

Disease Basics in Hemp

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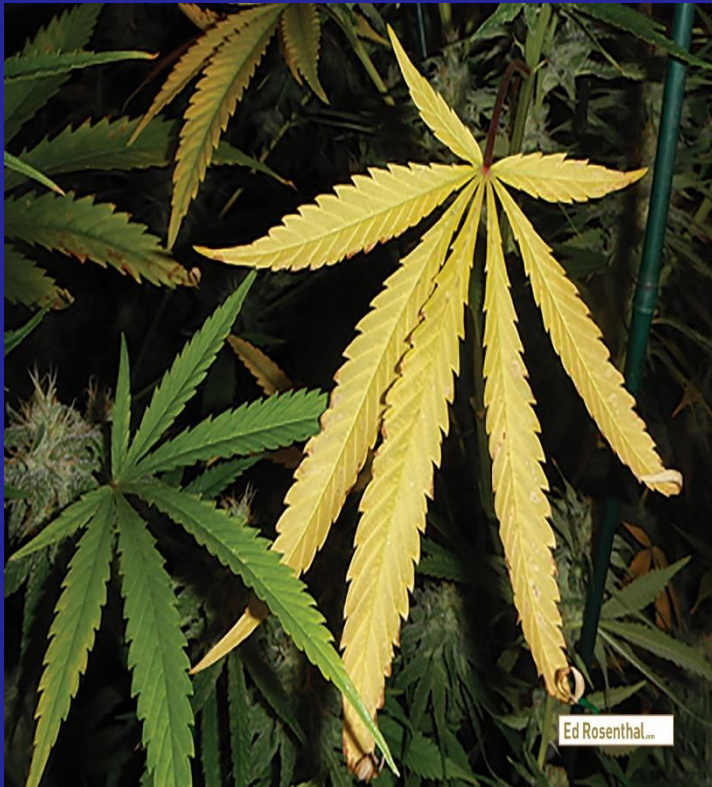
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Plant Disease: Change in the form or the function of the plant

Biotic diseases are caused by living organisms-**fungi**, bacteria, and **viruses**, **nematodes**



Abiotic diseases are caused by non-living things-
weather, drought, nutrient deficiencies, etc.



N Deficiency



Zinc deficiency



Drought/high heat stress

Chimera- genetic mutation



Rule out arthropods first- cast skins, webbing, frass, eggs,
actual pest



Potato leafhopper



Two spotted spider mite

If you see a problem in the foliage, check the lower stem and roots first!

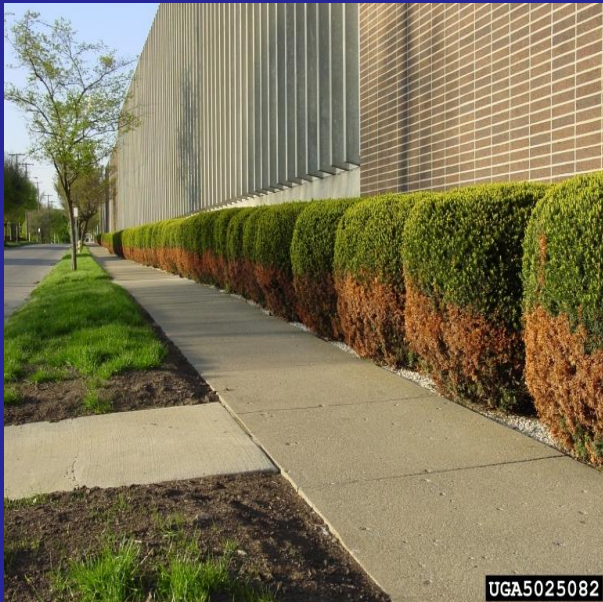


Hemp root rots

- Infrequent in the field unless saturated soils and cool temps, poorly drained fields or low spots
- More common in greenhouse transplants
- 4-5 different soil borne fungi in all soils that become active when wet/cool and roots are growing slowly-keep roots warm/dry
- Start with clean flats, soil-less mix, Rootshield (Trichoderma)

Abiotic Clues

- Often a pattern of injury-entire row, crop/living org. would be random
- Comes on quickly/living organisms build up slowly
- One age tissue affected-living organisms would attack all ages
- Gradient of injury away from source
- More than one crop affected
- No cure, plants should grow out of it-watch new growth



Biotic-LIVING ORGANISMS

- Fungi
- Bacteria
- Viruses
- Nematodes
- Higher plants

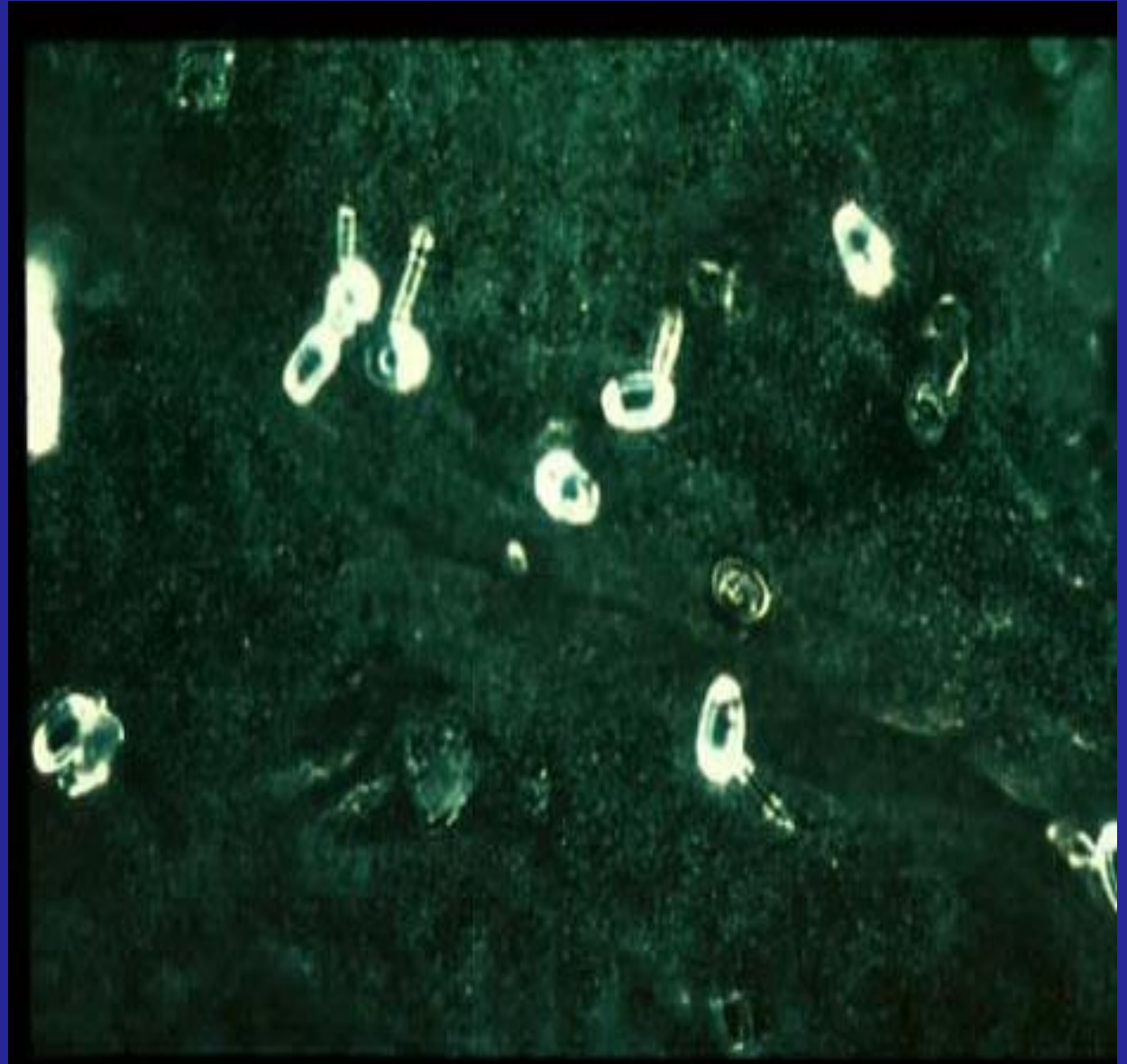
Often there is a “sign” of the pathogen-actual presence of the pathogen



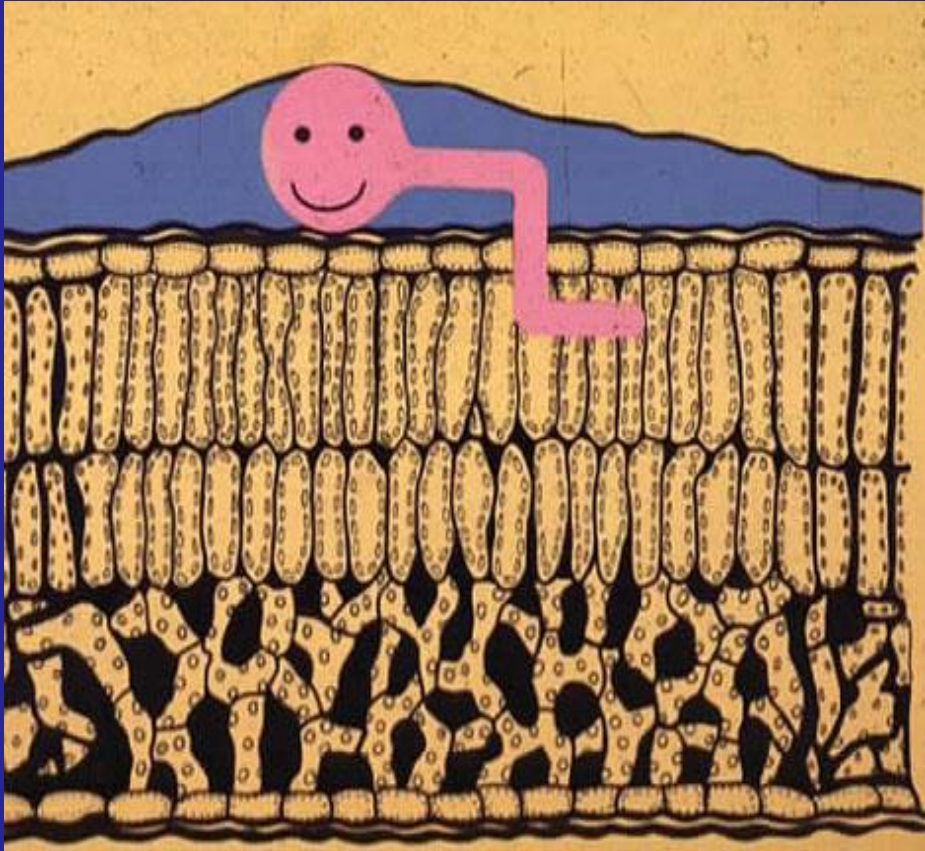
Botrytis blight- “sign” actual presence of pathogen- spores, mycelium, overwintering structures



Spores-lightweight carried on air currents, tools, etc. can get into tissue on their own



6-8 hrs leaf wetness or high rh



Most fungi overwinter on diseased refuse or may have long term overwintering structures like sclerotia



Sclerotia



Hyphae or mycelium

Scout!

- Scout fields on a regular basis going into the inner rows, low areas, etc.
- Easier to manage pests or diseases if you find them early

Botrytis gray mold

- Most economically damage hemp disease
- Everywhere-wide host range!
- Will attack any plant part, alive or dead
- Cooler temps and hi moisture-Fall
- As flower buds mature, check for botrytis
- Gray spores are visible to naked eye



Scouting Botrytis flowers



- Look for any necrotic (dead) tissue close to the bud. Look closer at the interior of these flower buds (though botrytis can infect the dense interior tissue without any sign on the exterior of flower)
- Scout by "cracking" the buds to get a view inside the flowers as soon as buds start to gain density and or weather favors Botrytis. Wash hands if you come into contact with Botrytis so scouting doesn't end up spreading the disease

Botrytis management

Environment:

- Field-lower RH by avoiding overcrowding/plant spacing
- GH-spacing, lower RH with roll up sides, fans, vents, heat

Host: no resistant cultivars

Pathogen: OW as sclerotia-clean up disease debris,

GH clean up debris and any senescing tissue

- Rotation
- Protectant fungicides-if there are the right environmental conditions the fungicides we have to work with probably can't overcome the disease





Botrytis management

- One of the most useful tools on the Vermont state list is Hydrogen peroxide (ai in Zeritol and Sanidate) which can be used both pre and post flower and is non residual.
- Some growers have also experimented with dipping freshly harvested flower stems in a peroxide solution, though dip should be a lower concentration than spray recommendation and flower should be dried quickly prior to hanging

Leafspot diseases-circular, dead spot, often with an advancing yellow margin. Can reduce vigor of the plant.

Several: Septoria, Cercospora, Bipolaris, Anthracnose



Septoria leafspot



Hemp leafspot (Bipolaris)

Nicole Gauthier, UKY

Leafspot disease management

Environment:

- Spacing
- Avoid over head irrigation

Host: probably no res cultivars, but
may notice differences in susceptibility

Pathogen:

- OW in plant debris, so clean up field and rotate 3 yrs, mulch will prevent splash up





Leafspot disease management

- Pruning all lower leaves and small interior branches can help deter leafspots from soil borne diseases like Septoria and increase airflow to help prevent powdery mildew and botrytis.
- Though this is time consuming, it may be worth the effort for smokeable flower.

Powdery mildew-only requires high humidity

Symptoms-white powdery coating on upper surface of foliage
In field, often after warm humid weather
Will only live on live tissue



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Powdery mildew management

- Environment-spacing, lower humidity, free moisture will inhibit the disease
- Host-resistant cultivars
- Pathogen-needs living host
 - Fungicides-horticultural oils, neem



Wilting in the field

- Entire field-probably abiotic-heat/drought
- Individual plants-look lower on stem for canker disease





Sclerotinia white mold

- Symptoms-wilt, death. White, fluffy fungal growth on the stem
- Very wide host range
- Hit or miss in low, wet areas of the field.
- Sclerotia can live for many years just waiting for right conditions.
- Avoid poorly drained areas
- Rotation
- Spacing for good air circulation
- Cut plant off at the base and remove from the field before sclerotia are produced.

Viruses-submicroscopic particles of protein and nucleic acid
Symptoms-mottling, stunting, leaf roll, chlorosis, curling,
twisting, spotting throughout plant

- SEVERAL!
- Can be seedborne or introduced by wounds, vector or tools
- No cure, rogue out of field
- Testing for viruses is \$



Disease management in general

- Start with healthy transplants, clean flats
- Choose good site with good drainage and soil fertility
- Plant with good spacing to promote air circulation
- Scout!
- Rotate hemp growing fields
- Use drip irrigation and mulch to prevent splash up
- Sanitation-remove any virus or white mold infected plants
- Clean up fields after harvest

Use of Biologicals

- Use of Regalia (botanical extract) and biologicals such as *Bacillus* spp. and *Trichoderma* to work in concert with plant processes to heighten natural plant defenses.
- More research needed but these materials are on the state list and show promise for hemp.
- Biological products must be protected from heat and stored appropriately to retain efficacy.



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