MANAGING COMMON ROOT AND FOLIAR DISEASES OF SPRING GREENHOUSE CROPS

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Disclaimer

- UMass does not promote the use of any particular brand or product

- Always follow the label!

General Management Concepts

Best practices for disease prevention and management in the greenhouse

General Management

- Sanitation, sanitation, sanitation
  - Clean work spaces
  - Control weeds inside and out
  - Keep flats, pots, and watering nozzles off the floor
  - Don't reuse flats & pots
  - Several disinfectants available
  - Fact Sheets:

www.ag.umass.edu/greenhouse-floriculture

General Management

- Exclusion- inspect incoming plants
- Discard infected plants
- Protectant fungicide applications plants
  - New England Greenhouse Floriculture Guide:

    www.ag.umass.edu/greenhouse-floriculture
  - Accurate diagnosis is key!

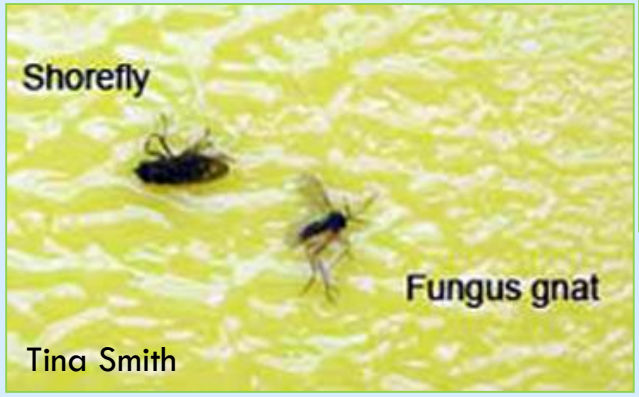
    www.ag.umass.edu/services/plant-diagnostics-laboratory

General Management (Root diseases)

- Add biofungicides to medium before potting
  - **competition** for nutrients (mainly iron) and space
  - **antibiosis**- one organism produces compounds toxic to others (i.e. antibiotics)
  - **parasitism/predation**- one organism preys upon another

General Management

- Good water management
  - Well-drained potting medium
  - Don't over-water- no wet feet
- Manage relative humidity
  - Air circulation, heating&venting
  - Proper plant spacing
- Avoid overfertilizing
- Control insect pests



Root Disease

Root Rot

- Symptoms include:
  - Wilting
  - Stunting
  - Chlorosis/necrosis
- Caused by:
  - Abiotic issues
  - Pathogens

Causes of Root Rot

- Abiotic factors
  - Excess soluble salts
  - Ammonium toxicity
  - Deficiency/excess
  - Suffocation
- Pathogens
  - *Pythium*
  - *Thielaviopsis*
  - *Rhizoctonia*
  - Others

Pythium

Oomycete (water mold)-
Not a "true fungus"

oospores

zoospores

Pythium

- Also causes damping off of seedlings
  - May also cause “black leg” or stem cankers
- Optimum temperature depends on species
  - Most fungicides effective for other pathogens are not effective for *Pythium*

Pythium Management- products

EDIBLES:

- *Bacillus subtilis* (Cease)
- *Gliocladium* (Prestop)
- *Streptomyces* sp. (Mycostop)
- *Trichoderma* sp. (RootShield)
- Phosphorus acid (Alude)
- Propamocarb (Previcur)

ORNAMENTALS:

- Etridiazole (Truban EC)
- Mefenoxam (Subdue)
- Cyazofamid (Segway O)
- Oxathiapiprolin (Segovis)
- Fluopicolide (Adorn)
- And many more!

Many isolates resistant to mefenoxam

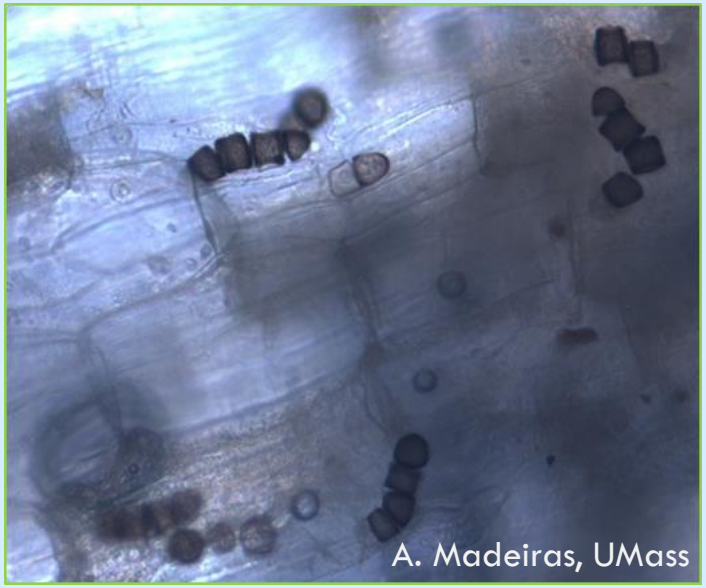
UMass Greenhouse Floriculture Guide

Thielaviopsis (Black Root Rot)

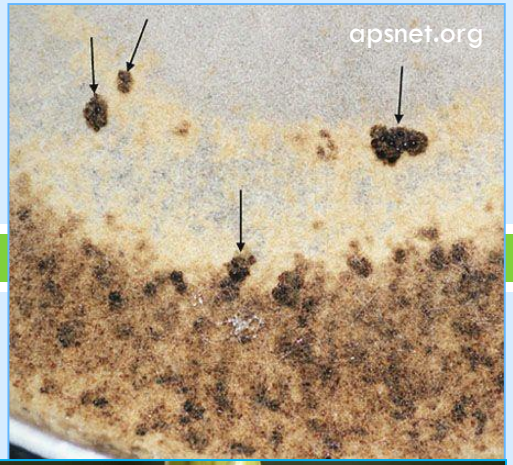
- Very wide host range
  - petunia, calibrachoa, pansy, viola, vinca
- Symptoms unevenly distributed
- Dark patches on roots
- Likes pH >5.6
- Likes 55-65°F
- Forms chlamydospores

Thielaviopsis Management

- pH 5.4-5.6 if possible (petunia group)
- Temperature >72°F
- Protective fungicides
  - Thiophanate-methyl (Clearys)
  - Triflumizole (Terraguard)
  - Fludioxonil (Medallion)



Rhizoctonia



- *R. solani* most common species
- Also causes damping off, stem cankers, web blight
- Likes temperatures 70-90°F
- Likes moist but not wet conditions
- May be stem lesions at soil line
- No spores; sclerotia

Rhizoctonia Management

- Decrease GH humidity to <93%
- Grow plants at <70°F
- Several fungicides available, including:
  - Fludioxonil (Medallion)
  - PCNB (Terraclor)
  - Polyoxin D (Affirm)
  - Pyraclostrobin & boscalid (Pageant Intrinsic)
  - Thiophanate-methyl (Cleary's 3336)
  - *Trichoderma* (Root Shield)

Root Rot Management- caveats

- Most fungicides effective for *Pythium* are ineffective for *Thielaviopsis* and *Rhizoctonia* and v.v.
- If in doubt, use a product labeled for both (Banrot, Hurricane)
- Rotate fungicide groups to prevent resistance development
- Fungicides will not help abiotic problems
- Efficacy of fungicides may vary due to application rate and / or GH temperature

Foliar Diseases

Leaf Spots/ Blights

- Abiotic factors
  - Phytotoxicity
  - Edema
  - Deficiency/excess
- Insect feeding

- Pathogens
  - Fungi
  - Bacteria
  - Viruses
  - Foliar Nematodes

Leaf spots can be caused by a number of things

Botrytis Blight (Gray Mold)

- Likes temperatures in the 70s but can be active to 32°F
- Likes RH>90%
- Needs wounds to infect- from there it attacks healthy tissue
- Saprophyte- survives on dead plant tissue

Botrytis Management

- Grow tolerant varieties
  - Petunia 'Fantasy Blue' and 'Tidal Wave Hot Pink'
- Preventive fungicides
  - Strobilurins, iprodione, and thiophanate-methyl ALONE no longer recommended
  - Polyoxin D (Affirm)
  - Chlorothalonil (Daconil)
  - Pyraclostrobin+boscalid (Pageant Intrinsic)
  - Many others
- BotryStop (*Ulocladium*)
- Calcium chloride- stay tuned!
- New in 2018: Broadform (fluopyram + trifloxystrobin)

Foliar Diseases- fungi in general

- *Alternaria*, *Cercospora*, etc.
- Increase air circulation/ decrease RH
- Start with clean seed
- Grow resistant/ tolerant varieties when available- there are few
- Protective fungicides- many products

Leaf Spots- Bacterial

Pseudomonas

Xanthomonas

Bacterial Diseases

- Can be seed-borne
- Spread by water splash, insects
- Accurate diagnosis is crucial!

Bacterial Disease Management

- Start with clean seed
- Avoid overhead irrigation
- Resistant/tolerant varieties
  - Geraniums: 'Martha Washington', 'Marie Vogel', etc.
  - Begonias: 'Pauline', 'Peace', 'Red Dot', etc.
- Labeled products are protectants-
  - Copper (Champ, Badge, etc.)
  - *Bacillus* sp. (Cease, Double Nickel, etc.)
  - Streptomycin (Agri-mycin 17)-pepper and tomato only
  - Oxidate

Foliar Nematodes on Easter Lily

Abiotic Causes of Foliar Disease

- Phytotoxicity
  - Solutions too concentrated
  - Crop is particularly sensitive
  - Try new things on a few plants
  - Be careful with fish emulsion!

Edema & Intumescence

- Edema
  - Undersides of leaves
  - Water imbalance- cells burst, cause blisters
- Intumescence
  - Upper or lower leaf surface
  - Low UV light- cells swell

Nutrient Deficiency/ Excess

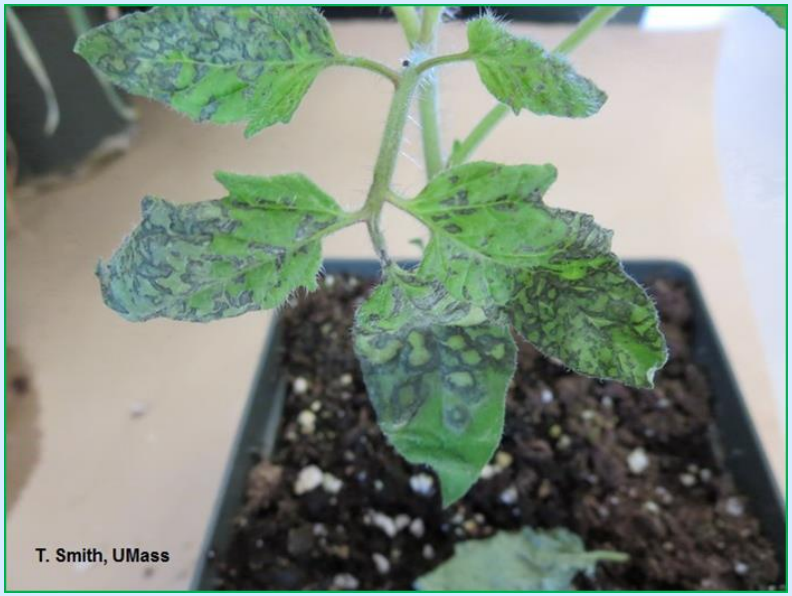
Insect Feeding Damage

- Insects may overwinter in heated greenhouses
- Insects may be brought in on purchased plants

Thanks for your attention

Leaf spots- viral

Impatiens Necrotic Spot Virus (INSV)



Leaf spots- viral

Tomato Spotted Wilt Virus (TSWV)

INSV & TSWV Management

- Discard infected plants
- Control thrips- they spread INSV and TSWV
- Control weeds