

# Turfgrass Disease and Management

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# What is a Plant Disease?



A plant disease is usually defined as **abnormal growth and/or dysfunction of a plant.**



Diseases are the result of some **disturbance** in the normal life process of the plant.



Diseases may be the result of **living and/or non-living causes.**

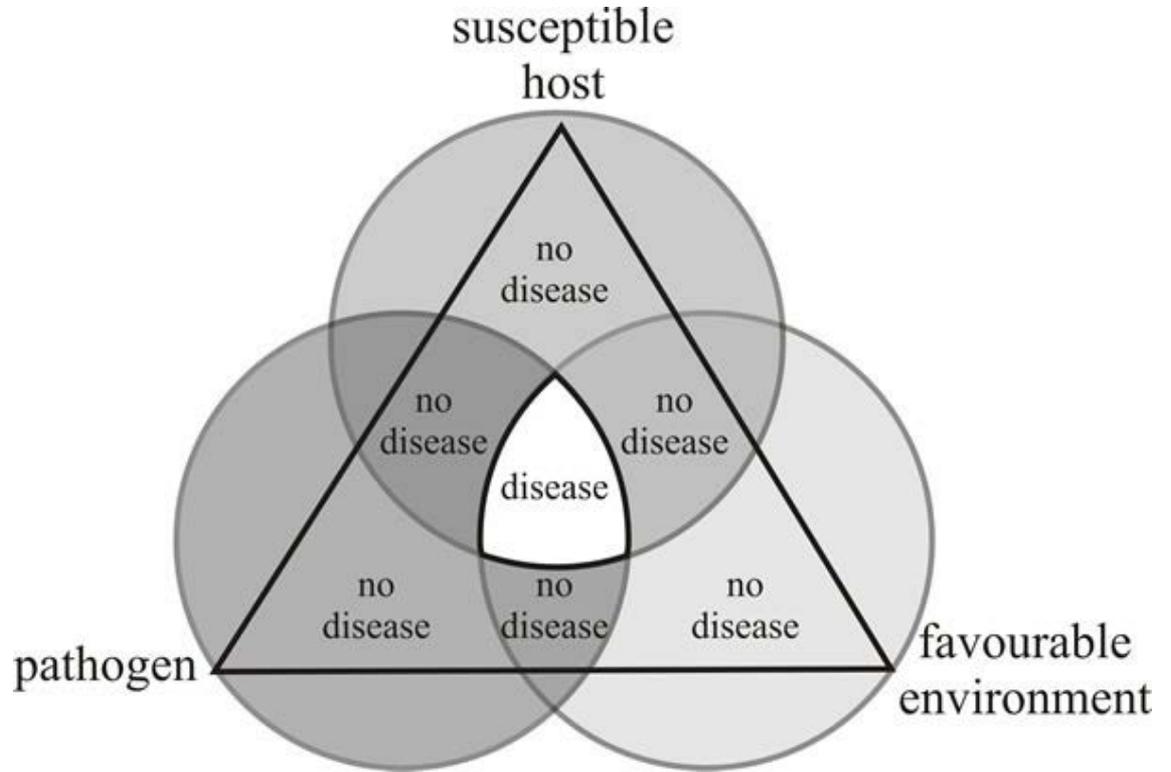


**Biotic diseases** are caused by **living organisms** (e.g., fungi, bacteria, and viruses).

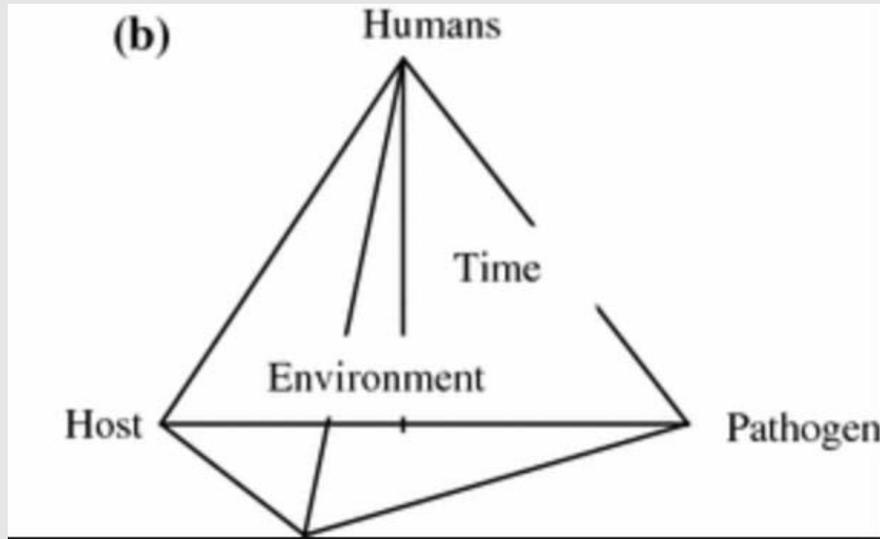
A dark blue, irregularly shaped graphic with a splatter effect, containing white text. The graphic is centered on a white background and has a rough, ink-splattered edge. The text is centered within the graphic and reads: "What components are necessary for disease to occur?"

What components are  
necessary for disease to  
occur?

The Disease Triangle - A Conventional Perspective



# The Disease Tetrahedron



Some may also include “genetics”

# Host

- Any plant that is growing in an area that we manage
  - Turfgrass
  - Perennial shrubs and trees
  - Annuals
  - Fruit and Vegetables



# What may make a host more susceptible?

- Nutrient Imbalance
- Physical Injury
  - Improper mowing or pruning
  - Herbicide Damage
  - Insect damage
  - Grazing
  - Traffic
- Environmental Stress
  - Drought/Flooding (Anaerobic Conditions)
  - Extreme Heat/Cold
  - Extreme Winds
  - Salinity
  - Shade





# Environment

- The physical place where a host lives, and the conditions associated with it.
  - Temperature
  - Humidity
  - Light
  - Moisture Availability
  - Oxygen Availability
  - Water Quality
  - Soil Conditions

# What may make an environment more favorable for disease?

Sometimes  
“extreme”  
conditions:

- Simultaneously stress the host
- Conducive to the growth and development of disease

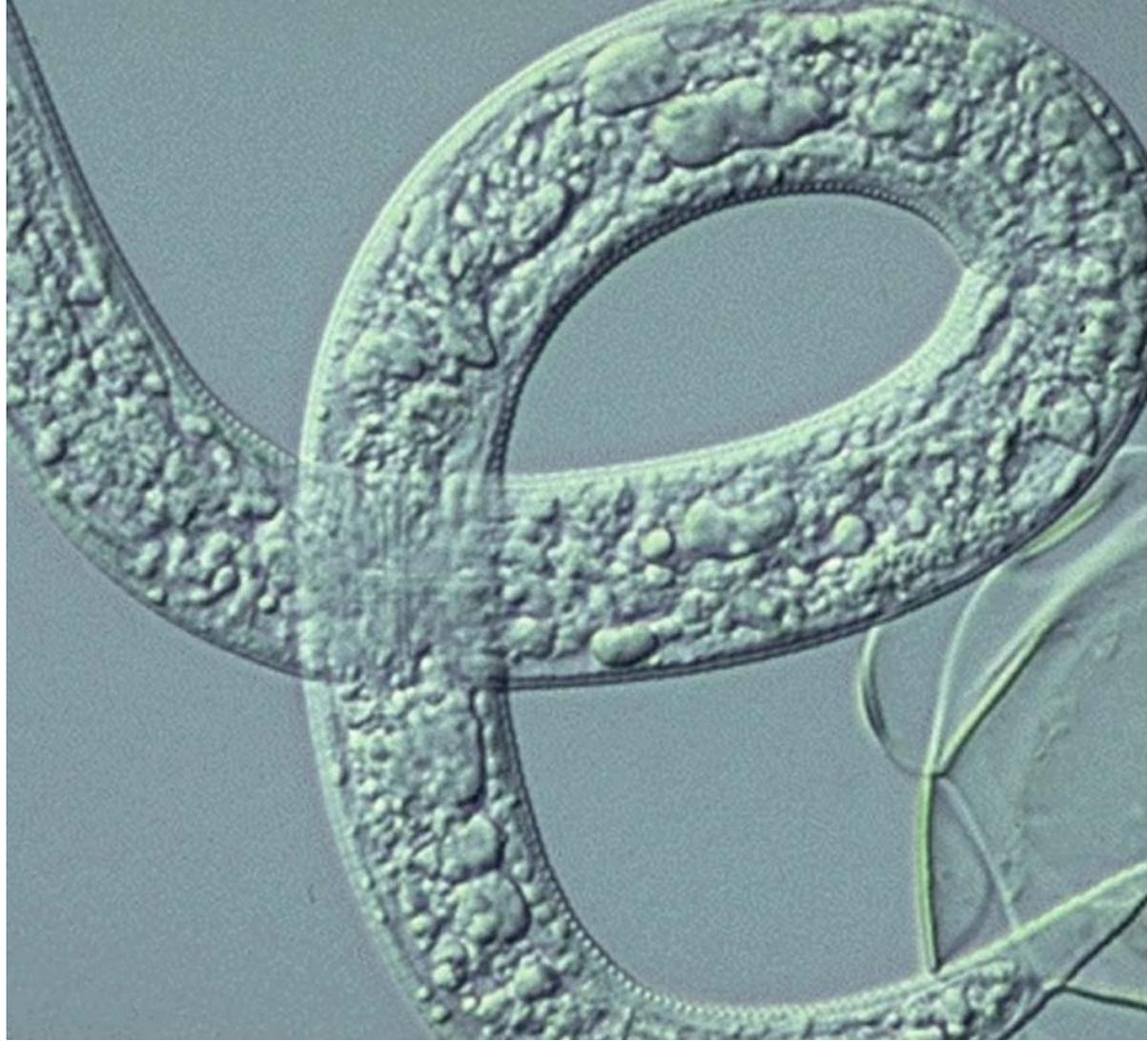
Sometimes  
ideal  
conditions

- In many cases, conditions that may potentially be perceived as ideal for plant growth may also be ideal for the growth and development of plant pathogens

# Pathogen

- Any organism which causes disease on a plant

- Fungi
- Bacteria
- Viruses
- Nematodes
- Oomycetes
- Parasitic Plants



# How are pathogens introduced?

- Soilborne
- Vectorborne
  - Insects
  - Wind
  - Water
  - Animals
  - Physical contact, feeding, burrowing



# What do I do when I think my plant has a disease?

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<b>Assess</b>	Assess what you are seeing. Confirm that a disease is present. Identify which disease it is.
<b>Evaluate</b>	Evaluate the environment and current management practices
<b>Design</b>	Design an integrated approach to tackle the problem and prevent future problems.

# Assess, Confirm, Identify

- Make notes of the symptoms/signs that you are seeing
  - Chlorosis/Discoloration
  - Lesions
  - Malformation or Underdeveloped Growth
  - Foreign bodies including mycelium
  - Wilting
- Observe all plant parts including below-ground growth
  - Rotten or discolored roots and rhizomes



# Assess, Confirm, Identify

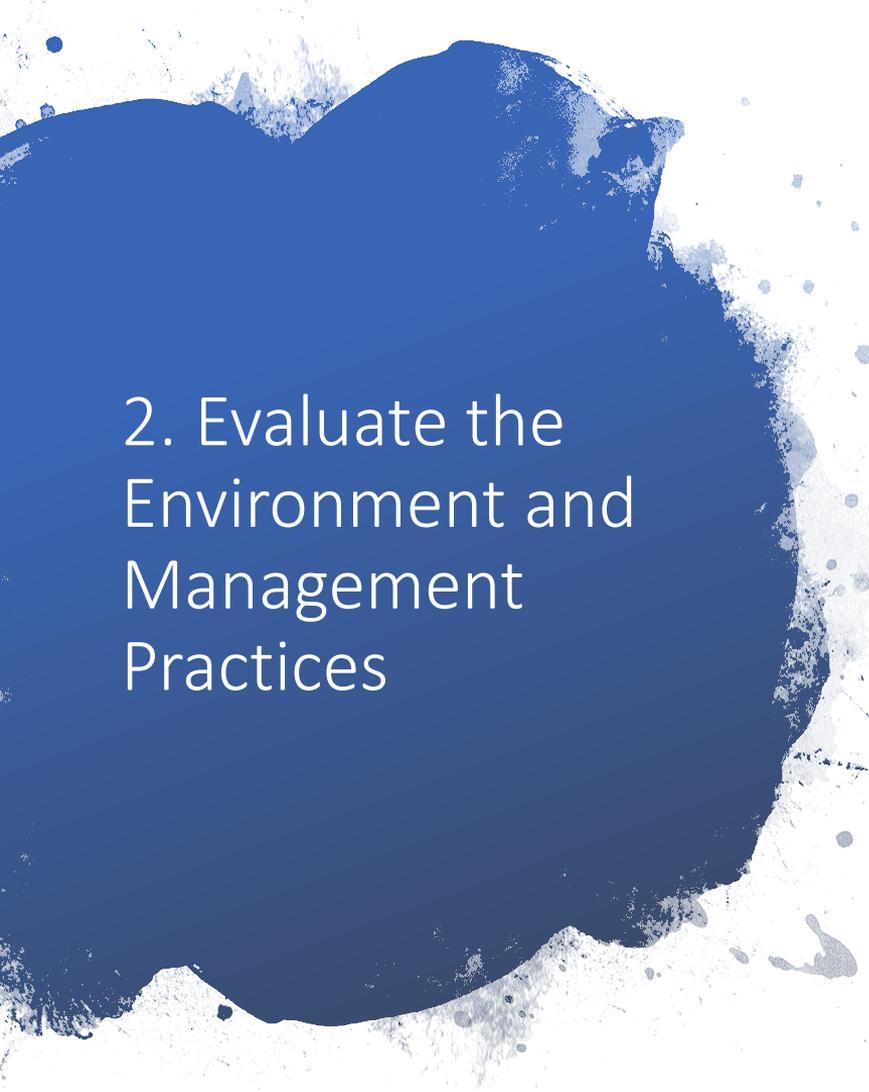
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Consider	Consider consulting a professional for a field visit and/or lab analysis of a sample. Provide them with as much information as possible including detailed photos.
Contact	Contact your County Extension Agents Office
Contact	Contact an AgriLife Extension Specialist that specializes in the particular crop/plant
Contact	Contact the Texas Plant Disease Diagnostic Laboratory

# 1. Assess, Confirm, Identify

- Often pests may coexist, and symptoms may be indicative of multiple pests.
- It is possible that though there is disease present, the primary causal agent is something else.
- For the best results, treat both problems simultaneously.





## 2. Evaluate the Environment and Management Practices

- A thorough understanding of the environment and the impact of current management practices is necessary to taking a more comprehensive and holistic approach to treating the problem.
- Consider everything. Keep an open mind.

# 2. Evaluate the Environment and Management Practices

## Test Your Soil



Customer Sample ID: Front & Back Yard  
Crop Grown: LAWN

Analysis	Results	CL*	Units	ExLow	VLow	Low	Mod	High	VHigh	Excess.	Fertilizer Recommended
pH	5.3	(6.2)	-	Mod, Acid							
Conductivity	84	(-)	umho/cm	None						cl-	0.9 lbs N/1000sqft
Nitrate-N <i>Top</i>	1	(-)	ppm**								0.7 lbs P2O5/1000sqft
Phosphorus	38	(50)	ppm								2.4 lbs K2O/1000sqft
Potassium <i>Both</i>	34	(175)	ppm								0 lbs Ca/1000sqft
Calcium	239	(180)	ppm								0.25 lbs Mg/1000sqft
Magnesium	43	(50)	ppm								0.5 lbs S/1000sqft
Sulfur	7	(13)	ppm								
Sodium	12	(-)	ppm								
Iron											
Zinc											
Manganese											
Copper											
Boron											
Limestone Requirement											10.00 lbs/1000sqft

\*CL=Critical level is the point which no additional nutrient (excluding nitrate-N, sodium and conductivity) is recommended. \*\*ppm=mg/kg

## 2. Evaluate the Environment and Management Practices

### Other Environmental Considerations

- Shade/lighting
- Humidity
- Temperatures
- Adjacent plant material
- Water Quality
- Precipitation
- Topography

### Management Considerations

- Mowing and/or Pruning Practices
- Irrigation Practices (Timing/Frequency/Uniformity)
- Fertilization Practices
- Recent transplanted
- Recent Treatments (herbicide applications)
- Traffic

### 3. Design an Integrated Approach to Tackle the Problem



Consider a comprehensive approach to manipulate the environment and reduce the risk of disease



Take all aspects of the disease triangle (or tetrahedron) into consideration including your host and whether an alternative turfgrass species would be more appropriate in the future or in cases where you are replacing turf.



Be mindful of all materials being introduced to your site and of the cleanliness and overall maintenance of your equipment.

# Texas Turfgrass Diseases

**Table 38. Diseases in turfgrass production and management<sup>1</sup>**

<b>Disease</b>	<b>Causal agent</b>	<b>Occurrence</b>
Anthracnose	<i>Colletotrichum cereale</i>	Occasional
Brown patch (cool-season turf)	<i>Rhizoctonia solani</i>	Common
Dollar spot	<i>Sclerotinia homoeocarpa</i>	Common
Fairy ring	<i>Basidiomycetes</i>	Common
Gray leaf spot	<i>Pyricularia grisea</i>	Common
Large patch (warm-season turf)	<i>Rhizoctonia solani</i>	Common
Leaf spots	Various types and causal agents	Common
Leaf and sheath spot	<i>Rhizoctonia zea</i> and <i>Rhizoctonia oryzae</i>	Occasional
Microdochium patch	<i>Microdochium nivale</i>	Occasional
Pythium diseases	<i>Pythium</i> spp.	Common
Root decline/take-all root rot/take-all patch	<i>Gaeumannomyces graminis</i> var. <i>graminis</i>	Common
Spring dead spot	<i>Ophiosphaerella herpotrica</i> and <i>O. korrae</i>	Occasional
Summer patch	<i>Magnaporthe poae</i>	Occasional
Thatch collapse disease	<i>Sphaerobolus stellatus</i>	Occasional

<sup>1</sup>: The Southern IPM Pest Management Working Group has identified these diseases as commonly occurring diseases in Texas.

# Large Patch

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- Large Patch: Warm-season Turfgrass (Cool-Season Turf: Brown Patch)
- Pathogen: *Rhizoctonia solani*
- Impacts: buffalograss, bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass
- Most economically important disease for St. Augustinegrass and zoysiagrass.





## Large Patch

- **Symptoms:**
  - Circular, discolored patches
  - Outer borders of the turf are orange or yellow
  - Diseased shoots pull easily from the sheath (diagnostic)
  - Diseased stems and sheaths show dark brown lesions



# Large Patch

- Conditions that may promote large patch infection:
  - Cool temperatures (less than 70 F)
  - Over-fertilization too late in the fall
  - Poor drainage
  - Over-irrigation/evening watering
  - Low Mowing Height
  - Excess thatch

# Steps for Prevent Large Patch



Remove thatch



Reduce leaf wetness periods (early morning watering)



Ensure good soil drainage



Water early in the morning



Balance nitrogen fertility



Maintain proper mowing height



Balance fertility level

# Fungicides Registered for Control

**Table 1.** Fungicides registered for control of large patch on turfgrass.

Common name	Trade name
<b>Aromatic Hydrocarbon</b>	
Chloroneb	Terraneb SP, Teremec SP
Etridiazol (ethazole)	Terrazole, Koban
PCNB	Turfcide 400, Turfcide 10G, PCNB 12.5G, Revere 10G Revere 4000, FF II, Terrachlor 400, Terrachlor 75WP
<b>Benzimidazole</b>	
Thiophanate-methyl	Fungo 50, Fungo Flo, 3336 WP, 3336 Flo, Caviler 2G Caviler 4.5F, Caviler 50WSB, 3336 Plus
<b>Carboximide (SDHI)</b>	
Flutolanil	ProStar 70WP
<b>Demethylation Inhibitor</b>	
Fenarimol*	Rubigan A.S.
Metconazole	Tourney
Myclobutanil	Eagle, Golden Eagle
Propiconazole	Banner, Banner MAXX, Spectator, Propiconazole Pro
Tebuconazole	Torque
Triadimefon*	Bayleton 25, Bayleton 50, Accost 1G
Triticonazole	Trinity, Triton
<b>Dicarboximide</b>	
Iprodione*	Chipco 26GT, Chipco 26019, Iprodione Pro, ProTurf Fungicide X
Vinclozolin*	Curalan, Curalan DF, Touché, Touché Flowable, Vorlan

# Fungicides Registered for Control

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**Dithiocarbamate**

Maneb	Maneb Plus Zinc F4, Maneb 75DF
Thiram	Spotrete, Thiram
Mancozeb	Fore, Fore Flo, Dithane T/O, Dithane WF, Pentathalon LF, Pentathalon DF

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**Nitrile**

Chlorothalonil*	Daconil WeatherStik, Daconil Ultrex, Daconil 2787 Daconil Zn, Manicure 6 Flowable, Manicure Ultrex, Concorde, Thalonil 4L, Thalonil 90DF, Echo 720, Echo 75
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**Phenylpyrrole**

Fludioxonil	Medallion
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**Polyoxin**

Polyoxin D Zinc	Endorse
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**Strobilurin (QoI)**

Azoxystrobin	Heritage
Fluoxastrobin	Disarm
Pyraclostrobin	Insignia
Trifloxystrobin	Compass

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\*Not for residential turf or home lawn

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## Take-All Root Rot

- Severely affects St. Augustinegrass and bermudagrass
- Pathogen: *Gaeumannomyces graminis* var. *Graminis*
- Soilborne. Found in both diseased and apparently healthy turfgrass





# Take-All Root Rot

- Symptoms
  - Initial: Yellowish foliage that eventually browns and wilts
  - Thinning turf - leaving brown, irregular patches (1 - 20 ft in diameter)
  - Roots are typically short, blackened, and rotten
  - Stolons are easy to lift from the soil
  - Nodes, or stem joints, may be discolored

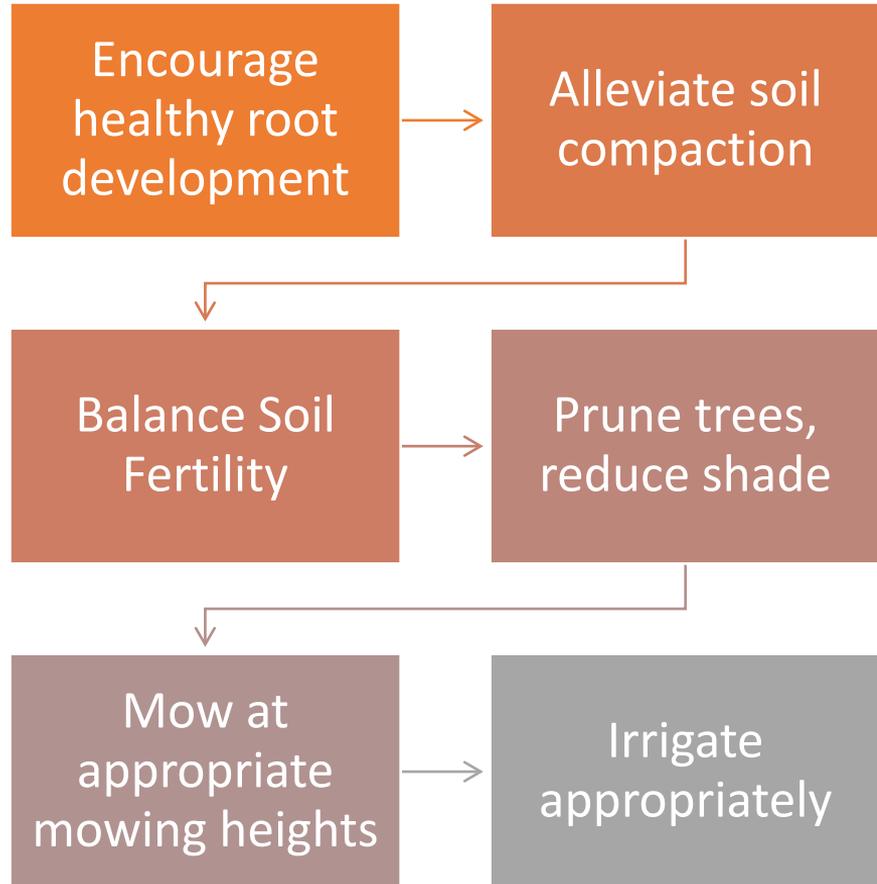
# Take-All Root Rot

- **Conditions that may promote Take-All infection:**

- Heat
- Drought
- Shade
- Alkaline soil
- High-sodium water

- Conditions which promote plant stress. More active in spring in early summer but can appear at any point that the turfgrass is actively growing and under duress.

# Steps to Prevent Take-All Root Rot



# Take-All Root Rot

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Common Name	Trade Name
azoxystrobin	Heritage, Heritage TL, Heritage G, Strobe 2L, Strobe 50 WG
azoxystrobin + propiconazole	Headway
fluoastrobilin	Fame
myclobutanil	Spectracide/Immunox, Green Light Fung-Away
Propiconazole	Banner MAXX, Kestrel, Savvi, Strider, Bayer Fungus Control, Ortho Lawn Disease Control
Thiophanate-methyl	Fungo 50, Fungo Flo, Scott's Lawn Fungus Control, Southern Ag Thiomyl, Bonide Lawn and Landscape Granules

# Other tips for control

- Lower soil pH to more neutral or slightly acidic
- Be judicious with nitrogen applications
- Apply no more than 4lbs of N per 1000 sq ft per year on St. Augustinegras
- No more than 6 on Bermudagrass
- Variable results from the application of powdered sulfur, peat moss, and compost
  - pH
  - C:N
  - Microbial Ecology

# *Pythium* *spp.*

- First appears as **small black or purple spots**
- Expands into larger irregular areas, especially during prolonged periods of humid, rainy, and/or cloudy weather anytime of the year.
- Affected leaves **are matted, orange or dark gray in color**, with a greasy appearance.
- **Gray, cottony mycelium** may be seen in the infected areas when the leaves are wet or humidity is high.
- The disease spreads rapidly along drainage patterns and **can be tracked by equipment.**

## *Pythium spp.*



- Water in the early morning hours to reduce period of leaf wetness.
- Avoid excessive nitrogen applications, as this disease prefers lush, succulent foliar growth
- Relieve compaction and maintain soil drainage through hollow tine aerification, and topdress golf course putting greens regularly to minimize thatch accumulations.
- **Do not mow or irrigate** when *Pythium* mycelium is present on the foliage to minimize spread of the pathogen.
- Collect and promptly dispose of clippings from infected areas and ensure that mowing equipment is washed before going to an uninfected area

# Pythium Disease

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Common Name	Trade Name	Application Interval
azoxystrobin	Heritage, Heritage TL, Heritage G, Strobe 2L, Strobe 50 WG	10 – 14 days
azoxystrobin + propiconazole	Headway	10 – 14 or 14 – 28 depending on rate
fluoxastrobin	Fame	7 to 14
mefenoxam	Subdue, Subdue MAXX, Quell, Subdue G, Mefenoxam	10 to 14 or 10 to 21 depending on rate
pyraclostrobin	Insignia (WG/SC)	10 to 14 or 14 to 28
pyraclostrobin + fluxapyroxad	Lexicon Intrinsic	14



Gray Leaf Spot

# Gray Leaf Spot

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Develops rapidly with **abundant moisture and warm temperatures** on St. Augustine grass.

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It is especially troublesome in **shaded areas that remain damp for some time**.

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Leaf spots first appear as tiny brown to ash-colored spots with purple to brown margins that enlarge and become diamond-shaped.

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In severe cases, lesions develop on stems and spikes and the leaves wither and die.

# Gray Leaf Spot

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Cultivar selection

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Manage leaf wetness. Irrigate early in the morning, and never in the late afternoon or evening.

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Prune or remove trees, shrubs, or other barriers to increase air movement and sunlight penetration.

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Mow frequently during the summer months to remove excess leaf tissue, keep the canopy open and dry.

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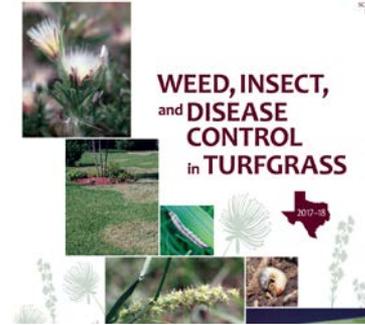
Collect clippings to reduce the spread of disease when symptoms are evident.

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Apply nitrogen and other nutrients as recommended to maintain vigorous foliar growth during the summer months.

# Resources

- Contact County Extension Agent
- Texas Plant Disease Diagnostic Lab



## Texas Plant Disease Diagnostic Lab

### The TX Plant Clinic



The TPDDL jumps for joy upon receiving STAR-D Lab Accreditation.

# Contact or Follow

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