Diagnostic Guide to Common Home Orchard Diseases

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This bulletin is intended to be used as a pictorial diagnostic guide to identify the most common diseases seen on fruits grown in home landscapes, gardens, and/or orchards in Georgia. Refer to the Homeowner Edition of the *Georgia Pest Management Handbook* for chemical control recommendations: http://extension.uga.edu/publications/detail.cfm?number=SB48.

In terms of plant disease management in home orchards, an integrated pest management (IPM) approach is necessary to manage plant pathogens and ensure production of quality produce. Using clean plant stock, selecting disease-resistant varieties (when available), sanitation, proper cultural care and control, and maintaining healthy plants are all essential components in minimizing home orchard plant diseases. Most fungicides are largely *protectant* in nature and must be applied before symptoms are seen.

Keeping records or a journal of past plant diseases will be useful in managing future problems in the home orchard. Remember, when applying pesticides, read the chemical label carefully and follow all instructions written on the label. More specifically, take note of the *Preharvest Intervals* (PHI – interval of time between when the last chemical spray is applied and when the fruit is harvested) for each individual chemical. The PHI will vary depending on the chemical used.

Apples and Pears
(see photos on page 6)

Disease: Sooty blotch and fly speck
Pathogen: Multiple organisms that usually occur together as a disease complex, referred to as SBFS (*Peltaster fructicola*, *Geastrumia polystigmatis*, and *Leptodontium elatius* – sooty blotch; *Zygophiala jamaicensis* – fly speck)

Comments: This disease complex appears late in the summer/early fall. Pruning is important to increase air circulation. Fruit thinning is also important. Diseases favor moderate temperatures and high humidity. These are superficial diseases, and they do not cause rots. Application (rubbing with a cloth) of a bleach solution (1 ounce household bleach per gallon of water) will help to remove these, but subsequent shelf life of apples is reduced.

Disease: Bitter rot

Pathogen: *Glomerella cingulata*

Comments: This is a very important summer disease, especially when conditions are warm and moist! Pustules of spores are formed in concentric rings on the fruit. A sunken, sour-smelling rot results. Good sanitation is vital to management. Remove diseased fruit, which will hang on the tree, and any cankers formed in the woody tissues.

Disease: Black rot

Pathogen: *Botryosphaeria (Physalospora) obtusa*

Comments: A major disease on both apples and pears in the Southeast. On leaves, a symptom known as "frog-eye" leaf spot occurs. Infection occurs early in the season at silver tip; rots become evident in the late season at the calyx or bottom end. Rot will be seen as concentric rings, and it will be dark (eventually turning black). Good sanitation is important, so prune out dead wood and remove fallen debris.

Disease: Apple scab

Pathogen: *Venturia inequalis*

Comments: Not a consistent problem in the Southeast. Cool, wet weather favors infection. Fruit and foliage must be protected season-long for adequate management if the disease does occur. Plant resistant varieties (ask local nurseries for availability). Sanitation is important. Rake and destroy fallen leaves to reduce the amount of disease that will carry over to the next year.

Disease: White or bot rot

Pathogen: *Botryosphaeria dothidea*

Comments: This is a serious and common late-season problem in apples and pears. This fruit rot is a rapidly developing soft rot (unlike bitter rot and black rot, which form harder rots). Sanitation is important. Remove mummified apples (dried, dead apples hanging in the tree) and prune out deadwood.

Disease: Fire blight

Pathogen: *Erwinia amylovora* — Bacterial disease

Comments: This is a bacterial disease, and it is very destructive on both apples and pears. It's difficult and expensive to control. Avoid spraying too often, as resistance may develop. Succulent tissues are most vulnerable to infection, so avoid excessive nitrogen fertilization. Avoid pruning during and after the blossom period (corresponds to insect feeding). Promptly prune out any blighted tissue; remove infected plant parts through cutting 8 to 12 inches below diseased tissue; between cuts, disinfect pruning tools using a 10 percent bleach solution.

Disease: Cedar-Apple Rust

Pathogen: *Gymnosporangium juniperi-virginianae*

Comments: Can cause extensive defoliation of apple trees. Plant resistant varieties! If possible, remove galls from nearby cedar trees (breaks the fungal life cycle, as it needs both hosts to reproduce).

Blueberries
(see photos on page 7)

Disease: Botrytis blight

Pathogen: *Botrytis cinerea*

Comments: Disease affects green twigs, flowers, leaves and fruit. Outbreaks often occur after freeze injury to flowers in the spring, especially when followed by cool, wet weather. Fruit rot does not generally occur until after fruit is harvested. Sanitation is important. Remove infected fruit/mummies and maintain a good mulch layer.

Disease: Mummy berry

Pathogen: *Monilinia vaccinii-corymbosi*

Comments: Sanitation is important. Rake and remove mummies (dead fruit on the ground); prune annually.

Disease: Septoria leaf spot

Pathogen: *Septoria albopunctata*

Comments: Rake and remove infected leaf debris. Summer pruning or topping will help remove older, infected tissues. Increased spacing will improve air circulation, resulting in dryer foliage.

Disease: Twig blight and Fruit rot

Pathogen: *Phomopsis vaccinii*

Comments: Twig blight: remove infected twigs in winter; choose resistant cultivars when available. Fruit rot: harvest fruit before it becomes overripe.

Brambles (Raspberries and Blackberries)

(see photos on page 8)

Disease: Anthracnose

Pathogen: *Elsinoe veneta*

Comments: Disease affects canes, leaves, fruit and stems of berry clusters. Symptoms on canes are ash grey lesions with raised purple to brown borders. Sanitation is very important. After harvest, cut old floricanes to the ground, and remove and destroy them.

Disease: Orange rust

Pathogen: *Kunkelia nitens*

Comments: Attacks all brambles except red raspberries. Establishes a systemic infection and, once infected, no cure is available. Symptoms include stunting and limited fruit production. Symptoms occur shortly after leafing out. When disease is first detected, dig up and discard/destroy any infected plants to reduce spread.

Disease: Rosette or double blossom

Pathogen: *Cercosporella rubi*

Comments: Most damaging to blackberries. In the spring, infected buds from the previous year produce numerous leafy sprouts – "rosettes" or "witches brooms." Berries do not develop from infected blossoms. Remove/destroy nearby wild brambles – they serve as reservoirs; remove infected rosettes and blossom clusters before they open.

Disease: Orange felt (orange cane blotch)

Pathogen: *Cephaleuros virescens*

Comments: Remove old floricanes after harvest; increase air circulation in canopy; avoid stressing plants; improve drainage.

Disease: Cane blight

Pathogen: *Leptosphaeria coniothyrium*

Comments: Remove old floricanes after harvest; increase air circulation in canopy; avoid stressing plants; improve drainage. Sanitation is very important. Remove dead and infected canes during and after harvest. Avoid stressing plants. During the summer, prune by pinching off tender primocanes when they reach 3-4 feet high. Remove 1-4 inches of primocane tip; avoid making severe pruning cuts on older tissues. Do not prune ahead of predicted rains; prune when 3-4 days of dry conditions are predicted.

Bunch Grapes

(see photos on page 9)

Disease: Black rot

Pathogen: *Guignardia bidwellii*

Comments: Annual pruning in February; removing infected berries both on the ground and on the plant. After pruning, only the permanent trunk, one-year-old fruiting canes and short spurs should remain. Sanitation is important. Remove mummified fruit! Disease spread is favored by moist, wet weather.

Disease: Powdery mildew

Pathogen: *Uncinula necator*

Comments: Annual pruning in February will help to remove inoculum; remove infected berries both on the ground and on the plant. After pruning, only the permanent trunk, one-year-old fruiting canes and short spurs should remain.

Disease: Downy mildew

Pathogen: *Plasmopara viticola*

Comments: Annual pruning in February; remove infected berries both on the ground and on the plant. After pruning, only the permanent trunk, one-year-old fruiting canes and short spurs should remain.

Disease: Botrytis bunch rot

Pathogen: *Botrytis cinerea* — see Blueberry-Botrytis blight image

Disease: Pierce's disease

Pathogen: *Xylella fastidiosa* — Bacterial disease

Comments: Vectored by various sharpshooters (such as glassywinged sharpshooter). New growth is stunted, yellow, deformed (resembles zinc deficiency). Choose more resistant cultivars; native grapes are generally more resistant. Do not propagate from symptomatic vines. Do not plant vinifera wine or table grapes at elevations below 1,300 feet. Muscadines are generally resistant, and some other native grapes have limited resistance.

Disease: Phomopsis

Pathogen: *Phomopsis viticola*

Comments: A late dormant application of lime sulfur is very beneficial for control of this disease.

Figs
(see photos on page 8)

Disease: Root knot nematode

Pathogen: *Meloidogyne* spp.

Comments: Prune tops to balance weakened roots; attentive watering and fertilization may prolong tree life. Nematode infested plants usually die sooner or later regardless of treatment. Plant new trees away from this site!

Disease: Rust

Pathogen: *Cerotelium fici*

Comments: Not fatal but will reduce tree vigor and size and quality of fruit. Attacks the leaves, usually in late summer. Infected leaves turn yellow-brown and drop. Underside of leaves have reddish brown spots/pustules. Sanitation is important.

Disease: Anthracnose

Pathogen: *Glomerella cingulata* — see Apple-bitter rot image

Comments: Not serious; Increase air circulation and avoid excess irrigation; sanitize.

Muscadines
(see photos on page 10)

Disease: Black rot

Pathogen: *Guignardia bidwellii*

Comments: Remove fallen debris and mummified fruit; during the winter, remove all old fruit stems to eliminate overwintering sites for fungi.

Disease: Bitter rot

Pathogen: *Melaconium fuligineum*

Comments: Remove fallen debris and mummified fruit; during the winter, remove all old fruit stems to eliminate overwintering sites for fungi.

Disease: Ripe rot

Pathogen: *Glomerella cingulata* — see Apple-bitter rot image

Comments: Remove fallen debris and mummified fruit. During the winter, remove all old fruit stems to eliminate overwintering sites for fungi.

Disease: Macrophoma rot

Pathogen: *Botryosphaeria dothidea*

Comments: Remove fallen debris and mummified fruit. During the winter, remove all old fruit stems to eliminate overwintering sites for fungi.

Disease: Angular leaf spot

Pathogen: *Mycosphaerella angulata*

Comments: This pathogen can cause leaf spotting that can lead to rapid defoliation. Remove fallen debris and mummified fruit; during the winter, remove all old fruit stems to eliminate overwintering sites for fungi. Pruning is equally important.

Disease: Powdery mildew

Pathogen: *Uncinula necator* — see Grape-powdery mildew image

Comments: Attacks young berries – causes a russetted look. Berry drop and reduced size result from infections. Improve air circulation and use proper sanitation practices.

Peaches, Nectarines and Plums
(see photos on pages 10-11)

Disease: Brown rot

Pathogen: *Monilinia fructicola*

Comments: Major disease of these fruits in Georgia. Disease infects blooms, stems and fruit. Sanitation is the key! Remove and/or prune infected tissues and areas on trees. Remove and discard mummies. During wet summers, green fruit injured by insects and/or environment will develop brown rot. Remove any fruit that has fungal growth.

Disease: Peach scab

Pathogen: *Cladosporium carpophilum*

Comments: Disease infects both fruit and twigs of current years' growth. Small, oval to round, gray to black spots on fruit. Fruit may crack because of coalescing of scabs. Pruning trees to promote penetration of sunlight and air circulation is necessary.

Disease: Gummosis

Pathogen: *Botryosphaeria dothidea*

Comments: Disease causes sunken lesions with oozing amber-colored resin or gum on trunks, limbs, and twigs. Small twigs may be killed as disease progresses. Prune out and remove dead wood. Irrigation during periods of dry weather helps to reduce plant stress and may minimize disease.

Disease: Peach leaf curl

Pathogen: *Taphrina deformans*

Comments: Disease occurs in cooler areas of the state – primarily the upper Piedmont and mountains. Apply this to nectarines and peaches only. Sanitize. For successful control, the fungicides must be applied before bud swell.

Strawberries
(see photos on page 11)

Disease: Leaf spots

Pathogen: *Mycosphaerella fragariae; Xanthomonas* sp.

Comments: Leaf spot – upper leaf surface first as tiny, round, purple spot 1/8" in diameter; spot becomes gray with purple border. Loss of foliage is common.

Disease: Anthracnose

Pathogen: *Colletotrichum* sp.

Comments: Anthracnose is a major disease of strawberries when conditions are wet. Anthracnose infects stolons, petioles, crowns, fruit and leaves. Small dark lesions form on stolons and petioles in summer. Crowns can be infected, resulting in plant death. Remove infected plants or fruit and destroy or bury. Always purchase disease-free plants!

Disease: Botrytis blight

Pathogen: *Botrytis cinerea*

Comments: Botrytis is often present in strawberry leaves, etc., even if symptoms are not present. These quiescent infections give rise to production of spores under wet conditions during bloom. Blossoms need to be protected season-long to reduce fruit infection and to prevent epidemic development.

Disease: Rhizoctonia root and crown rot

Pathogen: *Rhizoctonia* spp.

Comments: Root rot is favored by cool weather, but crown rot is worse in hot weather. Plants start collapsing as fruiting starts. The bottom of the leaves are purple and leaves curl up as the original crown is killed. Buy disease-free plants.

Disease: Phomopsis leaf blight

Pathogen: *Phomopsis obscurans*

Comments: Disease starts in the fall or spring after planting. It spreads rapidly and can destroy most of the foliage. Remains active as long as there is green foliage. Symptoms occur as circular red to purple spots on leaflets; the spots enlarge and develop gray centers, making large V-shaped lesions. Fruit and calyx infection also occurs. Remove infected foliage. Fruit infection is prevented by controlling foliar infection.

Apples and Pears

Disease: Sooty Blotch and Fly Speck

Dull black sooty blotches and individual "fly specks"

Disease: Bitter Rot

Concentric rings of acervuli

V-shaped lesions extending to core of fruit

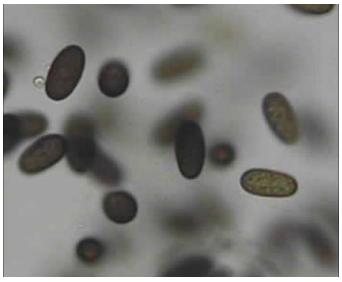
Pathogen: *Glomerella cingulata*

Conidia (J. Brock, UGA)

Disease: Black Rot

Brown, bruised look on the calyx end of fruit

Pathogen: *Botryosphaeria (Physalospora) obtusa*

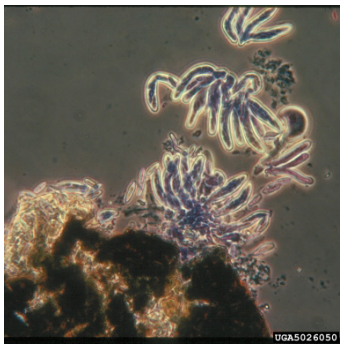


Conidia

Disease: Apple Scab

Black, scabby lesions on leaves and fruit

Pathogen: *Venturia inequalis*

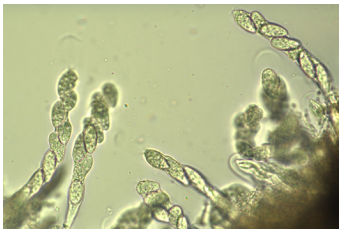


Perithecia and spores

Disease: White or Bot Rot

Depressed, soft, enlarged lesion on fruit

Pathogen: *Botryosphaeria dothidea*



Ascospores within asci

Disease: Fire Blight

Shepard's crook symptom on foliage

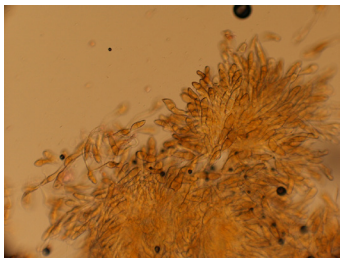
Dieback on branch due to presence of a canker

Disease: Cedar-Apple Rust

Lesions on apple leaves

Telial gall on cedar (alternate host)

Pathogen: *Gymnosporangium juniperi-virginianae*



Teliospores

Blueberries

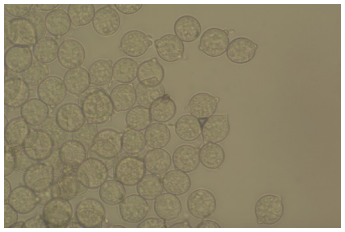
Disease: Mummy Berry

Shoot-blight phase
(Bill Cline, NCSU)

Mummies on the bush
(Bill Cline, NCSU)

Infected green berries
(H. Scherm, UGA)

Pathogen:
Monilinia vaccinii-corymbosi



Conidia

Mummies
(H. Scherm, UGA)

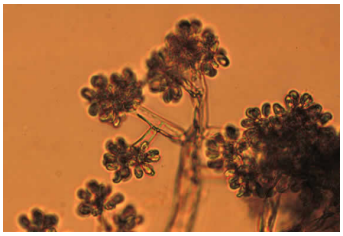
Apothecia
(H. Scherm, UGA)

Disease: Botrytis Blight

Blighted flowers (covered in conidia)

Berries covered in conidia
(Bill Cline, NCSU)

Pathogen:
Botrytis cinerea

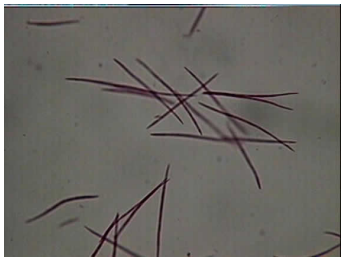


Conidiophore and conidia

Disease:
Septoria Leaf Spot

Small leaf spots with tan center and purple border (black dot in center - pycnidia of pathogen)
(Bill Cline, NCSU)

Pathogen:
Septoria albopunctata



Narrow, filiform, several-celled conidia

Disease:
Twig Blight and Fruit Rot

Dieback of blueberry twigs
(Bill Cline, NCSU)

Fruit rot
(Bill Cline, NCSU)

Pathogen:
Phomopsis vaccinii

Conidia (two types: alpha [oval or fusoid] and beta [long and curved])

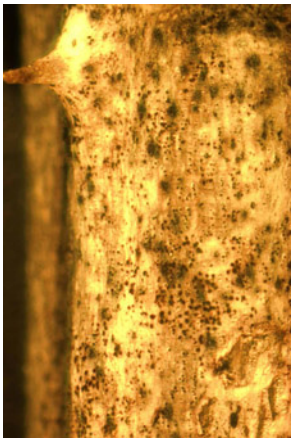
Brambles (Raspberries and Blackberries)

Figs

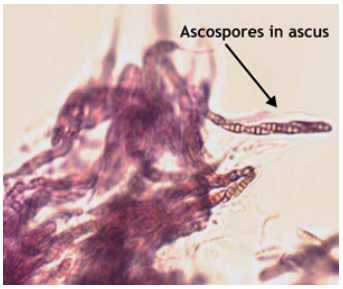
Disease: Cane Blight

Dieback of canes

Pathogen:
Leptosphaeria coniothyrium



Pycnidia

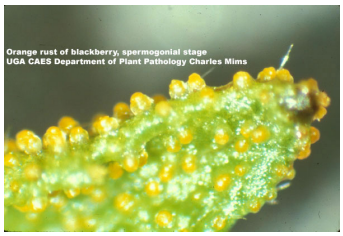


Ascospores in ascus

Disease: Orange Rust

Yellow-orange pustules on leaf surfaces (usually lower leaf)

Pathogen:
Kunkelia nitens



Spores

Disease: Rosette or Double Blossom

Bunchy growth at nodes

Pathogen:
Cercosporella rubi

Spores

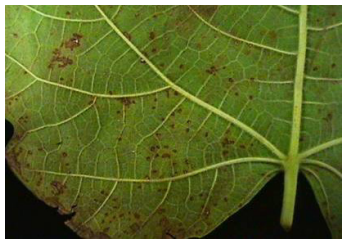
Disease: Anthracnose

Small, purplish or tan, slightly raised or sunken spots along young canes (NCSU/PDIC, courtesy of Bill Cline)

Disease:
Root Knot Nematode

Knotty, galled roots (not fig roots) (D. Langston, UGA)

Disease: Rust



Small, reddish pustules on the underside of the leaves

Pathogen:
Cerotelium fici

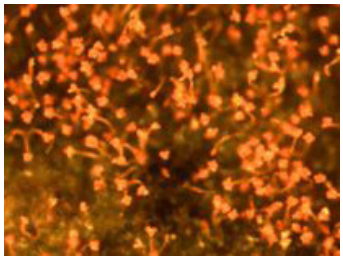
Pustule (uredinial stage) on underside of leaf

Urediniospores

Disease: Orange Felt (Orange Cane Blotch)

Yellow, disc-shaped spots on canes

Pathogen:
Cephaleuros virescens



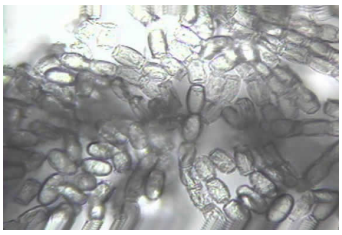
Algal sporangiophores

Bunch Grapes

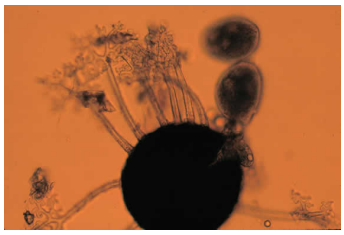
Disease:
Powdery Mildew

White powdery fungal growth on berries

Pathogen: *Uncinula necator*



Conidia



Cleistothecia

Disease:
Botrytis Bunch Rot

Masses of gray conidia covering infected grapes

Disease:
Downy Mildew

Yellow, irregular-shaped lesions on upper surface; whitish-gray fungal growth directly under lesions on lower surface of leaves

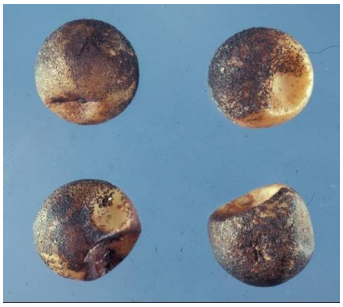
Pathogen: *Plasmopara viticola*

Conidiophores and conidia

Disease:
Pierce's Disease

Scorched leaves with a defined margin and yellow / chlorotic border

Disease: Bitter Rot



Black acervuli covering berries (Bill Cline, NCSU)

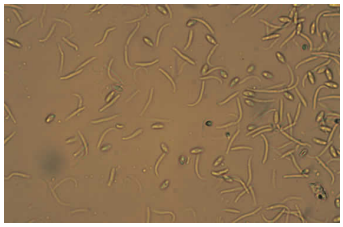
Disease: Ripe Rot

Dark brown rot with pink masses of spores covering part or all of fruit (Bill Cline, NCSU)

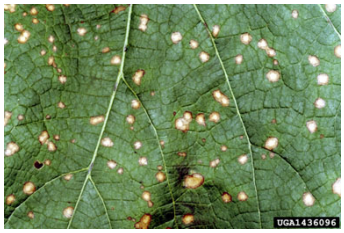
Disease: Phomopsis

Small, black pycnidia of the fungus on the cane

Pathogen:
Phomopsis viticola



Two spore types: alpha and beta conidia



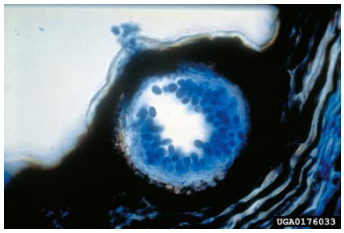
Small, yellowish spots on leaves

Disease: Black Rot

Sunken oval lesion with pycnidia of the fungus (black dots)

Shriveled mummies (infected berries)

Pathogen:
Guignardia bidwellii



Pycnidia in a mummified grapevine berry

Muscadines

Disease:
Powdery Mildew

Surface russeting on fruit
(Bill Cline, NCSU)

Disease:
Angular Leaf Spot

Light yellow spots;
irregular brown flecks
develop in the center
(Bill Cline, NCSU)

Pathogen: *Mycosphaerella angulata*

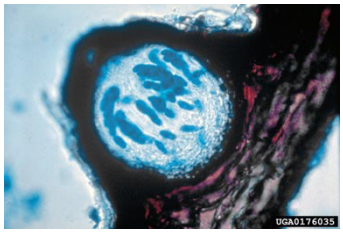
Asci

Ascospores

Disease: Black Rot

Circular brown leaf spots

Pathogen:
Guignardia bidwellii

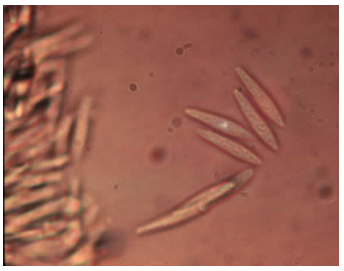


Pycnidia containing conidia

Disease:
Macrophoma Rot

Small, sunken, black fruit
spots; round, with distinct
edges (Bill Cline, NCSU)

Pathogen:
Botryosphaeria dothidea



Conidia

Peaches, Nectarines and Plums

Disease: Brown Rot

Masses of conidia covering
light brown fruit rot

Pathogen:
Monilinia fructicola

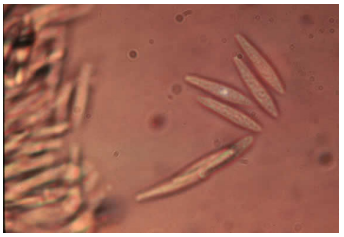
Apothecia (sexual fruiting
structure) on a peach
mummy

Conidia

Disease: Gummosis

Gum/jelly produced on
trunk

Pathogen:
Botryosphaeria dothidea



Conidia

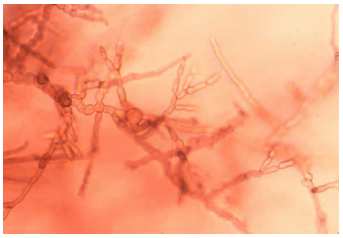
Peaches, Nectarines and Plums (continued)

Disease: Peach Scab

Raised dark brown lesions on twigs

Greenish brown-black lesions covering fruit, sometimes surrounded by yellow halo

Pathogen: *Cladosporium carpophilum*



Conidiophores and conidia

Disease: Peach Leaf Curl

Deformed leaves (wrinkled, puckered, and/or curled)

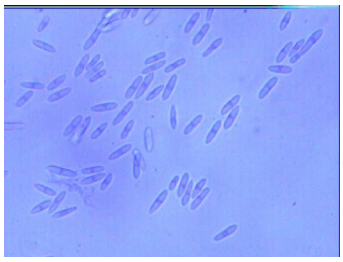
Strawberries (Continued)

Disease: Anthracnose

Light to dark brown sunken lesions on fruit (Courtesy of Tom Jennings)

Pathogen: *Colletotrichum* sp.

Long, black setae

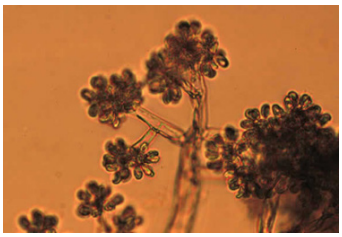


Conidia

Disease: Botrytis Blight

Botrytis blight on strawberry fruit

Pathogen: *Botrytis cinerea*



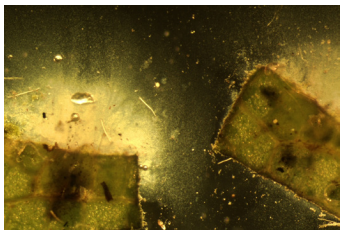
Conidiophores and conidia

Disease: Leaf Spots

Leaf spot (gray/white center with purple border) - *Mycosphaerella* sp.

Angular Leaf Spot (restricted by veins) (Courtesy of Jeff Cook)

Pathogen: *Xanthomonas* sp.

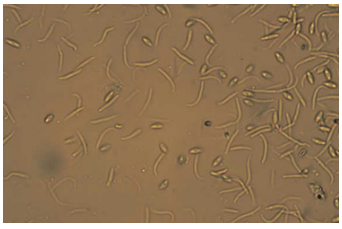


Bacterial Streaming (@ 40x)

Disease: Phomopsis Leaf Blight

V-shaped leaf lesions progressing from leaf margin to leaf interior

Pathogen: *Phomopsis obscurans*



Conidia (two types)

Disease: Rhizoctonia Root Rot and Crown Rot

Pathogen: *Rhizoctonia* spp.

Robust, separate, pigmented, branching mycelia

References

Literature:

2015 Georgia Pest Management Handbook – Homeowner Edition. University of Georgia Cooperative Extension.

Brannen, P.M. Orange Felt (Orange Cane Blotch) of Blackberry. www.smallfruits.org/bramble/pestinformation/OrangeFelt.pdf

Brannen, P. M. and G. Krewer. Cane Blight of Blackberry. www.smallfruits.org/bramble/pestinformation/CaneBlightFactSheetii.pdf

Compendium of Strawberry Diseases. 2nd edition. APS Press.

Eaker, T.H. 2002. Sanitation Measures for Limiting Diseases in the Home Orchard.

The Southern Region Small Fruit Consortium. IPM/Production Guides. www.smallfruits.org/SmallFruitsRegGuide

Images:

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