UNIVERSITY OF KENTUCKY
College of Agriculture

Plant Diseases in Kentucky

Plant Disease Diagnostic Laboratory Summary

2005

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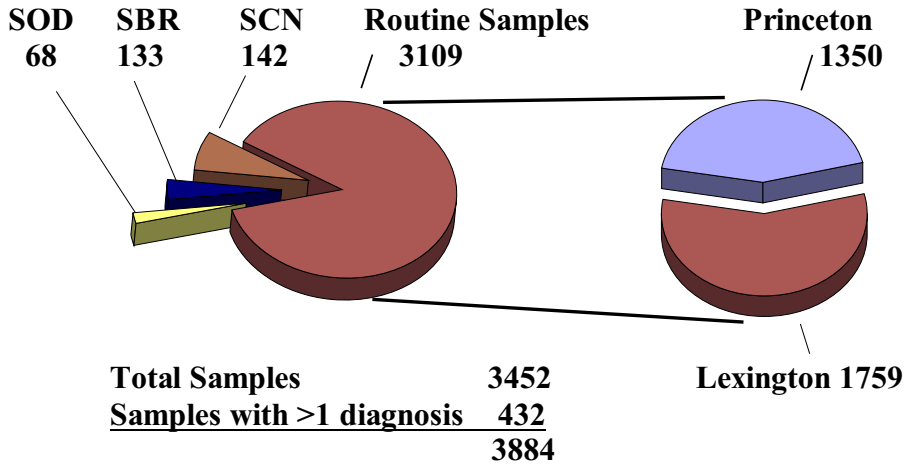
INTRODUCTION

The Plant Disease Diagnostic Laboratory (Lexington and Princeton) handled 3310 plant samples and 142 nematode soil samples during 2005. Plant samples with more than one problem numbered 432 bringing the total number of actual diagnoses to 3884. The Lexington Laboratory diagnosed 1838 specimens; of that number there were 1759 plant samples, 11 were Soybean Rust (SBR) sentinel plot samples, and 26 Nursery plus 42 Forest/Parks samples from the survey work for the occurrence of the Sudden Oak Death (SOD) pathogen. The SOD samples are included in the total number of samples in Figure 1 below but not in the rest of this summary, except for pages 23-24. The SBR samples are included in the total number of samples in Figure 1 below but not in the rest of this summary, except for page 6. The Princeton Laboratory's specimens totaled 1614; of that number 1350 were plant samples, 122 were Soybean Rust (SBR) sentinel plot samples and 142 were soil samples submitted exclusively for soybean cyst nematode analysis. In addition to the 3452 specimens processed in the laboratory, 175 cases were also submitted in 2005 through the Digital Consulting System for consultation by the Diagnosticians and Extension Specialists (see Table 10, page 22). Plant samples plus SCN samples are summarized in Figure 1 below:

Plant Disease Diagnostic Laboratory - 2005



Total Samples	**3452**
Samples with >1 diagnosis	**432**
	3884

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: Above Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 39.1 degrees across the state which was 6.2 degrees above normal. High temperatures averaged from 44 in the West to 45 in the East. Departure from normal high temperatures ranged from 1 degree above normal in the West to 6 degrees above normal in the East. Low temperatures averaged from 32 degrees in the West to 32 degrees in the East. Departure from normal low temperature ranged from 7 degrees above normal in the West to 9 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 4.94 inches statewide which was 1.17 inches from normal. Precipitation totals by climate division, West 4.94 inches, Central 5.47 inches, Bluegrass 5.01 inches and East 4.52 inches, which was 1.24, 1.45, 1.57 and 0.82 inches respectively above normal.

February: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 40.6 degrees across the state which was 3.4 degrees above normal. High temperatures averaged from 49 in the West to 49 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 34 degrees in the West to 33 degrees in the East. Departure from normal low temperature ranged from 7 degrees above normal in the West to 7 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 2.73 inches statewide which was 1.04 inches below normal. Precipitation totals by climate division, West 2.99 inches, Central 2.93 inches, Bluegrass 2.21 inches and East 2.74 inches, which was 1.06, 1.19, 1.23 and 0.72 inches respectively below normal.

March: Below Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 42.8 degrees across the state which was 3.4 degrees below normal. High temperatures averaged from 56 in the West to 54 in the East. Departure from normal high temperatures ranged from 4 degrees below normal in the West to 0 degrees from normal in the East. Low temperatures averaged from 35 degrees in the West to 34 degrees in the East. Departure from normal low temperature ranged from 0 degrees from normal in the West to 0 degrees from normal in the East.

Precipitation (liq. equ.) for the period totaled 4.09 inches statewide which was 0.51 inches below normal. Precipitation totals by climate division, West 3.90 inches, Central 4.58 inches, Bluegrass 3.65 inches and East 4.16 inches, which was 0.78, 0.29, 0.70 and 0.24 inches respectively below normal.

April: Above Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 58 degrees across the state which was 1.6 degrees above normal. High temperatures averaged from 69 in the West to 69 in the East. Departure from normal high temperatures ranged from 2 degrees below normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 48 degrees in the West to 47 degrees in the East. Departure from normal low temperature ranged from 1 degree above normal in the West to 2 degrees above normal in

the East.

Precipitation (liq. equ.) for the period totaled 5.18 inches statewide which was 0.99 inches above normal. Precipitation totals by climate division, West 4.74 inches, Central 5.14 inches, Bluegrass 4.63 inches and East 5.93 inches, which was 0.21, 0.94, 0.74 and 2.11 inches respectively above normal.

May: Below Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 62.1 degrees across the state which was 1.9 degrees below normal. High temperatures averaged from 77 in the West to 75 in the East. Departure from normal high temperatures ranged from 4 degrees below normal in the West to 1 degree below normal in the East. Low temperatures averaged from 53 degrees in the West to 51 degrees in the East. Departure from normal low temperature ranged from 4 degrees below normal in the West to 4 degrees below normal in the East.

Precipitation (liq. equ.) for the period totaled 2.39 inches statewide which was 2.66 inches below normal. Precipitation totals by climate division, West 2.38 inches, Central 1.95 inches, Bluegrass 2.57 inches and East 2.58 inches, which was 2.61, 3.31, 2.35 and 2.27 inches respectively below normal.

June: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 74.3 degrees across the state which was 2 degrees above normal. High temperatures averaged from 86 in the West to 85 in the East. Departure from normal high temperatures ranged from 1 degree below normal in the West to 3 degrees above normal in the East. Low temperatures averaged from 65 degrees in the West to 64 degrees in the East. Departure from normal low temperature ranged from 2 degrees above normal in the West to 2 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 2.94 inches statewide which was 1.32 inches below normal. Precipitation totals by climate division, West 3.64 inches, Central 3.01 inches, Bluegrass 2.38 inches and East 2.70 inches, which was 0.35, 1.35, 1.97 and 1.63 inches respectively below normal.

July: Above Normal Temperatures and Above Normal Precipitation

Temperatures for the period averaged 77.6 degrees across the state which was 1.3 degrees above normal. High temperatures averaged from 88 in the West to 87 in the East. Departure from normal high temperatures ranged from 1 degree below normal in the West to 1 degree above normal in the East. Low temperatures averaged from 69 degrees in the West to 69 degrees in the East. Departure from normal low temperature ranged from 3 degrees above normal in the West to 4 degrees above normal in the East.

Rainfall for the period totaled 4.22 inches statewide which was 0.25 inches above normal. Precipitation totals by climate division, West 4.31 inches, Central 4.77 inches, Bluegrass 3.07 inches and East 4.53 inches, which was 0.20, 0.25, -1.45 and 0.08 inches respectively from normal.

August: Above Normal Temperatures and Much Above Normal Precipitation

Temperatures for the month averaged 78 degrees across the state which was 3.4 degrees above normal. High temperatures averaged from 90 in the West to 89 in the East. Departure from normal high temperatures ranged from 3 degrees above normal in the West to 5 degrees above normal in the East. Low temperatures averaged from 70 degrees in the West to 68 degrees in the East. Departure from normal low temperature ranged from 6 degrees above normal in the West to 6 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 7.16 inches statewide which was 3.56 inches above normal. Precipitation totals by climate division, West 7.85 inches, Central 10.42 inches, Bluegrass 6.39 inches and East 4.82 inches, which was 4.66, 6.89, 2.67 and 0.91 inches respectively above normal.

September: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 71.8 degrees across the state which was 3.5 degrees above normal. High temperatures averaged from 84 in the West to 84 in the East. Departure from normal high temperatures ranged from 3 degrees above normal in the West to 7 degrees above normal in the East. Low temperatures averaged from 61 degrees in the West to 60 degrees in the East. Departure from normal low temperature ranged from 4 degrees above normal in the West to 5 degrees above normal in the East.

Rainfall for the period totaled 1.28 inches statewide which was 2.20 inches below normal. Rainfall totals by climate division, West 1.82 inches, Central 0.88 inches, Bluegrass 1.22 inches and East 1.20 inches, which was 1.56, 3.02, 2.04 and 2.21 inches respectively below normal.

October: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 58.1 degrees across the state which was 1.1 degrees above normal. High temperatures averaged from 71 in the West to 69 in the East. Departure from normal high temperatures ranged from near normal in the West to 1 degree above normal in the East. Low temperatures averaged from 48 degrees in the West to 48 degrees in the East.

Rainfall for the period totaled 1.11 inches statewide which was 1.94 inches below normal and only 36 percent of normal rainfall. Rainfall totals by climate division, West 0.306 inches, Central 0.56 inches, Bluegrass 1.42 inches and East 1.92 inches, which was 2.87, 2.64, 1.51 and 1.01 inches respectively below normal.

November: Above Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 48.2 degrees across the state which was 1.8 degrees above normal. High temperatures averaged from 60 in the West to 60 in the East. Departure from normal high temperatures ranged from near normal in the West to 4 degrees above from normal in the East. Low temperatures averaged from 40 degrees in the West to 39 degrees in the East. Departure from normal low temperature ranged from 2 degrees above normal in the West to 5 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 3.28 inches statewide which was 0.81 inches below normal. Precipitation totals by climate division, West 3.53 inches, Central 3.68 inches, Bluegrass 2.29 inches and East 2.79 inches, which was -0.99, -0.57, -0.31 and -1.10 inches respectively from normal.

December: Below Normal Temperatures and Below Normal Precipitation

Temperatures for the period averaged 33.8 degrees across the state which was 3.5 degrees below normal. High temperatures averaged from 43 in the West to 42 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 27 degrees in the West to 27 degrees in the East. Departure from normal low temperature ranged from 2 degrees below normal in the West to 3 degrees above normal in the East.

Precipitation (liq. equ.) for the period totaled 2.36 inches statewide which was 1.92 inches below normal. Precipitation totals by climate division, West 2.12 inches, Central 2.58 inches, Bluegrass 2.29 inches and East 2.44 inches, which was -2.45, -2.25, -1.69 and -1.43 inches respectively from normal.

CROP SUMMARIES

Tobacco:

The number of tobacco samples for 2005 was the second lowest since 1976; the lowest was the drought year of 1988. There was a very low incidence of Blue Mold (*Peronospora tabacina*) reflected by the very low number of samples, 14. Black Shank (*Phytophthora parasitica* var. *nicotianae*) samples nearly equaled 2004 with the wet July and August months. The number of cases of Fusarium Wilt Complex remained elevated as in 2004. The number of cases of Tomato Spotted Wilt virus were comparable to 2004 but still small compared to 2001 levels. With the Tobacco Buyout Program occurring in late 2004 growing of tobacco in the Commonwealth has been in a state of flux.

Other agronomic crops:

Corn: The number of corn samples with diseases were relatively few across the spectrum of corn diseases.

Soybean: Australasian Soybean Rust (SBR; *Phakopsora pachyrhizi*) was detected in Kentucky for the first time ever on November 11, 2005. The fungus was found on a few leaves in a patch of kudzu (*Pueraria montana* var *lobata*) in Caldwell County. This was the first report of *P. pachyrhizi* in Kentucky and the northernmost report of soybean rust on any host in the continental United States to date. We did not diagnose SBR in soybean. 133 samples from SBR sentinel plots were examined.

Samples diagnosed with Sudden Death (*Fusarium solani,* A strain) were similar to 2004 which was also a wet growing season. Samples diagnosed with Charcoal rot *(Macrophomina phaseolina*) were higher than normal due to the drought conditions later in the growing season and the overall higher than normal temperatures.

Although not a disease, there was a large number of cases of severe thrips injury early in the season.

Small Grains: We saw a rare sample of wheat with Stripe rust (*Puccinia striiformis*) in the laboratory but this represents an increasing problem with this disease in Kentucky in the last few years.

Forages: Overall levels of disease were low and leaf spot diseases were uncommon due to the relatively dry wet growing conditions in the early part of the growing season.

Fruit and Vegetable Plant Disease Observations:

Diagnosing fruit and vegetable diseases involves a great deal of research into the possible causes of the problems. Most visual diagnoses include microscopy to determine what plant parts are affected and to identify the microbe 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 PCR detection of 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. Computer-based laboratory records are maintained to provide information used for conducting plant disease surveys, identifying new disease outbreaks, and formulating educational programs. New homeland security rules now require reporting of all diagnoses of plant diseases to USDA-APHIS on a real-time basis and our laboratories are working to meet that requirement.

The 2005 growing season in Kentucky provided mostly warmer than normal temperatures and below normal rainfall, however these observations varied by location. The coldest temperatures occurred in late December, 2004 and ranged from -11F in parts of western Kentucky to +9F in the central and east regions. Cold temperatures occurred before some plants were completely hardened off. A late spring frost occurred the last week of May in some locations. For most of Kentucky, prevailing temperatures were above normal for all months except March and May. Rainfall in most Kentucky locations was below normal every month except January and August (Hurricanes Dennis and Katrina). Indeed, central Kentucky suffered moderate to severe drought for most of the summer and eastern Kentucky was in a state of severe drought by summer's end. Despite dry weather, there was enough rainfall in spring to promote development of apple rust and fire blight diseases. April and May temperatures were quite variable alternating from unseasonably warm to unseasonably cold. Cold temperatures extended apple and pear flowering periods and warm periods promoted bacterial growth so that pome fruits were more vulnerable to fire blight than usual.

Results and Discussion

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

- Grape crown gall caused by *Agrobacterium vitis* continues to plague vineyards, even to the extent of forcing the replanting of some vineyards
- Peach fruit rot caused by a species of *Colletotrichum*
- Cucurbit yellow vine disease caused by *Serratia marsescens*
- Downy mildew of cucurbits, caused by *Pseudoperonospora cubensis*, was a serious problem in some areas, particularly on pumpkin.
- Bacterial canker of tomato caused by *Clavibacter michiganensis* subsp. *michiganensis*
- Copper-resistant bacterial speck of tomatoes caused by *Pseudomonas syringae* pv. *tomato*
- 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.
- Although not found in Kentucky, soybean rust occurred in the southern U.S. this fall; many vegetable legumes are also hosts.
- An unknown Begomovirus was diagnosed on tomatoes being grown in a greenhouse; disease incidence was near 100%.

Tree Fruit Diseases

Pome fruits: With periodic warm spring temperatures, fire blight (*Erwinia amylovora*) was observed frequently, and in many orchards was severe. Dry weather helped keep apple scab (*Venturia inaequalis*) levels low, but high levels of cedar rusts of apple (*Gymnosporangium juniperi-virginianae, G. clavipes,* and *G. globosum*) and frogeye leaf spot (*Botryosphaeria obtusa*) were observed. Sooty blotch (*Peltaster fructicola, Geastrumia polystigmatis, Leptodontium elatius*, and other fungi) and flyspeck (*Zygophiala jamaicensis*) appeared late in the season along with apple bitter rot (*Colletotrichum acutatum*). Pears were observed with fire blight and leaf spot (*Diplocarpon mespili*).

Stone Fruits: Some stone fruits suffered cold temperature injury to trunk phloem and cambial tissues from the December cold period. Peach leaf curl (*Taphrina deformans*), bacterial spot (*Xanthomonas pruni*), and brown rot (*Monilinia fructicola*), were common; scab (*Cladosporium carpophilum*) was also observed. Plum black knot (*Apiosporina morbosum*) was widespread and plum pockets (*Taphrina communis*) and cherry leaf spot (*Blumeriella jaapii*) were observed.

Small Fruit Diseases

Grapes: Black rot (*Guignardia bidwellii*), downy mildew (*Plasmopara viticola*) and Phomopsis cane and leaf spot (*Phomopsis viticola*) were widespread; *Phomopsis* infections of fruits in early spring resulted in fruit losses. Anthracnose (*Elsinoe ampelina*) and crown gall (*Agrobacterium vitis*) were also observed. Powdery mildew (*Uncinula necator*) appeared late in the season. No new cases of Pierce's disease (*Xylella fastidiosa*) were found.

Brambles: Cane blight and canker diseases (*Leptosphaeria coniothyrium, Botryosphaeria dothidea*)were observed on blackberry. Blackberry rosette or double blossom (*Cercosporella rubi*) was also seen. An as yet unidentified virus or complex of viruses causing ring spots and leaf mottling was seen on blackberry from several locations. Testing is still in progress to determine the identity of the virus(es).

Blueberrries: Stem canker disease (*Botryosphaeria dothidea*) was diagnosed on blueberries. Botrytis twig blight occurred on blueberry in early spring.

Strawberries: Leaf spot (*Mycosphaerella fragariae*) and leaf scorch (*Diplocarpon earlianum*)were frequently observed.

Vegetable Diseases

Vegetable transplants. Pythium root rot (*Pythium* spp.) appeared in tomato, cantaloupe, squash and pepper fields this year, along with several cases of Rhizoctonia root rot, and may have originated in transplant production.

Cole crops. Cabbage black rot (*Xanthomonas campestris* pv. *campestris*), bacterial soft rot (Erwinia spp.), and Alternaria black spot, were observed. Wirestem (*Rhizcotonia solani*) was found on cauliflower.

Tomatoes. Commercial tomato plantings were affected by several bacterial diseases including bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*), bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*), and bacterial speck (*Pseudomonas syringae* pv. *tomato*). Early blight (*Alternaria* solani) was common, but caused limited damage due to dry conditions during most of the summer. Sclerotinia stem rot (timber rot), caused by *Sclerotinia sclerotiorum*, was found at several locations in the spring. 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. *lycopersici*), southern stem blight (*Sclerotium rolfsii*) and root knot nematode (*Meloydogyne* sp.) were problems in some fields. Tomato spotted wilt virus appeared in several tomato fields. A Begomovirus was identified on greenhouse tomatoes in one location and the entire crop had to be destroyed. Begomoviruses are transmitted by whiteflies of the genus *Bemisia*, and are more common in the southern U.S. The original source of the virus in Kentucky is not known at this time.

Peppers. Bacterial leaf spot (*Xanthomonas campestris* pv. *vesicatoria*) remains an important problem. Tomato spotted wilt was found in western Kentucky.

Cucurbits. Cucurbits are widely grown 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, but caused little loss in pumpkin, watermelon, squash, and cucumber in 2005. Anthracnose (*Colletotrichum* spp.), gummy stem blight/black rot (*Didymella bryoniae*), 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. Downy mildew (*Pseudoperonospora cubensis*) was widespread

across Kentucky in 2005, but generally was not serious, due to dry conditions; however, where there was more moisture, it caused losses to pumpkin and cucumber on some farms. Bacterial diseases of cucurbits included bacterial wilt (*Erwinia tracheiphila*) and cucurbit yellow vine decline caused by *Serratia marsescens*. However, incidence of the latter was lower than in previous years. Numerous cases of viral diseases (virus complex) were reported on squash and pumpkins.

Other vegetables. Anthracnose (*Colletotrichum lindemuthianum*) was found on beans this year. Cercospora leaf spot was reported on turnip.

Growers are urged to notify their County Extension Agent 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 mancozeb and chlorothalonil, to new chemicals such as the strobilurins (Quadris, Amistar, Cabrio, Sovran, and Abound). These three 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 want to know if this is due to use of new chemicals or 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. Growers should consult consistently with their County Extension Agents so that appropriate plant specimens are sent to the laboratory quickly. We urge 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 so 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. Most visual diagnoses involve 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 immunosorbent assay (ELISA), electron microscopy, nematode extraction, or soil pH and soluble salts tests. The laboratory is also using polymerase-chain-reaction (PCR) testing which, although very expensive, allows more precise and accurate diagnoses. 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.

To assist County Extension Agents in dealing with plant disease issues, we also operate a web-based digital consulting system utilizing photographic images. When the system is used to provide a diagnostic assist, the images can be used to help determine where best to collect samples for submission to the laboratory. The digital consulting system is especially useful in providing advice about landscape tree and shrub diseases and disorders because whole plants are difficult to send to the laboratory. Of almost 700 digital consulting cases, 30-35% dealt with landscape and nursery plants.

The 2005 growing season in Kentucky provided mostly warmer than normal temperatures and below normal rainfall, however these observations varied by location. The coldest temperatures occurred in late December, 2004 and ranged from -11F in parts of western Kentucky to +9F in the central and east regions. Cold temperatures occurred before some plants were completely hardened off. A late spring frost occurred the last week of May in some locations. For most of Kentucky, prevailing temperatures were above normal for all months except March and May. Rainfall in most Kentucky

locations was below normal every month except January and August (Hurricanes Dennis and Katrina). Indeed, central Kentucky suffered moderate to severe drought for most of the summer and eastern Kentucky was in a state of severe drought by summer's end.

When winter cold temperatures occurred in December, 2004, many plants were not yet fully hardened off. Cold temperature injuries of the trunk and major limbs were seen during the growing season on many hosts including holly, juniper, flowering prunus, and spruce. Despite dry weather, there was enough rainfall in spring to promote development of anthracnose and fire blight diseases. April and May temperatures were quite variable alternating from unseasonably warm to unseasonably cold. Cold temperatures extended crabapple and flowering pear bloom periods and warm periods promoted bacterial growth so that these ornamentals were more vulnerable to fire blight than usual. Hot dry summer conditions caused stress for all landscape plants that were not irrigated.

This year the following important diseases or diseases that were unusual were observed:

Deciduous trees

- Ash, dogwood, elm, maple, oak, redbud and sycamore anthracnose (*Discula, Kabatiella,* and *Apiognomonia*)
- Ash, dogwood, maple, redbud and willow canker (*Botryosphaeria*)
- Dogwood powdery mildew (*Microsphaera, Phyllactinia*), spot anthracnose (*Elsinoe*)
- Flowering pear and flowering crabapple fire blight (Erwinia)
- Flowering plum and flowering cherry black knot (*Apiosporina*)
- Hawthorn, serviceberry and crabapple cedar rusts (*Gymnosporangium juniperi-virginianae, G. clavipes, G. globosum*)
- Maple, and redbud wilt (*Verticillium*)
- Maple leaf spot (*Phyllosticta*)
- Oak and maple canker (*Hypoxylon*)
- Oak bacterial leaf scorch (*Xylella*), and Actinopelte leaf spot (*Tubakia*)

Needle Evergreens

- Juniper and arborvitae tip blight (*Kabatina*) and juniper rusts (*Gymnosporangium*)
- Pine and spruce tip blight (*Diplodia*) and pine needle casts (*Mycosphaerella, Plioderma*)
- Spruce needle cast (*Rhizosphaera*) and canker (*Cytospora*)
- White pine decline (abiotic) and ozone injury (abiotic)

Shrubs

- Azalea leaf and flower gall (*Exobasidium*)
- Boxwood Volutella canker (*Pseudonectria*)
- Holly and boxwood black root rot (*Thielaviopsis*)
- Hydrangea leaf spot (*Cercospora*)
- Rose black spot (*Diplocarpon*) and rosette (possible virus, leaf curl mite-transmitted)

Herbaceous Annuals and Perennials

- Begonia powdery mildew (*Erisyphe*)
- Celosia, chrysanthemum, foxglove, geranium, impatiens, pansy, petunia, salvia, vinca and zinnia root rots (*Pythium, Rhizoctonia*)
- Chrysanthemum web blight (*Rhizoctonia*)
- Chrysanthemum leaf spot (*Septoria*)
- Daylily rust (*Puccinia*)
- Impatiens leaf spot (*Alternaria*)
- Iris leaf spot (*Didymellina*) and bacterial soft rot (*Erwinia*)
- Hosta southern blight (*Sclerotium*)

- Pansy, petunia, and vinca black root rot (*Thielaviopsis*)
- Anemone foliar nematode (*Aphelenchoides*)
- Anemone tobacco rattle virus
- Peony unidentified nepovirus

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. This report is a synopsis of the useful information about plant disease provided for landscape professionals.

A Shift in Sample Types:

As noted above, the number of tobacco samples was the second lowest since 1976. Overall tobacco samples have been much lower than historical levels prior to 2000. This drop in the number of tobacco samples has been mostly offset by increases in the number of woody and herbaceous ornamental samples, both commercial and homeowner, as well as commercial vegetable samples. An increasing number of these samples are of plant types which are less common and therefore require more work, testing, and time to provide an accurate diagnosis. Along with the diversification of crops we are seeing a diversification of diseases.

Disease Monitoring:

In addition to the day-to-day diagnosis of samples, monitoring of several organisms and the diseases they cause is conducted by the diagnostic laboratory during the year.

- Pierce's disease of grapes caused by *Xylella fastidiosa*
- Grape crown gall caused by *Agrobacterium tumefaciens* emerges with more grapes grown
- 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*

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 2005 Sara Long filled the vacant full-time Diagnostic Assistant position. Her main responsibility is to fulfill the laboratory's data transmission requirements for the National Plant Diagnostic Network as part of our duties under the Department of Homeland Security. In addition, Sara provided much-needed assistance to the Lexington laboratory in sample triage, diagnostic and technical support. She has quickly become an integral part of our team, and as her training in plant disease diagnosis progresses, she 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, tobacco, forages, and fruits. Nathan Jennings worked with Ed provided very capable part-time assistance. Bernadette Amsden conducted laboratory research on vegetables, tobacco, ornamentals. Bernadette and Ed both helped in conducting diagnostic tests (PCR, ELISA, etc.) on many plant samples. Patricia de Sa' Guimares led our survey efforts with Sudden Oak Death sampling as well as developing PCR protocols. Colette Laurent works part-time in Princeton analyzing soybean cyst nematode samples. Nathan Wurts 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 2005.

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 2005. 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 DIAGNOSES[1] BY CROP CATEGORY AND CAUSAL AGENT TYPE.

Crop Category	Abiotic Problems	Biotic[2] Problems	Chemical Injury	Inadequate Specimen	Insect Injury	Other[3]	Total Diagnoses
Agronomic							
Corn	39	19	3	0	9	14	84
Forages	9	7	1	2	9	5	33
Small grains	10	14	1	0	0	6	31
Soybeans	47	217*	14	3	57	45*	383
Tobacco	134	360	41	8	1	51	595
Fruit							
Small fruit	20	61	10	2	20	22	135
Tree fruit	25	110	9	1	34	20	199
Herbs	0	2	0	0	1	1	4
Identifications	0	30	0	1	0	0	31
Ornamentals							
Herbaceous and Houseplants	83	94	9	7	29	37	259
Turfgrass	13	90	1	2	0	25	131
Woody	358	373	57	26	242	288	1344
Vegetables	103	203	38	19	28	55	446
Miscellaneous	4	1	0	0	1	2	8
Total	845	1581	184	71	431	571	3683

[1] All counts and totals include primary diagnoses plus secondary diagnoses of routine plant samples, plus samples from the Nematode Analysis Laboratory, Princeton.

[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 soil samples from the Nematode Analysis Laboratory, Princeton: 113 with Soybean Cyst Nematodes; 29 without Soybean Cyst Nematodes.

Table 2.

SUMMARY OF BIOTIC PROBLEMS BY CROP CATEGORY.

Crop Category	Bacterial	Fungal	Nematode	Virus	Other[1]
Agronomic					
Corn	1	17	0	1	0
Forages	0	7	0	0	0
Small grains	1	4	0	9	0
Soybeans	0	95	120	0	2
Tobacco	17	280	0	63	0
Fruit					
Small fruit	2	49	0	10	0
Tree fruit	49	58	0	0	3
Herbs	0	2	0	0	0
Identifications	0	18	0	0	12
Ornamentals					
Herbaceous and Houseplants	7	79	1	6	1
Turfgrass	0	89	0	0	1
Woody	53	308	0	5	7
Vegetables	42	133	3	25	0
Miscellaneous	0	1	0	0	0
Total	172	1140	124	119	26

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

Table 3.

NUMBER OF ROUTINE PLANT SAMPLES BY CROP CATEGORY

Crop Category	Number of Plant Specimens	Percentage of Total Plant Specimens
Agronomic (-Tobacco)	307	9.9
Tobacco	528	17.0
Fruit	297	9.5
Herbs	3	0.1
Identifications	31	1.0
Ornamentals	1547	49.8
Vegetables	390	12.5
Miscellaneous	6	0.2
Total Routine Plant Specimens	3109	100.0

Table 4.

SUMMARY OF DIAGNOSES BY CROP CATEGORY AND CROP.

Crop Category and Crop	Number of Primary Diagnoses[1]	Number of Secondary Diagnoses[2]	Total Diagnoses[3]
Agronomic			
Corn	71	13	84
Forages	25	8	33
Small grains	28	3	31
Soybeans	325*	58	383
Tobacco	528	67	595
Fruit			
Small fruit	122	13	135
Tree fruit	175	24	199
Herbs	3	1	4
Identifications	31	0	31
Ornamentals			
Herbaceous and Houseplants	219	40	259
Turfgrass	122	9	131
Woody	1206	138	1344
Vegetables	390	56	446
Miscellaneous	6	2	8
Total	3251	432	3683

[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 + 142 Soybean Cyst Nematode soil samples.

Table 5.

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

	Grower Type							
	Commercial		Homeowner		Research		Institution	
Crop Group	Ext[1]	Non-Ext[2]	Ext[1]	Non-Ext[2]	Ext[1]	Non-Ext[2]	Ext[1]	Non-Ext[2]
Agronomic								
Corn	64	7	0	0	0	0	0	0
Forages	24	0	0	0	0	1	0	0
Small grains	25	1	0	0	0	2	0	0
Soybeans	167	11	0	0	1	4	0	0
Tobacco	496	23	0	0	1	6	0	2
Fruit								
Small Fruit	48	4	60	2	2	6	0	0
Tree Fruit	13	0	153	7	0	1	1	0
Herbs	0	0	3	0	0	0	0	0
Identifications	1	1	26	2	0	0	1	0
Ornamental								
Herbaceous and Houseplants	106	21	72	6	0	8	5	1
Turfgrass	32	30	38	4	0	0	5	13
Woody	172	79	875	45	5	7	18	5
Vegetable	162	6	207	7	0	8	0	0
Miscellaneous	1	0	1	1	0	3	0	0
Total	1311	183	1435	74	9	46	30	21
Total/Grower Type	1494		1509		55		51	

Total number of samples received = 3109

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

Department, Facility or outside agency	Crop Category					
	Agronomic	Fruit	Ornamental	Vegetable	Other	Total
Agdia, Inc.	6	10	1	6	0	23
Agronomy Department	39	0	2	4	1	46
Entomology Department	5	7	28	2	0	42
Horticulture Department	0	0	1	1	1	3
Regulatory Services	0	0	1	0	0	1

Total	115
Total number of routine specimens	3109
Percent of specimens referred outside Diagnostic Lab for diagnosis	3.7

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

Table 7.

SPECIAL LABORATORY TESTS PERFORMED BY PLANT DISEASE DIAGNOSTIC LABORATORY*.

Test	Number of Tests
Polymerase Chain Reaction (PCR)	**8**
Culturing	**13**
Enzyme-linked Immunosorbent Assay (ELISA)	**100**
Incubation	**331**
Nematode extraction (total = 146)	
Pinewood nematode	**4**
Soybean cyst nematode	**142**
Soil tests (total = 239)	
pH	**66**
pH/Soluble Salts	**108**
Soluble salts	**28**
Quick nitrate	**9**
Soluble salts/Quick nitrate	**2**

*** Based on 3109 routine plant samples and 142 SCN samples.**
Does not include SOD work (see pages 23-24), or SBR work.

Table 8.

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

COUNTY	Total	Agronomic[2]	Tobacco	Fruit	Ornamental	Vegetable	Other
ADAIR	4	1	3	0	0	0	0
ALLEN	9	2	3	0	4	0	0
ANDERSON	31	0	1	0	23	7	0
BALLARD	19	5	2	2	6	4	0
BARREN	14	2	6	0	4	1	1
BATH	16	4	5	1	6	0	0
BELL	14	0	0	5	7	2	0
BOONE	23	0	2	0	21	0	0
BOURBON	14	3	3	0	5	3	0
BOYD	7	0	0	3	3	1	0
BOYLE	29	1	3	1	21	3	0
BRACKEN	13	0	7	6	0	0	0
BREATHITT	8	0	2	1	3	2	0
BRECKINRIDGE	106	11	54	15	14	12	0
BULLITT	65	0	4	11	45	4	3
BUTLER	21	8	1	2	8	2	0
CALDWELL	93	11	11	20	33	15	2
CALLOWAY	132	12	42	16	50	12	0
CAMPBELL	22	0	3	3	8	7	1
CARLISLE	22	5	2	1	9	5	0
CARROLL	7	0	3	1	2	0	1
CARTER	7	0	1	0	5	1	0
CASEY	1	0	0	0	0	1	0
CHRISTIAN	157	15	26	6	72	38	0
CLARK	22	0	13	0	9	0	0
CLAY	1	0	0	0	0	1	0
CLINTON	17	1	4	1	6	4	1
CRITTENDEN	25	1	0	3	15	3	3
CUMBERLAND	4	0	1	2	0	0	1
DAVIESS	149	21	32	23	47	25	1
EDMONSON	26	3	3	3	7	10	0
ELLIOTT	19	0	6	2	4	7	0
ESTILL	7	1	0	0	4	2	0
FAYETTE	307	6	13	14	245	21	8
FLEMING	16	0	1	5	6	4	0
FLOYD	16	0	0	1	10	5	0
FRANKLIN	29	2	5	1	17	3	1
FULTON	5	2	0	0	2	1	0
GALLATIN	0	0	0	0	0	0	0
GARRARD	7	0	2	0	5	0	0
GRANT	15	2	2	3	4	4	0
GRAVES	52	17	9	5	20	1	0
GRAYSON	17	3	2	2	6	4	0
GREEN	10	3	2	1	3	1	0
GREENUP	4	0	1	2	0	1	0
HANCOCK	20	3	7	1	9	0	0
HARDIN	22	7	4	1	4	5	1
HARLAN	17	0	1	1	14	0	1
HARRISON	9	1	2	0	5	1	0
HART	5	0	1	2	2	0	0
HENDERSON	37	6	7	1	19	3	1
HENRY	34	3	12	4	13	2	0
HICKMAN	15	9	1	0	3	2	0
HOPKINS	27	12	2	0	10	3	0
JACKSON	10	0	1	1	3	4	1
JEFFERSON	43	0	0	1	38	4	0
JESSAMINE	24	0	9	2	13	0	0
JOHNSON	3	0	0	0	1	2	0
KENTON	28	0	2	2	22	2	0
KNOTT	0	0	0	0	0	0	0
KNOX	1	0	0	0	1	0	0

COUNTY	Total	Agronomic[1]	Tobacco	Fruit	Ornamental	Vegetable	Other
LARUE	9	2	2	0	2	3	0
LAUREL	26	0	2	5	12	6	1
LAWRENCE	6	0	0	1	2	3	0
LEE	0	0	0	0	0	0	0
LESLIE	0	0	0	0	0	0	0
LETCHER	12	0	0	2	8	2	0
LEWIS	19	3	5	4	6	0	1
LINCOLN	12	1	0	1	10	0	0
LIVINGSTON	11	3	0	5	2	1	0
LOGAN	68	9	21	15	9	13	1
LYON	30	1	5	3	16	5	0
McCRACKEN	52	2	2	8	34	5	1
McCREARY	0	0	0	0	0	0	0
McLEAN	16	5	4	0	1	6	0
MADISON	34	0	15	0	17	2	0
MAGOFFIN	2	0	0	0	0	1	1
MARION	27	4	3	6	12	2	0
MARSHALL	60	2	4	3	46	6	0
MARTIN	4	0	0	2	2	0	0
MASON	10	1	4	1	4	0	0
MEADE	17	5	2	0	6	4	0
MENIFEE	9	0	1	4	2	2	0
MERCER	22	0	6	1	15	0	0
METCALFE	28	2	3	12	10	1	0
MONROE	13	0	2	0	6	5	0
MONTGOMERY	50	1	2	3	30	13	1
MORGAN	9	0	1	2	2	4	0
MUHLENBERG	31	7	7	1	11	5	0
NELSON	27	3	2	3	18	1	0
NICHOLAS	3	0	0	1	2	0	0
OHIO	14	4	4	1	3	2	0
OLDHAM	103	1	0	2	96	3	1
OWEN	9	1	7	0	1	0	0
OWSLEY	2	0	1	0	0	1	0
PENDELTON	4	0	1	0	2	1	0
PERRY	3	0	0	0	2	1	0
PIKE	1	0	0	0	1	0	0
POWELL	2	0	0	2	0	0	0
PULASKI	33	5	4	3	15	5	1
ROBERTSON	9	2	7	0	0	0	0
ROCKCASTLE	3	3	0	0	0	0	0
ROWAN	6	0	1	0	3	2	0
RUSSELL	24	3	1	3	9	6	2
SCOTT	30	1	6	3	17	3	0
SHELBY	47	4	12	0	27	3	1
SIMPSON	22	6	5	1	8	2	0
SPENCER	10	2	1	1	6	0	0
TAYLOR	27	8	5	3	8	3	0
TODD	57	13	24	0	12	7	1
TRIGG	42	2	6	6	23	4	1
TRIMBLE	9	0	6	0	2	1	0
UNION	22	12	1	3	5	1	0
WARREN	72	3	5	6	51	7	0
WASHINGTON	15	0	5	0	10	0	0
WAYNE	13	1	5	2	2	3	0
WEBSTER	18	2	3	3	8	2	0
WHITLEY	9	0	1	1	6	1	0
WOLFE	2	0	0	1	0	1	0
WOODFORD	31	0	1	0	28	2	0
Out-of-State (none)	0	0	0	0	0	0	0
TOTALS	3109	307	528	297	1547	390	40

[1] Does not include SCN, SOD, or SBR samples.

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

Table 9.

THE NUMBER OF CASES IN WHICH 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]	Number of cases: Consultations[2]
LEXINGTON			
Anderson, RG	Horticulture	0	4
Beale, JW (Diagnostician)	Plant Pathology	1412	17
Bessin, RT	Entomology	9	3
Coe, BL	Plant Pathology	6	0
Fountain, WM	Horticulture	0	2
Fulcher, A	Horticulture	0	1
Green, JD	Agronomy	6	3
Hartman, JR	Plant Pathology	97	13
Lee, CD	Agronomy	5	14
Long, SJ	Plant Pathology	163	3
Palmer, GK	Agronomy	20	9
Pearce, RC	Agronomy	1	0
Phillips, TD	Agronomy	0	1
Rowell, AB	Horticulture	2	2
Schwab, GJ	Agronomy	0	1
Seebold, KW	Plant Pathology	1	8
Spalding, WD	Horticulture	0	3
Strang, JG	Horticulture	1	1
Townsend, LH	Entomology	30	6
Ulrich, JE	Horticulture	0	1
Vincelli, P	Plant Pathology	9	5
PRINCETON			
Bachi, PR (Diagnostician)	Plant Pathology	1277	19
Bailey, WA	Agronomy	11	14
Dunwell, WC	Horticulture	7	21
Hayden, D	Horticulture	0	2
Herbek, JH	Agronomy	6	2
Hershman, DE	Plant Pathology	1	6
Johnson, DW	Entomology	5	4
Lacefield, GD	Agronomy	4	0
Masabni, JG	Horticulture	9	6
Martin, JR	Agronomy	12	8
Murdock, LW	Agronomy	11	5
Rasnake, M	Agronomy	4	0

[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 with limited access to only the case in question.

175 cases were submitted in 2005 by a total of 46 submitters.
Cases came from a total of 48 counties.

Plant/Crop	Count Of Plant/Crop
Corn	6
Forage crop	3
Forest tree	2
Herbaceous ornamental	13
Landscape shrub	14
Landscape tree	42
other (algae)	1
other (Houseplant)	2
other (Insect ID)	1
other (Weed ID)	3
Small fruit	7
Small grain	3
Soybean	6
Tobacco	19
Tree fruit	16
Turf grass	3
Vegetable	34

National Nursery, Forest, and Nursery Perimeter Survey for *Phytophthora ramorum* in Kentucky, 2005

Patricia B. de Sá, John Hartman, Joe Collins, Carl Harper, Bernadette Amsden, David Begley, Nathan Jennings and Celine Gouwie, Departments of Plant Pathology and Entomology

Note: A more complete report of this work can be found in the UK Agricultural Experiment Station publication, PR-520, http://www.ca.uky.edu/agc/pubs/pr/pr520/pr520.pdf

Acknowledgments: The forest survey was carried out in cooperation with the Kentucky Division of Forestry (KDF). Thanks to the Kentucky Commerce Cabinet, Department of Parks for providing us with a Scientific Research Permit; the USDA Forest Service for permission to sample in the Daniel Boone National Forest; to the private land owners who gave us permission to perform the survey and sample in their property and to Bernheim Forest, Land Between the Lakes National Recreation Area and Mammoth Cave National Park.

Nature of Work

Phytophthora ramorum, found in North America and Europe, is a fungus-like organism that can infect woody trees and shrubs, herbaceous plants and ferns in natural woodlands, parks and nurseries.

Kentucky nursery survey. A nursery survey was made in Kentucky during the summer of 2005, as a collaboration between the USDA-APHIS, and the Office of State Entomologist and the Department of Plant Pathology at the University of Kentucky. This survey was part of a National Nursery Survey, and nurseries were inspected by USDA-APHIS personnel and nursery inspectors operating from the Office of the State Entomologist. All samples were tested using direct DAS ELISA (Double Antibody Sandwich Enzyme Linked Immunosorbent Assay) using antibodies that recognize proteins present in organisms in the genus *Phytophthora*. This assay detects *Phytophthora* to the genus level but is not sensitive enough to differentiate between the 50 different species in the genus *Phytophthora*, so samples that were ELISA-positive were tested further. Total DNA was extracted from the samples that were ELISA-positive and the DNA was sent to the USDA-APHIS for testing by Polymerase Chain Reaction (PCR) using nested primers for amplification of *P. ramorum* DNA.

Kentucky forest survey. The 2005 Kentucky forest survey was done as a collaboration between the USDA Forest Service, the Kentucky Division of Forestry and the Plant Pathology Department of the University of Kentucky. The target host plants were plants in genera that are relatively abundant in forest settings, exhibit distinctive symptoms when infected with *P. ramorum*, and have been shown in other places to develop disease when exposed to *P. ramorum*. For the eastern United States forest survey in 2005 there were eleven target host genera: *Acer, Aesculus, Castanea, Fagus Hamamelis, Kalmia, Lonicera, Quercus, Rhododendron, Vaccinium, and Viburnum*.

Leaf and bark samples from plants showing symptoms similar to those expressed by plants infected by *P. ramorum* were collected, placed in double bags with zip closure, labeled and maintained at low temperature until they were analyzed in the laboratory at the Plant Pathology Department of the University of Kentucky. Replicate samples were shipped overnight to a collaborating regional laboratory for analysis and for confirmation of the results. Samples were tested by performing a DNA extraction and PCR with nested primers for *P. ramorum* identification. Tools used for sample collection were disinfested after each sample was taken to avoid spreading any disease to other plants.

Results and Discussion

Kentucky nursery survey. Approximately 30,217 plants in 105 nurseries and retail outlets were surveyed in 33 counties in Kentucky. A total of 26 samples were collected from nurseries in the following ten counties: Boone (5), Campbell (4), Clark (1), Fayette (3), Hardin (1), Jefferson (7), Jessamine (2), Madison (1), Pulaski (1), and Taylor (1).

Table 1. Number and type of plants sampled and results of ELISA and PCR assays for *Phytophthora sp.* and *P. ramorum* during the National Nursery Survey for *P. ramorum* in Kentucky Nurseries in 2005.

Plant	Number of samples	ELISA Positive	PCR Positive
Azalea	3	0	0
Forsythia	1	0	0
Hydrangea	1	0	0
Kalmia sp	1	0	0
Peony	1	0	0
Pieris sp	3	0	0
Rhododendron sp	11	1	0
Rose	1	0	0
Viburnum sp	4	1	0
Total	26	2	0

No samples collected from Kentucky nurseries were found to be positive for *P. ramorum* in the 2005 nursery survey.

Kentucky forest survey. Thirty locations in 26 counties were surveyed in Kentucky. From the 30 locations surveyed in Kentucky in 2005, 42 leaf and bark samples from plants showing symptoms similar to those that might be caused by *P. ramorum* were collected. DNA was extracted from all samples and PCR was performed to test for *P. ramorum*. No samples were found to be positive for *P. ramorum*. The list of target hosts and results of PCR reactions are shown in Table 2.

Table 2. Number of plants in each target genus sampled and results of PCR assays for *P. ramorum*, including plants showing foliar symptoms and trees from which bleeding cankers were collected during the National Forest Survey for *P. ramorum* in Kentucky in 2005.

Target Genus	Number of samples	PCR Result
Acer	6	Neg
Aesculus	2	Neg
Hammamelis	1	Neg
Kalmia	7	Neg
Lonicera	2	Neg
Rhododendron	4	Neg
Vaccinium	5	Neg
Viburnum	2	Neg
Castanea	0	Neg
Fagus	2	Neg
Quercus	8	Neg
Ulmus	1	Neg
Carya	1	Neg
Platanus	1	Neg
Total	42	Neg

No samples collected from Kentucky forests were found to be positive for *P. ramorum* in the 2005 forest survey.

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			AGRONOMIC CROPS			
			CORN			
CORN (Zea) (includes Popcorn)						
	Charcoal rot	-	**Macrophomina**	**1**	**0**	**1**
	Chemical injury	-	**growth regulator**	**1**	**0**	**1**
		-	**herbicide**	**2**	**0**	**2**
	Cultural	-	**improper depth**	**1**	**0**	**1**
	Ear/Kernel rots	-	**Fusarium**	**1**	**0**	**1**
		-	**Penicillium**	**1**	**0**	**1**
		-	**Stenocarpella**	**1**	**0**	**1**
	Environmental	-	**stresses**	**5**	**0**	**5**
	Gray leaf spot	-	**Cercospora**	**2**	**0**	**2**
	Insect injury			**7**	**2**	**9**
	Leaf spot	-	**fungal**	**0**	**1**	**1**
	Lodging	-	**environmental**	**1**	**0**	**1**
	No disease			**14**		**14**
	No ears	-	**environmental**	**1**	**0**	**1**
	Northern leaf blight	-	**Setosphaeria**	**2**	**1**	**3**
	Nutritional	-	**acid soil**	**3**	**1**	**4**
		-	**fertilizer burn**	**0**	**1**	**1**
		-	**general**	**1**	**0**	**1**
		-	**nitrogen deficiency**	**1**	**1**	**2**
		-	**phosphorus deficiency**	**3**	**1**	**4**
		-	**potassium deficiency**	**10**	**0**	**10**
		-	**zinc deficiency**	**5**	**1**	**6**
	Pollination problem	-	**unknown**	**2**	**0**	**2**
	Purpling	-	**physiological**	**0**	**1**	**1**
	Root rot	-	**Rhizoctonia**	**2**	**0**	**2**
	Stalk rot	-	**Colletotrichum**	**0**	**1**	**1**
		-	**Fusarium**	**2**	**0**	**2**
		-	**Gibberella**	**1**	**1**	**2**
	Stewart's wilt	-	**Erwinia**	**0**	**1**	**1**
	Virus	-	**Maize dwarf mosaic**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			FORAGES			
ALFALFA (Medicago)						
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
	Crown/root rot	**-**	**complex**	**1**	**0**	**1**
	Environmental	**-**	**stresses**	**3**	**0**	**3**
	Inadequate specimen, no disease			**6**		**6**
	Insect injury			**6**	**0**	**6**
	Leaf spot	**-**	**Leptosphaerulina**	**0**	**2**	**2**
	Nutritional	**-**	**acid soil**	**1**	**1**	**2**
		-	**boron deficiency**	**1**	**2**	**3**
		-	**potassium deficiency**	**1**	**0**	**1**
	Root rot	**-**	**Phytophthora**	**1**	**0**	**1**
	Summer black stem	**-**	**Cercospora**	**0**	**1**	**1**
CLOVER (Trifoliorum)						
	Insect injury			**1**	**1**	**2**
FESCUE (Festuca)						
	Insect injury			**0**	**1**	**1**
	Net blotch	**-**	**Drechslera**	**1**	**0**	**1**
MILLET (Panicum)						
	No disease			**1**		**1**
ORCHARDGRASS (Dactylis)						
	Brown stripe	**-**	**Cercosporidium**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			SOYBEAN			
SOYBEAN (Glycine)						
	Anthracnose	-	**Colletotrichum**	**0**	**1**	**1**
	Brown spot	-	**Septoria**	**2**	**0**	**2**
	Charcoal rot	-	**Macrophomina**	**10**	**0**	**10**
	Chemical injury	-	**fungicide**	**1**	**0**	**1**
		-	**growth regulator**	**1**	**0**	**1**
		-	**herbicide**	**3**	**0**	**3**
		-	**unknown**	**9**	**0**	**9**
	Downy mildew	-	**Peronospora**	**19**	**8**	**27**
	Environmental stresses			**5**	**3**	**8**
	Frogeye	-	**Cercospora**	**2**	**3**	**5**
	Inadequate specimen, no disease			**19**		**19**
	Insect injury			**35**	**22**	**57**
	Leaf scorch	-	**environmental**	**1**	**1**	**2**
	Nutritional	-	**acid soil**	**3**	**0**	**3**
		-	**manganese deficiency**	**5**	**0**	**5**
		-	**manganese toxicity**	**1**	**0**	**1**
	Pod blight	-	**Alternaria**	**0**	**1**	**1**
	Pod and stem blight	-	**Diaporthe**	**0**	**1**	**1**
	Physical injury	-	**deer**	**2**	**0**	**2**
	Purple seed	-	**Cercospora**	**1**	**0**	**1**
	Root rot	-	**Pythium**	**3**	**0**	**3**
		-	**Rhizoctonia**	**4**	**5**	**9**
	Root/stem rot	-	**Fusarium**	**0**	**1**	**1**
		-	**Phytophthora**	**3**	**1**	**4**
		-	**Rhizoctonia**	**2**	**2**	**4**
	Seed decay	-	**Alternaria**	**0**	**1**	**1**
		-	**Cercospora**	**1**	**0**	**1**
		-	**Fusarium**	**1**	**0**	**1**
		-	**Macrophomina**	**0**	**1**	**1**
	Soybean cyst nematode	-	**Heterodera**			
			on plant samples	**0**	**7**	**7**
		*	**in soil samples**	**113**		**113**
		*	**absent in soil samples**	**29**		**29**
			(*soil submitted to Nematode Analysis Laboratory)			
	Sudden death	-	**Fusarium**	**21**	**0**	**21**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			SMALL GRAINS			
BARLEY (Hordeum)						
	Nutritional	**-**	**potassium deficiency**	**1**	**0**	**1**
OAT (Avena)						
	Environmental	**-**	**cold injury**	**1**	**0**	**1**
	No disease			**1**		**1**
SORGHUM (Sorghum)						
	No disease			**1**		**1**
	Nutritional	**-**	**soluble salts**	**0**	**1**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
WHEAT (Triticum)						
	Black chaff	**-**	**Xanthomonas**	**1**	**0**	**1**
	Black head mold	**-**	**Cladosporium**	**1**	**0**	**1**
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
	Environmental stresses			**4**	**1**	**5**
	No disease			**4**		**4**
	Nutritional	**-**	**acid soil**	**1**	**0**	**1**
		-	**nitrogen deficiency**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
	Rust, stripe	**-**	**Puccinia**	**1**	**0**	**1**
	Virus	**-**	**Barley yellow dwarf**	**6**	**0**	**6**
		-	**Wheat spindle streak**	**2**	**1**	**3**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			TOBACCO			
TOBACCO (Nicotiana)						
	Air pollution	**-**	**unknown**	**1**	**0**	**1**
	Angular leaf spot	**-**	**Pseudomonas**	**6**	**1**	**7**
	Black leg	**-**	**Erwinia**	**7**	**3**	**10**
	Black root rot	**-**	**Thielaviopsis**	**5**	**0**	**5**
	Black shank	**-**	**Phytophthora**	**152**	**2**	**154**
	Blue mold	**-**	**Peronospora**	**14**	**1**	**15**
	Brown spot	**-**	**Alternaria**	**1**	**0**	**1**
	Chemical injury	**-**	**fungicide**	**2**	**0**	**2**
		-	**growth regulator**	**7**	**0**	**7**
		-	**herbicide**	**28**	**2**	**30**
		-	**unknown**	**2**	**0**	**2**
	Collar rot	**-**	**Sclerotinia**	**2**	**1**	**3**
	Cultural stresses			**14**	**1**	**15**
	Damping-off	**-**	**Rhizoctonia**	**4**	**1**	**5**
	Early flowering	**-**	**environmental**	**1**	**0**	**1**
	Environmental	**-**	**cold injury**	**6**	**2**	**8**
		-	**compaction**	**2**	**0**	**2**
		-	**frost injury**	**1**	**0**	**1**
		-	**lightning**	**3**	**0**	**3**
		-	**stress**	**5**	**1**	**6**
		-	**weather scald**	**7**	**3**	**10**
		-	**wet feet**	**3**	**1**	**4**
	Frenching	**-**	**metabolites**	**3**	**0**	**3**
	Frogeye	**-**	**Cercospora**	**11**	**2**	**13**
	Hollow stalk	**-**	**Erwinia**	**1**	**0**	**1**
	Inadequate specimen, no disease			**59**		**59**
	Insect injury			**1**	**0**	**1**
	Leaf breakdown	**-**	**physiological**	**5**	**0**	**5**
	Leaf breakoff	**-**	**physiological**	**1**	**0**	**1**
	Leaf spot	**-**	**physiological**	**1**	**2**	**3**
	Mutation	**-**	**genetic**	**1**	**0**	**1**
	Nutritional	**-**	**acid soil**	**12**	**1**	**13**
		-	**fertilizer burn**	**2**	**1**	**3**
		-	**general**	**0**	**2**	**2**
		-	**manganese toxicity**	**8**	**3**	**11**
		-	**nitrogen deficiency**	**9**	**0**	**9**
		-	**potassium deficiency**	**8**	**5**	**13**
		-	**soluble salts**	**0**	**1**	**1**
		-	**temp. phosphorus def.**	**5**	**0**	**5**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Physiological	**-**	**suckers**	**1**	**0**	**1**

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
(Tobacco, continued)						
	Root rot	-	Pythium	27	6	33
	Root rot	-	Rhizoctonia	1	3	4
	Sore shin	-	Rhizoctonia	13	4	17
	Stem bruising	-	unknown	1	1	2
	Stem girdling	-	Rhizoctonia	3	1	4
	Storage mold	-	Cladosporium	1	0	1
		-	fungal	0	1	1
		-	Penicillium	1	0	1
	Target spot	-	Rhizoctonia	11	1	12
	Virus	-	Alfalfa mosaic	9	0	9
		-	potyvirus	2	0	2
		-	Tobacco mosaic	0	1	1
		-	Tobacco ringspot	5	0	5
		-	Tobacco streak	1	0	1
		-	Tomato spotted wilt	33	11	44
		-	unknown	1	0	1
	Weather fleck	-	ozone	8	2	10
	Wilt	-	Fusarium	10	1	11

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			FRUIT CROPS			
			SMALL FRUITS			
BLUEBERRY (Vaccinium)						
	Blight	-	**Botrytis**	**2**	**0**	**2**
	Canker	-	**Botryosphaeria**	**1**	**0**	**1**
	Cultural	-	**transplant shock**	**2**	**0**	**2**
	Environmental	-	**cold injury**	**1**	**0**	**1**
	Fruit decay	-	**Phyllosticta**	**1**	**0**	**1**
	Insect injury			**1**	**0**	**1**
	Leaf scorch	-	**environmental**	**2**	**0**	**2**
	No disease			**7**		**7**
	Nutritional	-	**general**	**1**	**0**	**1**
		-	**iron deficiency**	**3**	**0**	**3**
	Root rot	-	**Phytophthora**	**1**	**0**	**1**
BRAMBLES - BLACKBERRY, and RASPBERRY (Rubus)						
	Anthracnose	-	**Elsinoe**	**6**	**0**	**6**
	Cane blight	-	**Leptosphaeria**	**1**	**1**	**2**
	Canker	-	**Botryosphaeria**	**1**	**0**	**1**
	Chemical injury	-	**growth regulator**	**2**	**0**	**2**
	Double blossom	-	**Cercosporella**	**1**	**0**	**1**
	Environmental stresses			**4**	**1**	**5**
	Insect injury			**3**	**0**	**3**
	Leaf spot	-	**Septoria**	**1**	**0**	**1**
	No disease			**2**		**2**
	Virus	-	**unknown**	**9**	**1**	**10**
	White druplet disorder	-	**physiological**	**2**	**0**	**2**
	Wilt	-	**Verticillium**	**1**	**0**	**1**
GRAPE (Vitis)						
	Anthracnose	-	**Elsinoe**	**2**	**0**	**2**
	Black rot	-	**Guignardia**	**16**	**1**	**17**
	Cane/Leaf spot	-	**Phomopsis**	**1**	**0**	**1**
	Chemical injury	-	**growth regulator**	**3**	**0**	**3**
		-	**herbicide**	**1**	**0**	**3**
		-	**unknown**	**1**	**0**	**1**
	Downy mildew	-	**Plasmopora**	**1**	**0**	**1**
	Environmental	-	**drought**	**1**	**0**	**1**
	Inadequate specimen, no disease			**12**		**12**
	Insect injury			**6**	**6**	**12**
	Nutritional	-	**nitrogen deficiency**	**1**	**0**	**1**
	Root/crown rot	-	**Phytophthora**	**1**	**0**	**1**

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
STRAWBERRY (Fragaria)						
	Environmental	-	stress	1	0	1
	Gray mold	-	Botrytis	1	0	1
	Insect injury			2	0	2
	Leaf blight	-	Phomopsis	1	1	2
	Leaf scorch	-	Diplocarpon	1	0	1
	Leaf spot	-	Mycosphaerella	1	1	2
	No disease			1		1
	Nutritional	-	unknown	0	1	1
			TREE FRUITS			
APPLE (Malus)						
	Bitter rot	-	Glomerella	1	0	1
	Cedar apple rust	-	Gymnosporangium	10	4	14
	Cedar quince rust	-	Gymnosporangium	0	1	1
	Chemical injury	-	herbicide	4	0	4
	Cork spot	-	calcium deficiency	1	0	1
	Environmental	-	cold injury	1	0	1
	Fire blight	-	Erwinia	31	0	31
	Flyspeck	-	Schizothyrium	1	2	3
	Frogeye	-	Botryosphaeria	2	3	5
	Insect injury			6	3	9
	Lichen	-	species	1	0	1
	No disease			3		3
	Nutritional	-	soluble salts	1	0	1
	Physical injury	-	unknown	1	0	1
	Root problem	-	unknown	1	0	1
	Scab	-	Venturia	2	0	2
	Sooty blotch	-	Gloeodes	2	1	3
	Sooty mold	-	species	1	0	1
	Thread blight	-	Corticium	1	0	1
CHERRY (Prunus)						
	Black knot	-	Apiosporina	1	0	1
	Cultural	-	transplant shock	1	0	1
	Insect injury			1	0	1
	Leaf spot	-	Coccomyces	1	0	1
	Lichen	-	species	0	1	1
	No disease			3		3
	Wood decay	-	Irpex	1	0	1
PAWPAW (Asimina)						
	Fruit rot	-	Cladosporium	1	0	1
	Insect injury			1	0	1

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
PEACH, APRICOT and NECTARINE (Prunus)						
	Bacterial spot	**-**	**Pseudomonas**	**1**	**0**	**1**
	Bacterial spot	**-**	**Xanthomonas**	**1**	**1**	**2**
	Brown rot	**-**	**Monilinia**	**6**	**0**	**6**
	Canker	**-**	**Leucostoma**	**1**	**0**	**1**
	Chemical injury	**-**	**herbicide**	**2**	**0**	**2**
		-	**unknown**	**1**	**0**	**1**
	Fruit crack	**-**	**physiological**	**0**	**1**	**1**
	Insect injury			**8**	**1**	**9**
	Leaf curl	**-**	**Taphrina**	**5**	**0**	**5**
	No disease			**10**		**10**
	Nutritional	**-**	**nitrogen deficiency**	**9**	**0**	**9**
		-	**potassium deficiency**	**1**	**0**	**1**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Scab	**-**	**Cladosporium**	**2**	**1**	**3**
PEAR (Pyrus)						
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Fire blight	**-**	**Erwinia**	**13**	**0**	**13**
	Inadequate specimen, no disease			**3**		**3**
	Insect injury			**1**	**0**	**1**
PECAN (Carya)						
	Decline	**-**	**unknown**	**1**	**0**	**1**
	Insect injury			**9**	**1**	**10**
	No disease			**2**		**2**
	Internal breakdown	**-**	**physiological**	**0**	**1**	**1**
	Powdery mildew	**-**	**Microsphaera**	**2**	**0**	**2**
PERSIMMON (Dispyros)						
	Insect injury			**1**	**1**	**2**
	Physical injury	**-**	**rodent**	**1**	**0**	**1**
PLUM (Prunus)						
	Bacterial spot	**-**	**Xanthomonas**	**1**	**0**	**1**
	Black knot	**-**	**Apiosporina**	**4**	**0**	**4**
	Brown rot	**-**	**Monilinia**	**1**	**0**	**1**
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**0**	**1**	**1**
	Gummosis	**-**	**unknown**	**1**	**0**	**1**
	Insect injury			**0**	**1**	**1**
	Nutritional	**-**	**nitrogen deficiency**	**3**	**0**	**3**
	Plum pockets	**-**	**Taphrina**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			HERBS			
BASIL (Ocimum)						
	Canker	-	**Botrytis**	**0**	**1**	**1**
		-	**Rhizoctonia**	**1**	**0**	**1**
GINSENG (Panax)						
	No disease			**1**		**1**
MINT (Mentha)						
	Insect injury			**1**	**0**	**1**
			MISCELLANEOUS			
ARABIDOPSIS (Arabidopsis)						
	Nutritional	-	**potassium deficiency**	**1**	**0**	**1**
	Cultural	-	**overwatering**	**0**	**1**	**1**
BABY'S BIB						
	No disease			**1**		**1**
KUDZU (Pueraria)						
	No disease			**1**		**1**
SEA OAT (Chasmanthium)						
	Nutritional	-	**iron deficiency**	**1**	**0**	**1**
SOIL						
	Nutritional	-	**pH high**	**1**	**0**	**1**
SWEET WOODREED (Cinna)						
	Insect injury			**0**	**1**	**1**
	Leaf spot	-	**Cladosporium**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*

IDENTIFICATIONS

FUNGAL IDENTIFICATIONS					
Agaricus	**-**	**species**		**1**	**1**
Apophysomyces	**-**	**species**		**1**	**1**
Basidiomycete	**-**	**species**		**2**	**2**
Calvatia	**-**	**bovista**		**1**	**1**
Chlorophyllum	**-**	**molybdites**		**1**	**1**
Ganoderma	**-**	**species**		**2**	**2**
Inadequate specimen				**1**	**1**
Lactarius	**-**	**species**		**1**	**1**
Laetiporus	**-**	**sulphureus**		**1**	**1**
Scleroderma	**-**	**aurantium**		**1**	**1**
Scleroderma	**-**	**species**		**1**	**1**
Slime mold	**-**	**species**		**3**	**3**
Xylaria	**-**	**species**		**1**	**1**
LICHEN IDENTIFICATIONS					
Lichen	**-**	**species**		**4**	**4**
PLANT IDENTIFICATIONS					
Capsicum	**-**	**baccatum**		**1**	**1**
Cerastium	**-**	**vulgatum**		**1**	**1**
Cyperus	**-**	**species**		**1**	**1**
Juglans	**-**	**species**		**1**	**1**
Lolium	**-**	**multiflorum**		**1**	**1**
Muhlenbergia	**-**	**schreberi**		**1**	**1**
Physocarpus	**-**	**opulifolius**		**1**	**1**
Tilia	**-**	**americana**		**1**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			ORNAMENTALS			
			HERBACEOUS ORNAMENTALS and INDOOR PLANTS			
AFRICAN VIOLET (Saintpaulia)						
	Insect injury			**1**	**0**	**1**
	Nutritional	**-**	**acid soil**	**1**	**0**	**1**
		-	**fertilizer burn**	**0**	**1**	**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
AJUGA (Ajuga)						
	Southern blight	**-**	**Sclerotium**	**1**	**0**	**1**
ALSTROMERIA						
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
ANEMONE (Anemone)						
	Nematode, foliar	**-**	**Aphelenchoides**	**1**	**0**	**1**
	No disease			**1**		**1**
	Virus	**-**	**Tobacco rattle**	**1**	**0**	**1**
ANTHURIUM (Anthurium)						
	No disease			**1**		**1**
ASTER (Aster)						
	No disease			**1**		**1**
BACOPA (Bacopa)						
	No disease			**1**		**1**
BEGONIA (Begonia)						
	No disease			**1**		**1**
	Powdery mildew	**-**	**Oidium**	**1**	**0**	**1**
CALCEOLARIA (Calceolaria)						
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
CALIBRACHOA (Calibrachoa)						
	Insect injury			**1**	**0**	**1**
	Nutritional	**-**	**acid soil**	**0**	**1**	**1**
		-	**general**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**2**	**0**	**2**
	Sooty mold	**-**	**species**	**0**	**1**	**1**
CALYCANTHUS (Calycanthus)						
	No disease			**1**		**1**
CATHARANTHUS (Catharanthus)						
	No disease			**1**		**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
CELOSIA (Celosia)						
	Physical injury	**-**	**unknown**	**0**	**1**	**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
CHRYSANTHEMUM (Chrysanthemum)						
	Bacterial spot	**-**	**Pseudomonas**	**1**	**0**	**1**
	Cultural	**-**	**over watering**	**2**	**0**	**2**
	Inadequate specimen, no disease			**3**		**3**
	Insect injury			**2**	**0**	**2**
	Leaf spot	**-**	**Septoria**	**0**	**1**	**1**
	Nutritional	**-**	**acid soil**	**3**	**0**	**3**
		-	**fertilizer burn**	**3**	**0**	**3**
		-	**general**	**2**	**9**	**11**
		-	**magnesium deficiency**	**1**	**0**	**1**
		-	**manganese deficiency**	**5**	**0**	**5**
		-	**pH high**	**7**	**1**	**8**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**6**	**3**	**9**
		-	**Rhizoctonia**	**2**	**2**	**4**
	Web blight	**-**	**Rhizoctonia**	**3**	**0**	**3**
COLUMBINE (Aquilegia)						
	Insect injury			**1**	**0**	**1**
CROSCOMIA (Croscomia)						
	Insect injury			**1**	**0**	**1**
DAHLIA (Dahlia)						
	Bacterial soft rot	**-**	**Erwinia**	**1**	**0**	**1**
	Insect injury			**2**	**0**	**2**
	Leaf burn	**-**	**unknown**	**1**	**0**	**1**
	No disease			**1**		**1**
DAISY (Gerbera)						
	No disease			**2**		**2**
DAYLILY (Hemerocallis)						
	Environmental	**-**	**cold injury**	**1**	**0**	**1**
	Insect injury			**1**	**0**	**1**
	Leaf streak	**-**	**Aureobasidium**	**1**	**0**	**1**
	Rust	**-**	**Puccinia**	**1**	**0**	**1**
DRACAENA (Dracaena)						
	Insect injury			**1**	**0**	**1**
ECHEVERIA (Echeveria)						
	Inadequate specimen			**1**		**1**
ECHINACEA (Echinacea)						
	Insect injury			**1**	**0**	**1**
	Virus	**-**	**unknown**	**2**	**0**	**2**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
FICUS (Ficus)						
	Insect injury			**3**	**0**	**3**
FOXGLOVE (Digitalis)						
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
GARDENIA (Gardenia)						
	No disease			**1**		**1**
GENTIANA (Gentiana)						
	Environmental	**-**	**frost injury**	**1**	**0**	**1**
	Insect injury			**0**	**1**	**1**
GERANIUM (Pelargonium)						
	Blight	**-**	**Botrytis**	**1**	**0**	**1**
	Nutritional	**-**	**general**	**1**	**0**	**1**
		-	**fertilizer burn**	**3**	**0**	**3**
		-	**iron toxicity**	**1**	**0**	**1**
		-	**nitrogen deficiency**	**1**	**0**	**1**
	Physiological	**-**	**oedema**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**1**	**2**
		-	**Rhizoctonia**	**0**	**1**	**1**
GERBERA (Gerbera)						
	Insect injury			**1**	**1**	**2**
	No disease			**1**		**1**
HOSTA (Hosta)						
	Bacterial soft rot	**-**	**Erwinia**	**2**	**0**	**2**
	Environmental	**-**	**sunscald**	**1**	**0**	**1**
	Insect injury			**2**	**0**	**2**
	No disease			**3**		**3**
HOYA (Hoya)						
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
IMPATIENS (Impatiens)						
	Cultural	**-**	**high temperature**	**1**	**0**	**1**
		-	**overwatering**	**1**	**0**	**1**
	Insect injury			**1**	**1**	**2**
	No disease			**2**		**2**
	Nutritional	**-**	**nitrogen deficiency**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
		-	**Rhizoctonia**	**2**	**0**	**2**
	Virus	**-**	**Impatiens necrotic spot**	**2**	**0**	**2**
IMPERATA (Imperata)						
	Environmental	**-**	**wet feet**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
IRIS (Iris)						
	Bacterial soft rot	**-**	**Erwinia**	**2**	**0**	**2**
	Gray mold	**-**	**Botrytis**	**1**	**0**	**1**
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Heterosporium**	**3**	**0**	**3**
	No disease			**1**		**1**
IVY (Hedera and others)						
	Insect injury			**1**	**0**	**1**
	No disease			**1**		**1**
JADE (Crassula)						
	No disease			**1**		**1**
LILY (Lilium)						
	Environmental	**-**	**heavy soil**	**1**	**0**	**1**
LILY OF THE VALLEY (Convallaria)						
	No disease			**1**		**1**
MANDEVILLA (Mandevilla)						
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Cultural	**-**	**overwatering**	**1**	**0**	**1**
	Insect injury			**1**	**1**	**2**
MARCODONIA (Marcodonia)						
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
		-	**Rhizoctonia**	**0**	**1**	**1**
MARIGOLD (Tagetes)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Inadequate specimen			**1**		**1**
	Nutritional	**-**	**soluble salts**	**1**	**0**	**1**
MISCANTHUS (Miscanthus)						
	Nutritional	**-**	**acid soil**	**0**	**1**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
MOCK STRAWBERRY						
	Rust	**-**	**Frommeella**			
MONKEY GRASS (Liriope)						
	Environmental	**-**	**cold injury**	**1**	**0**	**1**
NORFOLK ISLAND PINE (Araucaria)						
	Insect injury			**1**	**0**	**1**
ORCHID (Habenaria)						
	No disease			**1**		**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
PACHYSANDRA (Pachysandra)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	No disease			**1**		**1**
PANSY (Viola)						
	Black root rot	**-**	**Thielaviopsis**	**2**	**0**	**2**
	Gray mold	**-**	**Botrytis**	**1**	**0**	**1**
	Inadequate specimen			**1**		**1**
	Leaf spot	**-**	**Cercospora**	**1**	**0**	**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
PENNISETUM (Pennisetum)						
	Environmental	**-**	**wet feet**	**1**	**0**	**1**
	Nutritional	**-**	**acid soil**	**0**	**1**	**1**
PEONY (Paeonia)						
	Blight	**-**	**Botrytis**	**1**	**0**	**1**
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	No disease			**1**		**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
	Soft rot	**-**	**unknown**	**1**	**0**	**1**
	Virus	**-**	**unknown**	**1**	**0**	**1**
PERSECARIA (Persecaria)						
	No disease			**1**		**1**
PETUNIA (Petunia)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Gray mold	**-**	**Botrytis**	**1**	**0**	**1**
	Inadequate specimen, no disease			**4**		**4**
	Nutritional	**-**	**alkalinity**	**0**	**1**	**1**
		-	**boron deficiency**	**1**	**0**	**1**
		-	**general**	**2**	**0**	**2**
		-	**iron deficiency**	**0**	**2**	**2**
		-	**nitrogen deficiency**	**2**	**0**	**2**
		-	**pH high**	**2**	**0**	**2**
	Root rot	**-**	**Pythium**	**3**	**0**	**3**
PHILODENDRON (Philodendron)						
	No disease			**1**		**1**
PHLOX (Phlox)						
	Leaf spot	**-**	**Septoria**	**1**	**0**	**1**
	Nutritional	**-**	**general**	**1**	**0**	**1**
	Powdery mildew	**-**	**Erysiphe**	**1**	**0**	**1**
	Southern blight	**-**	**Sclerotium**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
POINSETTIA (Euphorbia)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Cultural	**-**	**overwatering**	**0**	**1**	**1**
	Inadequate specimen			**1**		**1**
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Cercospora**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**5**	**2**	**7**
POPPY (Stylophorum)						
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
RUBBER PLANT (Ficus)						
	No disease			**1**		**1**
SALVIA (Salvia)						
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
	No disease			**1**		**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
SCHEFFLERA (Brassaia)						
	No disease			**1**		**1**
SEDUM (Sedum)						
	No disease			**1**		**1**
SNAPDRAGON (Antirrhinum)						
	Root rot	**-**	**Pythium**	**0**	**1**	**1**
		-	**Rhizoctonia**	**1**	**0**	**1**
SOLOMON'S SEAL (Polygonatum)						
	Insect injury			**1**	**0**	**1**
SPEEDWELL (Veronica)						
	Root rot	**-**	**Pythium**	**0**	**1**	**1**
		-	**Rhizoctonia**	**1**	**0**	**1**
SPIDER PLANT (Chlorophytum)						
	Insect injury			**1**	**0**	**1**
SUNFLOWER (Helianthus)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
TUBEROSE (Polianthes)						
	Inadequate specimen			**1**		**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
VERBENA (Verbena)						
	Algae	**-**	**species**	**1**	**0**	**1**
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
		-	**general**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
VINCA (Vinca)						
	Black root rot	**-**	**Thielaviopsis**	**1**	**0**	**1**
	Canker/dieback	**-**	**Phoma**	**3**	**0**	**3**
	Nutritional	**-**	**soluble salts**	**0**	**1**	**1**
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
ZINNIA (Zinnia)						
	Leaf distortion	**-**	**unknown**	**1**	**0**	**1**
	Nutritional	**-**	**general**	**0**	**1**	**1**

TURFGRASS

BENTGRASS (Agrostis)						
	Algae	**-**	**species**	**1**	**0**	**1**
	Anthracnose	**-**	**Colletotrichum**	**2**	**0**	**2**
	Anthracnose, basal rot	**-**	**Colletotrichum**	**5**	**0**	**5**
	Blight	**-**	**Pythium**	**4**	**0**	**4**
	Cultural	**-**	**heavy thatch**	**1**	**0**	**1**
	Environmental stresses			**2**	**1**	**3**
	Fairy ring	**-**	**Basidiomycete**	**1**	**0**	**1**
	Leaf blight	**-**	**Curvularia**	**1**	**0**	**1**
	Leaf spot	**-**	**Bipolaris**	**0**	**1**	**1**
	Localized dry spot	**-**	**environmental**	**1**	**0**	**1**
	No disease			**10**		**10**
	Nutritional	**-**	**soluble salts**	**1**	**0**	**1**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Pink snow mold	**-**	**Microdochium**	**2**	**0**	**2**
	Root disfunction	**-**	**Pythium**	**3**	**0**	**3**
	Root rot	**-**	**Pythium**	**12**	**0**	**12**
		-	**Rhizoctonia**	**0**	**1**	**1**
	Yellow patch	**-**	**Rhizoctonia**	**2**	**0**	**2**
BLUEGRASS (Poa)						
	Anthracnose	**-**	**Colletotrichum**	**0**	**2**	**2**
	Brown patch	**-**	**Rhizoctonia**	**1**	**0**	**1**
	Cultural	**-**	**heavy thatch**	**1**	**1**	**2**
	Leaf blight	**-**	**Leptosphaerulina**	**0**	**1**	**1**
	Necrotic ring spot	**-**	**Leptosphaeria**	**1**	**0**	**1**
	No disease			**1**		**1**
	Red thread	**-**	**Laetisaria**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
	Summer patch	**-**	**Magnaporthe**	**5**	**0**	**5**
CRABGRASS (Digitaria)						
	Smut	**-**	**Ustilago**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
FESCUE (Festuca)						
	Anthracnose	**-**	**Colletotrichum**	**1**	**0**	**1**
	Blight	**-**	**Pythium**	**1**	**0**	**1**
	Brown patch	**-**	**Rhizoctonia**	**16**	**0**	**16**
	Cultural	**-**	**heavy thatch**	**1**	**0**	**1**
	Environmental	**-**	**stress**	**1**	**0**	**1**
	Gray leaf spot	**-**	**Pyricularia**	**1**	**0**	**1**
	Inadequate specimen, no disease			**6**		**6**
	Nutritional	**-**	**acid soil**	**1**	**0**	**1**
		-	**soluble salts**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**1**	**2**
		-	**Rhizoctonia**	**1**	**0**	**1**
	Slime mold	**-**	**species**	**1**	**0**	**1**
	Smut	**-**	**Ustilago**	**1**	**0**	**1**
RYEGRASS (Lolium)						
	Anthracnose	**-**	**Colletotrichum**	**1**	**0**	**1**
	Gray leaf spot	**-**	**Pyricularia**	**2**	**0**	**2**
	Leaf blight	**-**	**Curvularia**	**1**	**0**	**1**
	No disease			**1**		**1**
	Red thread	**-**	**Laetisaria**	**1**	**0**	**1**
	Summer patch	**-**	**Magnaporthe**	**0**	**1**	**1**
	Yellow Patch	**-**	**Rhizoctonia**	**1**	**0**	**1**
TURF (unspecified)						
	Anthracnose	**-**	**Colletotrichum**	**2**	**0**	**2**
	Brown patch	**-**	**Rhizoctonia**	**2**	**0**	**2**
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Gray leaf spot	**-**	**Pyricularia**	**1**	**0**	**1**
	Inadequate specimen, no disease			**8**		**8**
	Leaf blight	**-**	**Curvularia**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**3**	**0**	**3**
	Southern blight	**-**	**Sclerotium**	**1**	**0**	**1**
ZOYSIA (Zoysia)						
	Large patch	**-**	**Rhizoctonia**	**1**	**0**	**1**
	No disease			**1**		**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
			WOODY ORNAMENTALS			
ALMOND (Prunus)						
	Bacterial spot	**-**	**Xanthomonas**	**1**	**0**	**1**
ARBORVITAE (Thuja)						
	Cultural	**-**	**transplant shock**	**3**	**0**	**3**
	Environmental stresses			**6**	**3**	**9**
	Insect injury			**3**	**0**	**3**
	No disease			**11**		**11**
	Needle drop	**-**	**normal**	**0**	**1**	**1**
	Physical injury	**-**	**unknown**	**2**	**0**	**2**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
	Sooty mold	**-**	**species**	**1**	**0**	**1**
	Tip blight	**-**	**Pestalotiopsis**	**1**	**0**	**1**
	Twig blight	**-**	**Kabatina**	**1**	**0**	**1**
ASH (Fraxinus)						
	Anthracnose	**-**	**Apiognomonia**	**6**	**0**	**6**
	Canker	**-**	**Botryosphaeria**	**4**	**0**	**4**
		-	**unknown**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Environmental	**-**	**stress**	**1**	**0**	**1**
	Gall	**-**	**unknown**	**1**	**0**	**1**
	Insect injury			**2**	**3**	**5**
	Virus	**-**	**unknown**	**1**	**0**	**1**
AZALEA - See listing under RHODODENDRON						
BALDCYPRESS (Taxodium)						
	Insect injury			**1**	**0**	**1**
BARBERRY (Berberis)						
	Bacterial spot	**-**	**Pseudomonas**	**1**	**0**	**1**
	No disease			**2**		**2**
	Tip blight	**-**	**Pestalotiopsis**	**1**	**0**	**1**
BEECH (Fagus)						
	Insect injury			**2**	**0**	**2**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
BIRCH (Betula)						
	Insect injury			**5**	**0**	**5**
	Leaf spot	**-**	**Gloeosporium**	**1**	**0**	**1**
	No disease			**4**		**4**
	Nutritional	**-**	**iron deficiency**	**1**	**0**	**1**
BLACK GUM (Tupelo)						
	No disease			**1**		**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
BOXELDER (Acer)						
	Physiological	**-**	**red stain**	**1**	**0**	**1**
BOXWOOD (Buxus)						
	Bacterial soft rot	**-**	**Erwinia**	**1**	**0**	**1**
	Black root rot	**-**	**Thielaviopsis**	**1**	**0**	**1**
	Canker	**-**	**Pseudonectria**	**6**	**3**	**9**
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**1**	**0**	**1**
		-	**wet feet**	**1**	**0**	**1**
	Environmental stresses			**9**	**3**	**12**
	Insect injury			**6**	**0**	**6**
	No disease			**7**		**7**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Root rot	**-**	**Rhizoctonia**	**0**	**1**	**1**
BUCKEYE (Aesculus)						
	No disease			**1**		**1**
	Powdery mildew	**-**	**Oidium**	**1**	**0**	**1**
BUCKTHORN (Rhamnus)						
	Crown rust	**-**	**Puccinia**	**1**	**0**	**1**
BUDDLEIA (Buddleia)						
	Environmental	**-**	**stress**	**1**	**0**	**1**
CATALPA (Catalpa)						
	Environmental	**-**	**cold injury**	**1**	**0**	**1**
CEDRUS (Cedrus)						
	Environmental	**-**	**stress**	**1**	**0**	**1**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
CHAMAECYPARIS (Chamaecyparis)						
	No disease			**1**		**1**
	Nutritional	**-**	**acid soil**	**0**	**1**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
	Twig blight	**-**	**Kabatina**	**1**	**0**	**1**
CHERRY (Prunus)						
	Bacterial spot	**-**	**Xanthomonas**	**1**	**0**	**1**
	Bark split	**-**	**unknown**	**1**	**0**	**1**
	Black knot	**-**	**Apiosporina**	**2**	**0**	**2**
	Cultural	**-**	**overwatering**	**1**	**0**	**1**
		-	**transplant shock**	**2**	**0**	**2**
	Dieback	**-**	**unknown**	**2**	**0**	**2**
	Environmental stresses			**4**	**0**	**4**
	Inadequate specimen, no disease			**6**		**6**
	Insect injury			**4**	**3**	**7**
	Leaf spot	**-**	**Coccomyces**	**1**	**0**	**1**
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
CHERRYLAUREL (Prunus)						
	Bacterial canker	**-**	**Pseudomonas**	**1**	**0**	**1**
	Black root rot	**-**	**Thielaviopsis**	**0**	**1**	**1**
	Canker	**-**	**Cytospora**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**1**	**1**	**2**
	Environmental stresses			**3**	**0**	**3**
	Insect injury			**1**	**0**	**1**
	No disease			**2**		**2**
CHESTNUT (Castanea)						
	Blight	**-**	**Cryphonectria**	**1**	**0**	**1**
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Phyllosticta**	**1**	**0**	**1**
CLEMATIS (Clematis)						
	Anthracnose	**-**	**Glomerella**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Dieback	**-**	**Ascochyta**	**2**	**0**	**2**
	Inadequate specimen, no disease			**4**		**4**
	Insect injury			**0**	**1**	**1**
	Leaf spot	**-**	**Alternaria**	**1**	**0**	**1**
	Nutritional	**-**	**acid soil**	**0**	**1**	**1**
CRABAPPLE (Malus)						
	Cultural	**-**	**transplant shock**	**1**	**0**	**1**
	Environmental stresses			**2**	**0**	**2**
	Fire blight	**-**	**Erwinia**	**7**	**0**	**7**
	Insect injury			**0**	**1**	**1**
	No disease			**1**		**1**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Scab	**-**	**Venturia**	**6**	**0**	**6**
CRAPEMYRTLE (Lagerstroemia)						
	Insect injury			**2**	**0**	**2**
	Sooty mold	**-**	**species**	**1**	**1**	**2**
CRYPTOMERIA (Cryptomeria)						
	Environmental	**-**	**cold injury**	**1**	**1**	**2**
	Insect injury			**1**	**0**	**1**
	No disease			**2**		**2**
CYPRESS (Cupressocyparis)						
	Cultural	**-**	**over watering**	**1**	**0**	**1**
	Environmental	**-**	**cold injury**	**7**	**0**	**7**
	Insect injury			**1**	**0**	**1**
	No disease			**2**		**2**
	Root rot	**-**	**Rhizoctonia**	**0**	**1**	**1**
	Sunbleaching	**-**	**environmental**	**1**	**0**	**1**
	Twig blight	**-**	**Pestalotiopsis**	**0**	**1**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
DOGWOOD (Cornus)						
	Anthracnose	**-**	**Apiognomonia**	**0**	**1**	**1**
		-	**Discula**	**3**	**3**	**6**
	Canker	**-**	**Botryosphaeria**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**3**	**0**	**3**
	Cultural	**-**	**transplant shock**	**4**	**1**	**5**
	Decline	**-**	**unknown**	**4**	**0**	**4**
	Environmental stresses			**8**	**0**	**8**
	Inadequate specimen, no disease			**11**		**11**
	In sect injury			**1**	**0**	**1**
	Leaf blight	**-**	**Botrytis**	**1**	**0**	**1**
	Leaf scorch	**-**	**environmental**	**1**	**0**	**1**
		-	**unknown**	**2**	**0**	**2**
	Leaf spot	**-**	**Phyllosticta**	**1**	**0**	**1**
		-	**Septoria**	**2**	**0**	**2**
	Powdery mildew	**-**	**Oidium**	**10**	**2**	**12**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
	Spot anthracnose	**-**	**Elsinoe**	**1**	**3**	**4**
DOUGLAS FIR (Pseudotsuga)						
	No disease			**1**		**1**
DOVE TREE (Davidia)						
	Decline	**-**	**unknown**	**1**	**0**	**1**
	Environmental stresses			**1**	**1**	**2**
ELDER (Sambucus)						
	Wilt	**-**	**Verticillium**	**1**	**0**	**1**
ELM (Ulmus)						
	Anthracnose	**-**	**Asteroma**	**1**	**1**	**2**
	Black spot	**-**	**Stegophora**	**1**	**0**	**1**
	Dutch elm disease	**-**	**Ophiostoma**	**3**	**0**	**3**
	Environmental	**-**	**cold injury**	**1**	**0**	**1**
	Inadequate specimen, no disease			**6**		**6**
	Insect injury			**6**	**3**	**9**
	Leaf spot	**-**	**Gloeosporium**	**1**	**0**	**1**
		-	**Gnomonia**	**1**	**0**	**1**
		-	**Phyllosticta**	**0**	**1**	**1**
EUONYMUS (Euonymus)						
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
		-	**unknown**	**1**	**0**	**1**
	Crown gall	**-**	**Agrobacterium**	**1**	**0**	**1**
	Environmental	**-**	**winter injury**	**2**	**1**	**3**
	Insect injury			**16**	**2**	**18**
	Powdery mildew	**-**	**Oidium**	**0**	**1**	**1**

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
FILBERT (Corylus)						
	Canker	-	Botryosphaeria	1	0	1
	Cultural	-	transplant shock	1	0	1
	Insect injury			0	1	1
	Root rot	-	Rhizoctonia	1	0	1
FIR (Abies)						
	Nutritional	-	general	1	0	1
	Physical injury	-	mower	1	0	1
FORSYTHIA (Forsythia)						
	Canker	-	Hypoxylon	0	1	1
	Chemical injury	-	growth regulator	2	0	2
	Physical injury	-	unknown	1	0	1
FRINGETREE (Chionanthus)						
	Chemical injury	-	unknown	1	0	1
	Root problem	-	unknown	1	0	1
	Root rot	-	Rhizoctonia	0	1	1
GOLDENRAINTREE (Koelreuteria)						
	No disease			1		1
HACKBERRY (Celtis)						
	Insect injury			1	0	1
HAWTHORN (Crataegus)						
	Cedar-quince rust	-	Gymnosporangium	3	0	3
	Chemical injury	-	herbicide	1	0	1
	Environmental	-	cold injury	1	0	1
	Fire blight	-	Erwinia	1	0	1
	Insect injury			1	0	1
HEMLOCK (Tsuga)						
	Environmental	-	drought	1	0	1
	Lichen	-	species	1	0	1
	No disease			5		5
	Root rot	-	Phytophthora	1	0	1
HIBISCUS (Hibiscus)						
	Insect injury			1	0	1
HICKORY (Carya)						
	Canker	-	Hypoxylon	0	1	1
	Environmental	-	cold injury	1	0	1
	Gall	-	Phomopsis	1	0	1
	Insect injury			10	1	11
	No disease			2		2
	Root/crown rot	-	Armillaria	1	0	1

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
HOLLY and INKBERRY (Ilex)						
	Black root rot	**-**	**Thielaviopsis**	**11**	**0**	**11**
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**4**	**1**	**5**
	Dieback	**-**	**unknown**	**2**	**0**	**2**
	Environmental stresses			**11**	**3**	**14**
	Fruit rot	**-**	**Alternaria**	**1**	**0**	**1**
	Inadequate specimen, no disease			**27**		**27**
	Insect injury			**14**	**3**	**17**
	Leaf spot	**-**	**fungal**	**2**	**1**	**3**
		-	**Macrophoma**	**2**	**0**	**2**
	Nutritional	**-**	**general**	**1**	**0**	**1**
		-	**iron deficiency**	**2**	**0**	**2**
		-	**pH high**	**1**	**0**	**1**
		-	**soluble salts**	**0**	**1**	**1**
	Root problem	**-**	**unknown**	**2**	**0**	**2**
	Root rot	**-**	**Pythium**	**2**	**0**	**2**
	Sooty mold	**-**	**species**	**0**	**1**	**1**
	Web blight	**-**	**Rhizoctonia**	**1**	**0**	**1**
HONEYLOCUST (Gleditsia)						
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Cercospora**	**1**	**0**	**1**
	Sooty mold	**-**	**species**	**1**	**0**	**1**
HONEYSUCKLE (Lonicera)						
	Insect injury			**1**	**1**	**2**
	No disease			**2**		**2**
	Powdery mildew	**-**	**Oidium**	**1**	**0**	**1**
HORNBEAM (Carpinus)						
	No disease			**1**		**1**
HYDRANGEA (Hydrangea)						
	Anthracnose	**-**	**Colletotrichum**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**2**	**0**	**2**
	Environmental	**-**	**drought**	**1**	**1**	**2**
	Inadequate specimen, no disease			**3**		**3**
	Leaf scorch	**-**	**environmental**	**1**	**0**	**1**
	Leaf spot	**-**	**Cercospora**	**3**	**0**	**3**
	Physical injury	**-**	**unknown**	**1**	**0**	**1**
	Root/crown rot	**-**	**Armillaria**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
JUNIPER and RED CEDAR (Juniperus)						
	Cedar/Apple rust	**-**	**Gymnosporangium**	**2**	**0**	**2**
	Cedar/Quince rust	**-**	**Gymnosporangium**	**0**	**1**	**1**
	Environmental stresses			**18**	**1**	**19**
	Insect injury			**1**	**1**	**2**
	No disease			**20**		**20**
	Root rot	**-**	**Phytophthora**	**1**	**0**	**1**
	Twig blight	**-**	**Kabatina**	**6**	**1**	**7**
		-	**Phomopsis**	**1**	**0**	**1**
		-	**Pestalotiopsis**	**0**	**3**	**3**
KATSURATREE (Katsura)						
	Canker	**-**	**Botryosphaeria**	**1**	**0**	**1**
KERRIA (Kerria)						
	Leaf/twig blight	**-**	**Blumeriella**	**1**	**0**	**1**
LILAC (Syringa)						
	Anthracnose	**-**	**Colletotrichum**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**2**	**0**	**2**
	Environmental stresses			**2**	**0**	**2**
	Inadequate specimen, no disease			**3**		**3**
	Leaf scorch	**-**	**unknown**	**1**	**0**	**1**
LINDEN (Tilia)						
	Anthracnose	**-**	**Gnomonia**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
LOCUST (Robinia)						
	No disease			**1**		**1**
MAGNOLIA (Magnolia)						
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Cultural stresses			**5**	**0**	**5**
	Decline	**-**	**unknown**	**1**	**0**	**1**
	Environmental stresses			**5**	**0**	**5**
	Flower decay	**-**	**Zygomycete**	**1**	**0**	**1**
	Insect injury			**3**	**1**	**4**
	Leaf spot	**-**	**fungal**	**1**	**2**	**3**
	No disease			**5**		**5**
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
		-	**iron deficiency**	**1**	**0**	**1**
	Sooty mold	**-**	**species**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
MAPLE (Acer)						
	Anthracnose	**-**	**Apiognomonia**	**4**	**1**	**5**
		-	**Discula**	**0**	**1**	**1**
		-	**Kabatiella**	**4**	**0**	**4**
		-	**Monostichella**	**1**	**0**	**1**
	Bacterial scorch	**-**	**Xylella**	**1**	**0**	**1**
	Canker	**-**	**Botryosphaeria**	**2**	**0**	**2**
		-	**Hypoxylon**	**1**	**0**	**1**
		-	**Nectria**	**2**	**0**	**2**
		-	**unknown**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**9**	**0**	**9**
	Decline	**-**	**unknown**	**7**	**0**	**7**
	Environmental stresses			**16**	**4**	**20**
	Graft problem	**-**	**incompatible**	**0**	**1**	**1**
	Inadequate specimen, no disease			**34**		**34**
	Insect injury			**19**	**4**	**23**
	Leaf scorch	**-**	**environmental**	**2**	**0**	**2**
		-	**unknown**	**1**	**0**	**1**
	Leaf spot	**-**	**Phyllosticta**	**2**	**0**	**2**
	Lichen	**-**	**species**	**0**	**1**	**1**
	Nutritional	**-**	**general**	**1**	**0**	**1**
		-	**pH high**	**1**	**0**	**1**
	Physical	**-**	**construction**	**1**	**0**	**1**
	Sooty mold	**-**	**species**	**1**	**1**	**2**
	Tar spot	**-**	**Rhytisma**	**2**	**0**	**2**
	Wilt	**-**	**Verticillium**	**3**	**0**	**3**
	Wood decay	**-**	**Schizophyllum**	**1**	**0**	**1**
MICROBIOTA (Microbiota)						
	Cultural	**-**	**overwatering**	**1**	**0**	**1**
MOUNTAIN LAUREL (Kalmia)						
	No disease			**1**		**1**
MULBERRY (Morus)						
	Bacterial blight	**-**	**Pseudomonas**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Cercosporella**	**1**	**0**	**1**
		-	**Phloeospora**	**1**	**0**	**1**
NANDINA (Nandina)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
		-	**herbicide**	**1**	**0**	**1**
	Environmental	**-**	**winter injury**	**1**	**0**	**1**
	No disease			**1**		**1**
NINEBARK (Physocarpus)						
	No disease			**1**		**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
OAK (Quercus)						
	Anthracnose	**-**	**Apiognomonia**	**8**	**1**	**9**
	Bacterial scorch	**-**	**Xylella**	**9**	**2**	**11**
	Bleeding necrosis	**-**	**Phytophthora**	**1**	**0**	**1**
	Canker	**-**	**Botryosphaeria**	**1**	**0**	**1**
		-	**Cerrena**	**1**	**0**	**1**
		-	**Hypoxylon**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**6**	**0**	**6**
	Cultural	**-**	**transplant shock**	**0**	**1**	**1**
	Decline	**-**	**unknown**	**2**	**0**	**2**
	Environmental stresses			**4**	**0**	**4**
	Inadequate specimen, no disease			**27**		**27**
	Insect injury			**37**	**5**	**42**
	Leaf blister	**-**	**Taphrina**	**1**	**0**	**1**
	Leaf scorch	**-**	**unknown**	**0**	**1**	**1**
	Leaf spot	**-**	**Elsinoe**	**1**	**0**	**1**
		-	**Tubakia**	**7**	**3**	**10**
	Nutritional	**-**	**fertilizer burn**	**0**	**1**	**1**
		-	**general**	**1**	**0**	**1**
		-	**iron deficiency**	**1**	**0**	**1**
		-	**pH high**	**0**	**1**	**1**
	Powdery mildew	**-**	**Phyllactinia**	**1**	**1**	**2**
OREGON GRAPE (Mahonia)						
	Environmental	**-**	**winter injury**	**1**	**0**	**1**
PEAR (Pyrus)						
	Cedar/Quince rust	**-**	**Gymnosporangium**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**5**	**1**	**6**
		-	**unknown**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**2**	**0**	**2**
	Decline	**-**	**unknown**	**3**	**0**	**3**
	Environmental stresses			**1**	**1**	**2**
	Fire blight	**-**	**Erwinia**	**24**	**1**	**25**
	Inadequate specimen, no disease			**7**		**7**
	Insect injury			**4**	**1**	**5**
	Leaf scorch	**-**	**environmental**	**0**	**1**	**1**
		-	**unknown**	**1**	**0**	**1**
	Leaf spot	**-**	**Phoma**	**1**	**0**	**1**
	Lichen	**-**	**species**	**1**	**0**	**1**
PHOTINIA (Photinia)						
	Environmental	**-**	**winter drying**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
PINE (Pinus)						
	Air pollution	**-**	**ozone**	**4**	**1**	**5**
	Brown spot	**-**	**Mycosphaerella**	**3**	**0**	**3**
	Cultural	**-**	**transplant shock**	**8**	**0**	**8**
	Environmental stresses			**4**	**1**	**5**
	Insect injury			**13**	**2**	**15**
	Needle cast	**-**	**Ploioderma**	**1**	**0**	**1**
	No disease			**15**		**15**
	Nutritional	**-**	**pH high**	**0**	**1**	**1**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
	Sooty mold	**-**	**species**	**1**	**0**	**1**
	Tip blight	**-**	**Sphaeropsis**	**4**	**0**	**4**
	Tip burn	**-**	**unknown**	**1**	**0**	**1**
	White pine decline	**-**	**environmental**	**26**	**0**	**26**
PITTOSPORIUM (Pittosporium)						
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
PLUM (Prunus)						
	Black knot	**-**	**Apiosporina**	**4**	**0**	**4**
	Cultural	**-**	**transplant shock**	**1**	**0**	**1**
	Insect injury			**0**	**1**	**1**
	Leaf spot	**-**	**fungal**	**1**	**0**	**1**
	Lichen	**-**	**species**	**1**	**0**	**1**
	No disease			**1**		**1**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
POPLAR (Populus)						
	Canker	**-**	**Cryptodiaporthe**	**1**	**0**	**1**
PRIVET (Ligustrum)						
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
PYRACANTHA (Pyracantha)						
	Fire blight	**-**	**Erwinia**	**0**	**1**	**1**
	Scab	**-**	**Venturia**	**1**	**0**	**1**
REDBUD (Cercis)						
	Chemical injury	**-**	**growth regulator**	**2**	**0**	**2**
		-	**herbicide**	**2**	**0**	**2**
	Cultural	**-**	**transplant shock**	**1**	**0**	**1**
	Decline	**-**	**unknown**	**1**	**0**	**1**
	Environmental	**-**	**cold injury**	**2**	**0**	**2**
	Insect injury			**2**	**1**	**3**
	No disease			**5**		**5**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
	Wilt	**-**	**Verticillium**	**3**	**0**	**3**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
REDWOOD (Sequoia)						
	Environmental	**-**	**winter injury**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**0**	**1**	**1**
	Insect injury			**1**	**0**	**1**
	No disease			**1**		**1**
RHODODENDRON and AZALEA (Rhododendron)						
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Dieback	**-**	**unknown**	**1**	**0**	**1**
	Environmental stresses			**9**	**2**	**11**
	Inadequate specimen, no disease			**8**		**8**
	Insect injury			**10**	**0**	**10**
	Leaf/flower gall	**-**	**Exobasidium**	**6**	**0**	**6**
	Leaf spot	**-**	**Pestalotiopsis**	**3**	**2**	**5**
		-	**Septoria**	**2**	**0**	**2**
	Nutritional	**-**	**iron deficiency**	**2**	**0**	**2**
	Root/crown rot	**-**	**Phytophthora**	**1**	**0**	**1**
RHUS (Rhus)						
	No disease			**5**		**5**
ROSE (Rosa)						
	Black spot	**-**	**Diplocarpon**	**2**	**0**	**2**
	Canker, common	**-**	**Coniothyrium**	**2**	**0**	**2**
	Chemical injury	**-**	**growth regulator**	**2**	**0**	**2**
		-	**herbicide**	**4**	**0**	**4**
		-	**unknown**	**1**	**0**	**1**
	Cultural	**-**	**transplant shock**	**1**	**0**	**1**
	Environmental stresses			**2**	**0**	**2**
	Inadequate specimen, no disease			**6**		**6**
	Insect injury			**7**	**1**	**8**
	Powdery mildew	**-**	**Oidium**	**1**	**1**	**2**
	Virus	**-**	**Rose mosaic**	**1**	**0**	**1**
		-	**Rose rosette**	**3**	**0**	**3**
SASSAFRAS (SASSAFRAS)						
	Insect injury			**1**	**0**	**1**
	No disease			**2**		**2**
	Sooty mold	**-**	**species**	**0**	**1**	**1**
SERVICEBERRY (Amelanchier)						
	Cedar/Quince rust	**-**	**Gymnosporangium**	**1**	**0**	**1**
SMOKETREE (Cotinus)						
	Leaf spot	**-**	**Pseudocercospora**	**1**	**0**	**1**
SOAPBERRY (Sapindus)						
	No disease			**1**		**1**
SOURWOOD (Oxydendrum)						
	Canker	**-**	**Phoma**	**1**	**0**	**1**

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
SPIREA (Spiraea)						
	Chemical injury	-	herbicide	1	0	1
		-	unknown	1	0	1
SPRUCE (Picea)						
	Basidiomycete	-	Coprinus	0	1	1
	Canker	-	Cytospora	3	0	3
	Cultural	-	transplant shock	8	0	8
	Decline	-	unknown	1	0	1
	Environmental stresses			6	1	7
	Insect injury			13	0	13
	Lichen	-	species	1	0	1
	Needle cast	-	Rhizosphaera	12	1	13
	Needle mold	-	fungal	1	0	1
	No disease			24		24
	Root problem	-	unknown	1	0	1
	Slime mold	-	species	1	0	1
	Tip blight	-	Sphaeropsis	2	0	2
ST. JOHNSWORT (Hypericum)						
	No disease			1		1
SWEETGUM (Liquidambar)						
	Chemical injury	-	unknown	1	0	1
	Cultural	-	girdling root	1	0	1
		-	improper depth	1	0	1
	Environmental	-	cold injury	1	0	1
	No disease			1		1
	Root problem	-	unknown	1	0	1
SYCAMORE and PLANETREE (Platanus)						
	Anthracnose	-	Apiognomonia	6	1	7
	Bacterial scorch	-	Xylella	2	0	2
	Cultural	-	transplant shock	1	0	1
	Insect injury			1	0	1
TAXUS (Taxus)						
	Chemical injury	-	herbicide	1	0	1
	Cultural	-	improper depth	1	0	1
	Environmental stresses			7	0	7
	Inadequate specimen, no disease			16		16
	Insect injury			1	0	1
	Nutritional	-	acid soil	1	0	1
TULIPTREE (Liriodendron)						
	Canker	-	Botryosphaeria	1	0	1
	Chemical injury	-	growth regulator	1	0	1
	Environmental stresses			2	0	2
	Inadequate specimen, no disease			6		6
	Insect injury			0	3	3
	Powdery mildew	-	Oidium	3	0	3

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
UNKNOWN						
	Inadequate specimen			**3**		**3**
VIBURNUM (Viburnum)						
	Canker	**-**	**Botryosphaeria**	**2**	**0**	**2**
	Chemical injury	**-**	**unknown**	**1**	**0**	**1**
	Insect injury			**2**	**0**	**2**
	No disease			**3**		**3**
	Powdery mildew	**-**	**Microsphaera**	**1**	**0**	**1**
	Root problem	**-**	**unknown**	**1**	**0**	**1**
	Root rot	**-**	**Phytophthora**	**1**	**0**	**1**
		-	**Pythium**	**1**	**0**	**1**
WALNUT and BUTTERNUT (Juglans)						
	Downy spot	**-**	**Microstroma**	**1**	**0**	**1**
	Environmental stresses			**2**	**0**	**2**
	Insect injury			**1**	**0**	**1**
	Kernel decay	**-**	**Penicillium**	**0**	**1**	**1**
	No disease			**2**		**2**
WEIGELA (Weigela)						
	Root rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
WILLOW (Salix)						
	Black canker	**-**	**Colletotrichum**	**1**	**0**	**1**
	Canker	**-**	**Botryosphaeria**	**1**	**0**	**1**
		-	**Cytospora**	**1**	**0**	**1**
		-	**unknown**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Environmental	**-**	**stress**	**1**	**0**	**1**
	Insect injury			**2**	**0**	**2**
	No disease			**1**		**1**
WISTERIA (Wisteria)						
	Insect injury			**1**	**0**	**1**
WITCH-HAZEL (Hamamelis)						
	Leaf spot	**-**	**Phyllosticta**	**2**	**0**	**2**
YELLOWWOOD (Cladrastis)						
	Mutation	**-**	**genetic**	**1**	**0**	**1**
ZELKOVA (Zelkova)						
	Chemical injury	**-**	**herbicide**	**1**	**0**	**1**

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
			VEGETABLES			
BEAN (Phaseolus)						
	Air Pollution	-	ozone	1	0	1
	Angular leaf spot	-	Isariopsis	1	0	1
	Anthracnose	-	Colletotrichum	2	1	3
	Bacterial decay	-	bacterial	0	1	1
	Chemical injury	-	growth regulator	1	0	1
		-	unknown	1	0	1
	Common blight	-	Xanthomonas	1	0	1
	Environmental	-	stress	1	0	1
	Inadequate specimen, no disease			9		9
	Insect injury			3	0	3
	Leaf scorch	-	environmental	2	0	2
		-	unknown	1	0	1
	Leaf spot	-	Cercospora	2	0	2
	Mold	-	Rhizopus	1	0	1
	Nutritional	-	acid soil	0	1	1
	Root rot	-	Fusarium	2	0	2
		-	Pythium	1	0	1
		-	Rhizoctonia	1	1	2
	Root/stem rot	-	Fusarium	2	0	2
	Rust	-	Uromyces	2	0	2
	Southern blight	-	Sclerotium	1	0	1
	Virus	-	Bean common mosaic	0	1	1
		-	Bean yellow mosaic	1	0	1
BROCCOLI - See listing under CRUCIFERS						
CABBAGE - See listing under CRUCIFERS						
CANTALOUPE - See listing under CUCURBITS						
CAULIFLOWER - See listing under CRUCIFERS						
CORN, SWEET (Zea)						
	Bacterial stalk rot	-	Erwinia	3	0	3
	Chemical injury	-	herbicide	2	0	2
		-	unknown	1	0	1
	Dieback	-	unknown	1	0	1
	Environmental stresses			1	1	2
	Gray leaf spot	-	Cercospora	1	0	1
	Insect injury			0	1	1
	Nutritional	-	phosphorus deficiency	1	0	1
		-	soluble salts	1	0	1
		-	zinc deficiency	2	0	2
	Root rot	-	Fusarium	0	1	1
	Rust, common	-	Puccinia	0	1	1
	Smut	-	Ustilago	1	0	1
	Stalk rot	-	Pythium	1	0	1
	Stewart's wilt	-	Erwinia	1	0	1

CROP	DIAGNOSIS		CAUSAL AGENT	#1º DIAGs	#2º DIAGs	TOTAL
CRUCIFERS - BROCCOLI, CABBAGE, CAULIFLOWER, KALE, TURNIP (Brassica) and RADISH (Raphanus)						
	Bacterial soft rot	-	Erwinia	0	2	2
	Black spot	-	Alternaria	1	0	1
	Blight	-	Botrytis	2	0	2
	Canker	-	Fusarium	1	0	1
	Chemical injury	-	herbicide	1	1	2
	Environmental stresses			5	0	5
	False broomrape	-	unknown	0	1	1
	Leaf spot	-	Cercospora	1	0	1
	Insect injury			1	1	2
	No disease			2		2
	Nutritional	-	acid soil	1	0	1
		-	boron deficiency	1	0	1
		-	magnesium deficiency	1	0	1
	Wirestem	-	Rhizoctonia	1	0	1
CUCUMBER - See listing under CUCURBITS						
CUCURBITS - CANTALOUPE, CUCUMBER (Cucumis), GOURD, PUMPKIN, SQUASH (Cucurbita) and WATERMELON (Citrulus)						
	Anthracnose	-	Colletotrichum	1	0	1
	Bacterial wilt	-	Erwinia	4	0	4
	Blight	-	Microdochium	1	0	1
	Blight	-	Plectosporium	2	0	2
	Chemical injury	-	herbicide	2	1	1
		-	unknown	1	0	1
	Damping-off	-	Pythium	2	0	2
	Downy mildew	-	Pseudoperonospora	4	0	4
	Environmental stresses			3	2	5
	Fruit rot	-	Fusarium	5	1	6
	Inadequate specimen, no disease			13		13
	Insect injury			3	1	4
	Leaf blight	-	Alternaria	1	2	3
	Leaf scorch	-	unknown	1	0	1
	Leaf spot	-	Cercospora	1	1	2
	Nutritional	-	fertilizer burn	1	0	1
		-	general	2	0	2
		-	magnesium deficiency	2	0	2
	Physiological	-	silver blotch	1	0	1
	Pollination problem	-	environmental	1	0	1
	Powdery mildew	-	Oidium	2	1	2
		-	Sphaerotheca	0	1	1
	Root rot	-	Phytophthora	1	0	1
	Root/stem rot	-	Fusarium	2	0	2
	Scab	-	Cladosporium	1	0	1
	Virus	-	complex	4	0	4
		-	potyvirus	3	0	3
GOURD - See listing under CUCURBITS						

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
KALE - See listing under CRUCIFERS						
LETTUCE (Lactuca)						
	Bacterial soft rot	**-**	**Erwinia**	**0**	**1**	**1**
	Gray mold	**-**	**Botrytis**	**2**	**0**	**2**
	Nutritional	**-**	**fertilizer burn**	**0**	**1**	**1**
		-	**general**	**1**	**0**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
OKRA (Abelmoschus)						
	Insect injury			**1**	**0**	**1**
	Nutritional	**-**	**general**	**1**	**0**	**1**
		-	**acid soil**	**0**	**1**	**1**
ONION (Allium)						
	No disease			**1**		**1**
PEA (Pisum)						
	Root/stem rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
PEPPER (Capsicum)						
	Bacterial spot	**-**	**Pseudomonas**	**1**	**1**	**2**
		-	**Xanthomonas**	**4**	**0**	**4**
	Blossom end rot	**-**	**calcium deficiency/dry**	**5**	**0**	**5**
	Chemical injury	**-**	**growth regulator**	**1**	**0**	**1**
	Environmental stresses			**2**	**1**	**3**
	Inadequate specimen, no disease			**11**		**11**
	Insect injury			**3**	**0**	**3**
	Mutation	**-**	**genetic**	**2**	**0**	**2**
	Nutritional	**-**	**fertilizer burn**	**1**	**0**	**1**
		-	**general**	**1**	**0**	**1**
		-	**nitrogen**	**1**	**0**	**1**
	Root/stem rot	**-**	**Pythium**	**1**	**0**	**1**
	Stem rot	**-**	**Fusarium**	**1**	**0**	**1**
	Virus	**-**	**Tomato spotted wilt**	**1**	**0**	**1**
		-	**unknown**	**1**	**0**	**1**
POTATO (Solanum)						
	Bacterial soft rot	**-**	**Erwinia**	**3**	**0**	**3**
	Black dot	**-**	**Colletotrichum**	**1**	**0**	**1**
	Black leg	**-**	**Erwinia**	**1**	**0**	**1**
	Inadequate specimen			**1**		**1**
	Insect injury			**1**	**1**	**2**
	Hollow heart	**-**	**physiological**	**1**	**0**	**1**
	Scab	**-**	**Streptomyces**	**3**	**0**	**3**
	Scurf	**-**	**Monilochaetes**	**1**	**0**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
PUMPKIN - See listing under CUCURBITS						
RADISH - See listing under CRUCIFERS						
RHUBARB (Rheum)						
	Bacterial soft rot	**-**	**Erwinia**	**2**	**0**	**2**
SALSIFY (Tragopogon)						
	Root/crown rot	**-**	**Rhizoctonia**	**1**	**0**	**1**
SPINACH (Spinacia)						
	Nutritional	**-**	**fertilizer burn**	**0**	**1**	**1**
	Root rot	**-**	**Pythium**	**1**	**0**	**1**
SQUASH - See listing under CUCURBITS						
SWEET POTATO (Ipomoea)						
	No disease			**1**		**1**
	Scurf	**-**	**Monilochaetes**	**1**	**0**	**1**
SWISS CHARD (Beta)						
	Insect injury			**1**	**0**	**1**
	Leaf spot	**-**	**Cercospora**	**1**	**0**	**1**
	Root knot nematode	**-**	**Meloidogyne**	**0**	**1**	**1**

CROP	*DIAGNOSIS*		*CAUSAL AGENT*	*#1º DIAGs*	*#2º DIAGs*	*TOTAL*
TOMATO (Lycopersicon)						
	Bacterial canker	**-**	**Clavibacter**	**10**	**0**	**10**
	Bacterial speck	**-**	**Pseudomonas**	**3**	**0**	**3**
	Bacterial stem rot	**-**	**Erwinia**	**2**	**0**	**2**
	Blossom end rot	**-**	**calcium deficiency/dry**	**10**	**0**	**10**
	Catfacing	**-**	**unknown**	**1**	**0**	**1**
	Chemical injury	**-**	**growth regulator**	**13**	**0**	**13**
		-	**herbicide**	**11**	**0**	**11**
	Crown/root rot	**-**	**Fusarium**	**1**	**0**	**1**
	Early blight	**-**	**Alternaria**	**9**	**2**	**11**
	Environmental stresses			**8**	**0**	**8**
	Fruit crack	**-**	**physiological**	**4**	**1**	**5**
	Inadequate specimen, no disease			**32**		**32**
	Insect injury			**8**	**2**	**10**
	Leaf roll	**-**	**physiological**	**1**	**0**	**1**
	Leaf scorch	**-**	**unknown**	**1**	**0**	**1**
	Leaf spot	**-**	**Septoria**	**15**	**2**	**17**
	Nutritional	**-**	**acid soil**	**1**	**2**	**3**
		-	**fertilizer burn**	**5**	**0**	**5**
		-	**general**	**1**	**0**	**1**
		-	**magnesium deficiency**	**3**	**1**	**4**
		-	**nitrogen deficiency**	**3**	**0**	**3**
	Rain check	**-**	**physiological**	**0**	**1**	**1**
	Root knot nematode	**-**	**Meloidogyne**	**2**	**0**	**2**
	Root/crown rot	**-**	**Rhizoctonia**	**2**	**0**	**2**
	Root rot	**-**	**Pythium**	**3**	**1**	**4**
		-	**Rhizoctonia**	**3**	**2**	**5**
	Root/stem rot	**-**	**Fusarium**	**1**	**0**	**1**
	Southern blight	**-**	**Sclerotium**	**3**	**0**	**3**
	Sooty mold	**-**	**species**	**0**	**1**	**1**
	Sour rot	**-**	**Geotrichum**	**0**	**1**	**1**
	Stem canker	**-**	**Alternaria**	**0**	**1**	**1**
	Stem rot	**-**	**Botrytis**	**1**	**0**	**1**
		-	**Rhizoctonia**	**2**	**0**	**2**
		-	**Sclerotinia**	**6**	**0**	**6**
	Virus	**-**	**Cucumber mosaic**	**1**	**0**	**1**
		-	**Potato virus X**	**0**	**1**	**1**
		-	**Tomato mosaic virus**	**2**	**1**	**3**
		-	**Tomato spotted wilt**	**6**	**1**	**7**
		-	**Tomato yellow leaf curl**	**1**	**0**	**1**
		-	**unknown**	**1**	**0**	**1**
	Walnut wilt	**-**	**juglone**	**0**	**1**	**1**
	Wilt	**-**	**Fusarium**	**5**	**0**	**5**
	Yellow shoulder	**-**	**unknown**	**2**	**0**	**2**

TURNIP - See listing under CRUCIFERS

WATERMELON - See listing under CUCURBITS

TOTALS	**3251**	**432**	**3683**