Turfgrass disease identification guide

syngenta®

Contents

Contents continued

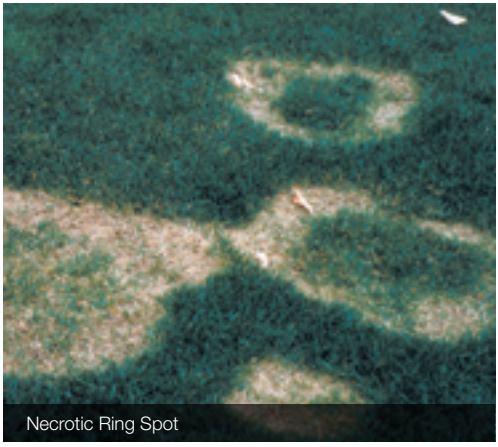
Syngenta would like to acknowledge the following individuals for their contribution to the development of this turf guide: **Pete Dernoeden** PhD, University of Maryland USA, and **Bruce Clarke** PhD, Rutgers University USA.

Necrotic Ring Spot

Causal Agent:
Ophiosphaerella korrae
formerly known as Leptosphaeria korrae

Susceptible Turfgrass:
Kentucky Bluegrass, Annual Bluegrass, Rough Bluegrass, fine-leaf Fescue

Symptoms:
Necrotic ring spot first appears as small light green spots and progresses to thinned, circular patches that are yellow to light-green in colour and approximately 8 to 40 cm in diameter. The patches, which can expand up to 1 metre in diameter, eventually turn brown or straw-coloured and die. The roots and rhizomes of the affected turfgrass turn brown to black. Grass plants can survive and recolonise the centre of the patches, which leads to a ring-like appearance.



Necrotic Ring Spot

Necrotic Ring Spot continued

Conditions Favouring Disease:

Necrotic ring spot initiates in moist soil, thrives in temperatures of up to 27°C and becomes more severe in higher temperatures and drought conditions. Seeded sites, as well as sodded sites in newly cleared woodlands, are susceptible to this disease. It is also found in areas with compacted soil and that are high in nitrogen during the Spring and Summer.

Integrated Turf Management Tips:

- Raise mower height
- Reduce soil compaction through aerification and use of lightweight equipment
- Use moderate to high amounts of phosphorous and potash
- Maintain adequate nitrogen and a balanced fertility
- Minimise the amount of shade
- Lightly irrigate (approximately 2.5 mm) in the mid-afternoon on a daily basis to cool plants
- Avoid drought stress
- Top-dress and aerate turf as needed
- Reduce thatch
- Overseed with Perennial Ryegrass or more tolerant Bluegrass cultivars
- Apply penetrant fungicides on a preventive basis

Approved product:

Heritage® Fungicide

Spring Dead Spot

Causal Agent:
Ophiosphaerella korrae, *Ophiosphaerella sp.* formerly known as Leptosphaeria sp.

Susceptible Turfgrass:
Bermudagrass, Buffalograss and Kikuyugrass

Symptoms:
Infected Bermudagrass and Kikuyugrass shows disease symptoms as it emerges from Winter dormancy. Spring dead spot appears as bleached, straw-coloured, circular patches that measure up to several feet in diameter. The roots of affected plants turn dark brown to black.

Spring Dead Spot

Spring Dead Spot continued

Conditions Favouring Disease:
Spring dead spot favours cool, wet weather in the Spring and Autumn and daily temperatures of less than 16°C in May. This disease is typically found where thatch is more than 1.2 cm thick and in locations with poor drainage and low potash levels. Heavy applications of nitrogen in late Summer often increase disease severity the following Spring. Spring dead spot is more severe on Bermudagrass that is over three years old and in locations with long dormancy and cold temperatures.

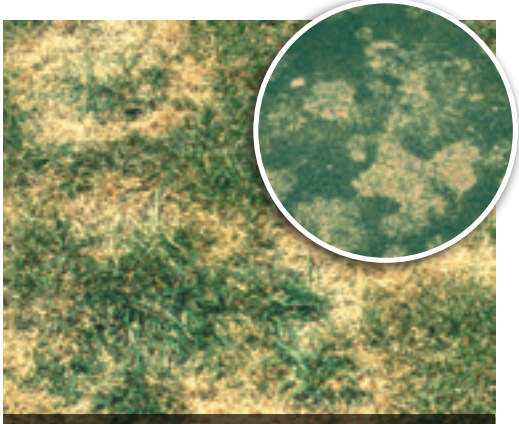
Integrated Turf Management Tips:
- Avoid late Summer or Autumn applications of nitrogen fertilisers which may enhance disease severity
- Use ammonium sources of nitrogen combined with potassium for fertiliser from Spring through early August
- Control weeds in affected turf to enhance recovery from Spring dead spot
- Apply moderate to high levels of phosphorous, potash, and minor elements
- Improve drainage of turf
- Reduce thatch
- Convert from common varieties to hybrid Bermudagrass with good Winter hardiness
- Use preventive fungicide applications in late September or October

Summer Patch

Causal Agent:
Magnaporthe poae

Susceptible Turfgrass:
Annual Bluegrass, Kentucky Bluegrass, and fine-leaf Fescue

Symptoms:
Summer patch appears as circular or irregularly shaped patches that measure from several inches to several feet in width. Initially, patches appear as slow-growing thinned or wilted turfgrass. Mature patches are brownish-yellow to straw-coloured and can coalesce as they increase in size. The leaves of the plant turn yellow to brown from the tip to the base. The roots turn moderate to dark brown. Summer patch can exhibit a ring-like appearance where a less susceptible grass species survives inside the diseased patch.



Summer Patch as seen from 3 m and 6 m (top)

Summer Patch continued

Conditions Favouring Disease:
Root infection is initiated when soil temperatures exceed 18°C; however, foliar symptoms of Summer patch are favoured by temperatures over 29°C during the day and over 21°C at night. It is also commonly found in areas that are sunny, exposed, and with high soil moisture, high soil pH, compaction, poor drainage, and low mowing height. This disease is typically more severe in turfgrass that has been fertilised with nitrate-nitrogen.

Integrated Turf Management Tips:

- Use acidifying fertilisers
- Increase the height of cut
- Reduce soil compaction through aerification and use of lightweight equipment
- Syringe when the temperature is over 29°C
- Improve the drainage of the turf
- Convert to resistant species, such as tall Fescue, Bentgrass, or Perennial Ryegrass
- Apply fungicide preventively in Spring

Approved product:

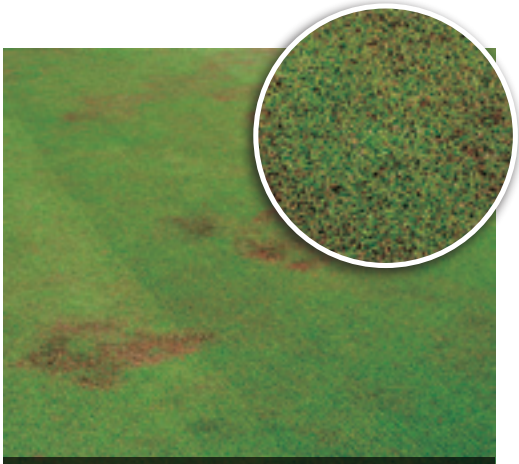
Heritage® Fungicide

Take-all Patch

Causal Agent:
Gaeumannomyces graminis var. avenae

Susceptible Turfgrass:
Bentgrass

Symptoms:
Take-all patch symptoms initially appear as small, circular reddish-brown spot patches. Symptoms will progress to wilted, circular patches that are brown or bronze-coloured and can measure up to several feet in diameter. Symptoms are most evident during periods of stress induced by hot, dry weather. Infected plants have dark-brown roots.



Take-all Patch as seen from 3 m (top) and 6 m

Take-all Patch continued

Conditions Favouring Disease:

Take-all patch is most common on newly established turf and severity decreases as the turf stand matures. It will occur on sites that have light textured soils, low organic matter content, manganese deficiency, and pH above 6.5. Take-all patch typically occurs in cool, wet conditions and in areas with a high soil pH—most severe at pH 6.5 or above. This disease is more severe on less fertile and sandy soil.

Integrated Turf Management Tips:

- Use acidifying fertilisers
- Apply moderate to high levels of phosphorus, potash, and minor elements where these nutrients are depleted from the soil
- Improve the drainage of the turf
- Reduce thatch
- Improve drainage
- Apply penetrant fungicides in the early Spring after the first mowing and in the late Summer or Autumn

Approved product:

Heritage® Fungicide

Fairy Ring

Causal Agent:
Basidiomycetes of more than 50 species on native soils can cause fairy ring symptoms; some of the more common agents include: *Agaricus campestris; Chorophyllum molybdites; Collybis* spp.; *Hygrocybe* spp.; *Lepiota* spp.; *Marasmius oreades; Bovista* spp.; *Scleroderma* spp.; *Tricholoma* spp.; *Lycoperdon clitocybe; Agrocybe* spp.; *Corprinus comatus*; and other species. Fungal species occurring on sand-based greens are not as diverse, *Lycoperdon* spp., however, is most common.

Susceptible Turfgrass:
All species of warm- and cool-season turfgrass

Symptoms:
Fairy ring symptoms vary with causal agents and the environment. Above-ground mushroom and puff ball basidiocarps may or may not occur. Typically, turf symptoms can appear as outer rings that are either dark-green or brown in colour. Sometimes the symptoms may be hydrophobic rings or circular areas showing the first signs of wilt. The shape and size of the rings vary depending on the species and environmental conditions. Activity in the turf may subside when the individual rings come in contact with each other. Some causal agents form fruiting bodies (i.e. mushrooms), but do not form rings. Conversely, other causal agents will form rings, but not fruiting bodies. The fungi that result in a fairy ring symptoms may be confined to the soil or the thatch area or both. Upon taking a soil profile, an orange discolouration along the root zone may be present with or without a strong mushroom odour.

Fairy Rings

Fairy Ring

Fairy Ring continued

Conditions Favouring Disease:
Fairy rings typically occur when the turfgrass is most actively growing. This disease can also occur on cool-season turfgrass in mild Winter climates. In warm climates, fairy ring inhabiting Bermudagrass can decrease over-seed germination and stands in these areas due to hydrophobic areas limiting water availability for the germinating seed.

Integrated Turf Management Tips:
- Avoid using root zone mixes with high levels of undecomposed organic materials
- Reduce thatch by vertical cutting
- Core aerify
- Irrigate deeply
- Use nitrogen fertiliser to mask symptoms on some types of fairy ring
- Use soil wetting agents/soil surfactants to help alleviate hydrophobic soil conditions

Approved products:

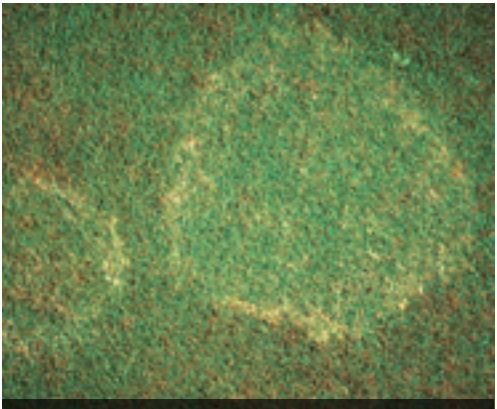
Heritage® Fungicide

Superficial Fairy Ring

Causal Agent:
Coprinus kubickae, Melanotus phillipsii, Trechispora alnicola, Trechispora cohaerens, Trechispora farinacea, other species

Susceptible Turfgrass:
All species of warm- and cool-season turfgrass

Symptoms:
Symptoms vary depending on the type of superficial fairy ring. This disease can cause patches with felted, white mycelium. Sometimes the patch is sunken and has a ring that measures approximately 2.5 cm wide at the border. Also, the lower leaves on the turfgrass in the affected areas can die.



Superficial Fairy Rings as seen from 3 m

Superficial Fairy Ring continued

Conditions Favouring Disease:
Superficial fairy ring is favored by the summer season for cool-season turfgrass. For areas where warm-season turfgrass is the principle turfgrass species and dormancy is sporadic or doesn't occur, superficial fairy ring can be a common problem. While the patches typically disappear in the cool seasons for cool-season turf or in the summer for warm- season turf, they can remain if the turf is not properly managed.

Integrated Turf Management Tips:
- Maintain adequate fertilization to minimize symptoms
- Reduce thatch by vertical cutting and aerifying
- Topdress and cultivate turf to control mat and thatch
- Improve soil drainage
- Increase mowing height

Approved product:

Heritage® Fungicide

Powdery Mildew

Causal Agent:
Erysiphe graminis

Susceptible Turfgrass:
Kentucky Bluegrass, fine-leaf Fescue, Bentgrass, Ryegrass, and Bermudagrass

Symptoms:
The disease first appears on the leaves as individual tufts of fine, white mycelium. The tufts enlarge and coalesce, causing the leaves to have a greyish-white or powdery appearance. Severely infected turf turns yellow, then tan and brown in colour. Stressed turf that is severely infected can die. Severely infected turf, especially in shaded areas, can become thinned.

Powdery Mildew

Powdery Mildew continued

Conditions Favouring Disease:
Powdery mildew is favoured by humid, cloudy weather with temperatures between 15°C and 22°C. It occurs in areas under stress, with low light, and with high humidity. Powdery mildew is also common in areas with poor air circulation, but does not require a film of water to infect turf.

Integrated Turf Management Tips:
- Water as needed to avoid drought stress
- Avoid levels of nitrogen and irrigation that produce lush leaf growth
- Raise the mower height
- Prune tree limbs to improve air circulation and the amount of sunlight
- Convert to a polystand of shade-adapted turfgrass

Approved product:

Banner® Fungicide

Pythium Blight

Causal Agent:
Pythium aphanidermatum, other *Pythium* species

Susceptible Turfgrass:
All turfgrass species, especially Annual Bluegrass, Perennial Ryegrass, Bentgrasses, and tall Fescue and Bermudagrass

Symptoms:
Pythium blight appears suddenly during hot, humid weather. This disease causes greasy, brown circular spots that are initially about 2 cm to 5 cm in diameter and then rapidly enlarge in size. The spots are water-soaked and dark-coloured early in the morning. They also form fluffy white masses of fungal mycelium (cottony blight) and can coalesce to form large, irregular areas of dead turf. Infected patches may appear brownish-orange in colour.

Pythium Blight as seen up close in early stages

Pythium Blight from 3 m to 6 m (top)

Pythium Blight continued

Conditions Favouring Disease:

Pythium blight favours night temperatures of over 20°C. It occurs in areas that experience more than 10 hours a day of foliar wetness for several consecutive days. It is found in the wettest areas of turf and in areas with poor drainage and air circulation. Lush-growing turf growing under nitrogen fertilisation is particularly susceptible to the disease.

Integrated Turf Management Tips:

- Avoid mowing wet turf when the foliar mycelium is evident to minimise spreading the disease
- Reduce thatch
- Avoid excessive nitrogen application during hot weather
- Increase air circulation to speed the drying process of the turf
- Minimise the amount of shade
- Irrigate turf early in the day. Avoid late-day watering
- Improve soil drainage
- Irrigate turf deeply and as infrequently as possible

Approved product:

Heritage® Fungicide

Pythium Root Rot (Root Dysfunction)

Causal Agent:
Pythium aphanidermatum, Pythium aristosporum, Pythium graminicola, Pythium vanterpooli, other *Pythium* species

Susceptible Turfgrass:
Species grown on putting greens, such as Annual Bluegrass, Bentgrass, and Bermudagrass

Symptoms:
Pythium root rot is common on highly maintained turf, such as golf course greens. Although symptoms of *Pythium* root rot are typically non-distinctive, this disease can appear as yellow, irregularly shaped patches. The affected turfgrass is thin, off-colour, and slow growing, while the root system is stunted with reduced volume and vigour. Foliar mycelium does not occur.

Pythium Root Rot

Pythium Root Rot (Root Dysfunction) continued

Conditions Favouring Disease:

Some *Pythium* species favour temperatures between 0°C and 10°C while others thrive in temperatures between 21°C and 32°C. *Pythium* root rot occurs in areas with high soil moisture, poor drainage, and low light. It also infects locations with low mowing height and excessive wear.

Integrated Turf Management Tips:

- Increase the height of cut
- Apply optimum amounts of nitrogen, phosphorous, and potash
- Reduce mowing frequency and use lightweight mowers
- Avoid overwatering
- Apply low amounts of nitrogen in the Spring when roots are forming
- Minimise the amount of shade
- Improve the drainage of the turf
- Reduce soil compaction
- Apply penetrant fungicides on a preventive basis

Approved product:

Heritage® Fungicide

Brown Patch

Causal Agent:
Brown Patch: *Rhizoctonia solani*

Susceptible Turfgrass:
All species of warm- and cool-season turfgrass

Symptoms:
The symptoms of brown patch can vary depending on the grass cultivar, climatic and atmospheric conditions, soil, and intensity of the turfgrass management. This disease typically causes rings or patches of blighted turfgrass that measure 12 cm to more than 3 m in diameter. It also causes leaf spots and "smoke rings"—thin, brown borders around the diseased patches that appear most frequently in the early morning. After the leaves die in the blighted area, new leaves can emerge from the surviving crowns. On wide-bladed species, leaf lesions develop with tan centers and dark brown to black margins.

Brown Patch as seen up close (right) and from 6 m

Brown Patch continued

Conditions Favouring Disease:
Brown patch favours high relative humidity as well as temperatures of over 30°C during the day and over 15°C at night. This disease can be quite active at cool temperatures on warm-season grasses in the Spring and Autumn as temperatures in the turfgrass canopy, which is where infection starts, can often exceed air temperatures. It also occurs in areas that experience more than 10 hours a day of foliar wetness for several consecutive days. Brown patch infestation is more severe when the turf is cut to a height less than the optimum for that turfgrass species.

Integrated Turf Management Tips:
- Use low to moderate amounts of nitrogen, moderate amounts of phosphorous, and moderate to high amounts of potash
- Avoid nitrogen applications when the disease is active
- Increase the height of cut
- Increase the air circulation
- Minimise the amount of shade
- Irrigate turf early in the day
- Improve soil drainage
- Reduce thatch
- Remove dew from turf early in the day
- For best results, use contact or penetrant fungicides to prevent brown patch

Approved products:

Banner® Fungicide

Daconil Weatherstik® Fungicide

Heritage® Fungicide

Rhizoctonia Leaf & Sheath Spot

Causal Agent:
Rhizoctonia zeae and *Rhizoctonia oryzae*

Susceptible Turfgrass:
All species of warm- and cool-season turfgrass

Symptoms:
The symptoms of Rhizoctonia leaf and sheath spot can vary dramatically depending on the grass cultivar, climatic and atmospheric conditions, soil, and intensity of the turfgrass management. This disease typically causes thinned areas resembling scalped areas or semi-circular thinned rings in warm-season turfgrass and can also be commonly confused with fairy ring or hydrophobic areas. In cool-season turfgrass, small patches of blighted turfgrass that measure 12 cm or more in diameter may exist in conjunction with brown patch. The disease can often have a darker red/orange hue to the infected turfgrass. Leaf spots may, but oftentimes do not, occur. These thin areas can also be slower to respond to fungicides as the disease is most active at high temperatures which can impede turfgrass re-growth.

Rhizoctonia Leaf & Sheath Spot

Rhizoctonia Leaf & Sheath Spot
continued

Conditions Favouring Disease:
Infection from the pathogens that cause Rhizoctonia leaf spot is not as fast as with brown patch or large patch (R. solani), nor does it occur in the same conditions. Infection is most favoured by high canopy temperatures of 28°–36°C. This disease can be quite active in the heat of the Summer as temperatures in the turfgrass canopy exceed the 37°C range. Turfgrass that is stressed from drought and over-reliance on irrigation with poor quality water high in carbonates and salinity is more subject to infection. This can be a seemingly hot, dry weather disease as only humidity or moisture within the crown is necessary for infection.

Integrated Turf Management Tips:
- Avoid nitrogen applications when the disease is active
- Increase the height of cut on greens, especially during drought conditions
- Increase the air circulation
- Irrigate turf early in the day
- Manage leach salts periodically with heavy irrigation events
- Reduce thatch
- Use fans when practical to improve air flow and lower canopy temperatures
- For best results, use contact or penetrant fungicides to prevent brown patch

Yellow Patch/ Cool Season Brown Patch

Causal Agent:
Rhizoctonia cerealis

Susceptible Turfgrass:
Bentgrass, Annual Bluegrass, Perennial Ryegrass, Bermudagrass

Symptoms:
The symptoms of yellow patch (cool season brown patch) can vary depending on the grass cultivar, climatic and atmospheric conditions, soil, and intensity of the turfgrass management. This disease occurs from the Autumn through the Spring or as the warm-season grasses approach or break dormancy, generally when air temperatures average 19°–18°C. It causes rings and patches or circular patches that are yellow, light-brown, or reddish-brown in colour and that measure 12 cm to several feet in diameter. Leaf lesions rarely occur and grey "smoke rings"—thin borders around the diseased patches—sometimes occur. Damage is generally superficial, but thinning can occur during prolonged periods of wet weather in late Winter and early Spring.

Yellow Patch

Yellow Patch/ Cool Season Brown Patch
continued

Conditions Favouring Disease:
Yellow patch favours temperatures less than 15°C. It also occurs in areas that experience more than 10 hours a day of foliar wetness for several consecutive days. This disease is more severe in turfgrass with excessive thatch and high nitrogen levels.

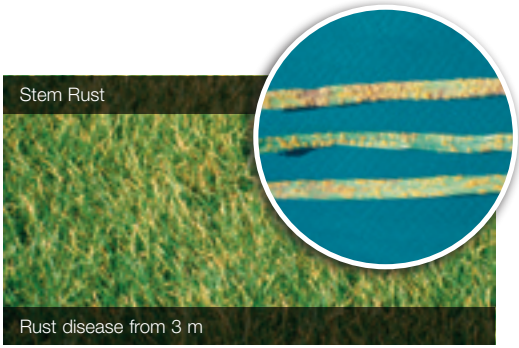
Integrated Turf Management Tips:
- Improve soil drainage
- Use low to moderate amounts of nitrogen, moderate amounts of phosphorous, and moderate to high amounts of potash
- Increase the air circulation
- Minimise the amount of shade
- Reduce thatch
- Use contact or penetrant fungicides preventively for best results

Rusts: Crown, Leaf and Stem

Causal Agent: Crown—*Puccinia coronata;* Leaf—*Uromyces dactylidis;* Stem (Black)—*Puccinia graminis;* Stripe (Yellow)—*Puccinnia striiformis*

Susceptible Turfgrass:
Kentucky Bluegrass, Annual Bluegrass, Ryegrass, Old Bentgrass cultivars, Bermudagrass, and tall and fine Fescue

Symptoms:
Rust diseases cause light yellow flecks initially on the leaf blades and sheaths. The flecks enlarge, elongate, and turn yellow in colour. The infected areas rise above the epidermis and then rupture, releasing spores that are yellowish-orange to reddish-brown in colour. The leaf blade turns yellow starting at the tip and progressing to the base sheath. A severe disease infection can cause the shoot to turn yellowish to reddish-brown in colour and slow in growth. The turf may appear thin as individual shoots die.



Rusts: Crown, Leaf and Stem
continued

Conditions Favouring Disease:
Rust diseases typically occur in early Spring through Autumn, depending on the location of the turf. Rusts favour moist, low-light areas. Depending on the species, rusts favour temperatures between 18°C and 30°C. Severe rust infections occur on slow-growing turfgrass, particularly those with low nitrogen levels and/or plant water stress.

Integrated Turf Management Tips:
- Convert to a turfgrass species or cultivar (especially for Kentucky Bluegrass and Perennial Ryegrass) that are resistant to rust diseases found in the area
- Apply adequate levels of nitrogen
- Remove clippings from turf
- Reduce thatch
- Reduce shade and improve air circulation
- Regulate irrigation to minimise the amount of time moisture remains on the leaf surface. Water deeply and infrequently
- Use penetrant fungicides to control rust diseases on slow-growing grasses and to grasses that are not mown

Approved products:

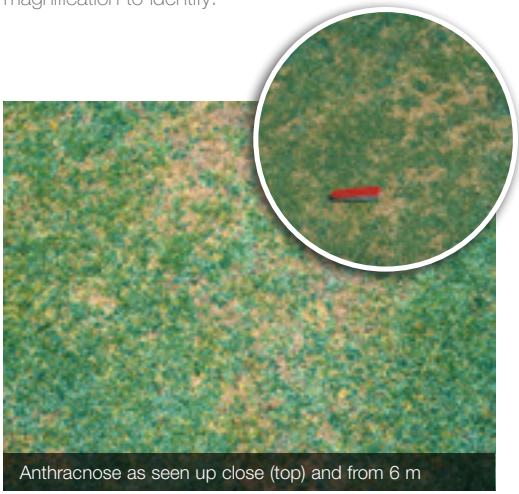
Banner® Fungicide Heritage® Fungicide

Anthracnose

Causal Agent:
Colletotrichum cereale
(formerly *Colletotrichum graminicola*)

Susceptible Turfgrass:
Annual Bluegrass and creeping Bentgrass

Symptoms:
Anthracnose is most destructive during warm weather. It causes irregularly shaped patches that are yellow to brown in colour. Leaf lesions that are yellow with black centers may also occur. Anthracnose also causes a basal stem rot from late Winter to Autumn. Infected shoots are easily detached. The dead foliage and stems also become covered with acervuli—tiny, spined, black fruiting bodies—that require magnification to identify.



Anthracnose as seen up close (top) and from 6 m

Anthracnose continued

Conditions Favouring Disease:
Anthracnose favours temperatures over 25°C. It occurs in areas that experience more than 10 hours a day of leaf wetness for several consecutive days. Conditions that stress turfgrass plants, such as soil compaction, poor drainage, low mowing height, and low amounts of nitrogen fertility also contribute to this disease.

Integrated Turf Management Tips:
- Increase the height of cut
- Minimise stress by using walk-behind mowers
- Decrease the amount of foot traffic
- Maintain adequate nitrogen and a balanced fertility level
- Irrigate the turfgrass just enough to prevent wilting
- Do not core aerate while disease symptoms are present
- Core aerate and overseed in the Autumn
- Convert from Annual Bluegrass to less susceptible varieties of turfgrass in the fairways
- Make preventive fungicide applications where the disease is a chronic problem

Approved products:

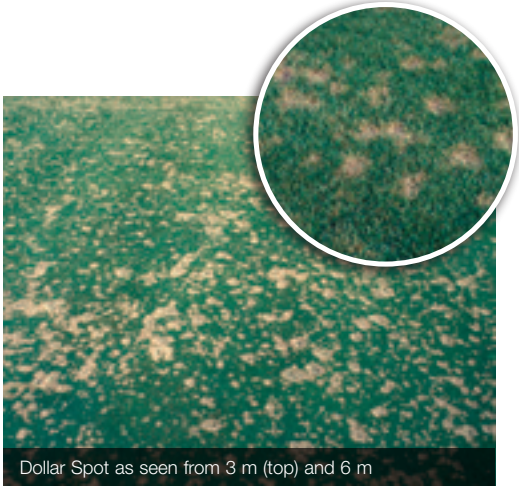
Banner® Fungicide Heritage® Fungicide

Dollar Spot

Causal Agent:
Sclerotinia homoeocarpa

Susceptible Turfgrass:
All species of warm- and cool-season turfgrass

Symptoms:
Dollar spot causes sunken, circular patches that measure up to 5 cm in diameter on golf greens and several inches on higher mown turf. The patches turn from brown to straw colour and may eventually coalesce, forming irregularly shaped areas. Infected leaves may display small lesions that turn from yellow-green to straw colour with a reddish-brown border. The lesions can extend the full width of the leaf. Multiple lesions may occur on a single leaf blade.



Dollar Spot as seen from 3 m (top) and 6 m

Dollar Spot continued

Conditions Favouring Disease:
Dollar spot is favoured by temperatures between 15°C to 30°C and continuous high humidity. This disease is particularly favoured by warm days, cool nights, and intense dews. It also infects areas with low levels of nitrogen and becomes more severe in dry soils.

Integrated Turf Management Tips:
- Use an adequate level of nitrogen, particularly in the Spring and early Summer
- Mow grass at regular intervals
- Reduce thatch
- Increase the air circulation
- Irrigate turf deeply and as infrequently as possible to avoid drought stress
- Remove dew from the turf early in the day
- Convert to a turfgrass cultivar (especially for Bentgrass) that is more tolerant to dollar spot
- Apply contact and/or penetrant fungicides on a preventive basis

Approved products:

Banner® Fungicide Daconil Weatherstik® Fungicide

Fusarium Patch (Microdochium Patch)

Causal Agent:
Microdochium nivale (same species that causes pink snow mold)

Susceptible Turfgrass:
Most species of cool-season turf

Symptoms:
Fusarium patch causes patches that are yellow or reddish-brown in colour and 2.5 to 15 cm in diameter. The periphery of the patches are reddish-brown or pink in colour. "Smoke rings"—thin, brown borders around the diseased patches that appear only in the early morning—can occur. The patches occur in cool, wet weather. Blighting in streaks can also occur as a result of spore tracking on equipment wheels.

Fusarium Patch

Fusarium Patch (Microdochium Patch) continued

Conditions Favouring Disease:
Fusarium patch thrives in temperatures less than 15°C (but above 0°C) and in locations that experience more than 10 hours a day of foliar wetness for several consecutive days. It also favours areas high in nitrogen fertility and low in phosphorous and potash. *Fusarium* patch also infects areas with slow growing conditions and heavy thatch. *Microdochium nivale* is termed *Fusarium* patch when it occurs in the absence of snow cover.

Integrated Turf Management Tips:
- Maintain balanced fertility but avoid urea sources of nitrogen
- Avoid using lime. Alkaline soils enhance disease development
- Increase air circulation to speed turf's drying process.
- Minimise the amount of shade
- Reduce thatch
- Apply fungicides prior to or at the first signs of disease. Turf recovery is more likely in the Autumn
- Make additional fungicide applications as needed during the Winter. Turf recovery is slow during the Winter so maintain a fungicide program to reduce turf damage

Approved products:

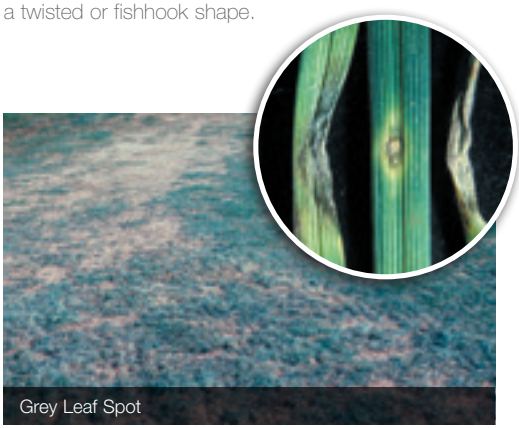
Heritage® Fungicide

Grey Leaf Spot

Causal Agent:
Pyricularia grisea

Susceptible Turfgrass:
St. Augustinegrass, Perennial Ryegrass, tall Fescue, and Centipedegrass

Symptoms:
The symptoms of grey leaf spot vary depending on the grass cultivar. On St. Augustinegrass, grey leaf spot first appears as small, brown spots on the leaves and stems. The spots quickly enlarge to approximately 0.5 cm in length and become bluish-grey in colour and oval or elongated in shape. The mature lesions are tan to grey in colour and have depressed centers with irregular margins that are purple to brown in colour. On Perennial Ryegrass and tall Fescue, symptoms first appear as small, water-soaked lesions that turn brown. Lesions may have a yellow halo. The leaf tips will have a twisted or fishhook shape.



Grey Leaf Spot

Grey Leaf Spot continued

Conditions Favouring Disease:
Grey leaf spot favours temperatures between 26°C to 32°C. It is also found in areas with high nitrogen levels and that are stressed by various factors, including drought and soil compaction. This disease is most severe during extended hot and humid periods.

Integrated Turf Management Tips:
- Avoid medium to high nitrogen levels during mid-Summer
- Irrigate turf deeply and as infrequently as possible to avoid water stress
- Allow water to remain on leaves for only a short period of time
- Reduce thatch by vertical cutting
- When possible, plant turfgrass that is resistant to grey leaf spot
- Avoid using herbicides or plant growth regulators when the disease is active
- Apply penetrant fungicides on a preventive basis

Approved product:

Heritage® Fungicide

Leaf Spot/Melting-Out

Causal Agent:
Drechslera spp. and/or *Bipolaris* spp.

Susceptible Turfgrass:
Creeping red Fescue, Kentucky Bluegrass, Annual Bluegrass, Perennial Ryegrass, tall Fescue, and some varieties of Bentgrass and Bermudagrass

Symptoms:
Leaf spot (melting-out) causes purplish-brown to black spots with tan centers on the leaf blade and sheath. The lower leaves of the infected plants become shriveled and blighted. When melting-out infection is severe, almost all of the leaves and tillers die, causing severe thinning of the stand—or melting-out. On cool-weather turfgrass, melting-out typically follows the appearance of leaf spots.

Melting-Out

Leaf Spot/Melting-Out continued

Conditions Favouring Disease:

Leaf spot favours temperatures between 4°C and 26°C. It occurs in areas that experience more than 10 hours a day of foliar wetness for several consecutive days. It also favours high amounts of nitrogen and a low mowing height.

Integrated Turf Management Tips:

- Increase the height of cut
- Reduce turf stress by using lightweight equipment.
- Avoid the application of high rates of water-soluble nitrogen in the Spring
- Minimise the amount of shade
- Irrigate turf deeply and as infrequently as possible
- Reduce thatch in the early Spring or Autumn for cool-season turfgrass and in the Summer for warm-season turfgrass

Approved products:

Banner® Fungicide

Heritage® Fungicide

Daconil Weatherstik® Fungicide

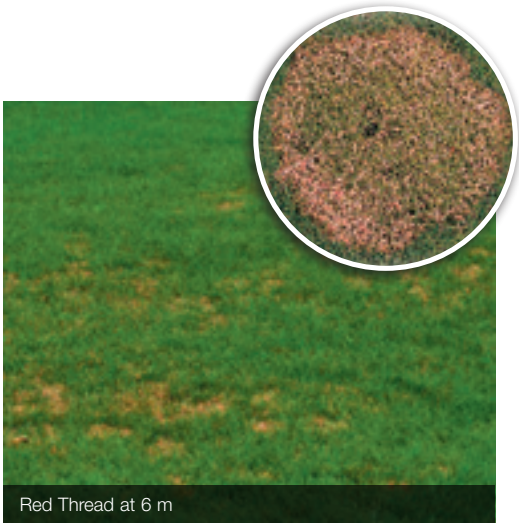
Bipolaris and Drechslera (previously classified as Helminthosporium fungi). Helminthosproium sp. are on the Daconil label.

Red Thread

Causal Agent:
Red Thread—*Laetisaria fuciformis*

Susceptible Turfgrass:
All turfgrasses, but particularly severe on fine-leaf Fescue, and Perennial Ryegrass

Symptoms:
Red Thread causes patches that are reddish-brown in colour and 2.5 to 10 cm in diameter up to 0.5 m.



Red Thread at 6 m

Red Thread continued

Conditions Favouring Disease:
Red thread thrives in temperatures between 4°C to 29°C and in locations that are low in nitrogen. It also occurs in areas that experience more than 10 hours a day of foliar wetness for several consecutive days.

Integrated Turf Management Tips:

- Mow turf frequently and collect clippings to remove diseased portions of the leaves
- Maintain adequate nitrogen and a balanced fertility
- Apply moderate to high amounts of phosphorous and potash
- Maintain the soil pH between 6.5 to 7.0
- Reduce shade
- Increase the air circulation to the turf's drying process
- Irrigate turf deeply and as infrequently as possible
- Use fungicides to control disease when it is a chronic problem

Approved products:

Heritage® Fungicide

Syngenta Fungicides

Approved for Lawns and Turf

Daconil Weatherstik® Fungicide

- Superior contact turf fungicide, with proven disease control
- Effective in resistance management programs
- Premium, proven leading-edge formulation technology

Approved for Turf

Banner® Fungicide

- Premier fungicide for preventive dollar spot control
- Broad-spectrum protection against, brown patch, and other diseases
- Virtually no odour, in a highly compatible, easy-mixing formulation

Approved for Golf and Lawn

Heritage® Fungicide

- Superior control of brown patch, grey leaf spot, Summer patch, take-all patch, and 12 other turf diseases
- Long-lasting broad-spectrum strobilurin fungicide

Notes

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