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Home & Garden Mimeo # HG51

IPM Series: Azaleas and Rhododendrons

Symptoms	Possible Causes	Notes
Leaf Yellowing	Older Leaf Drop	Towards interior of plant
	High Soil pH	
	Nutrient Deficiency	Iron or magnesium chlorosis
	Azalea Bark Scale	Leaves may also have sooty mold (black coating)
	Azalea Leaf Rust	Brightly colored, yellow-orange spots
Leaf Stippling	Lace Bugs	Whitish spots on upper surface of leaves; black spots on the lower leaf surface
Leaf Mottling	Azalea Whitefly	Margins of leaves cup, lower leaves covered with honeydew, then sooty mold; flat, oval transparent insects on the lower leaf surface
Leaf Distortion	Longtailed Mealybug	Terminal leaves become yellow and distorted, dieback may occur
	Exobasidium Leaf and Flower Gall	Swollen green or white puffy areas on newly expanded leaves or flowers
	Water Stress	Leaves roll and droop
Leaves Eaten or Chewed	Black Vine Weevil	Notching of leaf margins; interior leaves show most damage
	Twobanded Japanese Weevil	Notches chewed in leaf margins
	Azalea caterpillar	Branches or entire plants may be defoliated
Blotches on Leaves	Azalea Leafminer	Blotch mines on leaves of azalea in May
Spots on Leaves	Various Fungal Leaf Spots	Visible on upper leaf surface
Leaf Scorch	Winter Injury	Margins of leaves turn brown in winter or spring
White Coating on Leaves	Powdery Mildew	May be on upper and lower leaf surfaces
Flowers Affected	Ovulinia Petal Blight	Small, water-soaked spots enlarge rapidly, cause flowers to collapse and feel slimy
	Exobasidium Leaf and Flower Gall	Swollen areas on buds, flowers and petals
Failure to Flower	Winter Injury	Sudden temperature drop in fall, unusually cold winters, or spring freeze

Branch Dieback	Botryosphaeria Dieback	Scattered dying branches
	Phytophthora Dieback	Leaves on scattered branches wilt, roll and turn brown
	Rhododendron Borer	Wilting of leaves and twig dieback
	Rhododendron Stem Borer	Wilting terminals and dieback
Entire Plant Dies	Phytophthora Root Rot	Early symptoms may include wilting, shoot dieback,
	Black Vine Weevil and Twobanded Japanese Weevil	As above, result of larvae feeding on roots and crown
	Water Stress	Plants recover after irrigation

All rhododendrons and azaleas are members of the genus *Rhododendron* but are horticulturally distinct. There are about 1,000 species of rhododendron worldwide. Many new hybrids are introduced each year by plant breeders and are placed under group names. Examples of azaleas are: Ghent, Kurume, Exbury, Satsuki, and Knap Hill, and rhododendrons: Catawba, Korean, and Carolina. They offer a wide range of flower colors in the spring and have become one of the most popular plants in Maryland landscapes.

Both evergreen and deciduous rhododendrons are predominately woodland plants that require an acidic soil, shelter from full sun, adequate moisture and protection from winter winds. Azaleas will generally tolerate drier conditions and more sun than rhododendrons. Other related landscape plants that require the same growing conditions include **andromeda, mountain laurel** and **leucothoe**.

Cultural Problems

Leaf Chlorosis

Chlorosis symptoms, caused by a deficiency of iron, appear as yellow leaves with prominent green veins. These symptoms are usually caused by high soil pH. A soil test can determine if the pH is too high. Iron is most readily available in acidic soils between pH 4.5-6.0. When the soil pH is above 6.5, iron may be present in adequate amounts, but is in an unusable form, due to an excessive amount of calcium carbonate. This can occur when plants are placed too close to cement foundations or walkways. Gypsum or calcium sulfate is a safe source of supplemental calcium. Soil amendments that acidify the soil, such as iron sulfate or sulfur, are the best long term solution. Some fertilizers such as ammonium sulfate will also acidify the soil. Foliar sprays of iron sulfate or chelated iron can reduce symptoms.

Chlorosis caused by magnesium deficiency is initially the same as iron, but progresses to form reddish purple blotches and marginal leaf necrosis (browning of leaf edges). Epsom salts are a good source of supplemental magnesium. Other causes of chlorosis include poor root growth, root rot, root damage caused by over fertilization or excessive deep cultivation, soil nematodes and poor drainage.

Winter Injury

Low temperatures can cause bark splits near the base of the stem, damaged flower buds and marginal necrosis of leaves. Both bark splits and flower bud damage can be caused by a sudden temperature drop in the fall before new growth has hardened off, cold temperatures after dormancy has broken in the spring, or after a winter thaw. Winter hardiness will also influence the likelihood of winter damage of marginally hardy varieties.

Marginal leaf browning that results from drying winter winds is generally called “winter burn”. Tissue necrosis is caused by the removal of water in the leaves faster than the plant can replace it through root uptake from frozen water in the soil. Winter burn can be reduced by placing plants in locations less exposed to winter winds. Physical barriers, placed about 18 inches from the plants on the windward side, made from materials such as burlap or plastic, can also lessen winter wind damage by reducing wind velocity.

Insects

Azalea Bark Scale
Eriococcus azalea

A scale infestation is indicated by sooty mold on leaves, yellowing of leaves, and twig dieback. This scale is most obvious from

May through June when white egg sacs may be found in twig forks. Heavy infestations over several seasons may kill plants. Overwintering immature scales (nymphs) are about 2 mm long, gray, and are usually found in twig forks. This scale primarily attacks azalea and rhododendron, but has also been found on andromeda, maple, arborvitae, willow, poplar, and hackberry. There are 2 generations a year in Maryland.

Control: Azaleas can tolerate low populations of this scale without injury, and if there are no yellowing leaves, no treatment is necessary. Beneficial predators and parasites will usually provide adequate control of light scale infestations. Examine egg sacs for holes which indicates control by parasites, and look for predators such as ladybird beetles.

To control heavy infestations, spray dormant plants with a late oil spray to kill developing nymphs on twigs. If necessary a 2% summer rate of horticultural oil may be applied in July after all of the eggs have hatched.

Azalea Caterpillar
Datana major

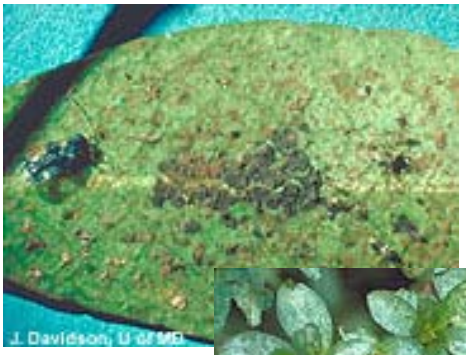
These caterpillars are black with rows of white or pale yellow spots, reddish brown legs, head and neck area and are 2 1/2 inches when mature. Preferred host plants are azaleas, but they may also attack witch hazel, sumac, apple, red oak and andromeda. The caterpillars feed together when young and disperse as they mature. Branches or entire plants may be defoliated. Damage occurs in late summer and fall.

Control: Look for caterpillars when defoliation damage occurs, and if only a few caterpillars are present, pick them off by hand. If needed, spray shrubs with B.t. (*Bacillus thuringiensis*), a microbial insecticide that is specific for caterpillars. It is sold under various trade names including Caterpillar Attack, Thuricide, Dipel, etc. Apply sprays when caterpillars are numerous and less than 3/4 of an inch long. Larger caterpillars must be sprayed with a registered residual insecticide.

Lace Bugs:
Azalea Lace Bug, *Stephanitis pyriodes*,
Rhododendron Lace Bug,
Stephanitis takeyai

Lace bug damage is indicated by stippling on leaves of plants growing on sunny dry sites beginning in early May. Damage usually begins on old leaves and later appears on new growth. Black fecal spots will be present on the lower sides of stippled leaves. Heavy infestations of lace bug may cause leaves to turn yellow and then brown. Shrubs that are exposed and heavily infested may be killed. There are several species of lace bug, with several generations a year that attack azalea, rhododendron and andromeda. Adult lace bugs are flat, about 1/8 inch long, with transparent lace-like wings. Immature lacebugs (nymphs) are black and covered with spines. Eggs overwinter on leaves and may begin to hatch as early as late April.

Control: Look for nymphs and black fecal spots on lower leaf surfaces in early May to estimate potentially damaging populations. When lacebug populations are high, sprays of horticultural oil (at a 2% summer rate), or insecticidal soap will control lace bugs if the lower surfaces of the leaves are thoroughly covered. (A currently registered systemic insecticide may be necessary where coverage of undersides of leaves is difficult.)



Azalea lace bug

Andromeda lace bug

Azalea leafminer
Caloptilia azaleella

Damage is indicated by the presence of blotch mines in leaves of azalea in May. Mines are initially formed near the midrib. As larvae mature they curl the tips of the leaves with silk and feed inside the curl. Large populations cause leaves to brown and drop prematurely. Curled leaf tips in June indicate the completion of the first generation. The second generation mines begin in July. Adult moths are present in late June and August. The moths are 3/8 inch long and yellowish brown. Mature larvae are 1/2 inch long and yellowish brown. Azalea leafminer overwinters as pupae in leaf mines.

Control: Rake and destroy fallen leaves in the fall to remove overwintering pupae.

Azalea leafminer

Azalea Whitefly
Paelius azalea

Heavy infestations cause the margins of terminal leaves to cup. These infested leaves will eventually turn yellowish and appear wilted. The lower leaves become covered with honeydew, followed by sooty mold (a black coating). To check for the presence of whiteflies, shake the terminals of white azaleas to flush out adult whiteflies which look like tiny white moths. Examine the lower surfaces of leaves for the presence of nymphs, which are flat, yellowish green, and resemble scale insects. All stages occur on the under sides of leaves. This whitefly is usually limited to varieties of the snow azalea, *Azalea ledifolia alba* (= *Rhododendron mucronatum*).

Control: If the infestation is light, little or no plant symptoms are evident, and if beneficial insects are present, spray the undersides of leaves with insecticidal soap or a horticultural oil at the 2% summer rate.

Rhododendron Borer
Synanthedon rhododendri

Azalea Whitefly

Rhodendron borer

Rhododendron borer causes wilting of leaves and twig dieback. Prune off the suspected branches and split them open longitudinally to see if larvae are present. Mature larvae are about 1/2 inch long, white with brown heads. The adult moths resemble wasps, have mostly clear wings, and black bodies with 3 gold bands on the abdomen. Boring larvae may cause branches to crack. Heavy infestations cause wilting and eventual branch dieback. This borer prefers rhododendron, but occasionally attacks deciduous azalea and mountain laurel. There is one generation a year and larvae overwinter in tunnels in branches.

Control: There are no conventional insecticides that will kill borer larvae once they are inside the branches. The best control option for homeowners with only a few plants is to prune out and destroy wilting branches in early spring or late summer. Beneficial nematodes, available under several trade names, are a control option. They may be injected into the active borer tunnels or sprayed on the affected area of the plant. See the package for specific instructions.

Rhododendron Stem Borer
Oberea myops

Damage caused by the stem borer, which includes wilting terminals and dieback, is similar to the Rhododendron borer. This borer, however is a longhorned beetle. Adult beetles feed on the underside of leaves on the midvein, causing the leaves to curl. The larvae bore down the twigs causing individual branches to wilt, and eventually dieback to the ground. The adult beetles are about 5/8 inch long, have long antennae, and are pale yellow with 2 black spots on the thorax and on the margins of the wing covers. Adults are present in June and July. The larvae are whitish and have no visible head. This beetle prefers rhododendron, but will also attack azalea and mountain laurel. The larvae overwinter in branches the first year and in roots the second year.

Control: There are no conventional insecticides that will kill stem borer larvae once they are inside the branches. The best control option for homeowners with only a few plants is to prune out and destroy wilting branches in early spring or late summer. (Beneficial nematodes are not effective on these borers.)

Black Vine Weevil
Otiorhynchus sulcatus

Adult feeding damage appears in June as notched leaf margins on azalea and rhododendron. Interior leaves usually show most damage. Small plants when heavily infested may be defoliated. The larvae live in the soil and feed on roots. They may girdle the plant at the root crown, causing the plant to wilt. The adult weevils are about 3/8 inch long, and black with faint yellowish flecks. Adults primarily feed in the evening. The larvae are "C-shaped", legless, and white with brown heads.

Control: When possible select resistant rhododendron cultivars (see resistant cultivar list). Inspect for adult weevils at night.

Beneficial nematodes may be effective in controlling larvae in the soil when the soil volume is contained. Currently registered insecticides are not effective as soil drenches for controlling the larvae.

Twobanded Japanese Weevil
Callirhopalus bifasciatus

The damage is very similar to that of black vine weevil. Adults chew notches in leaf margins. Small shrubs may be defoliated in heavy infestations. The larvae feed on the roots of the same plants as the adults. Heavy larval populations may cause stunting, wilting, and may kill small shrubs and tree seedlings. Feeding damage begins on lower leaves in mid-June. The adult weevils are about 3/16 inch long, brown, broadly oval, thick bodied, and brown to gray with two darker bands across the wing covers. Mature larvae are about 1/4 inch long, "C-shaped", legless, and white with brown heads. This weevil prefers azalea, rhododendron, privet, mountain laurel, forsythia, spirea, deutzia, lilac, and euonymus. There is one generation a year and all stages overwinter in the soil.

Control: Adult beetles feed for two to three weeks before laying eggs. To check for adults, place a tray under damaged shrubs and shake the plants. Adult Japanese weevils feed during the day and will drop from the plants when disturbed. If control is necessary, use a registered insecticide when damage begins in mid June.

Longtailed Mealybug
Psuedococcus longispinus

Infested plants will have honeydew and sooty mold (black coating) on the leaves. Terminal leaves may become yellow and distorted, and dieback may occur. Infested plants are usually growing in sheltered locations, such as against south facing walls. The mealybugs may be found on lower leaf surfaces and stems. Adult mealybugs are about 1/8 inch long, and covered with white wax. The body margin is ringed with white wax filaments, with the last pair over 1/2 the length of the body. Immature mealybugs have short wax filaments. This mealybug feeds on pyracantha, holly, yew, and rhododendron. There are two to three generations a year, and the immatures overwinter on the bark.

Control: Inspect plants for beneficial predators such as ladybird beetles. Some immature ladybird beetles may resemble the mealybugs, but move faster. Check carefully before spraying with an insecticide. A horticultural oil may be sprayed on dormant plants to reduce the overwintering population. A 2% summer rate of horticultural oil will reduce the numbers of mealybugs during the growing season if the coverage is thorough. If the mealybug problem persists, ant control may be necessary. Ants feed on the honeydew secreted by the mealybugs and protect them from parasites and predators.

Diseases

Botryosphaeria Dieback
Botryosphaeria dothidea

This is the most common disease of rhododendron in the landscape. A typical symptom of this fungal disease is scattered dying branches on an otherwise healthy plant. Leaves on infected stems turn brown, then droop and roll inward. These leaves often lay flat against the stem and will remain attached. The pathogen can infect all ages of stem tissue through wounds, pruning cuts, and leaf scars. Heat, drought stress, and winter injury can increase disease incidence. Cankers on branches can gradually grow through the wood until the stem becomes girdled. Diseased wood is reddish brown in appearance. Discolored wood viewed in longitudinal cross section often forms a wedge that points toward the center of the stem, and the pith may be darker brown than the surrounding wood.

Management: Fungicide treatments are not an effective disease control option. Plants should be grown in partial shade, with mulch and kept well watered during dry periods. All dying branches should be promptly pruned out in dry weather and all discolored wood should be removed. Plants should also be protected from rough treatment during maintenance activities to prevent unnecessary wounds.

Phytophthora Root Rot and Dieback
Phytophthora spp.

This soil pathogen exists in low levels throughout Maryland and becomes a problem in wet sites. As roots are killed the leaves begin to turn a lighter green and eventually yellow. Infected plants initially appear wilted. As symptoms progress leaves roll inward towards the midrib and turn brown. Highly susceptible cultivars can die within two weeks, where as more

resistant plants may not die until many weeks after the plants have developed the initial wilt symptoms (see resistant cultivar list). The entire root system may become diseased or portions may escape infection and support the plant until other stress factors cause death. On older plants, symptoms of root rot may be present a season or more before death. In such cases plants often decline in vigor and suffer additional damage from other pathogens or insect pests.

Phytophthora dieback, although uncommon in the landscape, is a distinct phase of the Phytophthora disease syndrome on rhododendrons. It can be brought into the landscape on infected plants and can be severe on plants grown under overhead sprinkler irrigation. The disease occurs when the pathogen is splashed onto the foliage. Thus, infected plants may show symptoms on leaves and shoots, but may have healthy root systems. Plants with dieback develop symptoms on the current season growth. Mature leaves are often resistant, however if they become infected, they usually fall prematurely. Infected leaves show chocolate brown lesions that often expand and cause dieback of the shoot tips. Infected leaves droop and curl towards the stem. Diseased leaves remain attached to the stem. Growth of the pathogen through the midrib tissue often produces a V shaped lesion that extends along the leaf midrib into the stem

Phytophthora Root Rot and Dieback

Control: Although chemical controls can be used in nursery production these measures are often too expensive and impractical in a landscape. Several soil and spray applications are required throughout the summer season to control both of these diseases. In addition, no chemical treatments will cure plants that show symptoms. The best disease prevention options are to avoid poorly drained compacted soils, low areas that collect water runoff, and locations near downspouts. Construction of raised beds or grade changes may be needed to ensure proper drainage. All newly planted rhododendrons should be watched closely for symptoms, and infected plants or prunings should be removed promptly. Symptoms on older plants can be caused by introducing infected plant material into the same planting bed, changes in water drainage patterns, and low plant vigor. Resistant varieties are available (see resistant plant list). However, if they are flooded for 48 hours or longer, or are drought stressed to the point of wilting, resistance is temporarily lost and the fungus can invade.

Ovulinia Petal Blight
Ovulinia azaleae

This disease only affects the flower petals. The first symptoms are small water-soaked spots on the petals. These spots rapidly enlarge and cause the flower to collapse and feel slimy. This disease is most severe under warm moist conditions. Flowers blighted by other fungi such as *Botrytis* or those killed by frost will not feel slimy. Flowers affected by petal blight turn brown and remain attached to the plant. Small black resting structures called sclerotia will develop on the brown flower remains and will overwinter on the ground. Sclerotia can survive as long as two years in the soil and will start the infection cycle in the spring.

Management: The use of a systemic fungicide such as triadimefon (Bayleton, Strike) when the flower buds first show color will give adequate control for about four weeks. Other fungicides such as chlorothalonil (Daconil 2787) and Mancozeb (Dithane F-45) will give protection for 7 to 14 days depending on weather conditions. Fungicide sprays are not effective on buds not showing color or flowers that are already open. If you can, spot spray only the plants with buds at the proper stage to reduce the amount of fungicide needed to treat the entire planting several times.

Exobasidium Gall
Exobasidium spp.

While very noticeable, these galls will not threaten the health of the plant. This problem is more common during cool and wet spring weather. The first symptoms are swollen or puffy portions on newly expanding leaves, shoots, buds or flowers. The galls range in color from green, to pink or red depending on the part of the plant infected. As these galls age they develop a white surface growth which is a layer of reproductive spores. Eventually the infected tissue will turn brown and shrivel up into hard galls.

Management: Fungicide sprays are not effective for the control of this disease. Prevention strategies involve hand picking the galls off before they develop the white surface growth to reduce the incidence of disease next season.

Exobasidium Gall

Powdery mildew

Powdery Mildew
Microsphaera penicillata, M. vaccinoii, Sphaerotheca pannosa, Erysiphe cruciferarm

Young plants grown in heavy shade are the most seriously affected by this disease. Infected plants appear to be covered with a powdery white substance on the leaves. The disease is more severe during periods of cool, moist weather. These fungi produce spores on the surface of the infected leaves which are spread by wind currents to surrounding leaf tissue. These fungi overwinter in the bud scales for initiation of infection next season.

Management: Maintain proper plant spacing to ensure good air circulation. Registered fungicides include sulfer and triadimefon (Bayleton, Strike). Check the label registration on horticultural oil products for powdery mildew control listings.

Leaf Spots
Various Fungal Species
Botrytis cinerea, Pestalotia sydowiana, P. rhododendri, Septoria azaleae , Colletotrichum azaleae (Glomerella cingulata), Cercospora handelii, Phyllosticta cunninghamii, and *P. rhododendri.*

In general, most leaf spots are not threatening to the health of the plant. Although under severe conditions some defoliation can occur. The symptoms usually include discrete spots with tan to brown centers surrounded by a darker border.

Management: Strategies for disease prevention include pruning and removal of infected leaves, proper plant spacing to allow good air circulation, minimizing water on the foliage from overhead irrigation, removal of fallen leaves. Although fungicides are registered for disease control, they are not necessary in most situations.

Rust
Puccininastrum vaccinii

Of the six rusts in North America, the hemlock-blueberry rust, is the one most common in Maryland. This rust is only sporadically severe and typically infects deciduous azaleas. Symptoms are easily recognized by the brightly colored yellow-brown spores present in disease pustules on the lower or upper surfaces of leaves. Infected plants lose their leaves prematurely and show reduced growth. Other fungi may then attack weakened plants causing further injury. This rust also causes yellowing and leaf or needle drop on blueberry and hemlock.

Management: Prevention includes planting resistant varieties (see resistant plant list), removal of diseased leaves, proper plant spacing to maximize air circulation and selected use of fungicides only leaf loss is severe. Registered fungicides include sulfur and Bordeaux mixture.

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