Vegetable disease update – Brassica crop focus

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Diseases seen Brassica crops in Utah

Damping-off and root rot

Damping-off and root rot

- Seedlings or young transplants turn brown/black at base and fall over
- Causal agents: Pythium spp., Rhizoctonia solani
- Problem in greenhouse transplant production and in field

Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Damping-off and root rot

- Occurrence in field:
  - In fields with a history of Rhizoctonia and Pythium
  - During very wet spring/early summer
- Occurrence in greenhouse:
  - Contaminated trays/pots, potting mix, benches
  - Recycled water in hydroponics

Damping-off and root rot

- Management:
  - Sanitation: Disinfect trays, pots and benches with a 10-15% household bleach solution. Pots and trays should be soaked for half hour to an hour in bleach solution and then rinsed in water.
  - Regularly clean holding tanks for nutrient solution in hydroponics
  - Do not over-water; Seedlings sitting in water are more susceptible
  - Do not plant seed too deep
  - Seed treatment with a fungicide to prevent damping-off

Powdery mildew

Powdery mildew

- Causal agent: *Erysiphe cruciferarum, E. polygoni,*
- Hosts: All *Brassica spp.* including vegetables, cover crops, canola and weeds

Dr Parthasarathy Seethapathy, Tamil Nadu Agricultural University, Bugwood.org

Powdery mildew

- Does not need free water on leaves to infect; Rain can actually have a negative effect on the fungus
- Spread of PM:
  - Conidia can be carried for miles by wind
  - Infected plants contacting non-infected plants
  - Dispersal by humans

Powdery mildew

- Management:
  - Resistant varieties if available
  - Remove infected plant material at the end of the growing season to prevent overwintering
  - Control weeds such as wild radish and pepperweed

Missouriplants.com

https://www.weeds.asn.au/tasmanian-weeds/view-by-common-name/wild-radish/

Powdery mildew

- Management:
  - Chemical control
    - Strobilurins such as Cabrio EG, Quadris Flowable
    - Sulfur (do not apply above 90F)
    - Following the label
  - Applications should start when first powdery mildew spots are detected

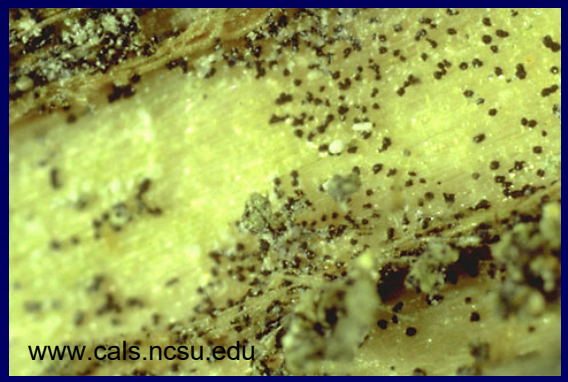
extension.unh.edu

IPM.Missouri.com

Verticillium wilt

Verticillium wilt

- Causal agent: *Verticillium dahliae*
- Wide host range
- Cauliflower, cabbage, Brussel sprouts, horseradish, rutabaga, radish are susceptible
- Spread by spores produced on plants
- Microsclerotia residing in soil (can survive for many years in soil)



Verticillium wilt

http://calag.ucanr.edu/Archive/?article=ca.v054n03p30

Verticillium wilt

- Management
  - Clean equipment to prevent moving Verticllium to non-infested areas
  - Broccoli is immune
  - Some studies have shown incorporating broccoli residue into soil may reduce disease severity

Turnip mosaic virus

Turnip mosaic virus

- Host: wide host range including Brassica spp., ornamentals, beets, lettuce, spinach and weeds
- Symptoms:
  - Yellow leaf spots or mosaic pattern on leaves

http://www.pestnet.org/fact_sheets/turnip_mosaic_099.htm

Turnip mosaic virus

- Transmission: Aphids in a non-persistent manner
- Management:
  - Good weed control
  - Do not plant susceptible crops next to perennial Brassica species like horseradish

Diseases you may see in Brassica crops in Utah

Black rot

- Causal agent: *Xanthomonas campestris* pv. *campestris*
- Symptoms:
  - Yellow, V-shaped lesion resulting in necrosis and wilting of leaves
  - Blackening of veins

https://ag.umass.edu/vegetable/fact-sheets/brassicas-black-rot

Growveg.com

Courtesy of G.J. Holmes

Black rot

- Transmission:
  - Seed
  - Splashing water
  - Equipment
  - Insects
- Disease development:
  - Warm and humid weather
  - Bacteria enter plant through wounds or hydathodes
  - Seedling infections may go unnoticed because temperatures are too cool for symptoms

Black rot

- Management:
  - Sanitation (remove plant debris, diseased plants)
  - Avoid overhead irrigation
  - Disease-free seed
  - Resistant varieties when available
  - Hot water treatment
    - 122F for 25 min for cabbage, broccoli and Brussel sprouts
    - 122F for 15 min for cauliflower, kohlrabi, kale, turnip and rutabaga
    - Some varieties may be sensitive to hot water treatment

Bacterial soft rot

Bacterial soft rot

- Causal agent: *Erwinia carotovora*
- Transmission:
  - Splashing water
  - Insects
  - Equipment
- Disease development:
  - Warm and humid weather
  - Bacteria enter through wounds
  - Bacteria survive in plant debris
  - Not only field problem; symptoms can develop in storage

Bacterial soft rot

- Symptoms:
  - Early: Watersoaked lesions
  - Mass of macerated tissue internally with cabbage head still intact
  - Slime oozing from cracks
  - Hollow stalks
  - Broccoli and cauliflowers heads have brown sunken areas

Bacterial soft rot

Black rot

- Management:
  - Sanitation (decontaminate knives used for harvesting)
  - Removing cull piles
  - Rotating with small grains
  - Well drained soils or raised beds
  - Tolerant varieties (some broccoli varieties with a more cone-shaped head have less water pooling on heads)

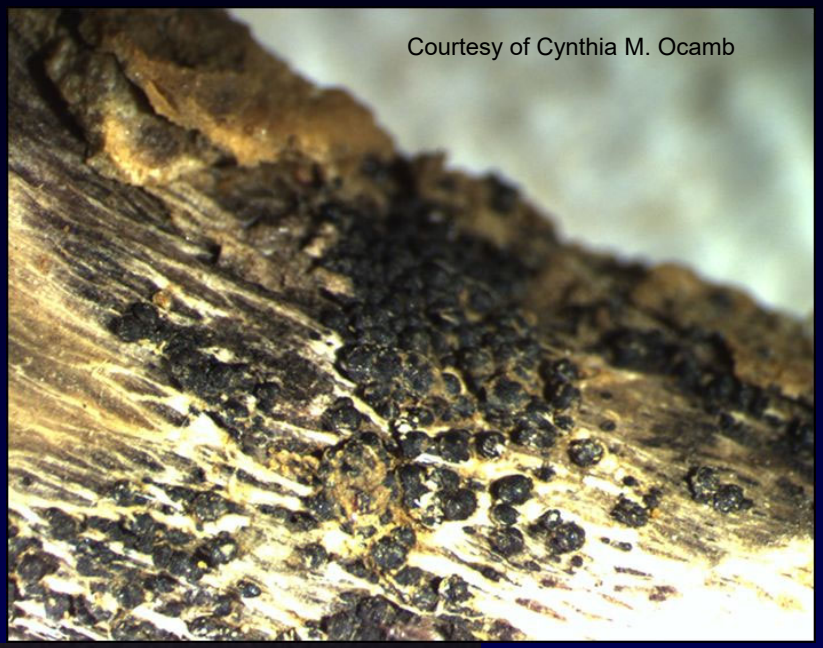
Blackleg

Blackleg

- Causal agent: *Phoma lingam (*syn. *Leptosphaeria macularis)*
- Symptoms:
  - Cotyledons can show symptoms
  - In severe cases, seedlings can die
  - On older plants: lesions develop confined by veins
  - Pycnidia (fruiting structures) develop in lesions

Blackleg


Courtesy of Cynthia M. Ocamb


Courtesy of Cynthia M. Ocamb


Courtesy of OSU Extension Plant Pathology

Blackleg

- Disease development:
  - Fungus survives in crop debris and is seedborne
  - Spores germinate of leaves and colonize plants through petioles, moving to the vascular tissue into the main stem
  - Spores are released at 46F and infection occurs and symptoms develop rapidly above 68F. No symptoms below 50F
- Management:
  - Use disease-free seed
  - Hot water treatment
  - Remove crop residue
  - Crop rotation for 3-4 years

Blackleg

- Management (continued):
  - Chemical control
    - Strobilurins such as Cabrio EG
    - Following the label

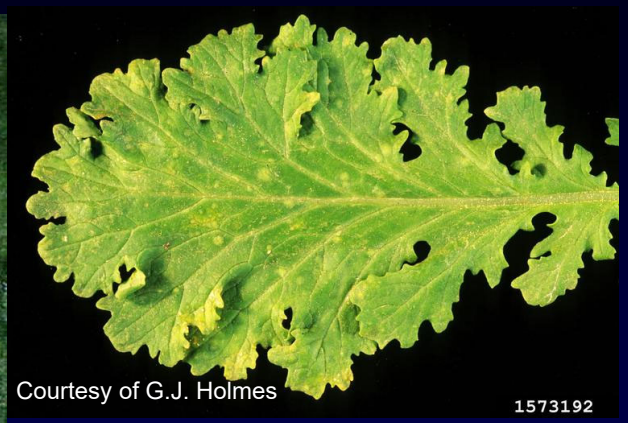
White rust

White rust

- Causal agent: *Albugo candida*
- Oomycete not a true fungus
- Symptoms:
  - White pustules develop on any aboveground plant part
  - Pustules may merge
  - Leaf curling
  - Flower heads may be distorted

White rust

Cesar Calderon, Cesar Calderon Pathology Collection, USDA APHIS PPQ, Bugwood.org



Pestnet.org

University of Warwick

Ca.Wikipedia.org

White rust

- Transmission:
  - Rain, splashing water
  - Seedborne
- Disease development:
  - Survives as oospores on seed and in soil
  - Oospores release motile zoospores that cause initial infections of seedlings
  - New infections develop sporangia in white pustules that are wind dispersed
  - Temperature 55-64F

White rust

- Management
  - Disease-free seed
  - Crop rotation
  - Good weed and volunteer *Brassica* control
  - Chemical control:
    - Strobilurins such as Cabrio EG, Quadris Flowable
    - Mefenoxam such as Ridomil Gold
    - Following the label


Thank you for listening