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Identifying & Treating Plant Diseases

July 9, 2024

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Missouri Valley Extension Master Gardeners



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First Steps

Be sure you've got a problem - This is a Process!

- Symptom - the abnormal appearance of a plant
- Sign - visible physical evidence of a pathogen, like wilting, etc.



In general,

- Consider the plant, and what diseases are common
- Examine for Symptoms/Signs to rule out insect damage (are there frass, honeydew, shed skins, eggs or adults), feeding signs? If not, its not insect damage.
- Consider patterns
 - Are signs uniform?
 - Are both new and old growth affected, or just one?
 - Which part of the plant is affected? Leaves, stems, fruit, etc.

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Common Disorders (not diseases)



Causes:

- Temperature / moisture
- Nutrient deficiencies / toxicities
- Chemical damage

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Disorders (continued)

Temperature & Moisture problems

- Wilting
- Browning of leaf margins & tips
- Failure to set fruit
- Shedding of developing fruit
- Misshapen fruit
- Root damage—root or crown rot



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Disorders (continued)



Nutrient deficiencies

- Color changes in leaves:
yellow (N, Fe), purple (P)
- Blossom end rot (Ca)

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Disorders (continued)

Chemical damage-- herbicides

- 2,4D—distorted growth, stunting
- Amino- and Chlopyralids--chlorosis, stunting, leaf cupping (remains in soil /compost)
- Dicamba—leaf cupping, stunting (re-volatilizes in warm temperatures)

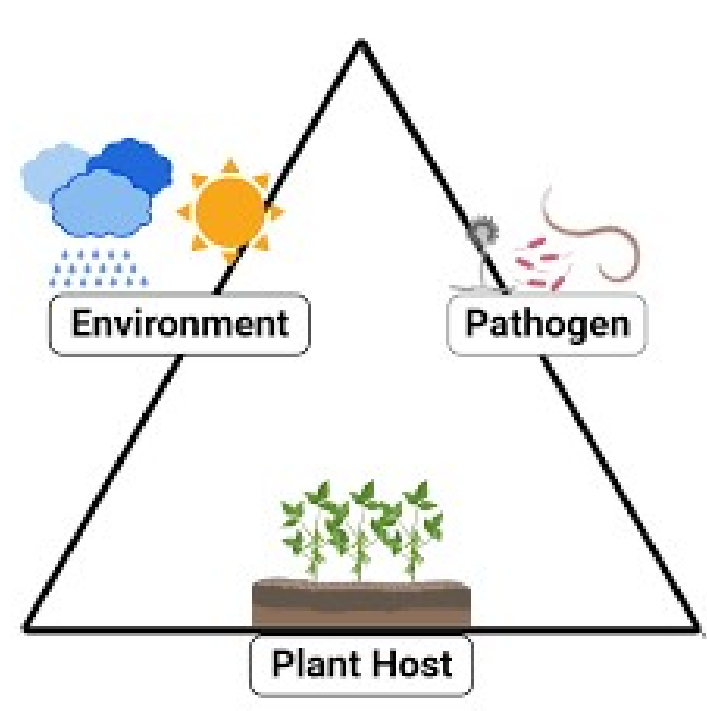


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Biotic Disorders--Diseases



Environment: air & soil
temperature, humidity,
rainfall, soil type, fertility

Plant host: susceptible crop
or cultivar

Pathogen: fungi, bacteria,
virus

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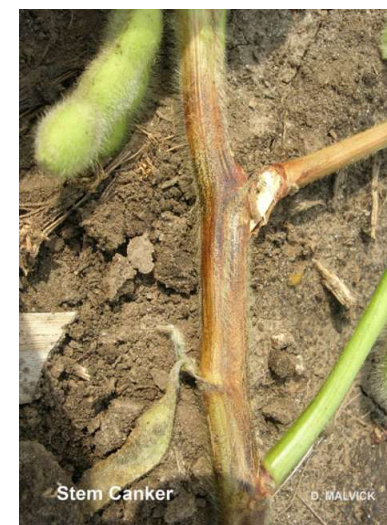


Pathogens--fungi

- Most common cause of plant diseases
- Many have multiple hosts
- Can invade plant cells directly, without a wound
- Reproduce mostly by spores
- Require moisture and warmth for about 2-12 hours to germinate



Corn smut



Stem canker



rust

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Fungal diseases



Anthracnose

- Depressed circular spots on ripe fruit
- Black Fungal structure
- Overwinter in soil



Septoria leaf spot

- Small spots—gray center, dark brown edge
- Causes defoliation



Early blight

- Target like spots on fruit or leaves
- Causes defoliation



Late blight

- Gray patches on top of leaf; fuzzy growth under
- Fruits turn black

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Fungal diseases



- Small spots expand; dark circular rings
- Overwinters in seeds and residue

Alternaria leaf spot



- Round black spots leaf tops
- Leaves yellow & drop
- Overwinters in leaf residue

Black spot



- Develops in cool, humid weather
- Yellow spots on top of leaf, “fuzz” underneath

Downy Mildew



- Develops in hot, dry weather
- “Powder” on top of leaf

Powdery mildew

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Control of Fungal Diseases

- Remove and destroy diseased plant debris
- 3-year crop rotation
- Create good air circulation by spacing and pruning
- Water in morning with drip or soaker hose
- Mulch thoroughly; control weeds
- Preventative fungicides: (read & follow the label)
inorganic copper early; captan or fungonil later



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Pathogens--bacteria



- Need wounds to infect plant
- Spread from plant to plant by water, insects, equipment, humans and seeds of infected plants
- Can overwinter in crop debris, weed hosts, or in the soil

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Bacterial diseases



- Black leaves
- Shoots wilt; form “hook”
- Can kill tree

Fire blight



- Carried by cucumber beetles
- Plant wilts; leaves yellow

Cucumber wilt



- Sunken, dark areas
- May ooze & have bad odor
- Most common in wet weather

Soft rot



- Onion maggots contribute
- Rots outer layers

Bulb rot

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Control of bacterial diseases

- Control insect vectors
- Don't overwater; water in morning with drip or soaker hose
- Rotate crops
- Fire blight—requires pruning and sanitation of equipment



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Pathogens--viruses

- Named after first host plant
- Inserted into cell by vectors or through a wound, as well as dirty tools
- Can be species specific or infect multiple plant families
- Can spread through contaminated seed, tubers, cuttings
- Replicate when specific conditions are met
- No cure—plants must be destroyed



Mottled or distorted leaves & fruit





Viral Diseases



- Mottled, curled leaves
- Mottled fruit
- Spread by contact

Tobacco mosaic



- Stunted plants
- Shoot die-back
- Misshapen, mottled pods

Yellow mosaic



- Stunted vines
- Distorted leaves, fruits
- Infected seeds
- Carried by aphids, beetles

Cucumber mosaic



- Purplish streaks on stems, leaves
- Brownish distorted pods

Pea streak

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Control of Viral Diseases

- Control weeds (hosts)
- Control insects (vectors)—aphids, cucumber beetles
- Remove and destroy diseased plants
- Select resistant varieties
- Keep tools clean & disinfected

Tomato Growing Tip #21
Check disease resistance codes when choosing tomato varieties.

Tomato Dirt

Disease	Common Code
Verticillium Wilt	V
Fusarium Wilt	F
Nematodes	N
Tobacco Mosaic Virus	T
Alternaria Leaf Spot	A
Gray Leaf Spot	St



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General Disease Prevention

- Rotate crop families every 3 years
- Use clean seed (don't save from diseased plants)
- Clean shoes and garden tools; wash hands & gloves
- Mulch (straw, grass, plastic)
- Create grassy walkways
- Use trellises (sanitize each year)
- Remove infected plants
- Use only fully composted compost



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Where to go for Help...

- Soil tests: <https://extension.sdstate.edu/soil-testing-labs> (tell where sample was collected)
- Garden Hotline: <https://extension.sdstate.edu/garden-yard/problems-and-solutions> (provide clear pictures: one close up and one of entire plant)
- SDSU Diagnostic Clinic: <https://www.sdstate.edu/agronomy-horticulture-and-plant-science/sdsu-plant-diagnostic-clinic> (pictures or samples: may be a charge for samples—instructions on web page)
- UMN Plant Diseases Diagnostic tool (online): <https://apps.extension.umn.edu/garden/diagnose/>



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Bibliography

Print:

MacNab, Sherf & Springer, "Identifying Diseases of Vegetables", Penn State College of Agricultural Sciences, 1994.

Strunk, Connie, "Plant Disease Management Decisions to Make Before Planting", SDSU Extension, 2/9/22.

E-resources:

"Plant Diseases", <https://extension.umn.edu/garden/diagnose/>

"Plant Disease Resistance Codes", <https://www.johnnyseeds.com/growers-library/methods-tools-supplies/pest-disease-control/disease-resistance-codes.html>

YouTube: "Strategies for Identifying and Managing Plant Diseases", UW-Madison Extension

YouTube: "Home Gardening Webinar 2024: Defying Tomato Diseases and Disorders", ISU Extension, 1/9/24.

YouTube: "2024 Crop Hour: Specialty Crops - Diseases and Growing Strategies", SDSU Extension, 3/6/24.

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