

Plant Disease Diagnostic Tips and Transmission Techniques For E-mail Submissions

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Plant Disease Diagnoses Resources On The Internet

- <http://www.apsnet.org/Education/IntroPlantPath/Topics/plantdisease/top.htm>
- Riley, M.B., M.R. Williamson, and O. Maloy. 2002. Plant disease diagnosis. *The Plant Health Instructor*. DOI: 10.1094/PHI-I-2002-1021-01

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Riley, M.B., M.R. Williamson, and O. Maloy. 2002. Plant disease diagnosis. *The Plant Health Instructor*. DOI: 10.1094/PHI-I-2002-1021-01

Plant Disease Diagnosis

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A plant pathologist or a student taking plant pathology is often asked by friends or associates the following questions. What is wrong with my plant; followed by, what can I do to get rid of the problem? It may be too late to help the specific plant when the question is asked, but proper diagnosis may be extremely important in preventing the problem on other plants or in preventing the problem in the future.

How does a plant pathologist or a plant pathology student go about diagnosing plant problems? The diagnostician must have very good observation skills, and s/he also needs to be a good detective. It is important to keep an open mind until all of the facts related to the problem can be collected. The possibility of multiple causal factors must also be considered.

Control measures depend on proper identification of diseases and of the causal agents. Therefore, diagnosis is one of the most important aspects of a plant pathologist's training. Without proper identification of the disease and the disease-causing agent, disease control measures can be a waste of time and money and can lead to further plant losses. Proper disease diagnosis is therefore vital.

Often, plant pathologists have to rely on symptoms for the identification of a disease problem. For example, Dr. Shoe is asked by Ms. Green to examine azaleas in her nursery. When Dr. Shoe gets to the nursery, he observes that the azaleas in Greenhouse 1 are wilted. When he removes plants from their pots, the roots appear to be rotten. Ms. Green wants to know right away what she should do with the azaleas in Greenhouse 2 where no wilting is currently being observed. Dr. Shoe is asked to make recommendations even before he has looked at plants in the second greenhouse. Because similar symptoms can be produced in response to different causal agents, the use of symptoms alone is often an inadequate method for disease identification. The identification of the disease-causing agent may take a week or more. What can Dr. Shoe do for Ms. Green now?

One of the most important things is for Dr. Shoe to use his powers of observation. He needs to ask many questions related to the azalea's care and culture in order to eliminate or identify possible causes of the problem. He also needs to consider various environmental and cultural factors. As a result of his questions and observations he may:

- ◆ Be able to identify a disease and disease-causing agent,

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Characteristics of Plant Disease

Diagnostics Procedures

- Ask lots of questions, knowledge always help rule out mysterious unknowns.
- Know what is normal, examples include hairy leaves, genetic color variations, tall vs short plants, etc.
- Do your best to properly identify the plant host to species, a twig in the lab with no information is practically useless.
- Look up plant disease resources, often just knowing names of diseases associated with a particular host can clue you in to what the disease may be.



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**The American Phytopathological Society
Common Names of Plant Diseases**

Compiled by the
**Committee on Standardization of
Common Names for Plant Diseases**
of The American Phytopathological Society, 1978-2007

In 1978, The American Phytopathological Society established a committee to develop listings of plant pathogens and the diseases they incite. By act of APS Council, the common names in these listings are now official names for use in APS journals and other publications. The Committee on Standardization of Common Names for Plant Diseases continually updates this list, publishes the names in *Phytopathology News*, and adds to this APSnet database.

You may [search the Common Names database by keyword](#) or select one of the plant disease collections listed in the [Table of Contents](#).

[Proposed Lists of Common Names for Comment and Consideration](#)

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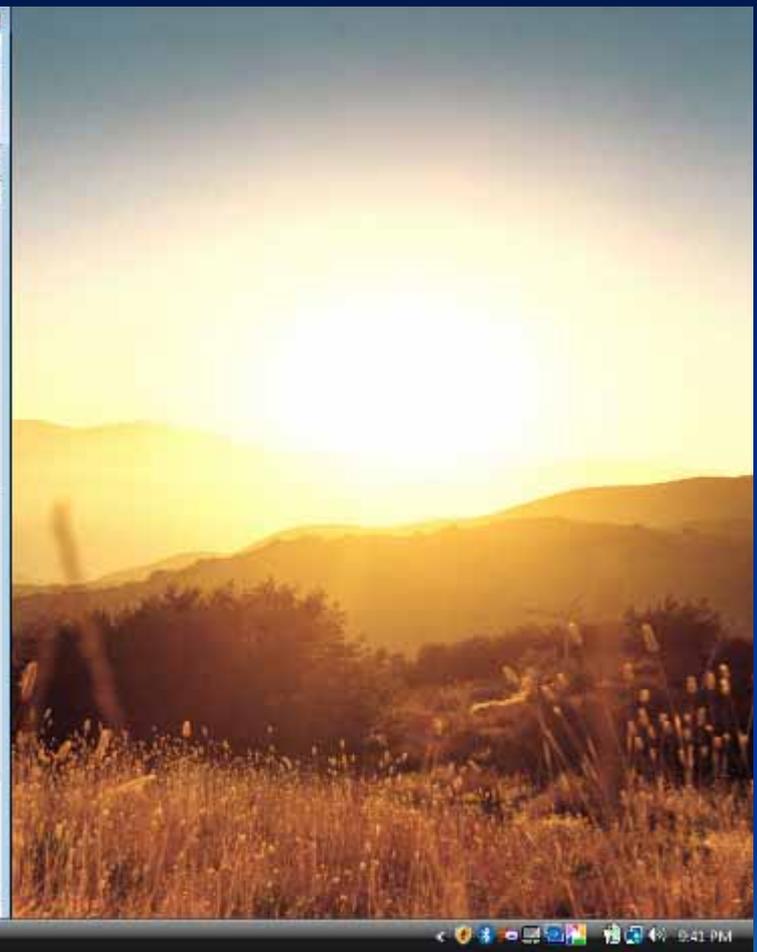
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Common Names of Plant Diseases

Search results

Documents 1 to 3 of 3 matching the query "Rose".

1. [Diseases of Rose \(Rosa spp.\)](#)



Summary: Common Names of Plant Diseases. Diseases of Rose (Rosa spp.. D.L. Gill and R. K. Horst, primary collators (last update 3/15/93). BACTERIAL DISEASES Bacterial leaf spot or blast *Pseudomonas syringae* pv. mors-prunorum (Wormald) Young et al. Crown gall *Agrobacterium tumefaciens* (Smith & Townsend) Conn Hair

2. [Diseases of Douglas-fir \(Pseudotsuga menziesii \[Mirb.\] Franco\)](#)



Summary: Common Names of Plant Diseases. Diseases of Douglas-fir (*Pseudotsuga menziesii* [Mirb. Franco]. E. Hansen and F. Tainter, primary collators. FUNGAL DISEASES Annosus root disease *Heterobasidion annosum* (Fr. Bref. Spiniger meineckellum (A. Olson) Stalpers [anamorph] *Armillaria* root disease *Armillaria ostoyae* (Romagne

3. [Diseases of Apple \(Malus × domestica Borkh.\)](#)



Summary: Common Names of Plant Diseases. Diseases of Apple (*Malus × domestica* Borkh.. A. L. Jones, primary collator (last update 9/4/00). BACTERIAL DISEASES. Blister spot *Pseudomonas syringae* pv. *papulans* (Rose 1917) Dhanvantari

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BACTERIAL DISEASES

Bacterial leaf spot or blast

Pseudomonas syringae pv. *mors-prunorum* (Wormald)

Young *et al.*

Crown gall

Agrobacterium tumefaciens (Smith & Townsend) Conn

Hairy root

Agrobacterium rhizogenes (Riker *et al.*) Conn

FUNGAL DISEASES

Alternaria leaf spot

Alternaria alternata (Fr.:Fr.) Keissl.

A. brassicae (Berk.) Sacc.

A. brassicicola (Schwein.) Wiltshire

Black mold

Chalara thielavioides (Peyronel) Nag Raj & Kendrick

= *Chalaropsis thielavioides* Peyronel

Black spot

Diplocarpon rosae F.A. Wolf

(anamorph: *Marssonina rosae* (Lib.) Died.)

Botrytis blight (bud, twig, and flower; also cane canker)

Botrytis cinerea Pers.:Fr.

(teleomorph: *Botryotinia fuckeliana* (de Bary) Whetzel)

Brand canker

Coniothyrium wernsdorffiae Laubert

Brown canker

Cryptosporella umbrina (Jenk.) Jenk. & Wehmeyer

= *Diaporthe umbrina* Jenk.

Cane blight canker

Botryotinia dothidea (Murr. Fr.) Gae. & De Not.

So you have resources, what the heck am I looking at?

- Check for symptoms and signs.
- Under or overdevelopment of tissues or organs.
- Chlorosis, necrosis, death of plant parts.
- Alteration of normal appearance (odd).
- Identify symptom variability-what's the range of what's odd?



Systematically look at the problem

- Identify plant parts affected-are symptoms associated with specific plant parts?
- Check for distribution of symptoms.
- Check for host specificity, are only certain species affected or is only one cultivar within a host species affected?
- Ask questions like-what cultural practices have been used and how much water and nutrients have been added, is there a schedule of watering and if so, how often?



What you probably won't be doing.

- Laboratory culturing.
- Microscopic observations (your new scopes are good but not this good).
- Isolation and identification of biotic plant disease causal agents.
- Diagnostic tests for identification of biotic causal agents.
- Diagnostic tests for identification of abiotic plant disease causal agents.



- **Fungal leaf spots** - spots usually vary in size. Generally are round and occasionally elongate on stems. Zones of different color or texture may develop giving the spot a "bull's eye" effect. Spots are not limited by leaf veins.



- **Bacterial leaf spots** - spots are often angular due to limitation by leaf veins. Color is usually uniform and no signs of plant pathogen are evident. Tissue may appear initially as being water soaked but may become papery as it dries.



- **Vein banding** - Vein banding occurs when there is a band of yellow tissue along the larger veins of the leaf. This symptom is observed with viral diseases and is in contrast with nutrient deficiencies which may cause a dark green band along leaf veins.



- **Mosaic and Ringspot** - Mosaic and ringspot are used to describe an irregular patchwork of green and yellow areas over the surface of a leaf. In some cases leaves may also become distorted. Often these symptoms are associated with viral pathogens. There is not a sharp margin between the affected and healthy areas. Distinct margins may indicate a nutritional problem or genetic variegation.



- **Leaf Distortion** - Leaves of the infected plant may be distorted from their normal shape and size. Leaves may be elongated, smaller size, or thickened. This type of symptom can be associated with viral, fungal or bacterial infections as well as insect, mite, and herbicide damage.



Powdery mildew - can affect leaves, stems, flowers and fruits with a white to gray surface coating of mycelia which can be rubbed off. Black specks may later develop in the mycelia. These specks are mature cleistothecia, the overwintering fungal structures which contain ascospores. Tissue may turn yellow, reddish or remain green under the mycelia and some leaf distortion may be observed especially on actively growing tissues.



Presence of Spores/Spore Structures - Several fungal diseases can be easily identified based on the presence of spores or spore structures on the leaf surface. Some examples of this are rusts which are often recognized by the rusty brown to black spores and smuts which are identified by the black spores which often replace the seed structure.



Needle drop in conifers - Conifers normally retain their needles for several years but these needles will eventually be lost. This drop is gradual and production of new needles obscures the loss of older needles. Unfavorable growing conditions, such as drought, may cause an acceleration of needle drop. If the drop occurs in only older needles especially during unfavorable growing conditions, there is no need for concern. If new needles are lost then other factors may be involved such as needle cast fungus, nutrient deficiencies, or toxic chemicals.



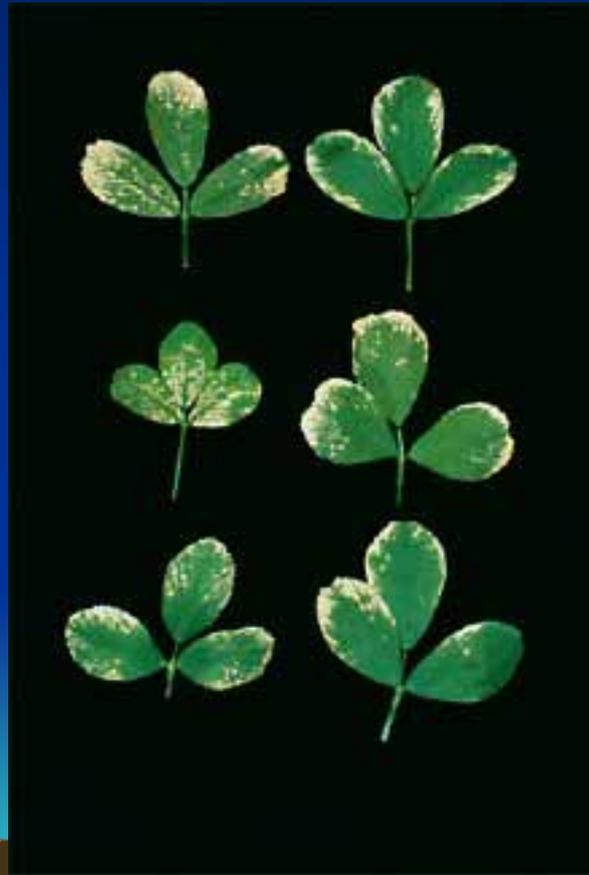
Chemical spray or air pollutant injury - Spots associated with injury are relatively uniform in color and the interface between the affected and healthy area is usually sharp. Distribution on plant may be associated with where spray or pollutant comes in contact with the plant.



Leaf or Needle Tip Death - Death at the tips of needles and tips and margins of leaves often indicate unfavorable climatic conditions, toxic chemicals or root malfunction due to poor cultural practices. Air pollutants, soil chemicals, and excess fertilizer can cause tip burn. Drought and freezing may have a similar effect. All needles of a specific growth period are usually affected. Needles infected by foliar fungal diseases are generally more scattered and rarely are all needles of a particular growth period killed. Needles diseased by infectious agents are generally affected over varying lengths and are often straw yellow or light tan. Fungal fruiting bodies may also be observed.



Soil or air chemical injury - Chemicals which are absorbed from the soil by roots or absorbed from air through leaves may exhibit a burning or scorching of leaf margins. If severe, islands of tissue between the veins may also be killed. Dead tissue may drop out of the leaf leaving a ragged appearance. Other chemicals may cause a distortion of leaf shape and size.



Cankers - Cankers are localized necrotic lesions which are often sunken in appearance. Cankers can result from mechanical injury (e.g. trees which have been damaged by collisions with cars or lawnmowers), and various fungi or bacteria. In the spring, ooze may be observed on the surface of bacterial cankers and fruiting bodies may be observed on the surface of fungal cankers.



Fruit Decays and Rots - Various fungi and bacteria can cause rots of fruit. These are often distinguished by the color, lack of firmness of tissue, and signs of spores or fruiting bodies.



Fruit Discoloration - Discoloration of fruit is often associated with viral infections (Figure 19). This discoloration may be similar to mosaic and ringspot symptoms observed on leaves.



Wilts - Wilts are characterized by a general loss of turgidity of leaves or possibly entire plants due to the loss of water. The loss is most often caused by a blocking of the water flow through the xylem. This blockage can be caused by the presence of various bacteria (*Erwinia*, *Ralstonia*) and fungi (*Fusarium*, *Verticillium*) in the xylem. Wilts may also be observed when there is a destruction of the root system due to nematodes or root-rotting fungi (*Armillaria*, *Phytophthora*, *Pythium*) or an acute water shortage in the soil.



Shoot dieback or blights - Sudden dieback of a shoot usually indicates climatic or chemical injury rather than parasitic problems. If the line between affected and healthy bark is sharp, a soil chemical should be suspected. If dieback is somewhat more gradual and there is a cracking or splitting of the bark and wood, cold injury should be suspected along with bacterial blights caused by *Pseudomonas* or *Erwinia*. A bacterial streaming test with phase and compound microscope and isolation may be required to determine if the blights/dieback is due to a bacterial agent. Gradual decline of shoots and retention of dead leaves is more indicative of a parasitic disease. The margin between the affected and healthy tissue is often irregular and sunken. There may also be small pin-like projections or bumps over the surface of dead bark. These bumps are spore-producing structures of the fungal causal agent.



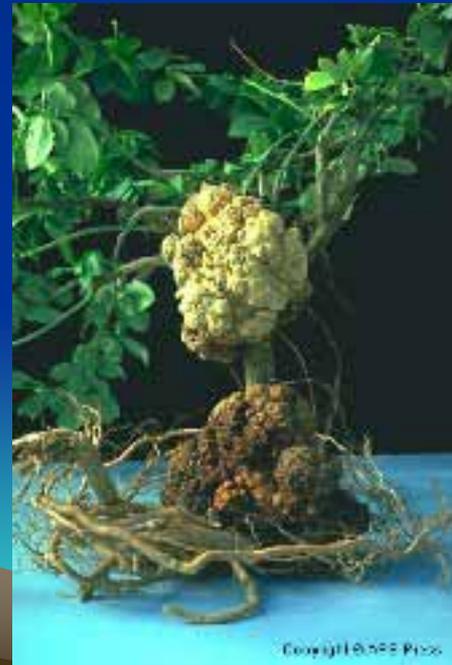
Dying branches of trees and shrubs - If scattered branches in a tree or shrub start to decline and eventually die, a canker disease or a shoot blight should be suspected. If branches die suddenly and, especially if affected branches are concentrated on one side of tree, weather conditions should be suspected (wind, snow, etc.) or animal or mechanical damage at the trunk base; however, this is not always the case. If symptoms develop over time on one side of a tree or plant then damage of the roots associated with one side may be suspected such as root rots due to *Phytophthora* spp.



Death of tree and shrub top - If all or a major portion of a tree or shrub dies over a period of time, the diagnostician should suspect a problem with the roots. Examples are diseases caused by *Armillaria* root rot and *Verticillium* wilt. The decline may be gradual and may eventually affect the entire tree, but in some cases the death may occur on one side of the plant initially. If the decline is sudden, a toxic chemical in soil or weather extremes such as freezing or drought should be suspected.



Overall Stunting or Decline - These symptoms can be caused by several very different factors. Systemic viral infections can result in stunting or decline, but such viral infections are often accompanied by other aboveground symptoms such as shortened internodes. In many cases, overall stunting of a plant may be due to problems associated with the root system. The roots should be examined for rotting and possible mycelial growth, reduction in roots especially feeder roots, and the presence of galls. Root galls can result from fungal and fungallike agents (*Plasmodiophora brassicae*), nematodes (*Meloidogyne* spp. - root-knot), and bacteria (*Agrobacterium* sp.). Abiotic factors such as nutritional deficiencies, soil compaction and herbicide residues can also result in overall stunting or decline.



Damping-off - This term describes the rapid death and collapse of young seedlings. Often the seedlings will appear to be almost broken at the soil line. It may be observed in flats of plants begun in greenhouses and can result from infection of the seedlings by the fungal organisms *Fusarium*, *Phytophthora*, *Pythium*, *Rhizoctonia*, or *Thielaviopsis*.



Plant pathogens are, or tend to be, microscopic, you probably won't be able to see the causative agent with these scopes but plant symptomology can be a good place to start. So try to send photos (even normal photos) of what you see. Here are some tips with regard to any photo, these rules always apply.



Effective Digital Photos for Sample Submission

No light, no picture

Get the subject in focus

Get close, then closer

Include a size and a color reference

Content or subject of the photo

Use a microscope

Post-Process the image

Document, Attach and Send



If you have access to a microscope:

The “fast and nasty” cellophane tape process, for mounting slides.

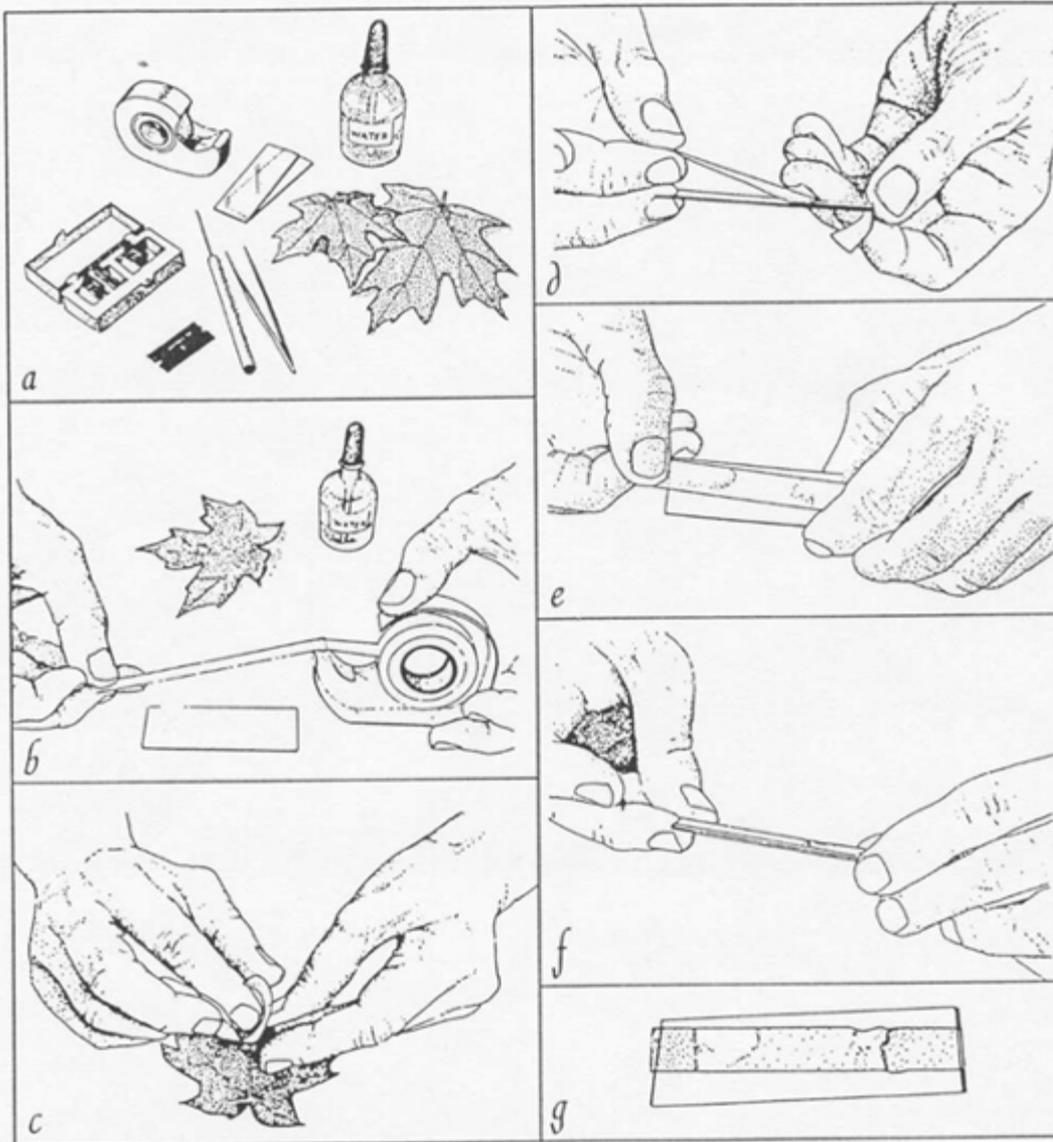


FIG. 5.2. Preparing a clear, sticky tape mount from a leaf spot for viewing through a compound microscope at 100x to 400x. a, Material

Close-ups, macros and dissecting microscope images of symptoms.

Take a field view showing distribution and pattern of symptoms.

Compound microscope images of fungal structures (not many counties have this ability).

Show a progression of symptoms (range) on the plant.

Try to incorporate some means of determining scale (a ruler, pen, keys, etc.).

