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COMMON PROBLEMS OF MOUNTAIN LAUREL

Mountain laurel, *Kalmia latifolia*, is a native plant and the state flower of Connecticut. There are several diseases that commonly occur on mountain laurel in landscapes and nurseries throughout the state every year. These include fungal leaf spots and blights, winter injury, drought injury, and chlorosis. The occurrence and severity of these diseases are influenced by many factors, including the severity of infection and amount of overwintering inoculum from the previous year, the weather at the time of leaf emergence, cultural practices, and the species or cultivar planted.

FUNGAL LEAF SPOTS AND BLIGHTS

Causal Agents: Several genera of fungi are associated with leaf spots (e.g., *Cercospora*, *Phyllosticta*, *Septoria*) and leaf blights (e.g., *Phomopsis*).

Symptoms: Symptoms of leaf spots and leaf blights usually develop on current season foliage of mountain laurel in mid to late summer. However, in rare cases, infections may not be visible until the following winter or spring after infection. Leaf spots appear as dead areas of tissue scattered over the surface of the leaf. They usually have distinct margins that are often darker than the brown, black, tan, or reddish centers. Spots are usually visible on both upper and lower leaf surfaces (Figures 1 and 2). However, the spots can vary in size from pin-head to those that are more diffuse or even coalesce over the entire leaf. Small, black fruiting bodies may be visible in the spots (Figure 3).

Figure 1. Fungal leaf spot of mountain laurel.

Figure 2. Characteristic leaf spots with distinct margins and tan centers.

Figure 3. Close-up of small fruiting bodies of the fungus in the leaf spot lesion (arrows).

Tan masses of fungal spores can sometimes be seen oozing from the black fruiting bodies after periods of wet weather. These tendrils consist of masses of individual fungal spores that are readily wind- or rain-driven to newly emerging leaves in spring.

Leaf blights have different characteristics than leaf spots. In particular, the brown lesions are larger than leaf spots and have a zonate pattern (Figures 4, 5, and 6). The lesions also often develop along the leaf margin or tip of the leaf. When they coalesce, the entire leaf turns brown and drops.

Management: Fungal leaf spots and blights can be managed using a variety of strategies. They are rarely serious enough to warrant chemical control and are often effectively managed by following good sanitary and cultural practices. In fall, it is important to rake and remove fallen leaves from the vicinity of the shrub since many of the leaf-spotting fungi overwinter on fallen leaves and plant debris. This practice reduces the number of spores available to infect emerging leaves in spring.

It is also important to follow sound cultural methods that promote plant vigor. These include proper watering, fertilizing, and mulching, and appropriately timed pruning, and managing insects, particularly the black vine weevil. Leaf spots and blights are most severe under crowded and shaded conditions.

Figure 4. Symptoms of leaf blight appear as large, brown blotches that can involve large portions of the leaf.

Figure 5. Blotchy, necrotic lesions associated with leaf blight.

Figure 6. Diagnostic zonate pattern associated with leaf blight. Note the small black fruiting bodies visible in the lesion (arrows).

Differences in susceptibility to leaf spots have been reported for some cultivars of mountain laurel. Among cultivars with good resistance to leaf spots are Carousel, Carol, Nathan Hale, Olympic Fire, and Pinwheel.

In some cases, leaf spots and blights can become serious and result in injury (i.e., branch and twig dieback) or even plant death. This is especially problematic on new transplants or on weakened or stressed plants. In such cases, chemical control is often necessary, especially in cool, wet springs. Several fungicides are registered for use in Connecticut, including thiophanate-methyl, chlorothalonil, and mancozeb. Organic options include sulfur and copper compounds. Several biological products can also be used as protectants. These include *Trichoderma harzianum* Rifai strain KRL-AG2, *Streptomyces griseoviridis* strain K61, and *Bacillus subtilis* strain QST 713 may be effective as protectants. The pesticide labels contain information for use, including specific plant hosts and diseases, dosage rates, and safety precautions. Since most leaf-spotting fungi infect in spring as new leaves are emerging, the first fungicide spray is usually applied at bud break. Additional applications may also be necessary in unusually wet springs. When symptoms are visible on the new leaves, it is usually too late for effective chemical control.

WINTER INJURY

Causal Factors: This abiotic disorder can be attributed to diverse factors that include sudden temperature fluctuations, excessive or late season fertilization, lack of snow cover, drying winds, and late spring frosts. The most common type of winter injury on mountain laurel is excessive drying. This occurs when a water deficit develops in the plant--water lost through the leaves is not replaced because the roots cannot absorb enough water from cold or frozen soil.

Symptoms: Winter injury or winter drying of mountain laurel commonly occurs on plants growing in both wind-swept and sheltered locations. Symptoms often do not show up immediately after the damage has occurred, but might appear months later. Symptoms can develop on one or two individual branches or on the entire shrub (Figure 7). Winter injury also predisposes affected plants to secondary invaders or opportunistic pests.

Symptoms can appear as tip or marginal browning of leaves, dieback of twigs and branches, and desiccation of growing tips or twigs. Water evaporates from the leaves on windy or warm, sunny days and cannot be replaced since the water in the soil is still frozen or unavailable to the plant roots. Plants that have been recently transplanted and lack well-developed or established root systems are most susceptible to winter injury, as are established shrubs of all sizes and ages growing in full sun or whose root systems are predisposed and damaged by excess water or drought.

Figure 7. Winter injury symptoms on an established mountain laurel.

Management: Winter injury does not generally contribute to long-term issues with plant health. However, it can be disconcerting, because of the eye-catching damage that can occur. It can also be stressful when it occurs on new transplants or when damage occurs for several consecutive years. While there is no cure for this physiological disorder, there are steps to help minimize its effects. These include selecting an appropriate site for planting and maintaining plant vigor by following sound cultural practices. Deep watering the plants before the ground freezes in the fall and mulching around the base of the plant can provide and maintain sufficient moisture in the root zone. Fertilizing at the proper time and rate can be helpful, especially avoiding late summer and early fall fertilization, which encourages growth that does not harden off properly for winter conditions. Good sanitation is also helpful, by pruning out dead, dying, or damaged branches in spring to minimize potential problems with secondary invaders and opportunistic pests. For new transplants and plants in exposed locations, providing physical protection from water loss and drying winds can be helpful. Burlap wraps and sprays of anti-transpirants or anti-desiccants can be effective.

DROUGHT INJURY

Causal Factors: This abiotic disorder is caused by the absence of rainfall for a period of time long enough to deplete the soil of available moisture and cause damage to plants.

Symptoms: Although mountain laurel is sometimes listed as tolerant to drought, it is often affected by drought, especially when plants are growing in thin soils with limited organic matter. Symptoms include loss of turgor in leaves, drooping, wilting, yellowing, premature leaf drop, bark cracks, and twig and branch dieback (Figure 8).

Figure 8. Naturally occurring mountain laurel with very sparse canopy and symptoms of wilt and dieback associated with drought.

Drought has primary physical effects, which include direct damage to the roots and root death, especially of non-woody feeder roots and root hairs. This results in the loss of root function, which creates a water deficit

in the plant. Drought also has significant secondary physical effects whereby plants are weakened and pre-disposed to secondary invaders and opportunistic pests such as winter injury, root rots, and insects. Drought is also associated with increased problems with transplant failures.

In addition to direct (physical) damage to the root system, drought triggers metabolic changes in the plant. Among these are changes in hormone levels and other physiological factors (e.g., factors that influence the number of leaves that will emerge the next year or that are responsible for the closing of stomates).

The effects of drought often do not show up until after the damage has occurred, sometimes as much as one year later. Symptoms can develop on one or two individual branches or on the entire shrub.

Mountain laurels that have been recently transplanted and lack well-developed or established root systems are most susceptible to drought, as are established shrubs of all sizes and ages whose root systems are predisposed and damaged by excess water or poor planting.

Management: Drought, like winter injury, does not generally contribute to long-term issues with plant health. However, it can be stressful when it occurs on new transplants or when drought conditions occur for several consecutive years. While there is no cure for this physiological disorder, there are steps to help minimize its effects. These include selecting an appropriate site for planting and maintaining plant vigor by following sound cultural practices. Watering in periods of low soil moisture and mulching around the base of the plant can provide and maintain sufficient moisture in the root zone. Most plants need about 1 inch of water per week. For most soil types, water is best applied at one time as a slow, deep soaking of the entire root zone to a depth of approximately 12-18 inches. The length of time required to "deep-water" will vary with soil type and water pressure: clay soils usually require more time than sandy soils. Frequent, light, surface watering will ***not*** help the plant and can actually cause harm by promoting growth of surface roots. A deep soaking just before the ground freezes in the fall will also help the winter hardiness of drought-stressed mountain laurels.

Good sanitation is also helpful, and consists of pruning out dead, dying, or damaged branches in spring to minimize potential problems with secondary invaders and opportunistic pests.

CHLOROSIS

Causal Factors: This physiological disorder occurs when mountain laurel grows in soils with pH levels above 6.0-6.5. This results in iron chlorosis and micronutrient deficiencies.

Symptoms: Mountain laurel growing in naturally alkaline soils, near new cement walls or foundations, or in heavy or poorly drained soils often develops chlorotic or yellowed leaves. Under the former two conditions of high soil pH, plants are unable to absorb iron. This results in a deficiency that leads to yellowing or interveinal chlorosis--where the leaf veins remain green and the area between the veins turns yellow. These symptoms usually develop on the youngest foliage first. Iron is not necessarily deficient in the soil—it may be there, but just in an unavailable form for absorption through the root system as a result of the soil pH.

Figure 9. Chlorotic leaves appear pale green to yellow, but the veins remain green.

Management: This physiological disorder can usually be corrected by treating the soil with an iron chelating compound or by lowering the soil pH (to pH 5.5 or below) using soil amendments such as sulfur, iron sulfate, or ammonium sulfate. These amendments must be thoroughly incorporated into the root area in order to be effective. Therefore, it is very helpful to have the soil tested prior to planting; this will also provide information on rates for the amendments. Leaf chlorosis can be temporarily remediated by spraying the foliage with iron compounds such as iron sulfate, iron chelate, and soluble organic iron complexes.

Under conditions of heavy or water-logged soils, leaves yellow because plants are unable to absorb nutrients because the feeder roots have been damaged by excessive soil moisture and lack of oxygen. This condition is often irreversible, especially if damage is extensive. However, if the problem is recognized early, efforts to improve soil texture and drainage can promote root health and improve root function.

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