problem	- unknown	1	0	1
	Sooty mold	- species	1	0	1
WALNUT (<i>Juglans</i>)					
	Anthracnose	- <i>Gnomonia</i>	1	0	1
	Canker	- <i>Fusarium</i>	1	0	1
	Insect injury		1	0	1
	Leaf spot	- <i>Phloeospora</i>	1	0	1
	No disease		1		1
HERBS					
BASIL (<i>Ocimum</i>)					
	Leaf spot	- <i>Pseudomonas</i>	1	0	1
	Nutritional	- unknown	1	0	1
	Root rot	- <i>Pythium</i>	1	0	1
DILL (<i>Anethum</i>)					
	Root rot	- <i>Rhizoctonia</i>	1	0	1
MINT (<i>Mentha</i>)					
	Insect injury		1	0	1
	No disease		1		1
ROSEMARY (<i>Rosmarinus</i>)					
	Distortion	- Physiological	1	0	1
	No disease		1		1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
MISCELLANEOUS					
ARABIDOPSIS (Arabidopsis)					
	Virus	- Impatiens necrotic spot	1	0	1
KUDZU (Pueraria)					
	Leaf spot	- Cercospora	1	0	1
	No disease		1		1
LEAF MULCH					
	No disease		1		1
PIGWEEED (Amaranthus)					
	White rust	- Albugo	1	0	1
SOIL					
	Cyst nematode	- Globodera	0	1	1
	Dagger nematode	- Xiphinema	0	1	1
	Lesion nematode	- Pratylenchus	3	1	4
	No disease		13		13
	Nutritional	- general	1	0	1
	Root knot nematode	- Meloidogyne	5	0	5
	Spiral nematode	- Helicotylenchus	4	2	6
	Stubby root nematode	- Trichodorus	1	0	1
	Stunt nematode	- Tylenchorhynchus	1	1	2
WOOD					
	Environmental	- water damage	1	0	1
WOOD SIDING					
	Brown rot	- Basidiomycotina	1	0	1

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IDENTIFICATIONS					
FUNGAL IDENTIFICATIONS					
	Aspergillus	- species	1		1
	Basidiomycete	- species	2		2
	Boletaceae	- species	1		1
	Climacodon	- septentrionalis	1		1
	Ganoderma	- aplanatum	1		1
	Gyrodon	- merulioides	1		1
	Inadequate specimen		1		1
	Mutinus	- caninus	3		3
	Panaeolus	- foenicicii	1		1
	Pluerotus	- sapidus	1		1
	Scleroderma	- aurantium	1		1
	Slime mold	- species	3		3
LICHEN IDENTIFICATIONS					
	Lichen	- species	2		2
PLANT IDENTIFICATIONS					
	Algae	- Gloeocapsa	1		1
		- green	1		1
	Brassica	- species	1		1
	Clematis	- terniflora	1		1
	Cucumis	- species	1		1
	Digitaria	- ischaemum	1		1
	Euonymus	- americanus	1		1
	Fraxinus	- americana	1		1
		- species	1		1
	Gleditsia	- species	1		1
	Hibiscus	- syriacus	1		1
	Hydrangea	- species	1		1
	Ilex	- glabra	1		1
	inadequate specimen		2		2
	Malus	- species	1		1
	Muhlenbergia	- schreberi	1		1
	no determination		2		2
	Paulownia	- tomentosa	2		2
	Poa	- trivialis	1		1
	Proboscidea	- louisianica	1		1
	Pyrus	- calleryana	1		1
	Solanum	- tuberosum	1		1
	Taxodium	- distichum	1		1
	Thuja	- occidentalis	1		1
	Tilia	- americana	1		1
	Tomato	- species	1		1
	Tsuga	- canadensis	1		1
	Viburnum	- rhytidophyllum	1		1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
ORNAMENTALS					
<u>HERBACEOUS ORNAMENTALS and INDOOR PLANTS</u>					
ANGELONIA (Angelonia)	No disease		1		1
BACOPA (Bacopa)	No disease		1		1
BEGONIA (Begonia)	Anthracnose	- Gloeosporium	1	0	1
	Cultural	- over watering	1	0	1
	Leaf spot	- physiological	1	0	1
	No disease		1		1
	Powdery mildew	- Oidium	1	0	1
BLANKET FLOWER (Gaillardia)	Environmental	- sunscald	1	0	1
CACTUS (Cryptocereus)	No disease		1		1
CACTUS (Schlumbergera)	Physical injury	- unknown	1	0	1
CALAMAGROSTIS (Calamagrostis)	Anthracnose	- Colletotrichum	1	0	1
	Root rot	- Rhizoctonia	0	1	1
CALIBRAHOA (Calibrachoa)	Root rot	- Pythium	0	1	1
		- Thielaviopsis	1	0	1
CALLA (Calla)	Nutritional	- general	1	0	1
CANNA (Canna)	Blight	- Phytophthora	1	0	1
	Leaf scorch	- unknown	2	0	2
	Physiological	- oedema	0	1	1
CARYOPTERIS (Caryopteris)	No disease		1		1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
CHRYSANTHEMUM (Chrysanthemum)					
	Bacterial blight	- Erwinia	2	0	2
	Bacterial leaf spot	- Pseudomonas	1	0	1
	Chemical injury	- unknown	1	0	1
	Cultural	- over watering	1	0	1
	Inadequate specimen, no disease		4		4
	Leaf cupping	- unknown	1	0	1
	Nutritional	- fertilizer burn	1	0	1
		- general	4	0	4
		- manganese deficiency	2	0	2
		- nitrogen deficiency	1	0	1
	Physiological	- unknown	1	0	1
	Root rot	- Fusarium	0	1	1
		- Pythium	1	2	3
		- Rhizoctonia	1	0	1
	Root/stem rot	- Rhizoctonia	2	1	3
	Stem rot	- Fusarium	0	2	2
CONEFLOWER (Echinacea)					
	Aster yellows	- phytoplasma	1	0	1
CORAL BELLS (Heuchera)					
	No disease		2		2
COREOPSIS (Coreopsis)					
	Downy mildew	- Plasmopora	1	0	1
CYCLAMEN (Cyclamen)					
	No disease		1		1
DAHLIA (Dahlia)					
	Powdery mildew	- Erysiphe	1	0	1
DAISY (Gerbera)					
	Inadequate specimen		1		1
DAYLILY (Hemerocallis)					
	Anthracnose	- Colletotrichum	0	1	1
	Cultural	- oedema	1	0	1
		- over watering	1	0	1
	Insect injury		2	0	2
	Leaf spot	- fungal	1	0	1
	Leaf streak	- Aureobasidium	2	0	2
	No disease		1		1
	Nutritional	- general	1	0	1
	Root rot	- Pythium	0	1	1
	Rust	- Puccinia	1	0	1
DIANTHUS (Dianthus)					
	Insect injury		1	0	1
	No disease		1		1

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EPIMEDIUM (Epimedium)					
	Cultural	- oedema	1	0	1
EPIPHYLLUM (Epiphyllum)					
	Physical injury	- unknown	1	0	1
FERN (Nephrolepis)					
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Phyllosticta	1	0	1
	No disease		2		2
FICUS (Ficus)					
	No disease		1		1
FOXGLOVE (Digitalis)					
	No disease		1		1
GERANIUM (Pelargonium)					
	Black leg	- Pythium	2	0	2
	Black root rot	- Thielaviopsis	1	0	1
	Cultural stresses		4	0	4
	Leaf spot	- Alternaria	1	0	1
	Nutritional	- high soluble salts	1	1	2
		- iron toxicity	1	0	1
	Root rot	- fungal	1	0	1
		- Pythium	1	1	2
GESNERIAD (Gesneriad)					
	No disease		1		1
GLADIOLUS (Gladiolus)					
	No disease		1		1
GOLDENROD (Solidago)					
	No disease		1		1
GRASS (ornamental)					
	No disease		1		1
HELICHRYSUM (Helichrysum)					
	Cultural	- overwatering	1	0	1
HELLEBORUS (Helleborus)					
	Downy mildew	- Peronospora	1	0	1
	No disease		1		1
HEUCHERA (Heuchera)					
	Cultural	- transplant shock	1	0	1
HOLLYHOCK (Althaea)					
	Insect injury		1	0	1
	Rust	- Puccinia	1	0	1

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HOSTA (Hosta)					
	Inadequate specimen, no disease		5		5
	Insect injury		1	0	1
	Leaf spot	- Colletotrichum	1	0	1
	Southern blight	- Sclerotium	2	0	2
IBERIS (Iberis)					
	Nutritional	- fertilizer burn	1	0	1
IMPATIENS (Impatiens)					
	Crown rot	- Rhizoctonia	1	0	1
	Environmental stress		1	0	1
	Inadequate specimen, no disease		6		6
	Insect injury		6	0	6
	Leaf spot	- Alternaria	2	0	2
	Nutritional	- fertilizer burn	3	2	5
		- general	1	0	1
		- nitrogen deficiency	2	0	2
	Virus	- Impatiens necrotic spot	1	0	1
IPOMOEA (Ipomoea)					
	Leaf spot	- physiological	1	0	1
IRIS (Iris)					
	Bacterial soft rot	- Erwinia	0	1	1
	Chemical injury	- herbicide	1	0	1
	Root rot	- fungal	1	0	1
IVY (Hedera and others)					
	Bacterial spot	- Xanthomonas	1	0	1
	Insect injury		1	0	1
	No disease		1		1
	Root rot	- Rhizoctonia	1	0	1
JACOB'S LADDER (Polemonium)					
	Insect injury		1	0	1
LADY'S MANTLE (Alchemilla)					
	Leaf spot	- Cercospora	1	0	1
LAMIUM (Lamium)					
	Insect injury		1	0	1
LILY (Lilium)					
	Anthracnose	- Colletotrichum	1	0	1
	Insect injury		1	0	1
	No disease		1		1
	Root rot	- Pythium	1	0	1
LIRIOPE (Liriope)					
	Anthracnose	- Colletotrichum	4	0	4

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LISIANTHUS (Lisianthus)					
	No disease		1		1
MANDEVILLA (Mandevilla)					
	Anthracnose	- Colletotrichum	4	0	4
		- Discula	1	0	1
		- unknown	1	0	1
	Blight	- Phytophthora	2	0	2
	Insect injury		2	1	3
	No disease		2		2
MARIGOLD (Tagetes)					
	Cultural	- transplant shock	1	0	1
	Insect injury		1	0	1
	Nutritional	- iron toxicity	1	0	1
MOLINIA (Molinia)					
	Nutritional	- nitrogen deficiency	1	0	1
ORCHID (various)					
	Cultural	- overwatering	2	0	2
	No disease		1		1
PACHYSANDRA (Pachysandra)					
	Leaf/stem blight	- Volutella	1	0	1
PANICUM (Panicum)					
	Rust	- Puccinia	1	0	1
PANSY (Viola)					
	Black root rot	- Thielaviopsis	1	0	1
	Gray mold	- Botrytis	1	0	1
	Leaf spot	- Alternaria	1	1	2
	Powdery mildew	- Oidium	1	0	1
	Root rot	- Fusarium	1	0	1
		- Pythium	1	0	1
		- Rhizoctonia	0	1	1
PENTAS (Pentas)					
	Root rot	- Rhizoctonia	1	0	1
PEONY (Paeonia)					
	Chemical injury	- growth regulator	1	0	1
	Gray mold	- Botrytis	1	0	1
	Leaf blotch	- Cladosporium	1	0	1
	Root knot nematode	- Meloidogyne	2	0	2
	Root problem	- unknown	1	0	1
	Root rot	- Rhizoctonia	0	1	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PETUNIA (Petunia)					
	Black root rot	- Thielaviopsis	4	0	4
	Cultural	- media compaction	1	0	1
	No disease		1		1
	Nutritional	- iron deficiency	1	0	1
		- nitrogen deficiency	1	0	1
		- pH high	1	1	2
	Root rot	- Phytophthora	1	0	1
		- Pythium	1	4	5
		- Rhizoctonia	1	0	1
	Stem canker	- Rhizoctonia	2	2	4
PHILODENDRON (Philodendron)					
	Leaf spot	- Glomerella	1	0	1
PHLOX (Phlox)					
	Gray mold	- Botrytis	1	0	1
	Insect injury		1	0	1
	Nutritional	- fertilizer burn	1	0	1
		- nitrogen deficiency	1	0	1
	Powdery mildew	- Oidium	1	0	1
POINSETTIA (Euphorbia)					
	Inadequate specimen		1		1
	Root rot	- Pythium	4	1	5
		- Rhizoctonia	1	0	1
POPPY (Stylophorum)					
	Nutritional	- magnesium deficiency	1	0	1
		- pH high	0	1	1
PULMONARIA (Pulmonaria)					
	Powdery mildew	- Microsphaera	1	0	1
PURPLE PASSION (Gynura)					
	Inadequate specimen		1		1
RUDBECKIA (Rudbeckia)					
	Fasciation	- unknown	1	0	1
	No disease		1		1
	Root/stem rot	- Rhizoctonia	1	0	1
SALVIA (Salvia)					
	Environmental	- wet feet	1	0	1
SCHEFFLERA (Brassaia)					
	Environmental	- wet feet	1	0	1
	Insect injury		1	0	1
SEDUM (Sedum)					
	Insect injury		1	0	1
	Environmental	- wet feet	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
SNAPDRAGON (Antirrhinum)					
	Nutritional	- fertilizer burn	2	0	2
		- soluble salts	1	0	1
	Root rot	- Pythium	1	1	2
	Root/Stem rot	- Rhizoctonia	1	0	1
SWEET POTATO (Ipomoea)					
	Intumescence	- physiological	1	0	1
TRADESCANTIA (Tradescantia)					
	Environmental	- low humidity	1	0	1
	Chemical injury	- fluoride toxicity	0	1	1
TROPICAL PLANT MIX (unknown)					
	Cultural	- over watering	1	0	1
TULIP (Tulipa)					
	Chemical injury	- herbicide	1	0	1
UNKNOWN					
	No disease		1		1
VINCA (Vinca)					
	Aerial blight	- Phytophthora	5	0	5
	Black root rot	- Thielaviopsis	1	1	2
	Canker/dieback	- Phoma	1	0	1
	Gray mold	- Botrytis	1	0	1
	No disease		2		2
	Root rot	- Pythium	1	2	3
	Root/stem rot	- Rhizoctonia	2	1	3
VIOLET (Viola)					
	Nutritional	- fertilizer burn	1	0	1
YARROW (Achillea)					
	No disease		1		1
YUCCA (Yucca)					
	Insect injury		1	0	1
ZEBRAGRASS (Miscanthus)					
	No disease		1		1
ZINNIA (Zinnia)					
	Charcoal rot	- Macrophomina	0	1	1
	Environmental	- cold injury	0	1	1
	Root rot	- Pythium	1	0	1
		- Rhizoctonia	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
<u>TURFGRASS</u>					
BENTGRASS (Agrostis)					
	Anthracnose	- Colletotrichum	4	0	4
	Brown patch	- Rhizoctonia	0	1	1
	Cultural	- heavy thatch	1	0	1
	Dollar spot	- Sclerotinia	6	0	6
	Environmental stresses		3	0	3
	Inadequate specimen, no disease		18		18
	Localized dry spot	- environmental	1	0	1
	Pink snow mold	- Microdochium	4	0	4
	Root disfunction	- Pythium	3	0	3
	Root rot	- Pythium	6	1	7
	Yellow patch	- Rhizoctonia	0	1	1
BERMUDAGRASS (Cynodon)					
	Brown patch	- Rhizoctonia	1	0	1
	Chemical injury	- natural gas	1	0	1
		- unknown	1	0	1
	Cultural	- sand thickness	1	0	1
	Decline	- Gaeumannomyces	0	1	1
	Fading out	- Curvularia	2	0	2
	Leaf spot	- Bipolaris	1	0	1
		- Helminthosporium	1	0	1
	No disease		1		1
	Spring dead spot	- Ophiosphaerella	2	0	2
BLUEGRASS (Poa)					
	Brown patch	- Rhizoctonia	2	0	2
	Dollar spot	- Sclerotinia	0	2	2
	Cultural	- heavy thatch	3	0	3
	Environmental	- stress	1	0	1
	Fading out	- Curvularia	1	0	1
	Melting out	- Drechslera	1	0	1
	Necrotic ring spot	- Leptosphaeria	1	0	1
	No disease		10		10
	Nutritional	- nitrogen deficiency	1	0	1
		- pH high	1	0	1
	Summer patch	- Magnaporthe	4	0	4
	Yellow patch	- Rhizoctonia	1	0	1
FESCUE (Festuca)					
	Anthracnose	- Colletotrichum	4	0	4
	Brown patch	- Rhizoctonia	13	0	13
	Crown rot	- fungal	1	0	1
	Dollar spot	- Sclerotinia	1	0	1
	Leaf spot	- Helminthosporium	1	0	1
	No disease		10		10
	Red thread	- Laetisaria	1	0	1
	Rust	- Puccinia	0	1	1
	Summer patch	- Magnaporthe	1	0	1
	Root rot	- Pythium	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
RYEGRASS (Lolium)					
	Brown patch	- Rhizoctonia	2	0	2
	Cultural	- heavy thatch	3	0	3
	Environmental	- wet feet	2	0	2
	Fading out	- Curvularia	0	1	1
	Gray leaf spot	- Pyricularia	1	0	1
	Leaf spot	- Drechslera	1	0	1
	Melting out	- Drechslera	1	0	1
	No disease		1		1
	Red thread	- Laetisaria	1	0	1
	Root rot	- fungal	1	0	1
	Rust	- Puccinia	1	0	1
TURF (unspecified)					
	Blight	- Pythium	1	0	1
	Brown patch	- Rhizoctonia	1	0	1
	Cultural	- heavy thatch	1	0	1
	Inadequate specimen, no disease		5		5
	Loose smut	- Ustilago	1	0	1
	Necrotic ringspot	- Leptosphaeria	1	0	1
	Nutritional	- acid soil	1	0	1
	Pink snow mold	- Microdochium	0	1	1
	Root rot	- Pythium	1	0	1
	Slime mold	- species	1	0	1
ZOYSIA (Zoysia)					
	Anthracnose	- Colletotrichum	1	0	1
	Fading out	- Curvularia	0	1	1
	Nutritional	- acid soil	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
<u>WOODY ORNAMENTALS</u>					
ARBORVITAE (Thuja)					
	Cultural	- transplant shock	1	0	1
	Environmental	- wet feet	1	0	1
	Inadequate specimen, no disease		12		12
	Insect injury		2	0	2
	Root rot	- Pythium	1	0	1
	Tip blight	- Pestalotiopsis	1	0	1
ASH (Fraxinus)					
	Anthraxnose	- Apiognomonia	2	0	2
	Black root rot	- Thielaviopsis	1	0	1
	Canker	- Botryosphaeria	1	0	1
	Chemical injury	- herbicide	1	0	1
	Environmental	- sunscald	1	0	1
	Insect injury		6	2	8
	Leaf spot	- Spilocaea	1	0	1
	No disease		4		4
	Sooty mold	- species	1	0	1
AZALEA - See listing under RHODODENDRON					
BALDCYPRESS (Taxodium)					
	No disease		1		1
BARBERRY (Berberis)					
	No disease		1		1
BAY (Laurus)					
	Insect injury		1	0	1
BEECH (Fagus)					
	Cultural	- transplant shock	2	0	2
	No disease		7		7
	Leaf spot	- Alternaria	0	1	1
		- physiological	1	0	1
BIRCH (Betula)					
	Chemical injury	- herbicide	1	0	1
	Cultural	- insufficient water	1	0	1
	Dieback	- unknown	1	0	1
	Insect injury		5	1	6
	Leaf spot	- fungal	2	0	2
		- Septoria	1	0	1
	No disease		4		4
	Nutritional	- iron deficiency	0	1	1
		- pH high	0	2	2
	Root problem	- unknown	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
BITTERSWEET (Celatrus)					
	Fruit spot	- Phoma	1	0	1
BLACK GUM (Tupelo)					
	Leaf spot	- Phyllosticta	1	0	1
	No disease		3		3
	Wilt	- Verticillium	1	0	1
BOXELDER (Acer)					
	No disease		1		1
BOXWOOD (Buxus)					
	Black root rot	- Thielaviopsis	2	0	2
	Canker	- Volutella	1	0	1
	Environmental stresses		8	1	9
	Insect injury		0	1	1
	No disease		4		4
BUCKEYE (Aesculus)					
	Leaf blotch	- Guignardia	1	0	1
	No disease		1		1
BUCKTHORN (Rhamnus)					
	Crown rust	- Puccinia	1	0	1
BUDDLEIA (Buddleia)					
	Insect injury		1	0	1
	No disease		3		3
CAMELLIA (Camellia)					
	Anthraxnose	- Colletotrichum	5	0	5
	Cultural	- oedema	0	2	2
	Leaf blight	- Phoma	1	0	1
	Leaf scorch	- environmental	2	0	2
	Leaf spot	- Mycosphaerella	1	0	1
		- Pestalotiopsis	3	0	3
		- Phoma	0	1	1
	No disease		1		1
	Virus	- unknown	0	1	1
CATALPA (Catalpa)					
	No disease		1		1
CEDRUS (Cedrus)					
	No disease		2		2

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
CHERRY (Prunus)					
	Bacterial canker	- Pseudomonas	1	0	1
	Chemical injury	- herbicide	1	0	1
	Cultural	- transplant shock	2	0	2
	Dieback	- unknown	2	0	2
	Environmental stresses		1	1	2
	Insect injury		3	0	3
	Leaf spot	- Blumeriella	1	0	1
		- Cercospora	1	0	1
	No disease		3		3
CHERRYLAUREL (Prunus)					
	Anthraxnose	- Discula	1	0	1
	Cultural	- transplant shock	2	0	2
	Insect injury		2	0	2
	Leaf blight	- Cryptosporium	1	0	1
		- Phoma	1	0	1
	Leaf spot	- environmental	3	0	3
	No disease		2		2
CHESTNUT (Castanea)					
	Cultural	- insufficient water	1	0	1
	Insect injury		1	0	1
	Leaf blotch	- Guignardia	1	0	1
	No disease		2		2
	Root problem	- unknown	0	1	1
	Root rot	- Phytophthora	1	0	1
CHOKEBERRY (Aronia)					
	No disease		1		1
CLEMATIS (Clematis)					
	Leaf scorch	- unknown	3	0	3
	Leaf spot	- Phyllosticta	1	0	1
	Leaf/stem rot	- Ascochyta	2	0	2
	Mutation	- genetic	1	0	1
	No disease		4		4
	Powdery mildew	- Oidium	1	0	1
CONRADIA (Conradia)					
	Nutritional	- fertilizer burn	1	0	1
COTONEASTER (Cotoneaster)					
	Insect injury		1	0	1
	No disease		2		2

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
CRABAPPLE (Malus)					
	Canker	- Botryosphaeria	1	0	1
	Cedar Apple rust	- Gymnosporangium	1	0	1
	Decline	- unknown	1	0	1
	Fire blight	- Erwinia	2	1	3
	Frogeye	- Botryosphaeria	1	1	2
	Insect injury		1	0	1
	Lichen	- species	1	0	1
	No disease		1		1
	Scab	- Venturia	11	0	11
	Wood decay	- Ganoderma	1	0	1
CRAPEMYRTLE (Lagerstroemia)					
	Blossom blight	- Botrytis	1	0	1
	Chemical injury	- herbicide	1	0	1
	Inadequate specimen		1		1
	Leaf spot	- Cercospora	1	0	1
	Powdery mildew	- Oidium	3	0	3
	Sooty mold	- species	1	1	2
CYPRESS (Cupressocyparis)					
	Cultural	- over watering	1	0	1
		- transplant shock	2	1	3
	Environmental	- wet feet	1	0	1
	Insect injury		1	0	1
	No disease		1		1
DOGWOOD (Cornus)					
	Anthraxnose	- Discula	1	0	1
	Canker	- Botryosphaeria	0	1	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- improper depth	0	2	2
		- transplant shock	4	0	4
	Decline	- unknown	5	0	5
	Environmental stresses		7	2	9
	Inadequate specimen, no disease		9		9
	Leaf scorch	- environmental	1	0	1
		- unknown	2	0	2
	Leaf spot	- Phyllosticta	0	1	1
		- Septoria	2	0	2
	Lichen	- species	1	1	2
	Nutritional	- unknown	1	0	1
	Powdery mildew	- Oidium	16	1	17
	Root rot	- Phytophthora	2	0	2
	Spot anthracnose	- Elsinoe	5	0	5
	Xylem disruption	- unknown	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
ELM (Ulmus)					
	Black spot	- Stegophora	0	1	1
	Collar rot	- Rhizoctonia	1	0	1
	Dutch elm disease	- Ophiostoma	3	0	3
	Environmental	- stress	2	0	2
	Insect injury		2	1	3
	Leaf blister	- Taphrina	1	0	1
	Leaf spot	- fungal	1	0	1
		- Phloeospora	1	0	1
		- Phyllosticta	1	0	1
	Native wilt	- Dothiorella	1	0	1
	No disease		3		3
	Root rot	- Basidiomycete	1	0	1
EUCALYPTUS (Eucalyptus)					
	Root rot	- Pythium	1	0	1
EUONYMUS (Euonymus)					
	Chemical injury	- herbicide	1	0	1
	Crown gall	- Agrobacterium	2	0	2
	Environmental stresses		2	0	2
	Insect injury		28	1	29
	Powdery mildew	- Microsphaera	1	0	1
FALSECYPRESS (Chamaecyparis)					
	Brown needles	- normal	1	0	1
FILBERT (Corylus)					
	No disease		1		1
FIR (Abies)					
	Insect injury		1	0	1
	No disease		2		2
FORSYTHIA (Forsythia)					
	Chemical injury	- growth regulator	1	0	1
	Dieback	- unknown	1	0	1
	Environmental	- cold injury	1	0	1
	No disease		1		1
	Root rot	- Phytophthora	1	0	1
	Twig blight	- Sclerotinia	1	0	1
FOTHERGILLA (Fothergilla)					
	No disease		1		1
FRANKLINIA (Franklinia)					
	Root/collar rot	- Phytophthora	1	0	1
GINGKO (Ginkgo)					
	Environmental	- wet feet	1	0	1
	Root rot	- Phytophthora	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
GOLDENCHAIN TREE (Laburnum)					
	Canker	- Fusarium	1	0	1
GOLDENRAINTREE (Koelreuteria)					
	No disease		1		1
HACKBERRY (Celtis)					
	Chemical injury	- herbicide	2	1	3
	Insect injury		1	0	1
HAWTHORN (Crataegus)					
	Cedar-quince rust	- Gymnosporangium	4	1	5
	Decline	- unknown	1	0	1
	Environmental	- stress	0	1	1
	Insect injury		1	0	1
	No disease		1		1
	Powdery mildew	- Phyllactinia	1	0	1
HEMLOCK (Tsuga)					
	Air pollution	- ozone	1	0	1
	Chemical injury	- unknown	1	0	1
	Cultural	- transplant shock	1	0	1
	Environmental	- stresses	3	0	3
	Insect injury		2	0	2
	No disease		1		1
HIBISCUS (Hibiscus)					
	Insect injury		1	1	2
	No disease		1		1
	Nutritional	- acid soil	1	0	1
HICKORY (Carya)					
	Insect injury		5	0	5
	No disease		1		1
HOLLY (Ilex)					
	Anthraxnose	- Glomerella	2	0	2
	Black root rot	- Thielaviopsis	12	2	14
	Blight	- Phytophthora	1	0	1
	Cultural	- transplant shock	2	0	2
	Dieback	- unknown	2	0	2
	Environmental stresses		1	1	2
	Inadequate specimen, no disease		18		18
	Insect injury		9	1	10
	Leaf spot	- fungal	4	0	4
	Nutritional	- acid soil	1	0	1
		- iron deficiency	1	0	1
		- nitrogen deficiency	1	0	1
		- pH high	3	0	3
	Physical injury	- girdling	1	0	1
	Root rot	- Rhizoctonia	1	0	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
HONEYLOCUST (Gleditsia)					
	Leaf spot	- Cercospora	2	0	2
	Insect injury		0	2	2
	Sooty mold	- species	1	0	1
HONEYSUCKLE (Lonicera)					
	Cultural	- unknown	1	0	1
	Nutritional	- nitrogen deficiency	1	0	1
HORNBEAM (Carpinus)					
	Leaf spot	- Phyllosticta	1	0	1
HYDRANGEA (Hydrangea)					
	Environmental stresses		2	0	2
	Gray blight	- Pestalotia	0	1	1
	Leaf spot	- Cercospora	1	0	1
		- Cylindrosporium	1	0	1
		- Phyllosticta	1	0	1
	No disease		3		3
	Nutritional	- fertilizer burn	1	0	1
		- iron deficiency	1	0	1
ITEA (Itea)					
	Cultural	- transplant shock	1	0	1
	Leaf spot	- Phyllosticta	1	0	1
JUNIPER and RED CEDAR (Juniperus)					
	Cedar/Apple rust	- Gymnosporangium	4	0	4
	Decline	- unknown	1	0	1
	Environmental stresses		2	0	2
	Insect injury		5	2	7
	No disease		13		13
	Twig blight	- Kabatina	3	0	3
		- Phomopsis	2	0	2
KATSURATREE (Katsura)					
	Leaf scorch	- unknown	2	0	2
LEUCOTHOE (Leucothoe)					
	Cultural	- oedema	0	1	1
	Gray blight	- Pestalotia	1	0	1
	Leaf spot	- Phyllosticta	2	0	2
LILAC (Syringa)					
	Anthracnose	- Colletotrichum	1	0	1
		- Discula	1	0	1
	Bacterial blight	- Pseudomonas	1	0	1
	Blight	- fungal	1	0	1
		- Phytophthora	4	1	5
	Chemical injury	- growth regulator	1	1	1
	Cultural	- transplant shock	4	1	5
	Environmental stresses		4	0	4

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
Lilac (continued)					
	Leaf blight	- Heterosporium	3	0	3
	Leaf scorch	- unknown	4	1	5
	Leaf spot	- Alternaria	1	0	1
		- Phyllosticta	1	0	1
	No disease		9		9
	Powdery mildew	- Microsphaera	2	2	4
MAACKIA (Maackia)					
	Canker	- unknown	1	0	1
MAGNOLIA (Magnolia)					
	Anthraxnose	- Colletotrichum	0	1	1
	Blight	- Phytophthora	2	0	2
	Canker	- Botryosphaeria	1	0	1
	Cultural	- transplant shock	2	0	2
	Environmental stresses		5	0	5
	Gray blight	- Pestalotia	2	0	2
	Insect injury		5	1	6
	Leaf drop	- normal	1	0	1
	No disease		10		10
	Powdery mildew	- Oidium	2	0	2
	Sooty mold	- species	1	1	2
	Wilt	- Verticillium	1	0	1
MAHONIA (Mahonia)					
	Anthraxnose	- Gloeosporium	1	0	1
	Blight	- Phytophthora	1	0	1
	Leaf spot	- Phyllosticta	1	0	1
	No disease		1		1
MAPLE (Acer)					
	Anthraxnose	- Discula	2	0	2
		- Kabatiella	4	2	6
	Bacterial scorch	- Xylella	6	0	6
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	10	0	10
	Decline	- unknown	5	0	5
	Environmental stresses		9	2	11
	Insect injury		16	5	21
	Leaf scorch	- unknown	6	0	6
	Leaf spot	- Cercospora	1	0	1
		- Cristulariella	3	0	3
		- Phyllosticta	6	2	8
	No disease		29		29
	Nutritional	- iron deficiency	1	0	1
		- phosphorus deficiency	1	0	1
	Physical injuries		3	1	4
	Root/collar rot	- Phytophthora	1	1	2
	Sooty mold	- species	1	0	1
	Wilt	- Verticillium	5	0	5

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
MOUNTAIN LAUREL (Kalmia)					
	Environmental	- stress	1	0	1
	Insect injury		1	0	1
	Leaf spot	- Septoria	1	0	1
	No disease		1		1
MULBERRY (Morus)					
	Insect injury		0	1	1
	Leaf spot	- Cercospora	1	0	1
		- Phloeospora	3	0	3
	No disease		1		1
NANDINA (Nandina)					
	No disease		1		1
OAK (Quercus)					
	Anthracnose	- Apiognomonia	8	2	10
		- Kabatiella	1	0	1
	Bacterial scorch	- Xylella	26	0	26
	Bleeding necrosis	- Phytophthora	2	0	2
	Chemical injury	- growth regulator	9	1	10
		- herbicide	3	0	3
		- unknown	2	0	2
	Cultural	- transplant shock	3	0	3
	Decline	- unknown	4	0	4
	Environmental stresses		1	3	4
	Insect injury		54	17	71
	Inadequate specimen, no disease		36		36
	Leaf blister	- Taphrina	1	0	1
	Leaf distortion	- unknown	1	0	1
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Elsinoe	2	3	5
		- Leptothyrium	1	0	1
		- Phyllosticta	1	0	1
		- Tubakia	21	9	30
	Nutritional	- fertilizer burn	1	0	1
		- iron deficiency	12	2	14
	Physical injury	- rodent	1	0	1
		- unknown	1	0	1
	Powdery mildew	- Oidium	2	1	3
	Wet wood	- bacterial	0	1	1
	White rot	- Basidiomycete	1	0	1
OSMANTHUS (Osmanthus)					
	No disease		2	0	2
PEACH (Prunus)					
	No disease		1		1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PEAR (Pyrus)					
	Canker	- Botryosphaeria	0	1	1
	Chemical injury	- growth regulator	3	0	3
		- herbicide	1	0	1
	Cultural	- transplant shock	1	0	1
	Decline	- unknown	5	0	5
	Environmental stresses		8	1	9
	Fire blight	- Erwinia	5	0	5
	Inadequate specimen, no disease		12		12
	Insect injury		3	1	4
	Leaf scorch	- unknown	1	0	1
	Nutritional	- acid soil	1	0	1
		- manganese toxicity	1	0	1
	Thread blight	- Corticium	2	0	2
PERSIMMON (Diospyros)					
	No disease		1		1
PHOTINIA (Photinia)					
	Leaf spot	- Entomosporium	3	0	3
PIERIS (Pieris)					
	Canker	- Botryosphaeria	1	0	1
	Dieback	- Phytophthora	3	0	3
	Gray blight	- Pestalotia	2	0	2
	Leaf blight	- Venturia	1	0	1
	Leaf scorch	- physiological	1	1	2
	Leaf spot	- Phyllosticta	1	0	1
	No disease		1		1
	Nutritional	- iron deficiency	1	0	1
PINE (Pinus)					
	Air pollution	- ozone	6	0	6
	Brown spot	- Mycosphaerella	1	0	1
	Chemical injury	- growth regulator	1	0	1
	Cultural	- transplant shock	4	0	4
	Environmental stresses		4	1	5
	Insect injury		17	0	17
	Needle blight	- fungal	1	0	1
		- Mycosphaerella	1	0	1
	Needle drop	- normal	1	0	1
	Needle rust	- Coleosporium	3	0	3
	No disease		21		21
	Pinewood nematode	- Bursaphelencus	3	0	3
	Pitch canker	- Fusarium	2	0	2
	Sooty mold	- species	1	0	1
	Tip blight	- Sphaeropsis	5	1	6
	Tip burn	- pollutionl	1	0	1
	White pine decline	- environmental	17	0	17

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PLUM (Prunus)					
	Black knot	- Apiosporina	2	0	2
POPLAR (Populus)					
	Wet wood	- bacterial	1	0	1
PRIVET (Ligustrum)					
	Environmental stresses		3	0	3
	No disease		1		1
PYRACANTHA (Pyracantha)					
	Gray blight	- Pestalotia	1	0	1
	Insect injury		2	0	2
	No disease		1		1
REDBUD (Cercis)					
	Anthraxnose	- Monostichella	1	0	1
	Canker	- Nectria	1	0	1
	Chemical injury	- growth regulator	2	0	2
	Environmental	- stress	1	0	1
	Lichen	- species	1	0	1
	No disease		3		3
	Wilt	- Verticillium	1	0	1
REDWOOD (Sequoia)					
	Insect injury		1	0	1
RHODODENDRON and AZALEA (Rhododendron)					
	Anthraxnose	- Colletotrichum	1	0	1
		- Gloeosporium	4	1	5
	Canker	- Botryosphaeria	9	1	10
		- Phomopsis	2	0	2
	Cultural	- oedema	4	0	4
		- transplant shock	7	0	7
	Dieback	- Phytophthora	30	1	31
	Environmental stresses		17	5	22
	Gray blight	- Pestalotia	13	6	19
	Inadequate specimen, no disease		21		21
	Insect injury		16	1	17
	Leaf blight	- Discula	3	0	3
	Leaf/flower gall	- Exobasidium	3	0	3
	Leaf spot	- Gloeosporium	1	0	1
		- Phyllosticta	4	0	4
		- Septoria	3	0	3
	Nutritional	- iron deficiency	2	2	4
		- nitrogen deficiency	1	0	1
	Powdery mildew	- Microsphaera	1	0	1
	Root problem	- unknown	2	0	2
	Root rot	- Phytophthora	2	0	2
	Web blight	- Rhizoctonia	2	0	2

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
ROSE (Rosa)					
Anthracnose		- Gloeosporium	1	0	1
		- Glomerella	1	0	1
Black spot		- Diplocarpon	7	5	12
Blight		- Botrytis	2	0	2
		- Phytophthora	1	0	1
Canker		- Coniothyrium	1	0	1
		- fungal	1	0	1
Chemical injury		- herbicide	1	0	1
		- unknown	1	0	1
Environmental		- stress	2	2	4
Inadequate specimen, no disease			7		7
Insect injury			5	4	9
Leaf spot		- Cercospora	0	1	1
Nutritional		- general	2	0	2
Powdery mildew		- Sphaerotheca	0	1	1
Root problem		- unknown	2	0	2
Root rot		- Phytophthora	2	0	2
Rust		- Phragmidium	1	0	1
Twig canker		- Phomopsis	1	0	1
Virus		- Rose mosaic	0	1	1
		- Rose rosette	5	0	5
SASSAFRAS (SASSAFRAS)					
Canker		- Phomopsis	1	0	1
SEABERRY (Haloragis)					
Leaf spot		- fungal	1	0	1
SERVICEBERRY (Amelanchier)					
Fire blight		- Erwinia	1	0	1
Leaf spot		- Cocomyces	1	0	1
No disease			1		1
SMOKETREE (Cotinus)					
Inadequate specimen, no disease			3		3
Wilt		- Verticillium	1	0	1
SPIREA (Spiraea)					
Cultural		- over watering	1	0	1
No disease			1		1
SPRUCE (Picea)					
Cultural		- transplant shock	3	1	4
Decline		- unknown	1	0	1
Environmental stresses			5	0	5
Inadequate specimen, no disease			16		16
Insect injury			11	2	13
Needle blight		- Dothistroma	1	0	1
Needle cast		- Rhizosphaera	8	1	9
Root rot		- Phytophthora	0	1	1

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
STEWARTIA (Stewartia)					
	No disease		1		1
SUMAC (Rhus)					
	No disease		1		1
SWEETGUM (Liquidambar)					
	Bacterial scorch	- Xylella	1	0	1
	Chemical injury	- herbicide	1	0	1
	Leaf spot	- Phyllosticta	1	0	1
	No disease		1		1
	Root problem	- unknown	1	0	1
	Sooty mold	- species	1	0	1
SYCAMORE (Platanus)					
	Bacterial scorch	- Xylella	1	0	1
TAXUS (Taxus)					
	Blight	- Botrytis	1	0	1
	Chemical injury	- herbicide	4	0	4
	Cultural	- transplant shock	1	1	2
	Environmental stresses		7	0	7
	Inadequate specimen, no disease		10		10
	Saprophyte	- Pestalotiopsis	0	1	1
	Tip dieback	- unknown	1	0	1
TULIPTREE (Liriodendron)					
	Inadequate specimen, no disease		3		3
	Insect injury		10	0	10
	Sooty mold	- species	1	5	6
VIBURNUM (Viburnum)					
	Anthracnose	- Discula	1	0	1
		- Gloeosporium	1	0	1
		- Sphaceloma	3	0	3
	Bacterial spot	- Pseudomonas	1	0	1
	Canker	- Cytospora	1	0	1
	Cultural	- transplant shock	1	0	1
	Downy mildew	- Plasmopora	1	0	1
	Environmental stresses		12	1	13
	Gray blight	- Pestalotia	1	0	1
	Insect injury		3	0	3
	Leaf scorch	- unknown	2	0	2
	Leaf spot	- Ascochyta	3	0	3
		- Phoma	1	0	1
		- Phyllosticta	6	1	7
		- Septoria	1	0	1
	No disease		5		5
	Spot anthracnose	- Sphaceloma	1	0	1
	Web blight	- Rhizoctonia	1	0	1
	Wilt	- Verticillium	1	0	1

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
WALNUT and BUTTERNUT (Juglans)					
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- <i>Cylindrosporium</i>	0	1	1
	No disease		3		3
WEIGELA (Weigela)					
	Leaf spot	- unknown	1	0	1
	Reddening	- physiological	1	0	1
WILLOW (Salix)					
	Canker	- <i>Phomopsis</i>	3	0	3
	Dieback	- unknown	1	0	1
	Gall	- unknown	1	0	1
	Insect injury		2	0	2
	Leaf spot	- <i>Cercospora</i>	2	1	3
	No disease		3		3
WISTERIA (Wisteria)					
	Insect injury		1	0	1
WITCH-HAZEL (Hamamelis)					
	Gray blight	- <i>Pestalotia</i>	0	1	1
	Leaf blotch	- <i>Botryodiplodia</i>	1	0	1
	Leaf spot	- <i>Phyllosticta</i>	2	0	2
	No disease		2		2
	Physical injury	- unknown	0	1	1
	Root rot	- <i>Phytophthora</i>	1	0	1
	Wilt	- <i>Verticillium</i>	1	0	1
YELLOWWOOD (Cladrastis)					
	Anthraxnose	- <i>Gloeosporium</i>	1	0	1
	Canker	- <i>Botryosphaeria</i>	2	0	2
	Environmental	- stress	1	0	1
ZELKOVA (Zelkova)					
	Environmental	- stress	1	0	1

VEGETABLES

ARUGULA (Eruca) - See listing under CRUCIFERS

BEAN (Phaseolus)

Angular leaf spot	- Isariopsis	1	0	1
Anthrachnose	- Colletotrichum	9	0	9
Environmental	- compaction	1	0	1
Inadequate specimen, no disease		4		4
Insect injury		2	0	2
Leaf scorch	- environmental	1	0	1
Nutritional	- general	2	0	2
Root problem	- unknown	1	0	1
Root rot	- Pythium	1	0	1
Root/stem rot	- Rhizoctonia	3	1	4
Rust	- Uromyces	4	0	4
Virus	- Bean yellow mosaic	1	0	1

BROCCOLI - See listing under CRUCIFERS

CABBAGE - See listing under CRUCIFERS

CANTALOUPE - See listing under CUCURBITS

CORN, SWEET (Zea)

Chemical injury	- unknown	3	0	3
Environmental	- stresses	2	0	2
Gray leaf spot	- Cercospora	1	0	1
Insect injury		2	0	2
Nutritional	- zinc deficiency	1	0	1
Root rot	- Rhizoctonia	0	1	1
Smut	- Ustilago	1	0	1
Southern rust	- Puccinia	1	0	1
Virus	- complex	1	0	1

CRUCIFERS - ARUGULA (Eruca), and BROCCOLI, CABBAGE, MUSTARD, TURNIP (Brassica)

Bacterial head rot	- Pseudomonas	1	0	1
Black rot	- Xanthomonas	1	0	1
Inadequate specimen, no disease		5		5
Nutritional	- boron deficiency	1	0	1
	- fertilizer burn	1	0	1
	- general	2	0	2
	- iron deficiency	1	0	1
	- magnesium deficiency	1	0	1
	- pH high	0	1	1
	- phosphorus deficiency	1	0	1
Root rot	- Fusarium	0	1	1
	- Pythium	1	0	1
White rust	- Albugo	1	0	1

CUCUMBER - See listing under CUCURBITS

CROP	DIAGNOSIS	CAUSAL AGENT	#1° DIAGs	#2° DIAGs	TOTAL
CUCURBITS - CANTALOUPE, CUCUMBER, MELON (Cucumis), PUMPKIN, SQUASH (Cucurbita) and WATERMELON (Citrulus)					
	Anthracnose	- Colletotrichum	8	0	8
	Angular leaf spot	- Pseudomonas	1	0	1
	Bacterial wilt	- Erwinia	5	0	5
	Blight	- Microdochium	2	0	2
	Blight	- Phytophthora	2	0	2
	Blossom end rot	- calcium deficiency/dry	2	0	2
	Chemical injury	- fungicide	3	0	3
		- growth regulator	2	0	2
		- herbicide	4	0	4
	Damping-off	- Pythium	1	0	1
	Downy mildew	- Pseudoperonospora	1	0	1
	Environmental stresses		7	1	8
	Fruit blight	- Phytophthora	1	0	1
	Fruit rot	- Fusarium	1	0	1
	Gummy stem blight	- Didymella	11	3	14
	Inadequate specimen, no disease		18		18
	Insect injury		5	1	6
	Leaf blight	- Alternaria	7	2	9
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- physiological	1	0	1
	Nutritional	- general	3	0	3
		- magnesium deficiency	2	0	2
		- manganese toxicity	1	1	2
		- unknown	0	1	1
	Pollination problem	- environmental	1	1	2
	Powdery mildew	- Oidium	1	0	1
		- Sphaerotheca	1	2	3
	Root rot	- Pythium	1	1	2
		- Rhizoctonia	1	0	1
	Root/stem rot	- Fusarium	2	0	2
	Virus	- complex	1	0	1
		- watermelon mosaic II	1	0	1
	Yellow vine decline	- Serratia	2	0	2
LETTUCE (Lactuca)					
	Chemical	- ventless heater	1	0	1
MELON, honeydew - See listing under CUCURBITS					
OKRA (Abelmoschus)					
	Inadequate specimen		1		1
	Nutritional	- iron deficiency	1	0	1
PEA (Pisum)					
	Ashy stem blight	- Macrophomina	1	0	1
	No disease		2		2
	Powdery mildew	- Erysiphe	1	0	1
	Root/stem rot	- Rhizoctonia	2	0	2

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
PEPPER (Capsicum)					
	Air pollution	- ozone	1	0	1
	Bacterial canker	- Clavibacter	1	0	1
	Bacterial soft rot	- Erwinia	0	1	1
	Bacterial spot	- Xanthomonas	6	0	6
	Blight	- Phytophthora	3	0	3
	Chemical injury	- growth regulator	2	0	2
	Cultural	- transplant shock	1	0	1
	Environmental stresses		4	0	4
	Fruit rot	- Alternaria	0	1	1
		- Fusarium	0	2	2
	Inadequate specimen, no disease		10		10
	Insect injury		2	0	2
	Nutritional	- fertilizer burn	1	0	1
	Physical injury	- unknown	4	0	4
	Root rot	- Pythium	2	0	2
		- Rhizoctonia	1	0	1
	Southern blight	- Sclerotium	1	0	1
	Stem rot	- Fusarium	2	0	2
		- Sclerotinia	1	0	1
	Virus	- Cucumber mosiac	0	1	1
POTATO (Solanum)					
	Bacterial soft rot	- Erwinia	0	1	1
	Dry rot	- Fusarium	1	0	1
	No disease		2		2
	Root knot nematode	- Meloidogyne	1	0	1
	Scab	- Streptomyces	1	0	1
PUMPKIN - See listing under CUCURBITS					
SQUASH - See listing under CUCURBITS					
SWEET POTATO (Ipomoea)					
	Growth cracks	- environmental	1	0	1
	Internal purpling	- unknown	1	0	1
	No disease		1		1
	Scurf	- Monilochaete	1	2	3

<i>CROP</i>	<i>DIAGNOSIS</i>	<i>CAUSAL AGENT</i>	<i>#1° DIAGs</i>	<i>#2° DIAGs</i>	<i>TOTAL</i>
TOMATO (Lycopersicon)					
	Anthracnose	- Colletotrichum	1	0	1
	Bacterial canker	- Clavibacter	9	1	10
	Bacterial soft rot	- Erwinia	1	2	3
	Bacterial speck	- Pseudomonas	3	2	5
	Bacterial spot	- Xanthomonas	2	1	3
	Blossom end rot	- calcium deficiency/dry	3	0	3
	Buckeye rot	- Phytophthora	4	0	4
	Canker	- Botrytis	1	0	1
	Chemical injury	- growth regulator	12	0	12
		- herbicide	3	0	3
		- unknown	3	1	4
	Crown/root rot	- Fusarium	1	0	1
	Early blight	- Alternaria	14	1	15
	Environmental stresses		15	5	20
	Fruit decay	- Alternaria	0	2	2
		- Phycomycete	2	0	2
		- Rhizoctonia	0	2	2
	Inadequate specimen, no disease		24		24
	Insect injury		5	6	11
	Leaf injury	- unknown	1	0	1
	Leaf mold	- Cercospora	1	0	1
		- Fulvia	3	0	3
	Leaf scorch	- unknown	1	0	1
	Leaf spot	- Septoria	28	3	31
	Mutation	- genetic	1	0	1
	Nutritional	- acid soil	4	0	4
		- fertilizer burn	4	0	4
		- general	2	3	5
		- internal white tissue	1	0	1
		- unknown	1	0	1
	Physical injury	- unknown	1	1	2
	Physiological	- oedema	1	0	1
	Pith necrosis	- Pseudomonas	1	1	2
	Powdery mildew	- Leveillula	1	0	1
	Root problem	- unknown	0	1	1
	Root rot	- Pythium	4	0	4
	Southern blight	- Sclerotium	4	0	4
	Stem rot	- Rhizoctonia	1	0	1
		- Sclerotinia	1	0	1
	Stunting	- unknown	1	0	1
	Virus	- Tomato spotted wilt	3	1	4
	Walnut wilt	- juglone	1	0	1
	Wilt	- Fusarium	6	0	6
	Yellow shoulder	- unknown	5	0	5

TURNIP - See listing under CRUCIFERS

WATERMELON - See listing under CUCURBITS

TOTALS **4033** **632** **4665**