‘Turfgrass sampling – the when’s, why’s and how’s of getting the best results from your sampling’

Steven Kammerer, USGA Green Section

PRESENTED BY THE USGA

Disease Diagnosis - End with a Start in Mind

Preparing or planning needs to begin before the Storm has passed…

What are your Expectations?

1. Lab Diagnosis options – where to go?

- **Expectations?**
  - Speed/time?
  - Accuracy?
  - Explanation of results & what to do?
- **Private or University?**

2. In the Lab – Fungal pathogens

- A good sample with living tissue is a must!
  - Inspect tissue 1st (stereo dissecting scope)
  - Secondarily - surface sterilize tissue on *PDA plates (selective media)
  - Sometimes more than one pathogen can be found
  - Can gauge the viability/"vigor" of the pathogen

*May or may not be active/alive – selective media (PDA)answers this question

ACCURACY vs. SPEED of Results

- If symptoms took days/ weeks/ months to develop
  - Time is needed to ensure accurate diagnosis
  - Whether or not the pathogen/disease is still active

Outline:

- Focus – Disease Identification
- When – timing
- Why – Basics of Turfgrass Pathology/Epidemiology
- How - Methodology

What is a Disease?

Plant disease is the malfunctioning of host cells and tissues, caused by continuous irritation by a pathogenic agent that leads to the development of symptoms.

Infection can occur for days/weeks/months with NO symptoms

Where:

- Send to experienced accredited Plant (Turf) Pathologists
  - University – many colleges provide this service for a nominal fee
  - University of GA
    - Alfredo Martinez
  - OTHERS – familiarity with the Region (located in the Region)
    - University of Florida – Phil Harmon
    - Clemson University – Bruce Martin
    - NC State University – Lee Butler

Where:

- If Out of State = Labs that are licensed/permitted to receive and work with disease samples from out of state
- Labs that can culture samples if needed:
  - Sterile Flow-Hoods, Autoclaves, ability to produce selective media

When

- **Disease Symptoms Present**:
  - First sign of Initial Symptoms
    - EARLY AS POSSIBLE
      - » Following weather event
      - » Prior to fungicide application(s)
      - » As far out from last application as possible
  - Prior to CURATIVE Actions

Warm season turfgrass – Infection period vs. Disease Expression

	Large patch (*Rhizoctonia solani*)	Leaf & Sheath Spot (*R. zeae*)	Bermudagrass Decline*	Bipolaris leaf spot	Pythium root rot, etc.
Infection	*Sept. & October.*	*May - August*	*Sept. & October.*	*Nov. - March*	*Nov. - March*
PEAK - Disease symptoms	Dec. - April	Oct. – Feb.	Dec. - April	Dec. - March	Dec. - March

Long infection period

Short infection period

*Often associated with other abiotic or biotic problems – secondary problem, opportunistic pathogen (nematodes, chronic nutrient deficiencies, etc.)

Where:

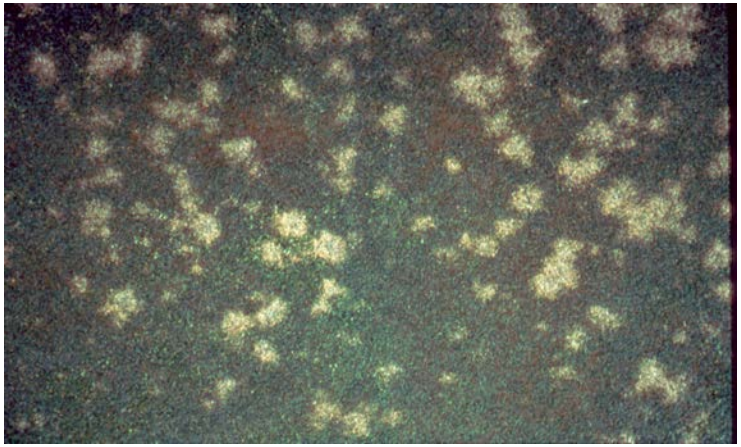
- Send to experienced accredited Plant Pathologists
  - University – many colleges provide this service for a nominal fee
  - University of GA
    - Alfredo Martinez
  - OTHERS – familiarity with the Region (located in the Region)
    - University of Florida – Phil Harmon
    - Clemson University – Bruce Martin
    - NC State University – Lee Butler

Where:

- If Out of State = Labs that are licensed/permitted to receive and work with disease samples from out of state
- Labs that can culture samples if needed:
  - Sterile Flow-Hoods, Autoclaves, ability to produce selective media

How – Background information

- Type of turfgrass
  - variety, location
  - Circumstances:
    - Ex: following extreme weather event (i.e. 4” rainfall incident or 3 days of 100°F+ days)
    - Ex: slow development and enlargement of irregular areas…



How

- Several samples – different areas if wide-spread
  - Keep bags separately labeled
- Doesn't have to be a cup-cutter (sod-cutter repair tool adequate)
- Inside and Outside trailing edge of suspect areas
- LIVING TISSUE needed
- Samples wrapped in Aluminum foil placed in paper bag – avoid ziplock bags
- Pictures – **eye level** and **close-up's**

Pictures can help compliment samples for disease identification

Pictures help, especially of turfgrass problems

Diseases can look different depending on how close/far the picture is

Pythium?

the Presence of Mycelium isn't always Pythium

Dollar Spot

How – Background information

- Fungicide(s), PGR(s), Herbicide(s), Fertilizer(s) applied within 2 weeks of sampling
- Other Biotic Stresses/Abiotic Stresses:
  - Ex: nematodes
  - Ex: Irrigation head malfunction

How

- $25 to $100 per sample
  - Cheap in comparison to spraying 2.5 Acres with one/two/three fungicides
- Keep Records, Ask Questions
- Labs may have specific directions on ‘How to package and ship the sample’
  - Forms to fill out

Interpreting Results

- Chemical Recommendations?
  - Check label
  - Program fit
  - Timing
- **Address Cultural Issues!**
  - Disease or problem will continue to re-occur if cultural problems aren't corrected
- Use good judgement
  - It took time for the problem to occur, it will take to recover

What is not a Disease?

- Unexplained problem
- An excuse for cultural problems
- Environmental stresses
- Senectopathic Disorders - Opportunistic fungi
  - Facultative saprophytes

    Curvularia, Leptosphaerulina blight, Cephalosporium, Nigrospora species

Disease-like Opportunists/Senectophytes

- Attack dying/dead tissues
  - Numerous biotic and abiotic factors can cause premature senescence of leaves and stems:

- Summer stresses
  - High air, soil temperatures
  - Drought
  - Excessively wet or anaerobic soils
- Low light/ shade
- Heavy thatch accumulation

- Very low mowing
- Mechanical injury
- Chemical phytotoxicity
- Other fungal opportunists/saprophytes
- Plant parasitic nematodes

Summary

- Accurate field disease diagnosis is difficult but not impossible
- Not all unhealthy turfgrass is disease or bermudagrass decline or ETRI
- All fungi are not pathogens
- Pathogen + Host + Environment = Infection
  - Disease = Expression of Damage (Symptoms)
- Following diagnosis – research the disease & put together a plan to prevent “repeat”