


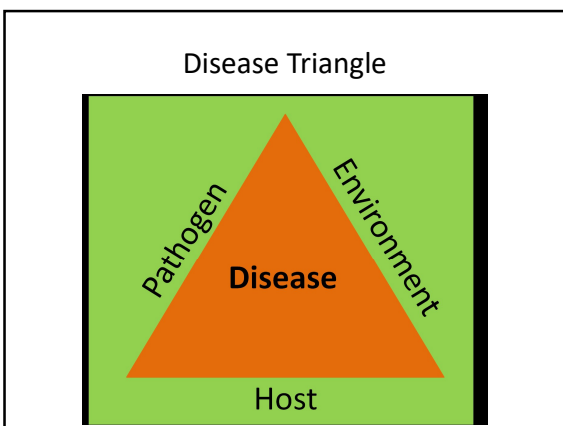


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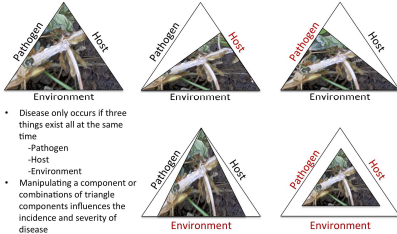
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PLANT DISEASE TRIANGLE

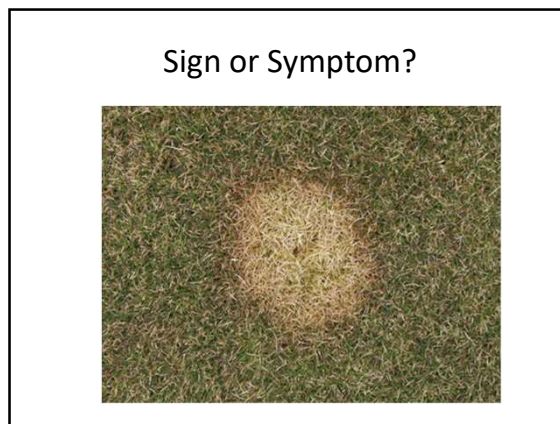


- Disease only occurs if three things exist all at the same time
 - Pathogen
 - Host
 - Environment
- Manipulating a component or combinations of triangle components influences the incidence and severity of disease

Field Crops Pathology 

Signs vs Symptoms

- Signs = Literally the pathogen
- Symptoms = The plants reaction to the pathogen



Sign or Symptom?



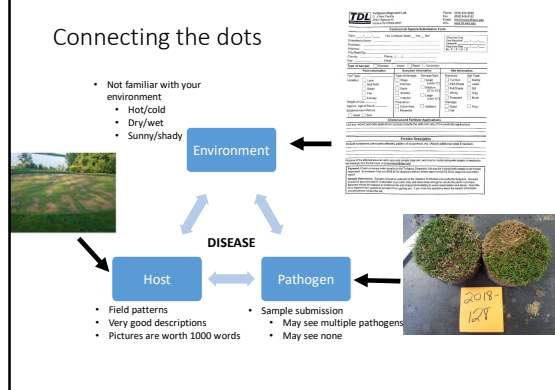
Sign or Symptom?



Sign or Symptom?



Connecting the dots



What we look for in a submission

- Take a 4" diameter sample with half the sample being affected grass and half being healthy
- Go down into the soil approximately 2-3" to include some roots
- Wrap in tinfoil (NOT PLASTIC BAG) and ship overnight to TDL
- Submit pictures!!!



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Common Mistakes

- Not filling out the submission form completely
- Not securing the sample (NO Shake N Bake!)
- Packing sample in plastic bag
- Packing submission form with sample
- Spraying right before shipping the sample
- SENDING ONLY DEAD GRASS!!!



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Turfgrass Diagnostic Lab

<https://tdl.wisc.edu/services-residential/>

About 40-50% of all samples are diagnosed as abiotic.

Common Lawn Diseases:

- Snow Mold
- Leaf Spots
- Necrotic Ring Spot
- Summer Patch
- Rust
- Gray leaf spot

Snow Molds

Causal agents: Gray snow mold (*Typhula incarnata*); pink snow mold (*Microdochium nivale*)

Optimum Conditions: Gray snow mold needs cold conditions and approximately 60 consecutive days of snow cover, pink snow mold needs extended periods of cool, wet weather **but not necessarily snow**

Signs: Fuzzy white mycelium right after snow melt, sclerotia left behind in leaf tissue (only gray snow mold)

Symptoms: Circular patches of matted turfgrass with a white to tan bleached color. Pink snow mold may have more of a reddish hue. In the absence of snow cover, patches of pink snow mold are often smaller and less distinct.

Control: Limit nitrogen fertility going into fall (do not confuse with dormant application). Mow grass until dormancy, but do not cut abnormally short. Remove leaves and other debris from the lawn surface.



Leaf spots

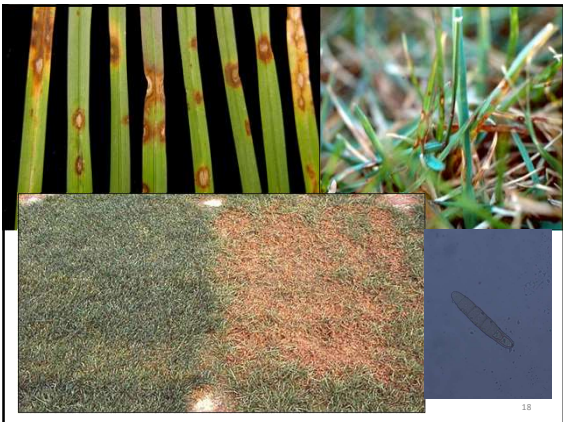
- Drechslera and Bipolaris leaf spot
- Ascochyta leaf spot
- Septoria leaf spot
- Curvularia leaf spot
- Nigrospora leaf spot

16

Drechslera leaf spot

- Causal agent: *Drechslera* spp.
- Turfgrass hosts: All lawn turfgrass species
- Optimum conditions: Extended periods of high moisture and high humidity
- Signs: Microscopic cigar-shaped spores
- Symptoms: Start out as purple/yellow/reddish colored lesions with dark-colored border that can spread to impact the entire plant. If infection is severe can thin and turn a reddish or purpling color (melting out).

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Necrotic Ring Spot

Causal agent: *Ophiosphaerella korrae*

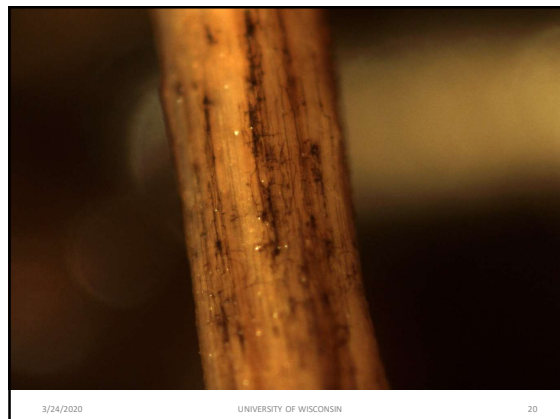
Turfgrass hosts: Kentucky bluegrass, fine fescues

Optimum conditions: Cool, wet weather in spring followed by warm, dry weather in summer.

Signs: Dark runner hyphae growing on the outside of root tissue

Symptoms: Is a **root-rotting disease**. Circular or arc-like patches of yellow to tan turf several inches to several feet in diameter form in late spring or early summer. Resistant weeds and grasses may fill in the center of the patch giving it a "frog-eye" appearance. Most severe on sodded lawns within 2-10 years of establishment. Disease severity drops off 8-10 years after establishment.

Fungus actually attacks the turfgrass roots in spring and fall with soil temperatures between 50-65°, but disease is not observed until summer. Why?????



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20

NRS-Rings, arcs, patches



Necrotic Ring Spot

Control: Frustrating!!!

Once symptoms are observed the root system has already been damaged and the turf has to be nursed along with light, frequent irrigation until the fall.

NRS is also difficult to prevent on newly sodded lawns. Plant resistant cultivars of Kentucky bluegrass. Limit nitrogen fertilizer application to no more than 4 lbs/1000 sq. ft. per year. Do not fertilize much before May 1. Keep thatch under 0.5 inches.

Deep, infrequent irrigation.



Necrotic Ring Spot

- Chemical Control NOT Usually Recommended

Leaf Tissue

Thatch

Root zone



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24

Summer patch

Causal agent: *Magnaporthe poae*

Turfgrass hosts: Kentucky bluegrass and fine fescues

Optimum conditions: Sustained temperatures greater than 85°F and wet soils.

Signs: Dark runner hyphae growing on the outside of root tissue

Symptoms: Is a root-rotting disease. Circular or arc-like patches of yellow to tan turf several inches to several feet in diameter form in mid to late summer. Resistant weeds and grasses may fill in the center of the patch giving it a "frog-eye" appearance. Most severe on lawns established on compacted soils, wet soils, soils with high pH, or soils over-fertilized with quick-release nitrogen.

Fungus becomes active at soil temperatures of approximately 60°F, and causes the most damage at temperatures greater than 85°F.



Summer patch

Control:

Similar to NRS, once symptoms are observed very little can be done to affect the fungus and the turf has to be nursed along with light, frequent irrigation until conditions cool.

Preventatively, general healthy rooting practices can be employed:

- Deep, infrequent irrigation
- Proper mowing height
- Well-drained soil
- Aerify in fall if needed (reduce compaction, reduce thatch layer)
- Proper nutrition balance (do not fertilize in hot conditions)
- If necessary, lower soil pH using acidifying fertilizers

Rust

Causal agent: *Puccinia* spp.

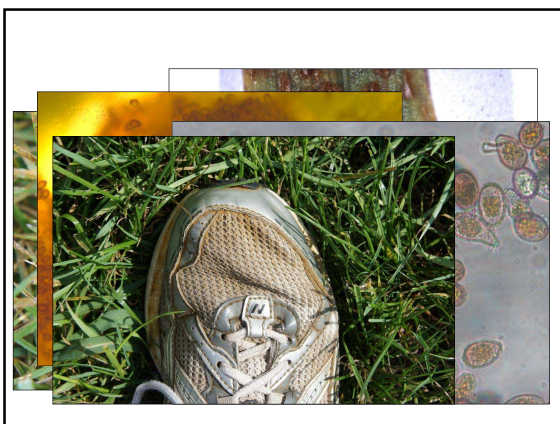
Turfgrass hosts: Most cool-season turfgrasses, esp. perennial ryegrass

Optimum conditions: Warm (68-84°F) and humid conditions on slowly growing turf

Signs: Rust colored spores. Begin as small yellow flecks on affected leaf blades. As the disease progresses the flecks multiply and turn orange, and can give the entire stand of turf an orange cast.

Symptoms: Most infections occur on turf growing slowly due to drought stress, nutrient deficiency, or heat stress. Under severe conditions thinning of the turf stand may occur. Usually only aesthetic, does not kill turf.

Control: Increase growth rate of plant through fertilization and irrigation. If serious problem persists, plant a more resistant grass species or cultivar.



Gray leaf spot

Causal agent: *Pyricularia grisea*

Turfgrass hosts: Ryegrasses, fine fescues, tall fescues, especially juvenile plants

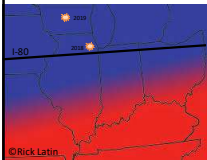
Optimum conditions: Hot (82-90°F) and humid conditions (9 hours leaf wetness)

Signs: Microscopic bowling pin shaped spores, produces a gray mold under incubation


Symptoms: Starts as small leaf spot, can progress to kill whole plants. Fish hook symptom. Thin, off-color turf. Can resemble drought stress.

Control: Rapid diagnosis is important as disease can progress quickly. Partially resistant varieties available. Reduce excessive moisture. Overfertilization may encourage disease. Overall healthy plants. Fungicides may be needed for high value areas.


Distribution and symptoms




A map of the United States with a red shaded area in the Southeast, indicating the distribution of a pathogen. The shaded area covers parts of Florida, Georgia, and Alabama. The map is labeled with '180' and '200' and has a copyright notice for '© Rick Latin'.



A close-up photograph of grass showing symptoms of a pathogen, likely a leaf sheath blight. The grass blades are green but have brown, necrotic lesions. The image is credited to '© Rutgers PDL'.



A photograph of a golf course green showing symptoms of a pathogen. The grass is green but has large, irregular brown patches, indicating significant damage. The image is credited to '© Rutgers PDL'.



A microscopic view of a pathogen, showing several dark, elongated, spindle-shaped structures. The image is credited to '© Rutgers PDL'.

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