

Quick Reference Pest Fact Sheets

Developed by
Dr. John F. Baniecki
Professor and Extension Specialist
West Virginia University Extension Service
and
Jordan E. Eggers
Graduate Assistant, Plant and Soil Sciences
West Virginia University

For more information, please contact John Baniecki at:
G101 South Agricultural Science Building
West Virginia University
Morgantown, West Virginia 26506
Office phone: (304) 293-88
E-mail: john.baniecki@mail.wvu.edu



Dear Reader,

Thank you for using West Virginia University Extension Service's Quick Reference Pest Fact Sheets. These fact sheets are intended to be used as supplemental aids in identifying plant disease problems that are common to West Virginia growers and homeowners. The information presented is organized by common plant types, i.e. corn, pepper, tomato, maple, etc. Tabs in the upper right corner of each fact sheet designate plant type. Each fact sheet is composed of a short description of symptoms, color images of signs and symptoms, the name of the disease and its cause, a short description of conditions ideal for the disease to arise, and references. Numbers in the lower left hand corners of the images correspond to the image's citation which is found in the "Picture Bibliography" located in the final pages of this document. The picture bibliography is organized in the sequence in which the diseases are presented, i.e. tomato diseases, potato diseases, bean diseases, etc. This document will be updated as more diseases are added. Any suggestions for plant disease issues are greatly encouraged. To submit a suggestion or to comment on any aspect of the fact sheets please contact Dr. John F. Baniecki at john.baniecki@mail.wvu.edu or (304) 293-8838 or contact your local WVU Extension agent.

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Plant: Tomato

Symptoms

Leaves: Chocolate brown spots on leaves near soil (Image 1). These grow into larger spots with rings that have a raised texture (Image 2). Leaves turn yellow around spots (Image 3). Spots can be round or irregular shaped and ¼ to ½ inch in size. Multiple spots and grow together and form larger spots. **Stem:** Chocolate brown spots with rings and a raised texture (Image 4). **Fruit:** Only unripe fruit are affected. Dark sunken spots form from the stem down.



Disease: **Early Blight** caused by *Alternaria solani*.

Disease development conditions? Two weeks after planting; need 80°F temperatures and high humidity.

References

- Delahaut, K. and W. Stevenson. 2004. Tomato disorders: early blight and Septoria leaf spot. University of Wisconsin Extension, Cooperative Extension Publishing. Disease fact sheet A2606.
- Dixon, G.R. 1981. "Pathogens of solanaceous crops" in *Vegetable Crop Diseases*. AVI Publishing Company, Inc. Westport, Connecticut.

Plant: Tomato

Symptoms

Leaves: Pale green water soaked spots starting at leaf tips turning into brown to purple-black spots with yellow edges. White fuzz present on underside of leaves (Image 3). Leaves rot quickly in moist conditions. **Stems:** Brown streaks along the stems (Image 2). **Fruit:** Infection spots on unripe fruit are brown, firm, appear leathery, and usually start at the stem (Image 1).



Disease: **Late blight** caused by *Phytophthora infestans*.

Disease development conditions? Mature, fruiting plants, infection requires a minimum of 3-4 days of high humidity (65-90% RH) with temperatures of 50-54.5°F.

References

- Dixon, G.R. 1981. "Pathogens of solanaceous crops" in *Vegetable Crop Diseases*. AVI Publishing Company, INC. Westport, Connecticut.
- Rowe, R. C., S. A. Miller, and R. M. Riedel. 1995. Late blight of potato and tomato. Ohio State University Extension. Extension Fact Sheet HYG-3102-95.

Plant: Tomato

Symptoms

Leaves: Small (1/16-1/4 inch), circular spots with tan or light colored centers and dark brown borders on the leaf surface (Image 2) and water soaked spots on underside of leaf. Leaves often yellow around spots (Image 3). Tiny black dots may be seen in tan centers (Image 1). Leaves drop from the plant bottom up leading to a complete loss of leaves. **Stems:** May also have spots. **Fruit:** Reduced in size due to leaf loss.



Disease: **Septoria leaf spot** caused by *Septoria lycopersici*.

Disease development conditions? Infection requires a total of 48 hours (can be over several days) of 100% humidity at 68 to 77°F. Arises on mature plants with full canopies. Full canopies prevent drying of the lower leaves by shading and reducing air movement.

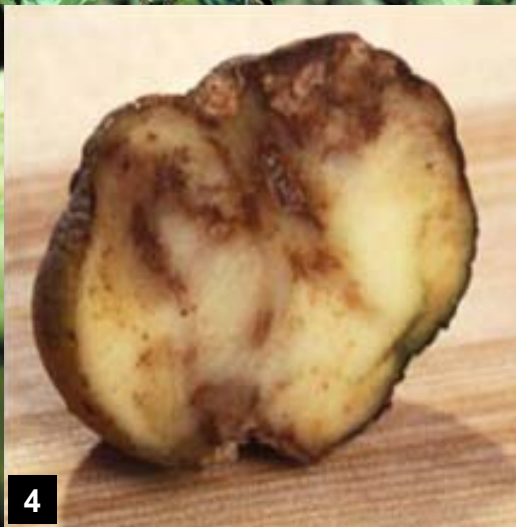
References

- Hansen, M. A. 2000. Septoria leaf spot of tomato. Virginia Cooperative Extension Plant Disease Fact Sheet 450-711W.
"Septoria leaf spot of tomato." 2006 Pest Management Fact Sheet, University of Maine Cooperative Extension, Orono, Maine.

Plant: Potato

Symptoms

Leaves: Pale green water soaked spots starting at leaf tips turning into brown to purple-black spots with yellow edges (Image 1). White fuzz present on underside of leaves. Leaves rot quickly in moist conditions and quickly shrivel in very dry conditions (Image 2). **Stems:** Infected areas appear brown or black (Image 3). **Tubers:** Brown, dry, sunken spots on tuber surface. Tissue under spots is tan to copper-brown with a granular texture (Image 4).



Disease: **Late blight** caused by *Phytophthora infestans*.

Disease development conditions? Favorable conditions consist of cool, moist weather with night temperatures in the 50-60°F and day temperatures in the around 70°F. Fogs and heavy dews also promote infection.

References

Rowe, R. C., S. A. Miller, and R. M. Riedel. 1995. Late blight of potato and tomato. Ohio State University Extension. Extension Fact Sheet HYG-3102-95.

Plant: Potato

Symptoms

Leaves: Leaves curl up, gradually turn yellow and die early (Images 2 & 4). **Stems:** Mushy light brown to inky black lesions on base of stem (Images 2 & 3). Aerial tubers may form on stems. **Tubers:** Slightly sunken brown patches on the surface with a reddish-brown discoloration in the flesh below, developing into a black, slimy rot (Image 1). Spots usually begin at the stem.



Disease: **Black leg** caused by *Erwinia carotovora* subsp. *atroseptica*

Disease development conditions? Disease development is favored by cool (below 50° F), wet soils at planting followed by high soil temperatures (75° F) after emergence. Bruising of seed tubers also favors disease development.

References

- Potato (*Solanum tuberosum*) bacterial soft rot and blackleg. [An Online Guide to Plant Disease Control!](http://plant-disease.ippc.orst.edu/disease.cfm?RecordID=882). University of Oregon Extension Plant <http://plant-disease.ippc.orst.edu/disease.cfm?RecordID=882>
- Rowe R. C., S. A. Miller, and R. M. Riedel. 1995. Blackleg, aerial stem rot, and tuber soft rot of potato. Ohio State University Extension Fact Sheet HYG-3106-95.

Plant: Beans

Symptoms

Wilting of whole plant. **Leaves:** Leaves turn yellow, dry up, and drop off. **Stems:** Dry rot of stem and main tap root near the soil line. Stem tissue brick red in color, may gradually darken and becoming necrotic (Images 1-4). **Pods:** Small pods with undersized seeds.



Disease: Root rot caused by *Fusarium solani* (Images 1 and 4) or *Rhizoctonia solani* (Images 2 and 3).

Disease development conditions? Hot weather and dry or overly saturated, coarse-textured, acidic and poorly fertilized soils favor development of *Fusarium* root rot. Warm (75°F to 85°F) and relatively dry soil conditions favor development of *Rhizoctonia* root rot.

References

- Abawi G. S., D. C. Crosier, and A. C. Cobb. 1985. Root rot of snap beans in New York. *New York's Food and Life Sciences Bulletin* 110.
- Dixon, G.R. 1981. "Pathogens of Legume Crops: Bean Crops" in *Vegetable Crop Diseases*. AVI Publishing Company, Inc. Westport, Connecticut.
- McNab, A. 2007. Beans: root rot diseases. Penn State University Vegetable Disease Identification Website: http://www.ppath.cas.psu.edu/EXTENSION/VEGDIS/VegDisases/Identification_files/bean_rrot.html

Plant: Beans

Symptoms

Young plants and sometimes older plants wilt and die. **Leaves:** General wilting. **Stems:** Disease begins as a colorless to dark brown wet rot near the soil line (Image 1). The outer tissue of the stem becomes slimy and can easily slip from the central core. Eventually stems dry out, become sunken, and turn tan to brown in color (Image 2). At this point the stems feel hollow like a soda straw. **Pods:** Pods that contact the soil may develop a soft watery rot. The white fuzz of the mycelium may be visible. **Roots:** Watery soft rot of main root and extensive root pruning.



Disease: **Damping off**, hollow stem rot, or root rot caused by *Pythium* spp.

Disease development conditions? Moderate to high temperatures and excess soil moisture with poor drainage are ideal for disease. Also, continuous planting of beans in the same field and poor seed quality (more than 2 years old) may increase risk of disease development.

References

- Dixon, G.R. 1981. "Pathogens of legume crops" in *Vegetable Crop Diseases*. AVI Publishing Company, Inc. Westport, Connecticut.
McNab, A. 2007. Beans: root rot diseases. Penn State University Vegetable Disease Identification Website:
http://www.ppath.cas.psu.edu/EXTENSION/VEGDIS/VegDisases/Identification_files/bean_rrot.html
Schwartz, H. F. 2006. Root rots of dry beans. Colorado State University Cooperative Extension. Fact Sheet no. 2.938

Plant: Beans

Symptoms

Leaves: Dark brown to black spots with brick red to purple borders (Image 2). Most commonly seen on leaf petioles and on lower surfaces of leaves and leaf veins. **Stems:** sunken oval spots that are brown to black with purple to brick-red borders extending up and down the stem. **Pods:** Initially small, reddish-brown elongated spots form becoming somewhat circular and sunken at the center (Image 1 & 2). Spots vary in color from tan, brown, reddish brown to black rusty-brown. A slightly raised border forms around each spot (Image 4). Older spots may be over 1/4 inch in diameter. During wet weather a mass of pinkish colored spores can be seen on the spots. Young pods may shrivel and dry if severely infected. **Seeds:** infected seeds have dark, sunken lesions of various sizes, which may extend through the seed coat (Image 3). Spots may form on cotyledons of germinating infected seed.



Disease: **Anthracnose** caused by *Colletotrichum lindemuthianum*

Disease development conditions?. Planting infected seed, planting in fields with infected debris, and cool, wet weather increase the risk of disease development.

References

Sikora, E., J. Kemble, and E. Bauske. Common diseases of snap and lima beans. Alabama Cooperative Extension System. Factsheet ANR-1024.

Plant: Beans

Symptoms

Leaves: General wilting. **Stems:** Stems are often the first plant part to become infected and this occurs usually at the soil surface. Water soaked spots are typical of infection. When dry, the spots have a white or beige color. White fuzz can also be present on the stem surface. Later on in infection small, black, seed-like structures form in plant tissue or white fuzz. Infected stems may have a papery appearance. Stem infections may result in plants falling over. **Pods:** Water soaked spots similar to those on the stem. When dry, the spots have a white or beige color. The white fuzz and small, black, seed-like structures may also be present on pods (Image 1).



Disease: **Sclerotinia rot** or white mold caused by *Sclerotinia sclerotiorum*

Disease development conditions? Spores are produced after a period of several weeks at 40°F in moist soil followed by 59 to 65°F degree temperatures. Moist conditions within the plant canopy favor infection. Rain, dew, and/or irrigation practices that keep foliage wet for long periods favor white mold development.

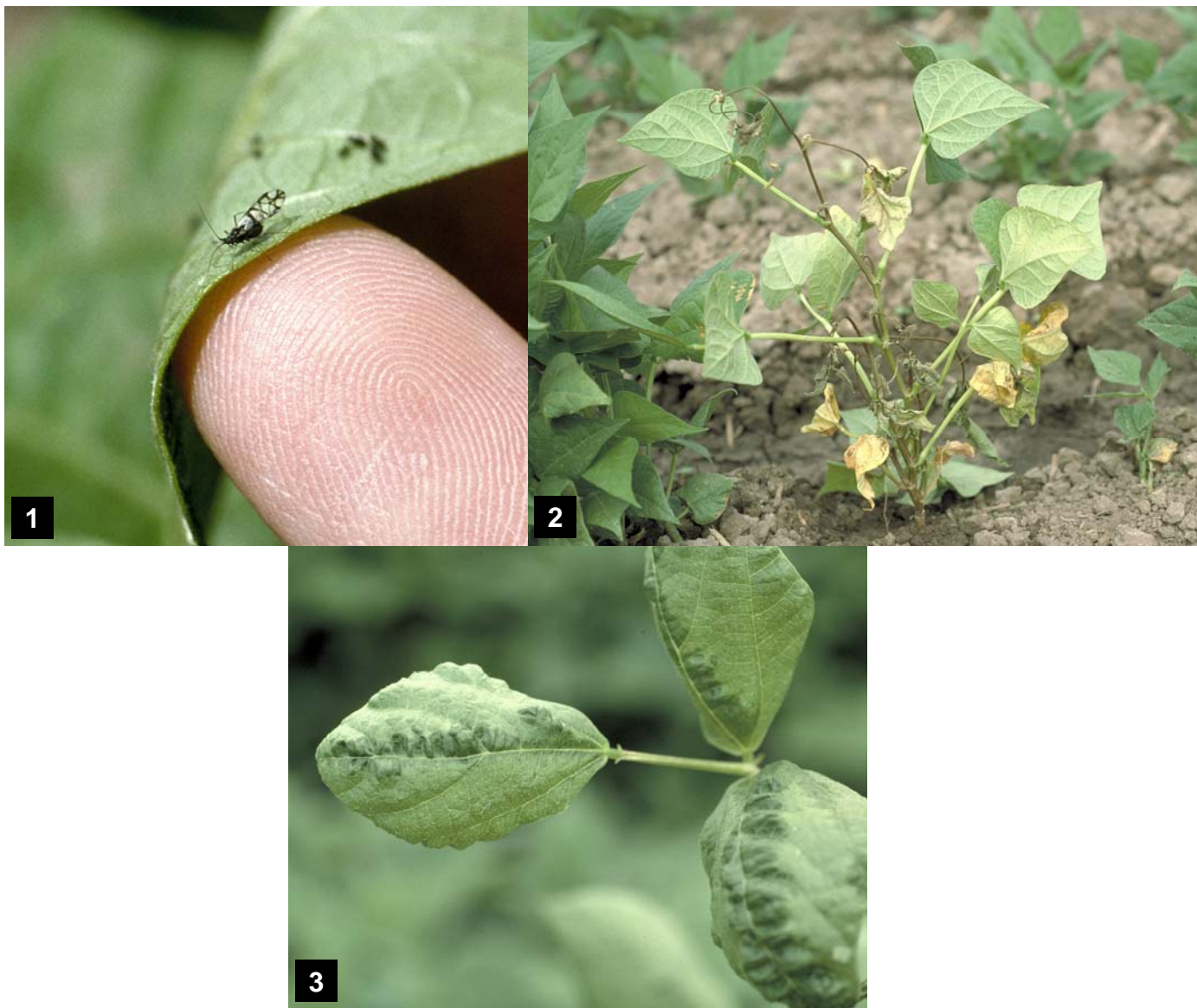
References

Ocamb, C. M. and D.H. Gent. 2007. Bean, snap (*Phaseolus vulgaris*) -- White mold (Sclerotinia rot). An online guide to plant disease control. Oregon State University Extension Service. <http://plant-disease.ippc.orst.edu/disease.cfm?RecordID=135>

Plant: Beans

Symptoms

Leaves: Leaves have light green-yellow and dark green mosaic pattern and are curled or cupped down ward giving them a arched, puckered or blistered appearance (Image 2 & 3). Leaves are reduced in size. **Stems:** Excessive number of lateral shoots.



Disease: **Bean Common Mosaic Virus**

Disease development conditions? Heavy aphid (Image 1) infestations and planting uncertified seed may increase risk of virus spread and disease development.

References

Davis, R. M., A. E. Hall, and R. L. Gilbertson. 2001. Dry beans: bean common mosaic. University of California Pest Management Guidelines, UC IPM Online: <http://www.ipm.ucdavis.edu/PMG/r52101611.html>.

Plant: Beans

Symptoms

Leaves: Leaves curl or wrinkle. Leaf surface is bumpy with small light yellow spots (Images 1 & 3). Eventually, most of the leaf will turn yellow (Image 2). **Stems:** The length of stem between nodes gets shorter. More lateral shoots are produced. Plants look bushy and stunted. **Pods:** Fewer pods are produced.



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Disease: Bean yellow mosaic virus

Disease development conditions? Large aphid populations and planting beans near clover crops increases the risk of disease development.

References

- Davis, R. M., A. E. Hall, and R. L. Gilbertson. 2001. Dry beans: bean yellow mosaic. University of California Pest Management Guidelines, UC IPM Online: <http://www.ipm.ucdavis.edu/PMG/r52101511.html>
- Dixon, G.R. 1981. "Pathogens of legume crops: Viruses" in *Vegetable Crop Diseases*. Westport, Connecticut: AVI Publishing Company, Inc.

Plant: Corn

Symptoms

Leaves, Stalks, Ears, and Tassels: Large galls can develop on any part of the plant at any stage (Images 1-3 & 5). Most common on the ears (Images 2 & 3). These galls are covered with a whitish green skin at first. As they age they darken and break open. The inside of the galls is dark brown or black and has a powdery texture (Images 3 & 5). Yellow or white spots or streaks may develop on the leaves (Image 4).



Disease: **Corn smut** caused by *Ustilago maydis*

Disease development conditions? Hot dry weather followed by periodic rain are good conditions for disease development. Plants are more susceptible before ear formation.

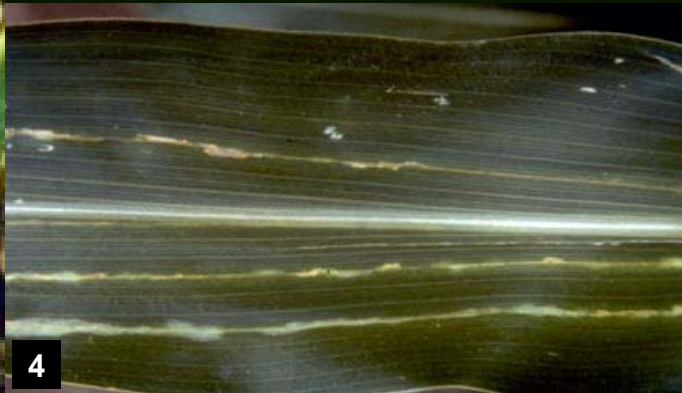
References

Dixon, G.R. 1981. "Pathogens of monocotyledon crops" in *Vegetable Crop Diseases*. AVI Publishing Company, Inc. Westport, Connecticut.
 Sherff, A. 1979. Vegetable Crops: Smut of Sweet Corn. Vegetable MD Online. New York State Cooperative Extension, Cornell University. Fact Sheet 727.20.

Plant: Corn

Symptoms

The whole plant is stunted. **Leaves:** Pale yellow or brown stripes on leaves (Images 1, 3, & 4). Leaves may have wavy margins. When cut, leaves exude a yellow slime (Image 2). The leaves wilt progressively from the base of the plant upwards.



Disease: **Bacterial wilt** or Stewart's wilt caused by *Erwinia stewartii*.

Disease development conditions? The bacteria over winter and are introduced and spread by the corn flea beetle. Warm winters may lead to higher populations of the beetles and increase spread of the disease. Infected seed can also introduce the bacteria into fields.

References

- Dixon, G.R. 1981. "Pathogens of monocotyledon crops" in *Vegetable Crop Diseases*. AVI Publishing Company, Inc. Westport, Connecticut.
- Sherff, A. and T. Woods. 1979. Vegetable crops: Stewart's disease of corn. Vegetable MD Online. New York State Cooperative Extension, Cornell University. Fact Sheet 727.10.

Plant: Corn

Symptoms

Plants are stunted and have reduced yields. **Leaves:** A mosaic mottled pattern of light and darker green streaks on the all leaves including flag and husk leaves, and is most striking at the whorl stages (Images 1-3). This may turn into a general yellowing as the growing season progresses

Ears: Ears show poor cob and tip fill (Image 4).



Disease: **Maize dwarf mosaic virus**

Disease development conditions? High aphid populations and planting non-resistant corn varieties can lead to quick spread of the disease.

References

- Lipps P. E. and D. R. Mills. Maize dwarf mosaic, maize chlorotic dwarf diseases of corn. Ohio State University Extension. Fact Sheet AC-0024-01.
- Zitter, T. A. 1984. Vegetable crops: diseases of sweet corn - Virus diseases. Vegetable MD Online. New York State Cooperative Extension, Cornell University. Fact Sheet 727.30.

Plant: Peppers

Symptoms

Leaves: Symptoms begin as water-soaked spots on underside of leaves. These spots turn brown and become slightly raised and are irregularly shaped. On the upper surface of the leaf the spots are beige and sunken with a brown border (Images 2 & 4). Affected leaves tend to turn yellow and drop (Image 1). **Fruit:** Raised, scab-like spots develop on fruit (Image 3). Fruit may also have sunscald due to exposure to sun because of dropped leaves.



Disease: **Bacterial leaf spot** caused by *Xanthomonas campestris* pv. *vesicatoria*.

Disease development conditions? The disease is favored by long periods of high relative humidity (more than 85%) with free moisture on the leaves. Bacteria are spread from plant to plant by splashing rain and by touching and handling wet plants.

References

- McGrath, M. T. and J. Boucher. Managing bacterial leaf spot in pepper. Vegetable MD Online. New York State Cooperative Extension, Cornell University.
Zitter, T. A. 1985. Bacterial spot of pepper. New York State Cooperative Extension, Cornell University. Fact Sheet 736.10.

Plant: Peppers

Symptoms

Leaves and Stems: Irregularly shaped brown spots with dark brown edges. **Fruit:** Circular or angular spots on immature fruit of any size. Often there are multiple spots on one fruit and spots may grow together to form a larger spot. Pink to orange rings of a dusty substance may be present on spots (Image 1). There may also be small black specks in older spots.



Disease: Anthracnose fruit rot of pepper caused by *Colletotrichum acutatum*.

Disease development conditions? Fungus survives in plant debris. Old and infected plant debris should be removed before replanting. Spores are splashed onto fruit by rain or irrigation. Infection occurs best at 20–24°C. Fruit must be wet for infection to occur.

References

- Cerkauskas, R. 2004. Pepper diseases: anthracnose. AVRDC – The World Vegetable Center Fact Sheet. AVRDC Publication 04-574.
Ivey, M. L. and S. A. Miller. 2004. Anthracnose fruit rot of pepper. The Ohio State University Extension. Factsheet HYG-3307-04.

Plant: Cabbage

Symptoms

Leaves: Infections begin as yellow V-shaped spots on the edges of the leaves with the point of the V in the direction of the veins. Spots enlarge and can go all the way to the stem. As spots enlarge the tissue rots (Image 1 & 2). Leaf veins turn black (Image 3).



Disease: Black Rot caused by *Xanthomonas campestris* pv. *campestris*

Disease development conditions? Sources of the bacteria include plant debris and infected seed. The bacteria is spread through splashing water, wind, insects, machinery, and irrigation or drainage water. Young leaves are the most susceptible to infection.

References

Miller, S. A., F. Sahin, and R. C. Rowe. 1996. Black rot of crucifers. The Ohio State University Extension. Fact sheet HYG-3125-96

Plant: Roses

Symptoms

Leaves: Black spots with fringed borders up to ½" in diameter primarily on the upper leaf surface (Images 1 & 3). Leaves begin turning yellow around spots. Eventually entire leaves may turn yellow and drop (Image 2). **Canes:** Spots on canes are first purple in color, turning black over time.



Disease: **Black spot** caused by *Diplocarpon rosae*.

Disease development conditions? The spores of the fungus must be wet for at least 7 hours before they can germinate. So ideal conditions for spore germination are wet foliage and temperatures near 65°F. The disease develops most rapidly at about 75°F.

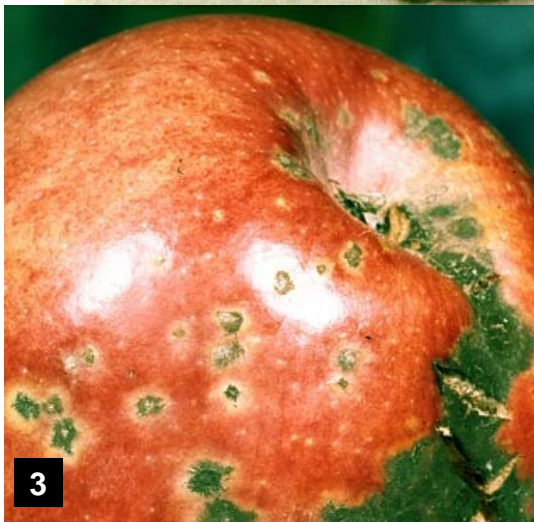
References

Black Spot of Rose. The University of Maine Cooperative Extension. Pest Management Lab Fact Sheet.
<http://pmo.umext.maine.edu/factsht/Spotrose.htm>

Plant: Apple

Symptoms

Leaves: Small, velvety textured, olive green, spots with unclear edges first develop on the under side of the leaf (Image 2). On some crabapples the infection may be a reddish color. As the spots age they become darker and their outlines become more distinct (Image 1). If heavily infected leaves become distorted and can drop off. **Fruit:** Spots on fruit look similar to those on the leaves but with a more distinct edge. As the spots age they darken and become black and with a roughened scabby surface (Images 3 & 4). Heavily scabbed fruit may become deformed and drop before reaching good size.



Disease: Apple scab caused by *Venturia inaequalis*.

Disease development conditions? Cool (between 55° and 75°F), wet weather during the early part of the growing season are ideal conditions for disease development. Leaves or fruit must remain wet continuously for a minimum of 9 hours for infection to occur.

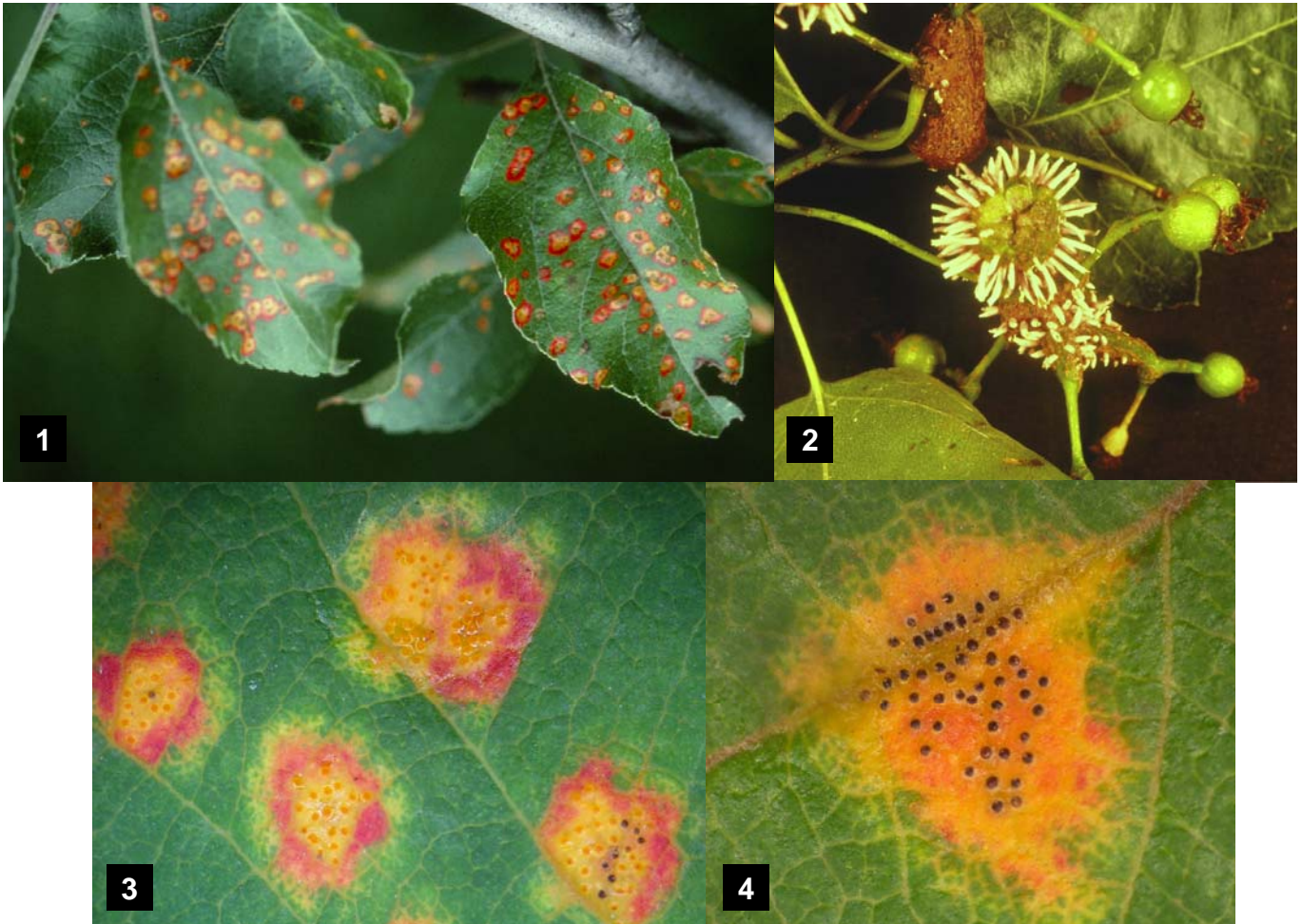
References

- Ellis, M. A., J. Chatfield and E. Draper. 1994. Scab of apple and crabapple. The Ohio State University Extension. Fact Sheet HYG-3003-1994.
- Ohlendorf, B. and M. L. Flint. 2001. Apple scab. IPM Education and Publications, UC Statewide IPM Project, University of California. Publication 7413.

Plant: Apple

Symptoms

Leaves: Pale yellow spots up to ¼ inch in diameter appear on the upper surface during May or June. Spots turn orange with time, and often have a reddish border (Images 1 & 3). Very small black spots form within the orange spot and produce an orange fluid (Image 4). Yellow spots eventually form on underside of leaf. These spots thicken during the summer. **Fruit:** Yellow-orange spots appear at or near the bottom end of the apple. These spots usually occur on immature fruit and are much larger than the spots on leaves (up to ¾ inch in diameter). The light green color of the young fruit becomes a darker green around the infected area. The small tube-like structures may form on the fruit spots (Image 2). Infected fruits are often stunted and misshapen, and may drop early.



Disease: **Cedar-Apple rust** caused by *Gymnosporangium juniperi-virginianae* .

Disease development conditions? Cool temperatures (50 to 70°F) and periods of extended moist conditions on leaves and fruit are ideal for disease development. The presence of cedar trees near apple trees increases risk of infection.

References

- Ellis, M. A. 1995. Rusts of apple. The Ohio State University Extension. Fact Sheet HYG-3024-95.
Yoder, K. S. and A. R. Biggs. Cedar-Apple Rust, *Gymnosporangium juniperi-virginianae*. Kearneysville Tree Fruit Research and Education Center, West Virginia University. http://www.caf.wvu.edu/kearneysville/disease_descriptions/omcar.html.

Plant: Maple

Symptoms

Leaves: Light green to yellow green spots develop on the top of leaves in late spring or early summer. During mid to late summer, black spots begin forming on the top of leaves (Images 1-4). These spots have the appearance of tar that has been dripped on the leaves. The spots can be made up of many pin point spots (Images 2 & 4) or a single large spot that often has a rippled surface (Images 1 & 3). The underside of the leaf directly below the tar spot turns brown and is cupped downward. Heavily infected leaves may drop early.



Disease: Tar spots caused by *Rhytisma* species.

Disease development conditions? Infected leaves that are not cleaned up and destroyed may lead to more leaf spots in subsequent years. Trees in over all poor health are more susceptible.

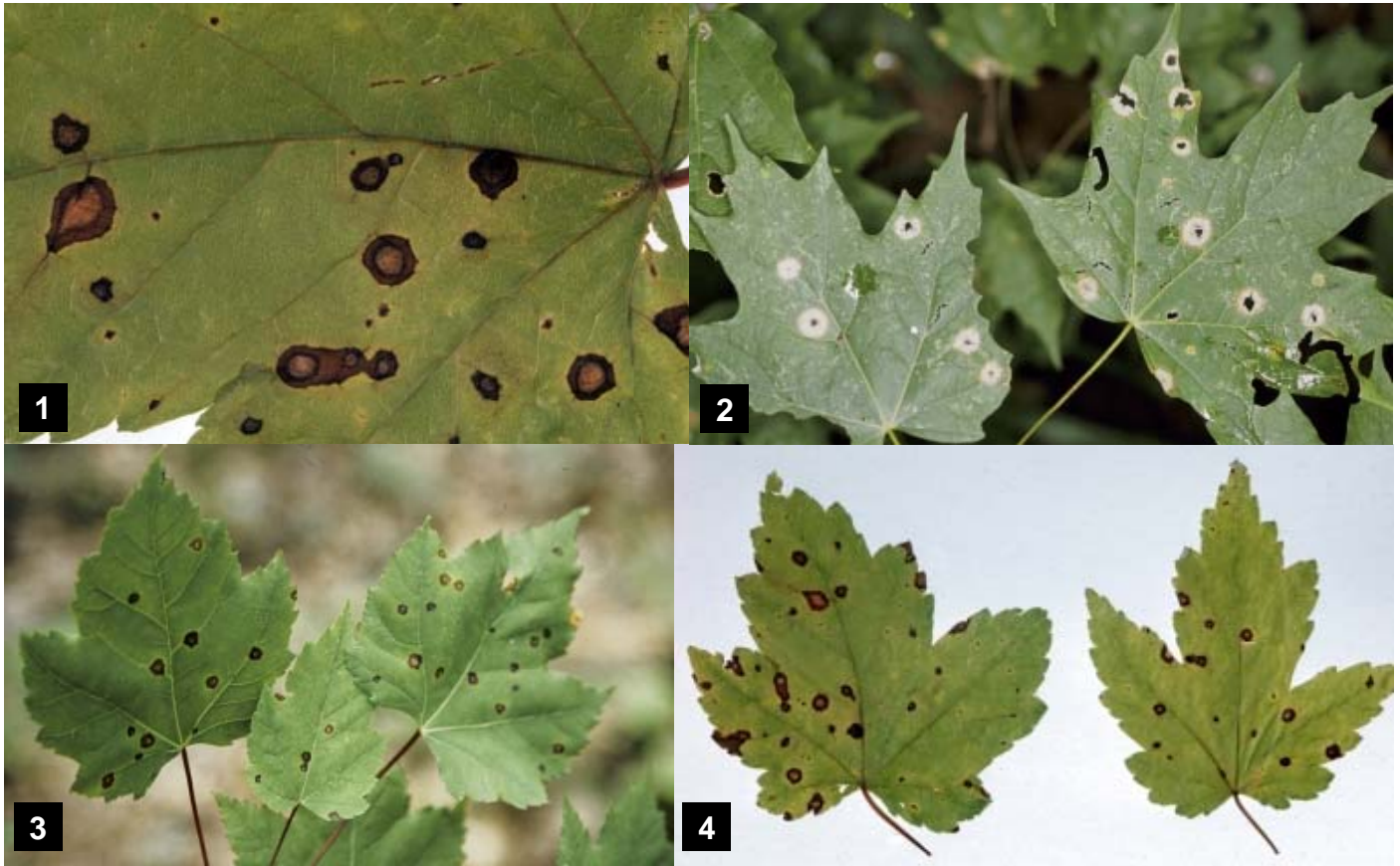
References

Sinclair, W. A. and H. H. Lyon. 2005. Diseases of trees and shrubs. Ithaca: Cornell University Press.

Plant: Maple

Symptoms

Leaves: Disease starts as small (usually less than 2 inches) irregularly round, brown spots. Spots later have a tan center with a dark border that is often red or purple in color (Images 1, 3, & 4). Spots may grow together resulting in large irregular dead areas on leaves. Small pinpoint black spots arranged in a circle may develop in the tan area of the larger spot. The centers of the large spots may fall out leaving holes in the leaves (Image 2).



Disease: Phyllosticta leaf spot caused by *Phyllosticta minima*.

Disease development conditions? Infected leaves that are not cleaned up and destroyed may lead to more leaf spots in subsequent years. Trees in over all poor health are more susceptible.

References

Sinclair, W. A. and H. H. Lyon. 2005. *Diseases of trees and shrubs*. Ithaca: Cornell University Press.

Plant: Maple

Symptoms

Leaves: Irregular purple or brown spots form along or near leaf veins (Image 1). Spots enlarge and often grow together forming large dead areas on leaves (Images 2 & 3). These dead areas can extend all the way to the edge of leaves. Leaves also may become twisted, crinkled, or otherwise deformed. Early leaf drop is common. **Branches:** Young shoots may also become infected and killed.



Disease: Maple anthracnose caused by *Discula* species.

Disease development conditions? Infected leaves that are not cleaned up and destroyed may lead to more leaf spots in subsequent years. Ideal conditions for infection are cool temperatures and wet weather.

References

- Tisserat, N. 1995. Anthracnose diseases of shade trees. Kansas State University. <http://www.oznet.ksu.edu>.
Sinclair, W. A. and H. H. Lyon. 2005. Diseases of trees and shrubs. Ithaca: Cornell University Press.

Plant: Maple

Symptoms

Leaves: Leaves on one side of the tree wilt and curl, dry up, turn red or yellow between the veins or have a scorched appearance (Images 1 & 4). In long lasting infections leaves may be small and sparse in some areas of the canopy. Early leaf fall also may occur. **Branches:** Stunted growth and dieback. Green or black discoloration is visible when outer bark is removed or branches are cut (Images 2 & 3). Death of entire trees is possible.



Disease: Verticillium wilt caused by *Verticillium albo-atrum* and *V. dahliae*.

Disease development conditions? Development of Verticillium wilt is favored by factors that stress roots, including wounding and droughty conditions.

References

- Chatfield, J., S. Nameth and N. Taylor. 1996. Verticillium wilt of landscape trees and shrubs. The Ohio State University Extension. Fact Sheet HYG-3053-96.
- Sinclair, W. A. and H. H. Lyon. 2005. Diseases of trees and shrubs. Ithaca: Cornell University Press.

Plant: Oak, Elm, Sycamore, Willow, Fir, Maple, Hemlock, Cottonwood, Poplar, Mulberry, and other tree species.

Symptoms

Trunk: A watery, foul smelling ooze (slime flux) coming from branch scars, old wounds, cracks, or holes in the bark. The slime flux is made up of bacteria, sap, water and yeasts. This ooze runs down the trunk, causing dark streaks that become gray or white when dry (Images 1 & 2). The wood under the bark is often discolored. **Branches:** Decline or die back may occur.



Disease: **Wet wood** caused by *Enterobacter cloacae*, other bacteria, yeasts, and other fungi.

Disease development conditions? Improper pruning of branches and wounding can lead to wet wood. Pruning trees with tools used to prune or cut down other trees with wet wood can lead to introduction of the bacteria into new trees.

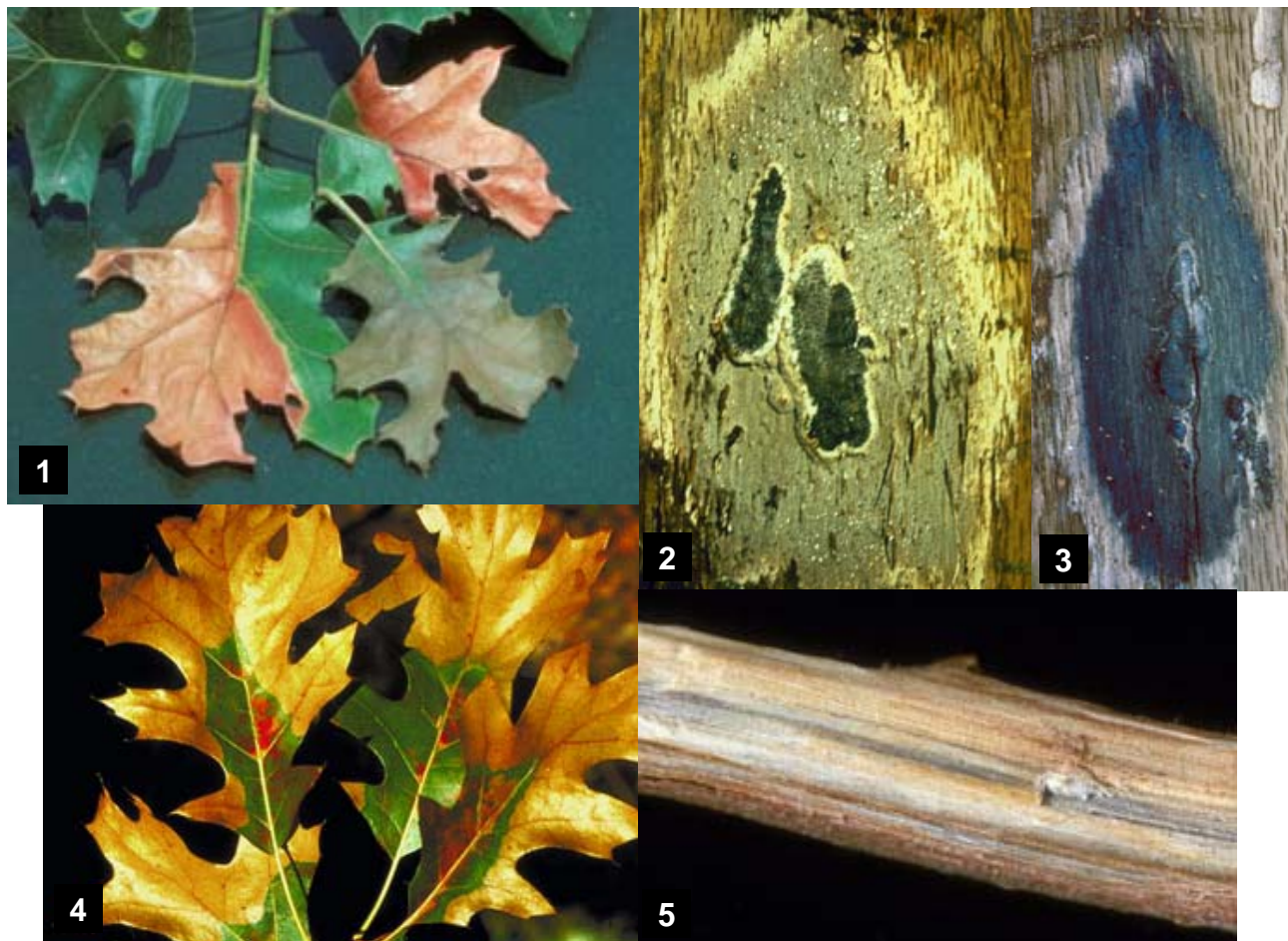
References

- Gillman, D. H. 2005. Wet wood and slime flux. University of Massachusetts Extension.
Sinclair, W. A. and H. H. Lyon. 2005. Diseases of trees and shrubs. Ithaca: Cornell University Press.

Plant: Oak

Symptoms

Leaves: Leaves at or near the top of a tree turn dull green, bronze or tan, beginning along the tips and edges (Images 1 & 4). There is often a abrupt line between the dead part of the leaf and the part that is still green. Leaves wilt from the top of the tree down. **Branches:** Brown to black streaks may be visible on branches when the outer bark is removed (Images 5). **Trunk:** Brown to black streaks may be visible in outer sapwood when bark is removed from trees that are completely wilted. The summer after a tree has died from wilt, the fungus will form small fungal mats under the bark. The mats are first gray or white in color (Image 2) and darken with age (Image 3). The first evidence of these mats are cracks in the outer bark. The mats can be viewed by pulling off the bark around the cracks. There may also be a sweet or fermented smell that accompanies the mats.



Disease: **Oak wilt** caused by *Ceratocystis fagacearum*.

Disease development conditions? The fungus is spread through the roots, so any oaks near other oaks that are wilting may contract the disease. Red oaks are more strongly affected by the fungus than white oaks. The fungus is also spread by small sap feeding beetles. Avoid pruning oaks from early June through August.

References

Bonello, P. 2001. Oak wilt. Thee Ohio State University Extension. Fact Sheet HYG-3306-01.
 Sinclair, W. A. and H. H. Lyon. 2005. Diseases of trees and shrubs. Ithaca: Cornell University Press.

Picture Bibliography

Tomato Diseases

Early Blight (*Alternaria solani*)

- Picture 1. Cornell University, Plant Disease Diagnostic Clinic, <http://www.pdis.org/ImageLibrary/ImageSearch.aspx>
- Picture 2. Clemson University - USDA Cooperative Extension Slide Series, www.ipmimages.org.
- Picture 3. Clemson University - USDA Cooperative Extension Slide Series, www.ipmimages.org.
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Late Blight (*Phytophthora infestans*)

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- Picture 2. T. A. Zitter, Cornell University, <http://vegetablemdonline.ppath.cornell.edu>
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- Picture 2. William M. Brown Jr., Colorado State University, <http://www.pdis.org/ImageLibrary/ImageSearch.aspx>
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Black Leg (*Erwinia cartovora* subsp. *Atroseptica*)

- Picture 1. Clark Livingston, Colorado State University, <http://www.pdis.org/ImageLibrary/ImageSearch.aspx>
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Fusarium and Rhizoctonia Root Rot (*Fusarium solani* and *Rhizoctonia solani*)

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Bean Common Mosaic Virus

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Black Rot (*Xanthomonas campestris* pv. *campestris*)

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Picture 2. Fred Baker, Utah State University, www.Bugwood.org

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