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HOW TO IDENTIFY RHODODENDRON AND AZALEA PROBLEMS

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HOW TO IDENTIFY RHODODENDRON AND AZALEA PROBLEMS

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FOREWORD

Azalea and Rhododendron Culture

Both azaleas and rhododendrons belong to the genus *Rhododendron,* which is in the Ericaceae or heath family. Other members of the heath family include heaths, heathers, blueberries, mountain laurel, and andromeda (*Pieris*). Cultural needs of plants in the heath family are all somewhat similar.

Because of the diversity in the genus *Rhododendron,* it is impossible to give exact cultural requirements for each variety. There are some varieties which will tolerate temperatures to -25˚F, while others do not tolerate frost. Some varieties almost demand full sun, while others require full or partial shade. It is important to select the correct variety for a given set of environmental conditions. If the conditions do not suit a given variety, for example, if too wet, too dry, too cold, and/or too sunny, the plant will become stressed. Stressed plants are much more susceptible to damage from insects and diseases.

Another extremely important consideration is the soil in which the rhododendron is growing. It must be an acid soil with a pH range of about 4.5–6.0. If the pH of the soil is much above or below these figures, it should be adjusted. Secondly, the soil must be well drained. Insufficient drainage leads to root problems. Thirdly, the plants need ample moisture. Irrigation will be required in all areas of Washington in the summer. Finally, an organic mulch, such as sawdust, bark chips, or ground bark, is very beneficial to keep roots cool and moist.

The hardiness of a plant may be defined as the ability to withstand either cold or warm temperatures. If the plant can withstand rather cold temperatures it is said to be cold hardy, and if the plant can tolerate warm temperatures it is said to be heat hardy.

Hardiness ratings with minimum temperatures and a few examples of each hardiness group are listed below. There are many more within each group. (Check with a local grower or garden center for availability of varieties suited to your area.)

H-1—Hardy to -25˚F
(Probably hardy to many areas of eastern Washington)

America
Catawbiense Alba
Ignatius Sargent
R. mucronulatum (deciduous)
Nova Zembla
Pioneer (dwarf)
PJM (dwarf)
Ramapo (dwarf)
Roseum Elegans
Some of Exbury and Knap Hill deciduous azalea group

H-2—Hardy to -15˚F

Anah Kruschke
Cadis
Chionoides
Cynthia
Mrs. Furnival
R. impeditum (dwarf)
Many of the Gable hybrid azaleas
Lee's Dark Purple
Purple Splendor
Scintillation
Trilby
Vulcan

H-3—Hardy to -5˚F

Alice
Brittania
Cary Ann
Christmas Cheer
Crest
Jock
Lavender Girl
Loderi King George
Leo
Pink Pearl
Puget Sound
Rosamundi
Sappho

H-4—Hardy to +15˚F

Many, many varieties.

A little care in the selection of the proper variety for the given location and attention to the details of correct soil preparation will prevent many problems.

HOW TO IDENTIFY RHODODENDRON AND AZALEA PROBLEMS

This guide is based on general descriptions of plant problem categories which are listed below. Examine the plant carefully and determine which of the symptoms best describe the condition observed. Then look at the pictures and detailed descriptions until you identify the causes. When diagnosing plant problems, it is important to assess the plant's habitat. For example, note such things as exposure to sun, soil moisture over long periods, pesticide usage, fertilizers applied, or any other environmental condition you may observe. If the plant is not yours, ask the owner to summarize these growing conditions as thoroughly as possible. For specific solutions to correct maladies, refer to other publications or confer with a qualified plant diagnostician or individual who is knowledgeable about this plant group. Further information is available from Washington State University Extension offices in each county.

MISSING PORTIONS OF LEAVES

Root Weevils

Symptoms: Small, irregular or semicircular notches on leaf edges, sometimes running together into larger jagged notches (Fig. 1).

Cause: Adult root weevil (Fig. 2) feeding. Root weevils (*Otiorhynchus* spp. and others) normally feed at night. Their damage can be confirmed by checking plants at night with a flashlight for the presence of the weevils. Damage to leaves by weevil adults is not normally a serious threat to the plants, but heavy feeding results in an unsightly plant. Some chemicals are effective in controlling adult weevils on the plants (see EB0970), but chemical applications only prevent future notching. They cannot eliminate notching already present. These notches will remain until the leaf falls off. Also, many rhododendron and azalea varieties or species demonstrate considerable weevil resistance. Selecting resistant varieties will minimize maintenance and damage (Appendices A and B).

NOTE: Pesticides registered for root weevil control will normally reduce aphids and many other leaf feeding insects as well.

Fig. 1. *Adult root weevil notching.*

Fig. 2. *Obscure root weevil adult. Other weevils may also notch rhododendrons. These include black vine weevil, strawberry root weevil, woods weevil, and clay-colored weevil. Adults range from 1/4–1/2 inch long.*

Caterpillars

Symptoms: Large, irregular, chewed leaf areas.

Cause: Several species of caterpillars, cutworms, and loopers (Figs. 3–5). Many of these are nocturnal feeders and can be seen at night with the aid of a flashlight. When damage becomes too unsightly, or the plant is threatened, select a registered pesticide, or pick off the caterpillars and destroy them.

Fig. 3. *Rusty tussock moth caterpillars on rhododendron. These caterpillars can be seen feeding during the day. They often strip the leaves down to nothing. Caterpillars, cocoons, egg masses, or wingless gray females are signs of this insect. Caterpillars are approximately 1 inch long.*

Fig. 4. *Damage to rhododendron typical of climbing cutworms.*

Fig. 5. *A looper and its damage (similar to cutworm damage). Loopers may be up to 1 1/2 inches long depending on species.*

Sawflies

Symptoms: Leaves badly chewed, sometimes stripped down to midrib.

Cause: Sawfly larvae (not flies) belonging to the order *Hymenoptera*. These green caterpillar-like larvae blend with the leaves (Fig. 6). They can be seen during the day and are easily controlled with pesticides (when the larvae are present). They can also be picked off and destroyed without using chemicals if only a few plants are involved.

Fig. 6. *Sawfly larva damage. Note caterpillar-like insect in center of picture. Sawfly larvae 1/2–3/4 inch long.*

SPOTTING, DISCOLORATION, OR DEAD AREAS ON PLANT PARTS

Fig. 7. *Physiological leaf spot. Note diffuse blotches on leaves.*

Physiological Leaf Spot

Symptoms: Variously colored (generally dark purple), discrete or diffuse spots, discoloration and blotches occur on leaves as a result of environmental and cultural stress (Fig. 7). Some varieties (Mrs. G.W. Leak) are known for their spots.

Cause: Actual causes are not known. If the problem is severe or persistent, consider replacing the rhododendron with a more desirable variety.

Fig. 8. *Fungus leaf spot. Several species of fungi cause this disease.*

Fungus Leaf Spot

Symptoms: Spots are irregular in size and color (Fig. 8). Some have red-brown borders with silvery gray centers. Very small black dots (fruiting structures of fungi) are sometimes visible in the center of the spot or in concentric rings. These fungi commonly enter through wounds.

Cause: The fungi *Phyllosticta, Septoria, Pestalotia* are commonly the causal agents of this malady. Remove and destroy affected leaves. Spray with a registered fungicide after flowering and repeat at 10–14 day intervals until dry weather begins. It is usually advisable to apply a spreader-sticker with the fungicide to hold the fungicide on the leaves during rains.

Azalea Leafminer

Symptoms: Brown, blister-like mines on leaves. Leaves may be tightly rolled and skeletonized followed by premature leaf drop. Plants look thin and scraggly.

Cause: Azalea leaf miner, *Caloptilia azaleella,* (Fig. 9). Small yellowish caterpillars mine inside leaf tissues and later roll the leaves. Chemical controls may be used if the infestation is severe. If only a few leaves are involved, squeezing the insect within its mine may decrease damage to an acceptable level. Since the larvae pupate in leaf debris, rake and destroy the leaves in the fall. Do not compost.

Fig. 9. *Azalea leafminer damage.*

Rhododendron Leafminer

Symptom: A serpentine or fairly straight mine starting at the leaf edge and eventually going vertically to, into, or across the midrib causing all leaf tissue from that point to the tip to die.

Cause: Rhododendron leaf-miner (Fig. 10). Seldom causes enough damage to warrant control. Remove and destroy infested leaves.

Fig. 10. *Mine and damage of rhododendron leafminer (middle leaf).*

Fig. 11. *Marginal leaf necrosis.*

Fig. 12. *Marginal leaf necrosis. Plant shows symptoms on both tip and edges of leaves.*

Marginal Leaf Necrosis

Symptoms: Upper leaves brown, burned back (necrotic) from tips and/or edges toward the midrib or middle of the leaf (Figs. 11, 12).

Causes:

1. Cold damage occurs when temperatures dip to near or below the hardiness limit of the plant. May be accentuated by wind and drought, especially in eastern Washington.
2. Drought, especially while the plant is in active growth or the foliage is in soft growth, and on newly established plants.
3. High amounts of salts in the soil caused by excessive use of soluble fertilizers. Very common close to the house where the eaves protect soil from rain, and along the dripline of the house where salt (fertilizer) concentrations are high when the plant is in soft growth.
4. Root damage due to poor drainage, planting too deep, physical injury to root system, or disease.
5. Girdling due to weevil feeding on bark and/or roots.
6. Nutrient deficiency.

Iron or Manganese Deficiency

Symptoms: Marked yellowing (chlorosis) of leaf parts, primarily between veins of new leaves. The yellowing (from very pale yellow to intense bright yellow) will vary with severity of the symptoms and the cause (Fig. 13).

Causes:

1. An overly alkaline soil (should have a pH of 4.5–6.0).
2. **Lack of sufficient iron or manganese in the soil (uncommon).**
3. Lack of sufficient air space and/or lack of good drainage (soil constantly waterlogged or compacted).
4. **Excessive amounts of some herbicides may cause similar symptoms (see EB1048, *Leaf Scorch of Rhododendron*).**

Fig. 13. *Iron chlorosis at left, leaves on the right show probable manganese deficiency. (Note: notching on the leaves is from insect feeding and has nothing to do with mineral deficiency.)*

Fig. 14. *Sunscald on rhododendron leaves.*

Heat Damage

Symptoms: Brown, indistinct blotches of varying degrees, originating mostly on the central portions of the top leaves. Symptoms are usually more severe on the south and southwest side of the plant and on leaves oriented perpendicular to the sun.

Cause: Heat and/or sun scald symptoms develop rapidly after a hot spell with intense sunlight (Fig. 14). Plant a sun tolerant rhododendron or provide partial shade. Cooling the foliage with water on the hottest afternoons may help temporarily.

Fig. 15a. *Marginal yellowing and browning can indicate problems with the roots.*

Root Problems

Symptoms: Marginal yellowing of leaves; may be followed by browning (necrosis) (Fig. 15a).

Cause: Root problems are caused by poor drainage, disease, soil compaction, heavy clay soils, being buried too deep in planting hole, or by mulch buildup. Early symptoms include yellowing and wilting of new growth and irregular yellowing along margins of older leaves. Roots need abundant air spaces to function properly. (See Root Rots, page 24).

Fig. 15b. *Leaf yellowing caused by wet feet.*

Nitrogen Deficiency/Wet Feet

Symptoms: Overall yellowing of leaves, generally more prevalent on older or lower leaves (Fig. 15b).

Causes:

1. *Nitrogen deficiency.* Lack of nitrogen, or available nitrogen, tied up in decomposing organic matter, such as sawdust in the soil around the plant.
2. *Wet feet.* An early symptom of poor drainage is yellowing and wilting of newly emerging growth. If the plant is wilted and the soil is very wet, there is probably a root problem or insufficient air space and/or drainage in the soil.

Virus Diseases

Symptoms: Bright yellow to red-brown rings, spots, and blotches on rhododendron leaves. The patterns are distinct but margins of the patterns are vague.

Cause: Probably several different viruses involved (Fig. 16). They are not common and often are not severe. If severe, remove and replant with other varieties. Virus disease cannot be cured. Once a plant is infected, it remains infected.

Fig. 16. *Virus symptoms on rhododendron.*

Bud Blight

Symptoms: Flower buds turn brown and fail to open in the spring. Later, tiny black bristles cover their surface.

Cause: The fungus *Briosia azaleae* causes bud blight (Fig. 17). Remove and destroy (do not compost) affected buds. Fungicide applications are usually not necessary.

Fig. 17. *Bud blight. Note the tiny black bristles or spores on the bud surface.*

Fig. 18a. *Flower bud cold injury.*

Fig. 18b. *Flower bud cold injury. Note differential bud development with shriveled buds.*

Cold Injury/Buds

Symptoms: Flower buds turn brown and fail to open, or only partially open. If they open, only some of the flowers develop, while the underdeveloped flowers turn brown (Figs. 18a, 18b).

Cause: Freezing temperatures in late fall, winter, or early spring. Replant with a more hardy variety if problem occurs regularly.

Fig. 19. *Frost damage to newly emerged shoots.*

Frost Injury/New Growth

Symptoms: Newly emerged growth killed or partially killed in the spring of the year. Most of the damage is to the top of the pant. Severity of symptoms vary with cultivar and species. Partially affected leaves will eventually be distorted (Fig. 19).

Cause: Late spring frost. Newly emerged leaves and stems are not as hardy as older foliage and stems. Varieties which start to grow early are more susceptible.

Leaf Senescence

Symptoms: Older leaves (1–2 years old) will turn yellow and/or brown and fall off the plant (Fig. 20).

Cause: Like all evergreens, rhododendrons eventually lose their leaves one, two, or more years after they first emerge. When older leaves turn yellow and/or brown and fall off in large numbers, this is usually normal leaf senescence. Some varieties will lose their older leaves just before the onset of winter, and some varieties will lose their leaves during summer drought periods. This is normal.

Fig. 20. *Normal leaf senescence.*

Normal Bark Development

Symptoms: Emerging rhododendron shoots are, for a period of time, very green. They eventually turn brown (bark color). Where this color change takes place on the stem there is usually a sharp contrast between the green and the brown (Fig. 21).

Cause: Normal development. However, the contrast between new and old bark sometimes leads people to think a disease is involved.

Fig. 21. *Normal bark development.*

Fig. 22. *Yellow speckling caused by rhododendron lacebug.*

Lacebug

Symptoms: Leaves show a yellowish speckling on the top surface (Fig. 22). Brown and black tar spots are present on the underside of the leaf.

Cause: Rhododendron lacebug, *Stephanitis rhododendri,* (Fig. 23). When speckling become apparent, control is advised. Most materials registered for root weevils also control lacebugs.

Fig. 23. *Adult lacebugs. Note the fecal drops or "tar" spots on leaf. Rhododendron lacebug is approximately 1/8 inch long.*

Chemical Injury

Symptoms: A variety of leaf discolorations that do not fit well into previously listed symptoms. These are often attributed to chemical burn (Figs. 24, 25a, b).

Cause: Herbicides and other chemicals. The plant diagnostician must also be a good detective and ask the right questions. People are often reluctant to admit to chemical misuse or are simply unaware of the effects of such chemicals as roof preservatives, demossing chemicals, paint thinners, or herbicides on ornamental plants.

Fig. 24. *Chemical injury to leaves (possibly herbicide).*

Fig. 25a. *Chemical injury. In this case, pentachlorophenol drift from nearby roof. Damage is on older leaves but not on new leaves. May indicate treatment occurred two or three years earlier and is only now being noticed.*

Fig. 25b. *An overzealous application of Casoron (Dichlobenil) resulted in interveinal and marginal yellowing.*

Fig. 26. *Leafroller damage. Leafroller larvae about 1/2 inch long.*

Leaf Roller

Symptoms: Leaves rolled, webbed, and chewed (although significant chewing may not yet be apparent at the time of observation).

Cause: Several species of leafroller caterpillars (Fig. 26). If damage is significant, then a registered pesticide may be applied. Be sure the chemical gets into the "rolled" leaves or control may not be complete. Look carefully for the caterpillars, or at least their damage. Harmless spiders sometimes web leaves together, but they do not chew leaves.

Fig. 27. *Drooping rolled leaves caused by cold weather.*

Cold Response/Leaves

Symptoms: Drooping, rolled leaves (Fig. 27) in winter.

Cause: Some rhododendrons will have curled leaves (rolled towards the bottom of the leaf) due to cold weather. This will vary with the species or variety. It is a normal reaction of the plant which serves to minimize damage, and the leaves will recover with warmer weather. In summer, such symptoms can be a sign of root rot or extreme lack of water.

Azalea Leaf Gall

Symptoms: On **azaleas,** light green, fleshy, bladder-shaped galls appear on new leaves in late spring and early summer. The galls change from red to brown, become hard, and are covered with a powdery white bloom. On **rhododendrons,** leaves may be entirely or partially chlorotic (often bleached to a creamy off-white or pinkish color) and may be somewhat thickened. Partially affected leaves have a distinct line between the healthy green and the chlorotic tissue. A white fungal growth develops on the underside of the leaves. A rosette of affected leaves may occur at the ends of branches. Blossoms and seed pods can also be affected.

Cause: Azalea leaf gall (Figs. 28, 29). The fungus *Exobasidium vaccinii* is responsible for this disease. Remove and destroy affected leaves. Spray with registered fungicide just prior to bud break and repeat two or three weeks later.

Fig. 28. *Azalea leaf gall on azalea.*

Fig. 29. *Azalea leaf gall on rhododendron.*

Aphids

Symptoms: Leaves, particularly new growth, appear twisted, puckered, or curled (Fig. 30).

Cause: Several species of aphids. Either the aphids or their cast skins can be found on the leaves, usually on the undersides. A sticky, shiny material called honeydew is deposited by the aphids onto the plant. Honeydew deposits offer a medium for black sooty mold, which may also be present. Late frost damage on newly emerged leaves is similar, except that the insects and/or cast aphid skins will not be present. Varieties which start to grow early (such as Christmas Cheer) are susceptible to late frost damage.

Fig. 30. *Twisted, puckered new growth on rhododendron caused by aphid feeding. If you examine the photograph carefully, you will see the white cast skins of the aphid.*

POWDERY, GRANULAR, OR OTHER UNUSUAL MATERIAL ON LEAVES AND/OR STEMS

Rust

Symptoms: Light green to yellow, small, diffuse spots randomly distributed on the leaf. Associated with spots on the underside of the leaf are pustules producing yellow to orange powdery spore masses. Later in the season, dark brown spores are produced in these pustules.

Cause: The fungus *Chrysomyxa ledi* is the most common cause of rust in the Pacific Northwest (Fig. 31). Sitka spruce is the alternate host. To avoid this problem, use resistant varieties. Avoid planting Sitka spruce in close vicinity. Preventative applications of a registered fungicide may be necessary when rust continues to be a yearly problem.

Fig. 31. *Rust on rhododendron.*

Powdery Mildew

Symptoms: Leaves may be off-color, and are covered with fungus growth which is often powdery. Black pepper-sized structures of the fungus (cleistothecia) are visible later in the season. Plants in the shade may show more symptoms.

Cause: The fungus *Microsphaera azalae* causes this disease (Fig. 32a). To reduce the incidence of this disease, rake up and destroy fallen leaves. Spray with a registered fungicide at the first sign of disease.

Fig. 32a. *Powdery mildew on rhododendron.*

Fig. 32b. *Powdery mildew symptoms on upper leaf surface seen on some rhododendron varieties.*

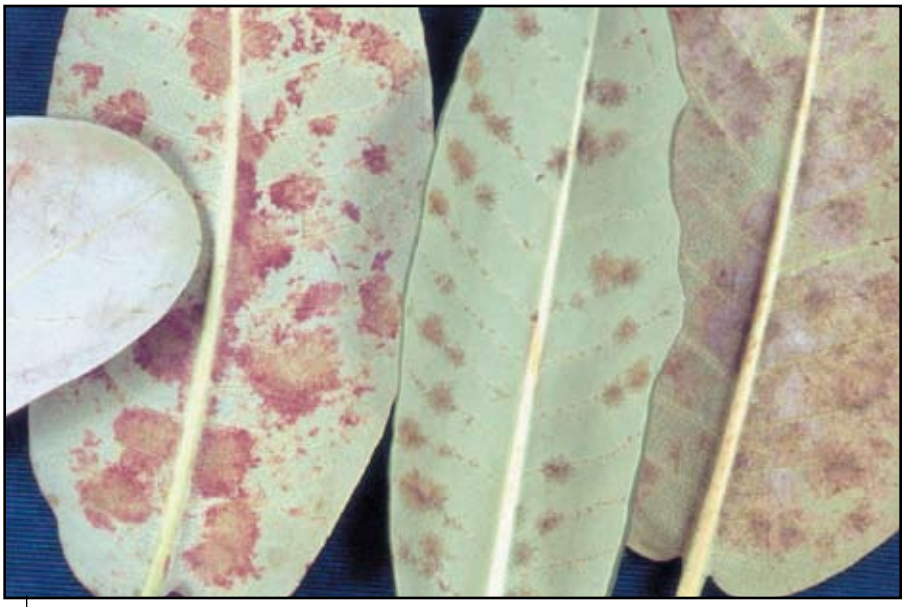

Fig. 32c. *Lower leaf surface of rhododendrons showing diversity of powdery mildew symptoms.*

Powdery Mildew

Symptoms: Some rhododendrons have unusual symptoms and lack the white powdery appearance typical of powdery mildew diseases. The most common symptoms are diffuse yellow spots on the upper leaf surface and various discolored areas on the lower surface. (Figs. 32b, c). Other varieties may show purple-brown spots, purple ring spots, or purple discoloration along the leaf veins. Infected leaves may drop prematurely.

Cause: The fungus *Microsphaera azalae* causes this disease. To control, rake up and destroy fallen leaves, and spray a registered fungicide at first sign of disease and continue applications during periods favorable for disease. Plant resistant varieties.

Sooty Mold/Bark Scale

Symptoms: A black sooty growth is present on the leaf surfaces and bark, which is easily wiped off. It is associated with aphid or other sucking insect activity, either on the plant or on trees or shrubs overhead.

Cause: Sooty mold (Fig. 33). Sooty mold is the fungus which develops on the honeydew excreted by sucking insects. Control of these insects will eliminate the problem. Sooty mold can be partially washed off with water.

Symptoms: Plant appears thin and unthrifty and sooty mold is often present (see EB1051). Small white cottony masses are present on the bark (Fig. 33).

Cause: Azalea bark scale, *Eriococcus azaleae.* Certain insecticides will control this pest if applied when crawlers (newly hatched nymphs) are present.

Fig. 33. *Azalea bark scale. Sooty mold is also present (on bark). Pink eggs and young crawlers are present in the scale that has been broken open.*

Lecanium Scale

Symptoms: Plant appears thin and unthrifty; sooty mold is often present. Tortoise-like bumps (soft) are present on the bark. The "bumps" may be brown or marbled white and brown (Fig. 34).

Cause: Lecanium scale, *Lecanium spp.* If infestation is severe or plant is showing signs of stress, chemical control will be necessary (see EB0746).

NOTE: Oystershell and possibly other scales may also attack this plant group.

Fig. 34. *Lecanium scale.*

Indumentum

Symptoms: A matted wooliness is present on the surface of the leaves (often the underside) or the twigs. The hairs range in color from white to a very bright tan-brown or rusty brown.

Cause: Indumentum (Fig. 35). The woolly hairs are normal (and often the prized feature) of some species and varieties of rhododendrons.

Fig. 35. *Indumentum, a normal phenomenon which in this case the brown fuzziness is on underside of the leaves. Other types of indumentum may be nearly white.*

Lichens

Symptom: Yellow, gray, green, orange, or black fleshy or papery growth on bark.

Cause: Lichens are a fungi/algae association which use the bark as a growth site, not a feeding site. They can be controlled chemically, if desired, for appearance. Although often associated with spindly, unthrifty plants, lichens cause no damage to the plant (Fig. 36).

Fig. 36. *Lichens. Note yellow and gray growths on stems. Leaves are exhibiting normal fall color of a deciduous azalea.*

Algae

Symptoms: Green felt-like material on leaf surfaces, which can be rubbed or scraped off.

Cause: Algae (Fig. 37) cause no apparent injury to plant, mostly a concern of unsightliness.

Fig. 37. *Algae on rhododendron leaves.*

DIEBACK, TOTAL DECLINE, OR POOR PERFORMANCE

This category is a "catch-all" and may overlap with other categories. Hopefully, you have had the opportunity to observe the plant earlier in its decline, have seen it at its planting site, or have a thorough knowledge of the maintenance (or lack of maintenance) program. Some of the causes of such symptoms follow.

Fig. 38. *Crown girdling by root weevil larvae.*

Crown Girdling

Crown girdling or root feeding: Plants appear unthrifty with no apparent symptoms on foliage except full or partial loss of color in the leaves. Over time, plant declines and dies. This can be the result of root weevil larvae feeding on the roots or base of the plant. The legless, cream colored, C-shaped larvae live in the soil and feed on the small roots through the winter. In the spring, they attack larger roots and may even girdle the plant (by chewing away bark) just below the soil or mulch line. A girdled plant may still get some water and nutrients to the leaves, so the death process is prolonged. Look for a poor root system, girdled crown (Fig. 38), or white larvae in the soil (Fig. 39).

Fig. 39. *Root weevil larvae. These are the larvae of the same group of weevils that notch the leaves.*

Root Rot and Stem Diseases

Root rots: Leaves (Fig. 40) wilt (roll downward), turn yellow, and eventually the plant dies. Dead leaves remain attached to the plant. Small, fibrous roots rot first. Rot progresses to large roots, and finally, the entire root system and lower stems develop a brown discoloration. The fungus *Phytophthora cinnamomi* is a common cause of root rot, but other species of *Phytophthora* and other fungi can also be responsible. Poorly drained soil can also be responsible as roots suffocate in water and are then invaded by rot organisms. Remove and destroy infected plant. Do not replant into the same hole. To avoid root rots, provide good soil drainage, maintain proper nutrition and soil pH, and purchase healthy plants from reputable outlets. Several effective fungicides are available for use in greenhouses and nurseries.

Stem diseases: In contrast to root rots, where the entire plant is affected, diseases causing stem dieback usually only affect some of the twigs and branches, while others will appear normal. Two fungi, *Phytophthora* and *Botryosphaeria*, are common causes of this problem. Reddish brown to black sunken cankers develop and girdle the stem. Leaves and stems above the canker wilt and die. Diseased stems should be pruned out well below the cankered area. The prunings should be destroyed and the pruning shears disinfected. Applications of an appropriate fungicide may also be helpful.

Broken branches: Branches are sometimes accidentally broken by animals or people, resulting in dead spots in the plant canopy. Look closely at such symptoms to be certain the cause is properly diagnosed.

Mountain beaver: These rodent-like creatures are burrowers and occasionally eat away part or all of the subterranean portion of the plant. They are also inordinately fond of rhododendrons and will cut off branches and drag them back to their burrows. The branches may also be left near the plant of origin. Trapping for these destructive animals is the only way to avoid further plant and landscape damage.

Small leaves: Small rhododendron leaves are common on plants suffering from cultural or environmental stress. Although leaves may look fairly normal, compare them to the leaves of previous years. They may be smaller or less green, a sign that the plant needs attention. Sometimes the newer leaves are bigger than in past years, which indicates there has been a past problem and the plant is recovering.

Fig. 40. *Root rot response. Could be mistaken for cold injury, so be certain to check all aspects mentioned in text.*

Planted too deep: If rhododendrons are planted too deep, the symptoms on the plant will be similar to lack of drainage with reduced top growth, smaller yellow leaves, and a possibility of developing root rots. Frequently, shrubs planted at the proper depth (crown even with the soil) will sink lower as the loosened soil in the planting hole begins to settle. Adding mulches year after year may also bury roots too deep.

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GLOSSARY

Algae—low forms of plant life that never form true roots, leaves, or stems.

Chlorosis—yellow coloration usually resulting from reduced development or loss of chlorophyll.

Crawlers (young)—the mobile nymphal stage of certain insects, such as scales, mealybugs, etc. Later nymphal stages become somewhat or completely immobile.

Crown—the junction of major roots and stem.

Fungi—small plants that are unable to produce their own food because they lack chlorophyll. They feed on living or dead plants and animals, resulting in disease or decay.

Fungicides—chemicals that prevent or retard fungal development.

Girdling—an encircling destruction of a plant stem or root, resulting in restrictive flow of water and nutrients.

Herbicides—specialized chemicals that kill plants.

Honeydew—name given to the excretory material of aphids and many other sucking pests.

Hymenoptera—order of insects that includes the bees, ants, wasps, and sawflies.

Larva—the immature stage of insects possessing an egg—larval—pupal—adult progression. Example: caterpillars.

Mine—the condition seen after an insect (usually the immature stage) feeds between the epidermal (surface) tissue of leaves or just under the bark.

Necrotic—dead or dying (usually in reference to tissue).

Nymph—the immature stage of insects possessing an egg—nymph (young adult)—adult progression. Example: grasshoppers.

Pentachlorophenol—a chemical frequently used on structures (fence posts, etc.) to retard or prevent the growth of fungi or other plant life.

pH—a measurement relating to the acidity (low pH) or alkalinity (high pH) of a medium such as soil or water.

Pustules—a blister-like disruption on a plant surface containing fungus spores.

Registered insecticide—a chemical that is registered by a company with the federal government for killing *specific* insects on *specific* plants. The word *registered* implies specific pest and host and may also precede *fungicide* or *herbicide*.

Spores—minute reproductive bodies produced by fungi and some other plants.

Symptoms—abnormal appearances of a plant.

Virus—submicroscopic infective particles which can only multiply in living cells, often detrimental to these invaded cells.

APPENDIX A

Species Rhododendrons Showing Resistance to Feeding by Adult Root Weevils

Species	Series	Possible Blossom Colors	Rating*
heliolepis	Heliolepis	white, rose	100
impeditum	Lapponicum	purplish blue	100
scintillans	Lapponicum	purplish blue	100
burmanicum	Maddenii	yellow to greenish white	100
dauricum	Dauricum	lavender-rose	97
intricatum	Lapponicum	mauve	97
minus	Carolinianum	rose, white	93
desquamatum	Heliolepis	rose, violet	93
ferrugineum	Ferrugineum	rose, white	93
hemsleyanum	Fortunei	white	93
cuneatum	Lapponicum	rose	90
fastigiatum	Lapponicum	lilac, purple	90
yakusimanum	Ponticum	white, rose	90
ungernii	Ponticum	white, pale pink	83
rubiginosum	Heliolepis	pink, rose	83
irroratum	Irroratum	white, ivory, rose	83
racemosum	Virgatum	white, rose	80
russatum	Lapponicum	blue-purple	80
carolinianum	Carolinianum	pink, rose, white	80
oreodoxa	Fortunei	rose, white	80
oreotrephes	Triflorum	mauve, purple, rosy red	77
vernicosum	Fortunei	white, rose	77
adenophorum	Teliense	rose	77
campylogynum	Campylogynum	pink, purple, crimson	77
xanthocodon	Cinnaborinum	ivory, yellow	77
diaprepes	Fortunei	white, pale rose	73
pubescens	Scabrifolium	white, rose	73
lepidastylum	Trichocladum	pale yellow	73
pemokoense	Uniflorum	lilac-pink	73
arizelum	Falconeri	white, yellow, rose, crimson	73
glaucophyllum	Glaucophyllum	white, rose	73
decorum	Fortunei	white, pink, chartreuse	73
cardiobasis	Fortunei	white, rose	73
praestans	Grande	magenta-rose, pink	73
hippophaeoides	Lapponicum	lilac, rose	73
eurysiphon	Thomsonii	ivory, rose	73
imperator	Uniflorum	pink, rose	70
concatenans	Cinnaborinum	apricot, yellow	70
yunnanense	Triflorum	white, lavender, pink	70
ciliatum	Maddenii	white, rose	70
discolor	Fortunei	white, pink	70
davidsonianum	Triflorum	white, pink, rose	70

*The higher the number, the less feeding is expected. A 100 rating indicates complete resistance.

APPENDIX B

Hybrid Rhododendrons Showing Resistance to Feeding by Adult Root Weevils

Hybrid	Possible Blossom Colors	Rating*
P.J. Mezzitt (P.J.M.)	pink	100
Jock	pink	92
Sapphire	blue	90
Rose Elf	white, flushed violet-pink	89
Cilpinense	white	88
Lucky Strike	deep salmon-pink	83
Exbury Naomi	lilac tinged yellow	81
Virginia Richards	Chinese yellow with crimson blotch	81
Cowslip	cream, pink	80
Pride of Leonards lee (Luscombei)	rose-pink	80
Vanessa	soft pink	80
Oceanlake	deep violet-blue	80
Dora Amateis	white, lightly spotted green	79
Crest	yellow	79
Rainbow	carmine-pink	76
Point Defiance	pink	76
Naomi	pink	76
Pilgrim	rich pink	76
Letty Edwards	yellow	76
Odee Wright	yellow	76
Moonstone	yellow	73
Lady Clementine Mitford	pink	72
Candi	bright rose	72
Graf Zeppelin	bright pink	71
Snow Lady	pure white	71
Loderi Pink Diamond	delicate pink	71
Faggetter's Favourite	cream with pink	70

*The higher the number, the less feeding is expected. A 100 rating indicates complete resistance.

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College of Agricultural, Human, and Natural Resource Sciences

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