Common Diseases of Ornamentals: Symptoms, Signs, and Management

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Annie's Project: Farming in New Jersey's Cities and the Urban Fringe

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To understand plant disease…

Host

Pathogen

A disease is a dance between a…

- host plant
- causal agent

…where the growing environment plays a huge role in…

- the disease process
- management

Diseases, simplified:

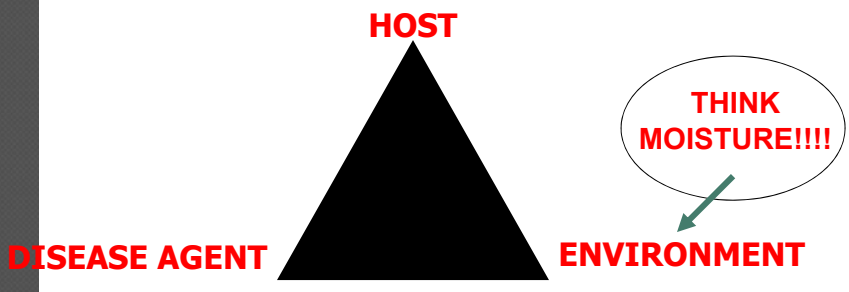
- Diseases are caused by many different agents, some living, some not
- Diseases "violate grower expectations." They are:
  - injurious
  - progressive (develop over time)
  - complex and challenging
- (Definition excludes insects, although sometimes insects play a role in the spread of plant diseases)

Insects can cause injury, but not disease

https://sebsnjaesnews.rutgers.edu/wp-content/uploads/2015/10/EAB-1.jpg

Disease development

- Diseases develop when the complex association between the disease agent, the host, and the environment *is just right*
- To manage a disease: remove a point on the triangle!



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Today

- Below ground
  - root rot
- Above ground
  - boxwood blight
  - canker

- Note: every part of a plant may become diseased. The symptoms you see are usually a function of the plant part infected

Below ground

Root disease

Root Issues

Pull the plant out of the pot…

What's wrong with this picture?

Root diseases in general

- These are caused by **soilborne organisms**
- Plants are exposed to these organisms when grown in contaminated soil or irrigation water
  - root, crown, and stem rots are common
  - rots of propagative plant parts
  - damping off
- Root diseases are troublesome when growing conditions are too wet

Fusarium on Exacum

APSnet

Common symptoms include:

- Moisture stress – wilt
- Nutrient stress – loss of color
- Root rot – lack of biomass

Where does the inoculum (source of the disease) come from?

- Inoculum comes from contaminated:
  - soil
  - irrigation water and their sediments
  - plant material produced elsewhere: cuttings, seedlings, transplants, or potted plants
  - survival structures leftover from previous crops

http://extension.psu.edu/i

- Examples

First look: what's happening here?

Missing plant is first clue.

Rhizoctonia blight of impatiens (APSnet)

Root rot (Exacum)

Root rot caused by *Pythium*. Much of the cortex has decayed away, leaving the vascular cylinder (stele) behind

Root rot on Blue Remington pansy caused by *Thielaviopsis*
Note: blackened roots and chlorotic foliage

Lower leaves turn yellow; plants stunt and die

https://pnwhandbooks.org/plantdisease/host-disease/pansy-viola-spp-thielaviopsis-root-rot

Damping-off: seeds fail to emerge or seedlings die afterward

http://www.dudutech.com/wp-content/uploads/2014/05/dudutech-disease-pythium.jpg

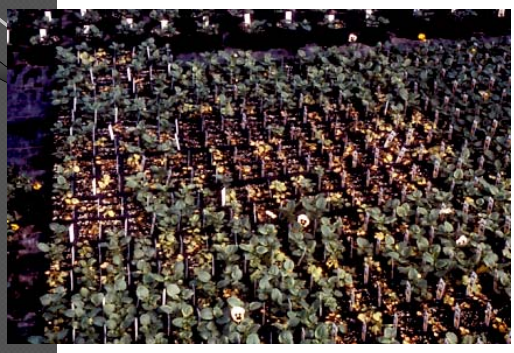
Cutting rot (rot extends from cut end up)

Photo: APS Press

Bulb rot: note rotted bulb and fluffy fungal mycelium

Bulb rot, Tulip

Infection often starts where water puddles in a low spot of the floor (left) or in “patches” (right)



http://floriculture.osu.edu/archive/jun03/curr-i/pansy1.jpg

http://www.oznet.k-state.edu/path-ext/factSheets/Ornamentals/Root%20Rot%20Diseases%20of%20Flowering%20Plants.asp

Water mold management

- Difficult to control once established
  - **an accurate diagnosis is key**
  - **prevention is key**
  - **sanitation is needed**
    - labor-intensive practices that keep inoculum low
- Maintain healthy plants and use resistant plant material
- Regularly inspect stock for insects and diseases
- In greenhouse and nurseries: prevent movement of infested soil or debris
- Careful water and nutrient management
- Combine any chemicals used with preventive, cultural controls

Above ground

Boxwood blight

Boxwood

https://www.thetreecenter.com/wp-content/uploads/american-boxwood-4-547x547.jpg

- *Buxus* sp., Family *Buxaceae*
- Long history of cultivation
  - principal woody plant in landscapes and historic gardens
  - significant economic value (15% of broadleaf evergreen sales in 2014)
  - demand is high: exceeds azalea, holly, hydrangea, arborvitae
- Costs for production are also at an all-time high
  - boxwood blight

Boxwood blight

- Hosts:
  - no evidence of real resistance in *Buxus* to pathogen
  - most susceptible: English and American boxwoods
  - others: little leaf boxwood, Japanese boxwood, and Korean boxwood, and hybrids
- Introduced to U.S. (Connecticut) in 2011
  - most likely from infected nursery stock

Boxwood blight (boxwood)

- First symptoms: black leaf lesions or blight at tip of leaf

Photos: Sharon Douglas, CAES

Boxwood blight

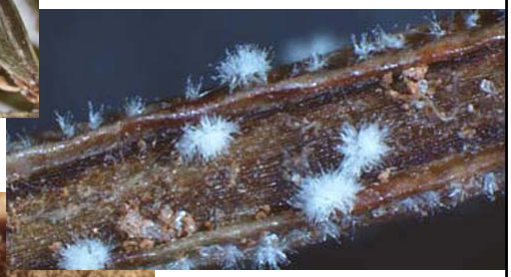
- Leaves turn tan, drop; stems blacken

Boxwood blight

- Plants defoliate and die

Photos: Sharon Douglas, CAES

White spore clusters on leaves and stems



http://pubs.ext.vt.edu/PPWS/PPWS-4/L_IMG_boxwood_3_jpg.jpg

Sandra Jensen, Cornell University

Management

- In the U.S., management is preventive:
  - keep boxwood blight out of production areas and landscape: historic gardens
  - "start clean, stay clean"
  - **key**: sanitation, better pruning, better groundcover management, resistant/tolerant cultivars, other practices
- Relative susceptibility (for new plantings)
  - *B. microphylla* Golden Dream
  - *B. sinica* var. *insularis* Nana
  - *B. microphylla* var. *japonica* Green Beauty

Above ground

Canker

Cankers

- Localized necrosis of the cambium and bark on trunks, stems, or twigs of woody and non-woody plants
- Elliptical lesions can girdle the stem, affecting tissue distal to the canker
- Appear sunken, and callous tissue may form

Nectria canker

Symptoms

- Cause vascular dysfunction in affected branches
  - dead or dying branches
  - often wilted or scorched leaves attached
  - affected branches scattered among healthy ones

Cytospora canker

Disease development

- Pathogen enters through wounds and other openings
  - often at a branch stub
- Pathogen expands in all directions from point of entry:
  - through the cambium and bark when host is dormant (usually) or actively growing (sometimes)
- Fungal pathogens produce signs (fruiting structures) in dead tissue that release spores during favorable weather

Predisposition

- Most cankers develop on plants severely weakened or stressed by:
  - **moisture or temperature extremes**
  - mineral deficiencies
  - defoliation
  - chemical or physical injury
  - transplant shock (many cankers develop within the first few years of planting)

A. B. Gould

Fusarium canker on sophora (annual canker)

APSnet

Nectria canker on apple (perennial canker)

Nectria canker and fruiting bodies

http://www.extension.umn.edu/garden/yard-garden/trees-shrubs/nectria-canker/img/fig2.jpg

http://www.forestryimages.org/browse/detail.cfm?imgnum=2110061

Canker management is preventive

- Improve plant vigor
- Avoid moisture stress and wounding
- Prune affected branches
- Plant species well-adapted to site
- Fungicides and wound dressings are not beneficial

Pruning

- Prune 6 to 8 inches below visible damage
  - prune only during dry weather
- If possible, remove branch at branch collar
  - remove trees if large cankers appear on main stem or trunk
- Make a clean cut flush with the collar, not with the trunk
- Disinfest pruning tools by dipping in denatured alcohol between cuts
- Remove and discard (compost, chip, bury, burn) infected plant parts

Disposal

- Most diseased plant material may be safely chipped, shredded, or composted
- These processes create inhospitable environment for pathogen by:
  - drying out the substrate (chipping, shredding)
  - raising the temperature to unsuitable levels (composting wood chips)
  - placing pathogens in competition with beneficial microorganisms (all)
- Optimal process is to subject shredded or chipped substrate to composting