

SOIL, PLANT & PEST CENTER
U-EXTENSION
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

HYDRANGEA DISEASES AND IPM

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POWDERY MILDEW



Forever And Ever



Nikko Blue

- Many *Hydrangea* species are susceptible including mophead, lacecap, panicle, smooth and oakleaf
- Plants in shade are more likely to be affected
- Fungicide applications are often necessary



POWDERY MILDEW



POWDERY MILDEW – EARLY SYMPTOMS



POWDERY MILDEW – ADVANCED, SIGNS OF DISEASE

POWDERY MILDEW INFECTION HAPPENS QUICKLY



Spore germinates in 2 hours



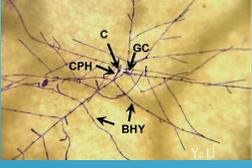
Infection structures produced in 12 hr



Fungus reproduces in 5 days

Y. Li

OUTCOME IN 5 DAYS



Susc. cultivar: Nikko Blue

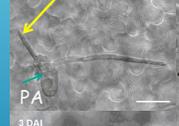


Resistant cultivar: Veitchii

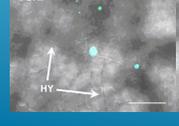
HYDRANGEA MAY RESPOND TO INFECTION

Nikko Blue

No barrier at point of attack!



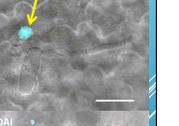
1 dai



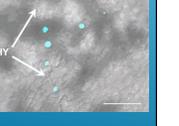
3 dai

Veitchii

Barrier at point of attack!



1 dai

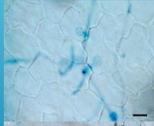


3 dai

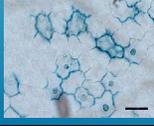
CELL DEATH (HYPERSENSITIVE RESPONSE)

Nikko Blue

Cells with stained cell walls are dead/dying!

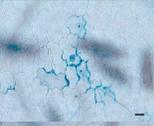


3 dai

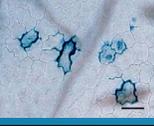


5 dai

Veitchii



3 dai



5 dai

- ▶ Under shade will most likely deal with on Hydrangea macrophylla
- ▶ Which Hydrangea cultivars work best for you
- ▶ Fungicide sprays

POWDERY MILDEW



LEAF SPOTS

- ▶ Consult with a plant pathologist/plant disease clinic
- ▶ Several fungi can cause leaf spots on hydrangea: Mmbaga et al. 2011, J. of Phytopathology – Corynespora, Cercospora, Colletotrichum, Phoma, Myrothecium, Botrytis

WARNING! LEAF SPOTS CAN LOOK VERY SIMILAR



ANTHRACNOSE

- Affects mophead and lacecap hydrangeas
- Favored by hot, wet weather
- Can appear on all parts of foliage and flower heads at same time
- Brown/gray spots with rings that give target-spot appearance
- Fungicides may be necessary

Gen. Vicomtessee de Vibraye

Altona

CERCOSPORA LEAF SPOT

- Occurs on mophead, lacecap, smooth, oakleaf and panicle hydrangeas
- Usually starts at bottom of plant
- More severe in late summer, but is active once it gets hot
- May cause defoliation
- Fungicides may be necessary

Endless Summer

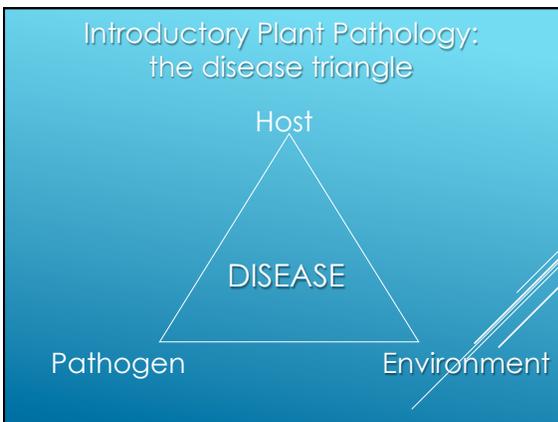
Lady in Red

CULTIVARS RESISTANT TO FOLIAR LEAF SPOTS

Ayesha	Pretty Maiden
Frillibet	Sea Foam
Lanarth	Tricolor
White	Tovelit
Libelle	Veitchii
Miranda	

Veitchii

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ROLE OF ENVIRONMENT ON DISEASE RESISTANCE (CLS AND ANTHRACNOSE)

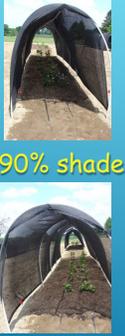
Cultivars: Blue Deckle, Fasan, Lilacina, Miranda, Pretty Maiden, Sister Theresa

Light level: full sun, 30, 60, and 90% shade

Duration: three years

Crossville, TN

Resistant Cultivars



90% shade

60% shade

	
Lilacina	Blue Deckle
	
Fasan	Sister Theresa
	
Miranda	Pretty Maiden

Resistant cultivars



30% shade

	Sister Theresa
	Miranda
	Pretty Maiden

Resistant cultivars:



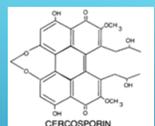
Full Sun

	Miranda
	Pretty Maiden

- ▶ Toxin is cercosporin
- ▶ Universal toxicity to cells
- ▶ Only Cercospora and other fungi that produce similar toxins are resistant to damage
- ▶ Fungal resistance genes as a novel source of resistance to transgenic plants?

CERCOSPORA PRODUCES A TOXIN

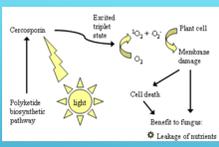
WHY DOES LIGHT MATTER?



CERCOSPORIN
Cercospora spp.

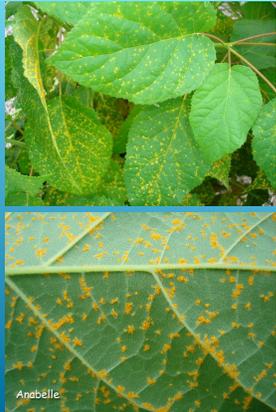


Fig. 1. (B) Culture of *Cercospora nicotianae* showing red pigmentation on underlines of colony due to production of cercosporin.



The diagram shows Cercospora entering a plant cell through a wound. It produces polyketide via the biosynthetic pathway, leading to the production of cercosporin. Cercosporin causes membrane damage, leading to cell death and leakage of contents, which benefits the fungus.

CERCOSPORA PRODUCES A PHOTOACTIVATED TOXIN: CERCOSPORIN



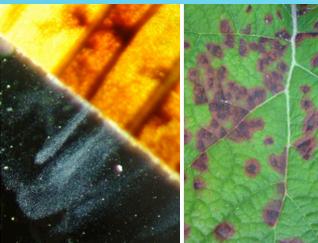
Rust

- *H. arborescences* (smooth hydrangea) is susceptible
- Anabelle is very susceptible; Frosty is very resistant
- Fungicides may be needed

Anabelle



BACTERIAL LEAF SPOT



- Angular leaf spots
- Overhead irrigation favors
- Copper sprays

**BACTERIAL LEAF SPOT-
XANTHOMONAS CAMPESTRIS**



LimeLight

FOUR LINED PLANT BUG



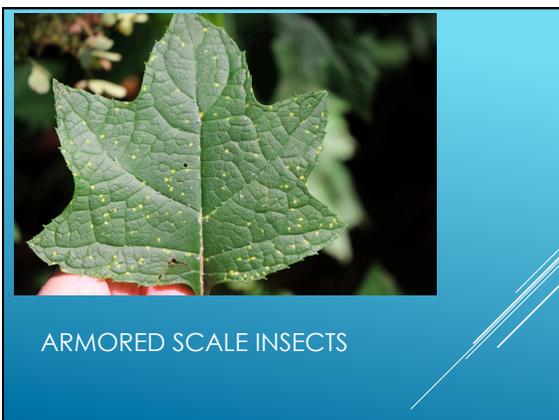
SOUTHERN BLIGHT- STEM ROT



Hosta

**SOUTHERN BLIGHT-
SCLEROTIUM ROLFSII**

Hemp



▶ Looks at production path
▶ High risk, vulnerable points of production are identified-"Critical Control Points"
▶ CCP's are where pathogens may be introduced

SYSTEMS APPROACH TO DISEASE MANAGEMENT

- ▶ Receiving area
- ▶ Propagation area
- ▶ Container storage areas
- ▶ Substrate piles/storage areas
- ▶ Irrigation sources
- ▶ Cull piles

CRITICAL CONTROL POINTS

Systems Approach - Safe Procurement and Production Manual

Publications » Safe Procurement and Production Manual

Share    

Safe Procurement and Production Manual

Manual outlines pest and pathogen prevention methods

The Oregon Association of Nurseries has published the "Safe Procurement and Production Manual," a 106-page guide to producing healthy nursery stock by using a systems approach. A new revised version is available online now as a PDF download, at no cost. A print version is available from the OAN office, 503-682-5089 or 888-283-7219.

When it comes to preventing the introduction and spread of plant pests and pathogens, a proactive approach that intelligently targets areas of highest risk is better than reacting to things as they happen. This easy-to-follow book helps growers evaluate their own nursery operations. It contains best practices that are proven to be effective at reducing risks from plant pests and pathogens. Different chapters of the book address the various components of plant production, from propagation to final shipment.

- ▶ [Download the Safe Procurement and Production Manual \(PDF\)](#).
- ▶ [Download treatment options for waterborne pathogens in nursery and greenhouse irrigation systems here](#)



- ▶ Sharpen diagnostic skills
- ▶ Inspect incoming and outgoing plants
- ▶ Work cooperative with state regulatory, university and Extension personnel
- ▶ Protect your reputation by following all shipping regulations

REDUCE RISK RECEIVING AND SHIPPING

- ▶ Limit access
- ▶ Propagate on site or buy local liners
- ▶ Grow stock plants or source cuttings locally
- ▶ Cuttings from diseased free plants only
- ▶ Propagate in raised beds or on benches to eliminate soil contamination
- ▶ Pay attention to detail/sanitation practices

REDUCE RISK - PROPAGATION

- ▶ Avoid species/cultivars not resistant to common diseases
- ▶ Avoid fields with known soil-borne pathogen problems
- ▶ Use new containers stored on concrete pads
- ▶ Ground pads should be contoured, covered with fabric or gravel
- ▶ Muddy containers could indicate root rot issues
- ▶ Limit visitors
- ▶ Clean vehicles and implements

REDUCE RISK PRODUCTION AREAS

- ▶ How do you manage irrigation?
- ▶ Too much, too little or ill-timed can lead to issues
- ▶ Check water quality
- ▶ Drip irrigation on plants susceptible to foliar diseases

REDUCE RISK WATER MANAGEMENT

- ▶ Train and designate at least one person as a scout
- ▶ Post images of your top ten disease/pest issues
- ▶ Outbreaks should be mapped and reported
- ▶ Send employees to educational meetings
- ▶ Use social media to stay engaged

REDUCE RISK
INTEGRATED PEST MANAGEMENT

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FOR MORE INFORMATION