

CSI Cut flower farm: Disease and insect cases from 2022

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Freesia sneak virus

Freesia sneak virus

- Host: Freesia and lachenalia
- Third report for the country
- Symptoms:
 - Chlorotic and necrotic lesions
 - Could be mistaken for insect feeding or fungal infection



Freesia sneak virus

- Spread: Infected bulbs or soilborne fungus *Olpidium brassicae* that infects roots; no mechanical transmission
- Management:
 - Destroy infected plants

**Pythium root
rot**

Pythium root rot

- Causal agent: *Pythium* sp. (same pathogen that causes damping-off)
- Pythium root rot affects older plants including cut flowers, vegetables, hemp
- Symptoms:
 - Plants start to wilt
 - Roots are discolored and the cortex may be easily pulled off and only the inner core of the root is left
 - Sometimes the lower part of the stem can be rotten as well

Pythium root rot

<https://www.insectimages.org/browse/detail.cfm?imgnum=1634171#collapseseven>



Cortex
missing

1634171

Management

- Do not over water. Drip irrigation can minimize disease incidence
- Disinfect tools that come in contact with soil
- Buy healthy transplants

Powdery mildew

Powdery mildew

- Obligate parasite – needs living tissue to survive
- All plants except for a few, such as conifers and ginkgo, are infected with at least one species of powdery mildew
- Some PM infect many different plant species, others are very specific

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

- Survival in winter:
 - Ascospores survive in fruiting bodies on dead plant material or on bark
 - Mycelium can survive in cracks in the bark or in buds
 - During mild winter temperatures PM can survive on green plant tissue (shoots, leaves)

Ascospores released
in the spring



Re-infect new leaves

Spores infect tissue



Overwinter in plant
debris



Colonies form and
produce conidia or
chasmothecia

Powdery mildew

- Pathogen: *Golovinomyces ambrosiae*
- Hosts: Dahlia, zinnia, celosia
- Pathogen: *Podosphaera pannosa*
- Hosts: Roses, peaches
- Symptom: White patches or entire leaves covered in a white powder.
- Environmental conditions: Dry and warm. High humidity for a few hours needed for infection; often occurs later in the season



T. Smith, UMass

Powdery mildew

- Management:
 - Fungicide applications including sulfur or Kaligreen (potassium bicarbonate) work well
 - Need to be started as soon as the first spots appear
 - Reminder: Do not apply sulfur above 90F
 - Test it on a couple of plants first to check for phytotoxicity

Southern blight

Southern blight

- Pathogen: *Sclerotium rolfsii*
- Hosts: Iris, tulip, dahlia, daffodils, vegetables
- Symptom: Brown spots at the base of leaves, fast growing white mycelium covering leaves, formation of sclerotia (mustard-seed like fruiting structures)
- Environmental conditions: Moist and warm.
Soilborne pathogen. Can be introduced on infected planting material. Sclerotia can survive for years in the soil.

Southern blight



White
mycelium



Brown necrotic spots



Sclerotia

Southern blight

- Management:
 - Destroy infected plants and tubers
 - Monitor new planting material
 - Remove three inches of soil around an infected plant

Dahlia mosaic virus

Dahlia mosaic virus

- Three strains:
 - DMV-D10 (most common in USA)
 - DMV-Portland (least common)
 - DMV-Holland
 - Can occur single or in combination in plants
- Transmission: Aphids and seed/tubers
- Symptoms:
 - Chlorosis of leaves
 - Deformation of leaves
 - Reduced flower production
 - Color breaking in flowers
 - Stunted plants

Dahlia mosaic virus



Dahlia mosaic virus

- Management:
 - Destroy infected plants and tubers
 - Use certified disease-free seed and tubers
 - Do not overfertilize
 - In our 2022 trials plants with excessive amounts of N, P and K showed more symptoms

Tobacco streak virus

Tobacco streak virus



- Over 200 hosts including vegetables, field crops and ornamentals
- Indirectly transmitted by thrips through pollen
- Can be seedborne and seed transmitted in some species
- Found in dahlia tubers
- Only other hosts found in Utah: winter squash and calendula

Tobacco streak virus

- Host: Dahlias
 - Yellow streaks along the veins



Tobacco streak virus

- Management:
 - Insect control
 - Destroy infected plants and tubers

TSV and TSWV

- Mixed infections



Phytoplasma

Phytoplasma

- Phytoplasma are bacteria without a cell wall
 - Cannot survive outside the vector or plant
- Transmitted by insects, mostly leafhopper species



Beet
leafhopper



Aster
leafhopper

Phytoplasma

- Several Phytoplasma species can infect ornamentals
- Symptoms can be mistaken for herbicide damage

Infected Cosmos



- Phyllody (parts of or the entire the flower are replaced with leaves)
- Symptoms look similar on many Asteraceae

Infected Veronica plant



Part or all of the flower stays green and may be flattened

Healthy plant



Management

- Monitor for leafhopper with sticky cards
- Remove symptomatic plants
- Once a plant is infected there is no cure

Leafy gall

Leafy gall

- Causal agent: *Rhodococcus fascians*
 - Soilborne and can grow on surface of plant material
 - Enters plant tissue through wounds or natural openings like lenticels or stomates
 - Bacteria manipulate the hormone levels in the plant
 - Over 80 known hosts including dahlia, delphinium, sunflower, chrysanthemum, Veronica, many other ornamentals, corn, vegetables

Leafy gall

- Symptoms:
 - Fasciation: Stems are flattened and ribbon-like
 - Shoot proliferation: Numerous shoots emerging from one area
 - Stunted plants, reduced root growth
- Symptoms in some plants can be caused by:
 - Eriophyid mites
 - Herbicide
 - Phytoplasma

Leafy gall

<https://www.plantdiseases.org/bacterial-fasciation-leafy-gall-daisy-0>



Leafy gall

Leafy gall

- *Rhodococcus fascians*
- Shoots sprout from tumors
- Infect through wounds and natural openings
- Soilborne as well as on plant tissue
- Infects mostly herbaceous plants

Crown gall

- *Agrobacterium tumefaciens*
- No shoots are produced
- Infect through wounds
- Soilborne
- Infects many woody plants

Leafy gall

Leafy gall



Crown gall



UGA5223043

Leafy gall

- Management:
 - Remove infected plants (if neighboring plants are very close to infected plant, remove them as well)
 - Get the symptomatic plants tested to determine cause
 - Do not take cuttings from infected plants
 - Sterilize pruning tools between plants
 - Use new or sterilized pots and trays

Grasshopper

Grasshopper

- Lay eggs in the fall in pastures, fence rows, ditches etc
- Eggs hatch April to June
- Nymphs go through five instars before turning into adults
- Usually one generation per year

Grasshopper



Grasshopper



Grasshopper

- Management:
 - Bait
 - Nolo Bait (currently not produced)
 - Semaspore
 - Bait containing Carbaryl
 - Insecticides
 - Most insecticides registered for grasshopper are effective against nymphs not adults
 - Floating row covers

Leafhopper

Leafhopper

- Some species can transmit viruses and phytoplasma
 - Beet leafhopper – Beet curly top virus, Phyoplasma sp.

**Bumble flower
beetle**

Bumble flower beetle

- Lay eggs in compost or soil with high organic matter in early spring
- Larvae mature in June - July
- Adults emerge in mid-August and September.
- They mostly feed on plant sap, overripe fruit and vegetables
- Can occasionally damage flowers
- One generation per year

Bumble flower beetle



Earwigs

Earwigs



Diane Alston, USU



Whitney Cranshaw, Colorado State University, Bugwood.org

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https://entnemdept.ufl.edu/creatures/veg/european_earwig.htm

Earwigs



Earwigs

- Feeds on fungi, decaying plant material, insects and plants
- Both beneficial (feed on aphids, mites, maggots and caterpillars) and a pest (damage flowers and flower buds)
- Nocturnal and hide in protected areas during the day
- Adults overwinter in pairs in the soil
- Lay eggs in spring in clusters in the soil

Earwigs

- Eggs hatch in mid-May
- Four instars (look similar to adults)
- Mainly disperse by crawling; weak fliers
- Management:
 - Corrugated cardboard or newspaper traps where earwigs hide during the day
 - Traps could be placed on posts or stakes
 - Remove traps and put in plastic bags every 2-3 days

Earwigs

Diane Alston, USU



Earwigs

- Management (continued):
 - Traps with smelly oil (for example fish oil or canola) or bacon grease
 - Yoghurt container with holes in the lid are placed in the soil
 - Check several times per week and dispose of earwigs
 - Add more bait

Earwigs



Diane Alston, USU



Whitney Cranshaw, Colorado State University, Bugwood.org

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Earwigs

- Management (continued):
 - Sticky band around the plant stem
 - May work for plants with strong stems
 - Put a strip of duct tape around the stem and double-sided sticky tape on top of the duct tape
 - Traps earwigs crawling up the stem

Earwigs

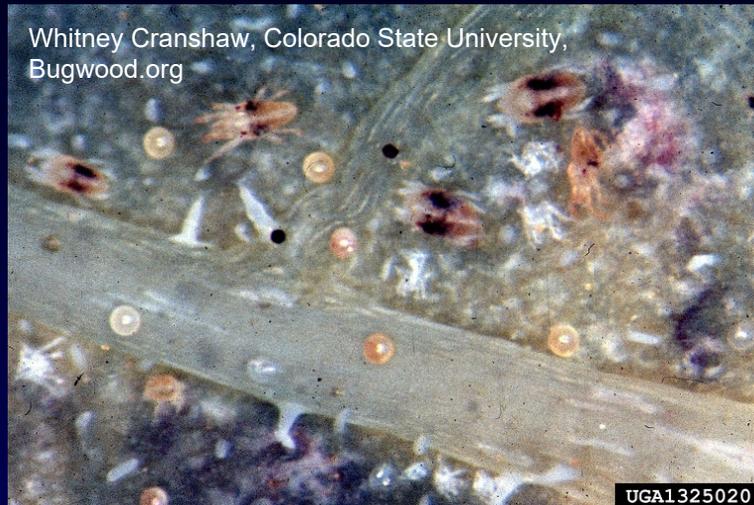


Spider mites

Spider mites

- Two-spotted spider mite most common
- Adults overwinter in the soil
- Eggs are laid on underside of leaves
- Preferred temperature 86-90°F
- Often worse during hot and dry conditions and in areas with a lot of dust
- Outbreaks can also occur if insecticides are applied
- Wide host range including vegetables and ornamentals

Spider mites



Spider mites

- Symptoms:
 - Stippling and brownish spots on leaves
 - Chlorosis of leaves
 - High infestation leaves desiccate and die
 - Webbing may be seen around leaves or even entire plants

Spider mites



Amanda Pratt, USU



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Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org



Spider mites

- Management
 - Avoid dust if possible
 - Reduce drought stress
 - Reduce fertilizer applications; high concentrations of nitrogen can make spider mite outbreaks worse
 - Biological control:
 - Damselfly bugs, predatory mites, big eyed bugs, lady beetles and their larvae

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Thank you for listening!
Questions?