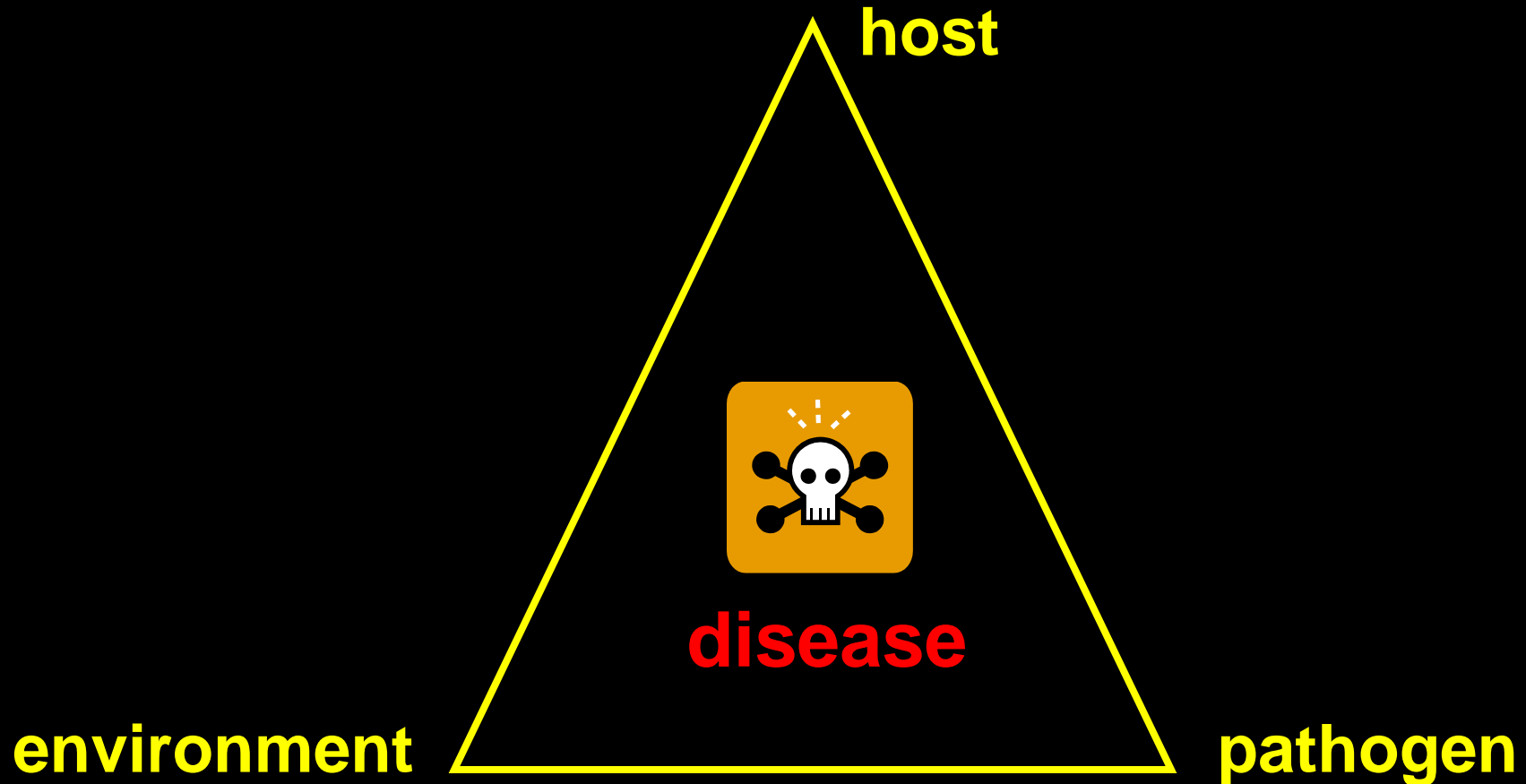


The Disease Triangle

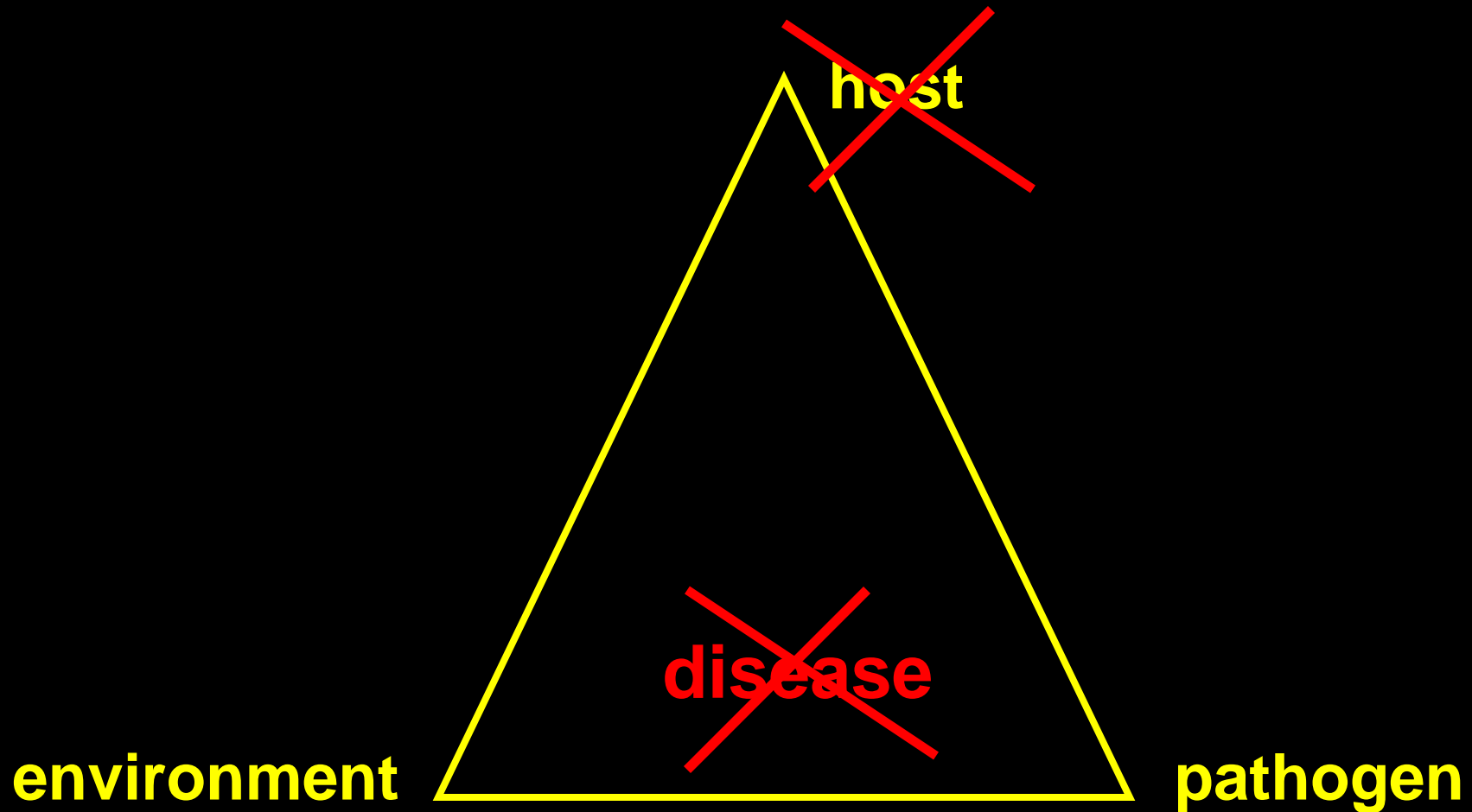
Sherrie Smith University of Arkansas Cooperative Extension



Disease?

- **biotic:** viruses, fungi, bacteria, nematodes
- **abiotic:** drought, over watering, deficiencies

The Disease Triangle



V = Verticillium wilt

F = Fusarium wilt

N = Nematodes

**T = Tobacco mosaic
virus**

A = Alternaria stem rot

**Better Boy
(VFN)**



Tomato

VFNTA

A = Alternaria stem rot canker.



J.C Watterson APS Images



J.C Watterson APS Images



Alternaria

J.C Watterson APS Images

Fusarium wilt

VFNTA

F = Fusarium wilt





Fusarium wilt

<http://www.youtube.com/watch?v=tHnOYcl6B44>





J.P. Jones APS Images



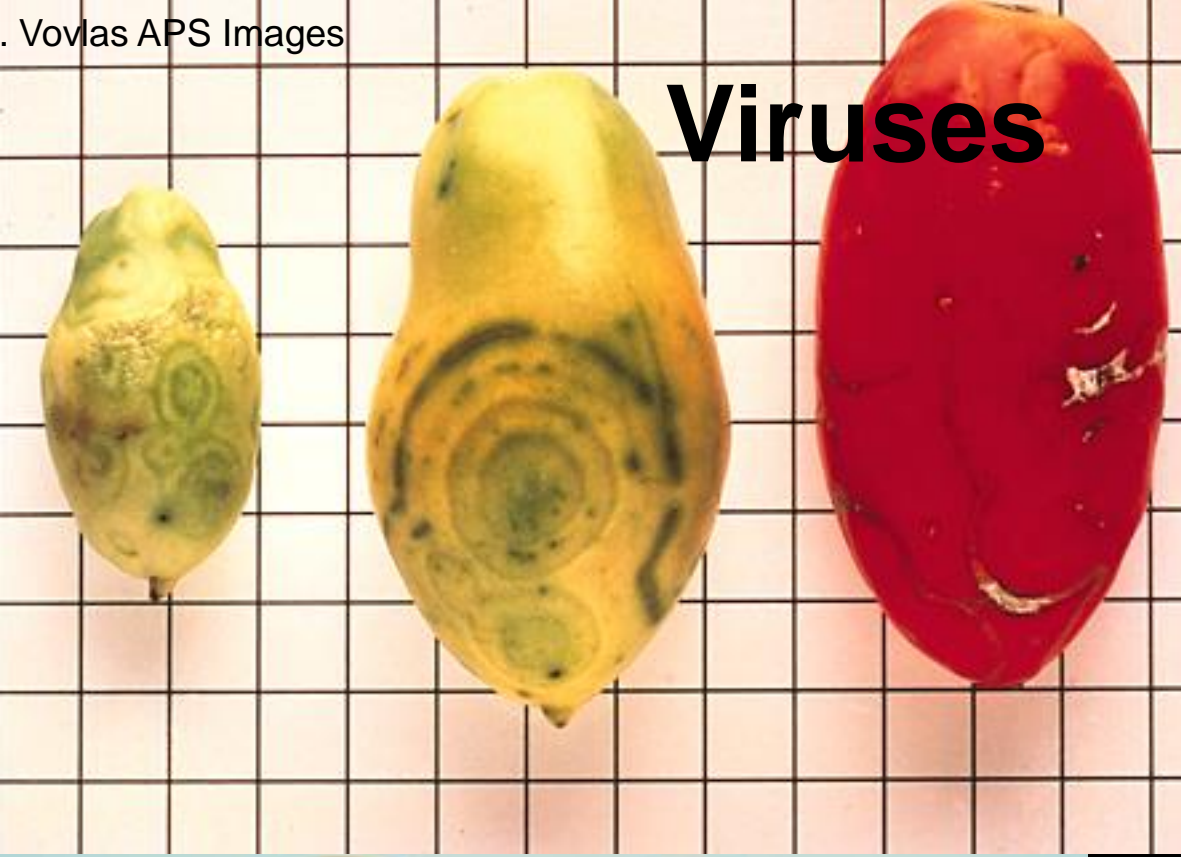
J.P. Jones APS Images

Verticillium wilt

V F N T A

V = Verticillium wilt

Viruses



VFNTA

T = Tobacco Mosaic Virus

Virus





Roundup damage



Whitney Cranshaw, Colorado State University

Tomato Spotted Wilt Virus



Tospovirus



Photo by Whitney Cranshaw, Colorado State University

174 host species

Field Crops

Tobacco

Peanut

Vegetables

Tomato

Pepper

Potato

Eggplant

Lettuce

Endive

Celery

Bean

Cowpea

Spinach

Cucumber

Cauliflower

Ornamentals

Mums

African Violet

Primrose

Begonia

Gerbera

Calla lily

Zinnias

Snapdragon

Dahlia

Cosmos

Peony

Geranium

Phlox

Salvia

Poppy

Petunias

Impatiens

Marigold

Weeds

Amaranth

Chickweed

Burdock

Beggar ticks

Sowthistle

Morning glory

Lamb's quarters

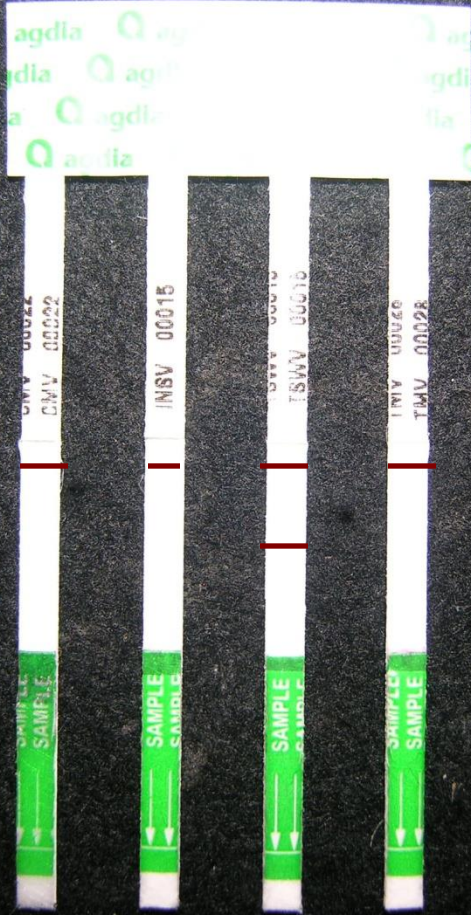
Smooth rattlepod

Cheese weed

Stalice

Sweet clover

Shepherd's purse



www.biology.arizona.edu/.../elisa_plate.gif

- **Amelia**
- **Red Defender**
- **Nico**
- **Sophya F1**
- **HMX 5790 F1**



<http://www.harrismoran.com/products/tomato.htm>

- **BHN 444**
- **BHN 601**
- **BHN 640**

<http://www.tomatogrowers.com/index.html>

- ✓ **Weed control.**
- ✓ **Insecticides.**
- ✓ **Mesh-400 micron. <http://www.miami-aquaculture.com/screen.htm> 400 micron 60"wide \$23.01 per linear yard**
- ✓ **Destroy infected plants.**
- ✓ **Use resistant cultivars.**
- ✓ **Reflective mulches.**
- ✓ **Sticky traps.**



Healthy roots



[ttpucdnema.ucdavis.edu/imagemap/nemmapEnt156html/204NEMTNEMSAMP.htm](http://pucdnema.ucdavis.edu/imagemap/nemmapEnt156html/204NEMTNEMSAMP.htm)

Tomato root knot nematode



Cucumber scab



Annual vinca-Phytophthora canker



Department of Plant Pathology Archive, North Carolina State University, Bugwood.org



Department of Plant Pathology Archive, North Carolina State University, Bugwood.org



Sherrie Smith University of Arkansas Cooperative Extension

Resistant cultivars

- **Cora® Vinca** <http://www.goldsmithseeds.com/>



Dogwood anthracnose-*Discula destructiva*



Robert L. Anderson, USDA Forest Service, Bugwood.org



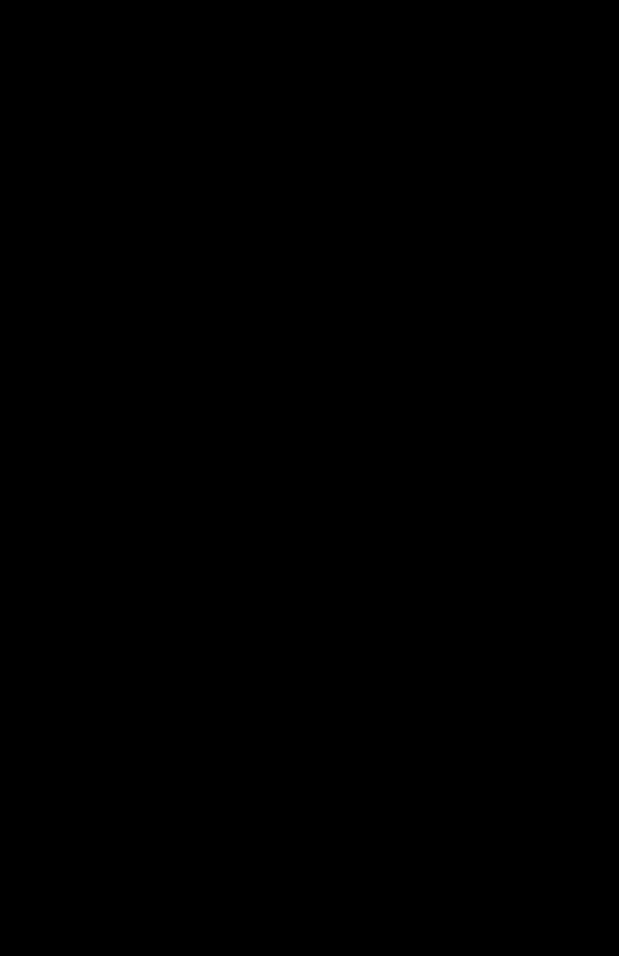
Robert L. Anderson, USDA Forest Service, Bugwood.org



Charles Hoysa, Virginia Cooperative Extension, Bugwood.org



Terry Price, Georgia Forestry Commission, Bugwood.org



Resistant cultivars

<i>Cornus florida</i>	<i>Cornus Kousa</i>	<i>Cornus florida x kousa</i>
Appalachian Spring	Big Apple	Aurora
	China Girl	Celestial
	Elizabeth Lustgarten	Constellation
	Gay Head	Ruth Ellen
	Greensleeves	Star Dust
	Julian Milky Way	Stellar Pink
	Steeple	
	Temple Jewel	

Dogwood Powdery mildew



Resistant cultivars

Jean's Appalachian Snow

Karen's Appalachian Blush

Kay's Appalachian Mist

Cultivars of *C. kousa*, oriental dogwood

Zinnia Powdery mildew



Resistant cultivars

- **Zinnia angustifolia**
- **Rose Pinwheel**
- **Blue Point series**
- **Profusion zinnias**



Crabapple scab



Resistant cultivars

- Ann E.
- Basakatong
- Bob White
- Jack
- Japanese Flowering
- Louisa
- Ormiston Roy
- Prairie Maid
- Prairifire
- Redbud
- White Angel



Pear Fire blight

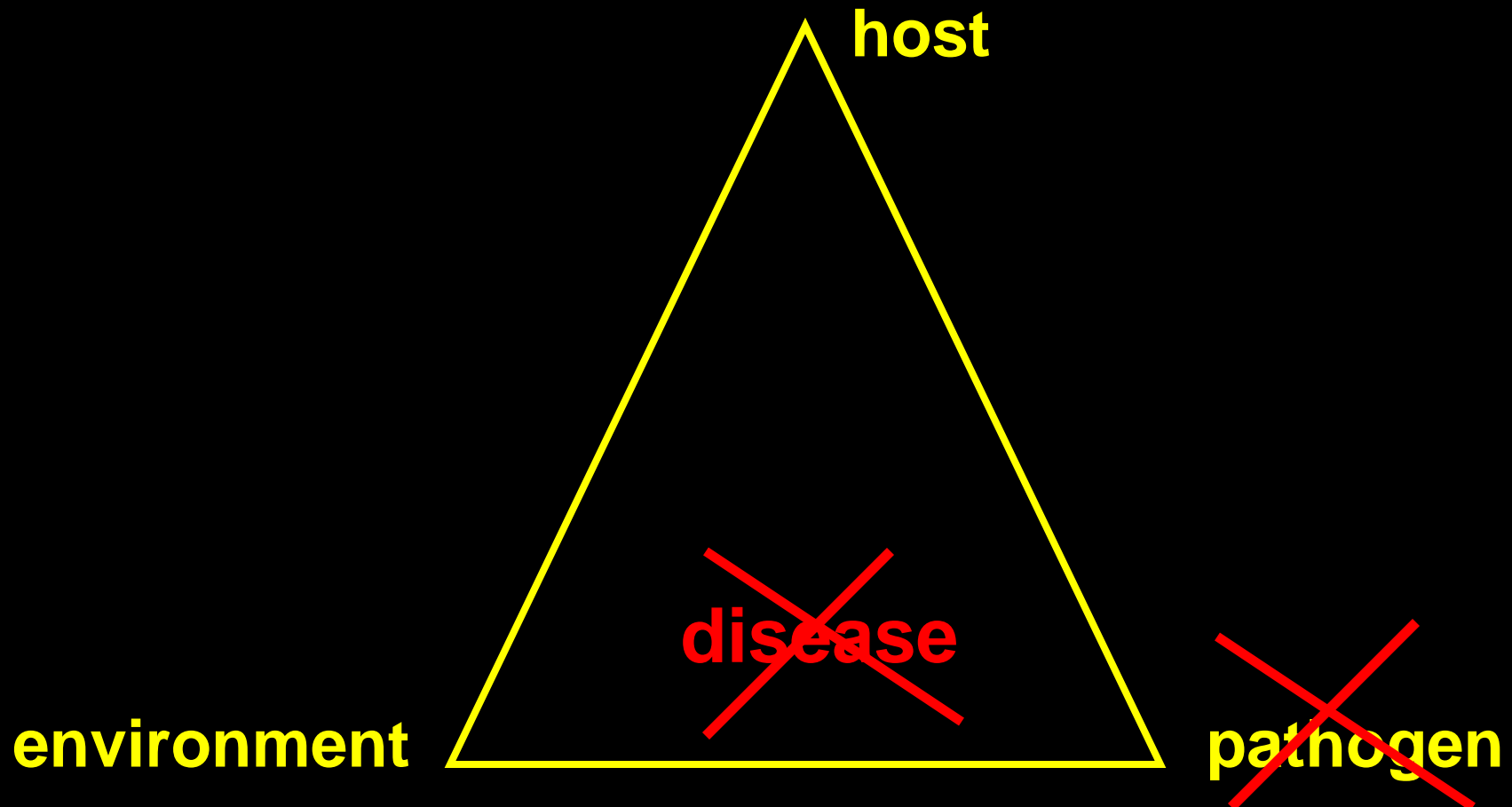


Fire Blight Resistant Pear

Pyrus ussuriensis Maxi. 'Prairie Gem'



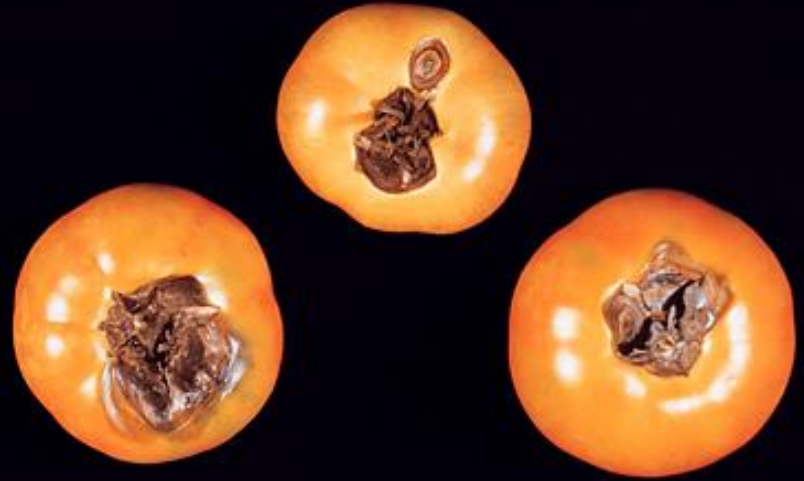
The Disease Triangle



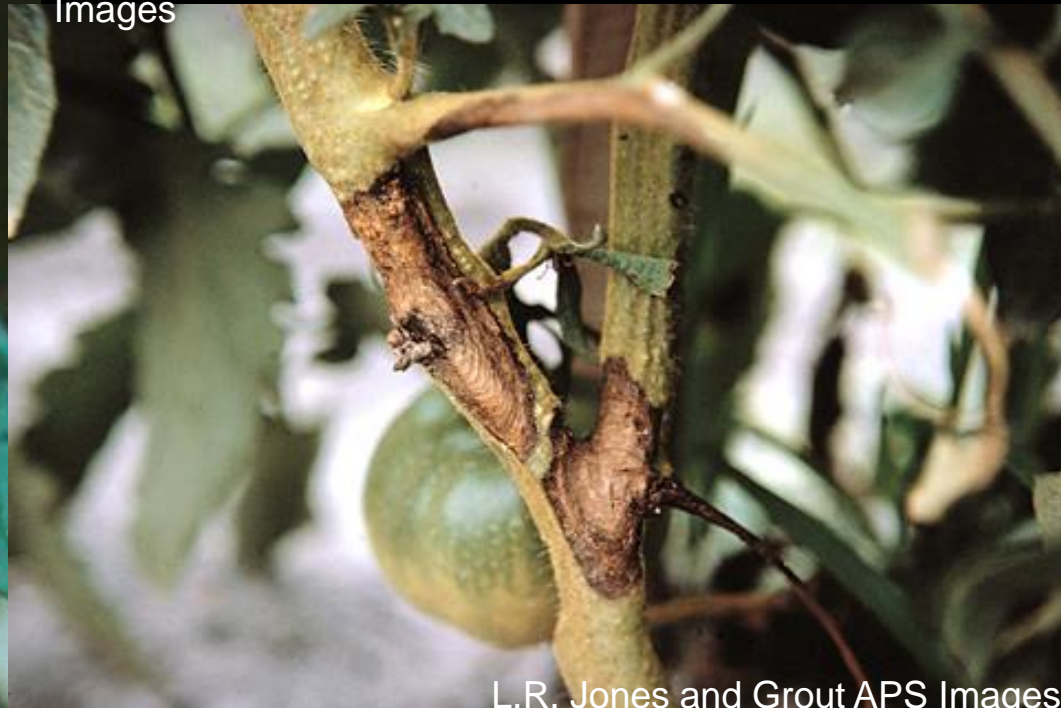
Early blight



R.W. Stevenson APS Images



L.R. Jones and Grout APS
Images



L.R. Jones and Grout APS Images

Fusarium rot



Lettuce drop



Southern blight



J.C.Watterson APS Images

Sclerotium rolfsii

Southern blight on fruit



Timber rot



Sclerotinia sclerotiorum

Ajuga Crown rot



Hosta Crown rot



Azalea/Rhododendron Petal blight



Maple Anthracnose





Nematodes



Soil Solarization



How to solarize

- **Level the ground, free of debris.**
- **Transparent plastic sheeting.**
- **Seal plastic edges around treated area by burying the edges in soil.**
- **Wet the area.**
- **Leave plastic for 4-6 weeks.**

Divide the garden into three sections.

- ✓ **nightshade plants: potato, tomato, eggplant, peppers.**
- ✓ **mustard group: cabbage, cauliflower, broccoli, brussels sprouts, kale, collards, kohlrabi, sprouting broccoli, pak choi, Chinese cabbage, turnip, mustard greens, rutabaga, radish, horseradish.**
- ✓ **everything else.**

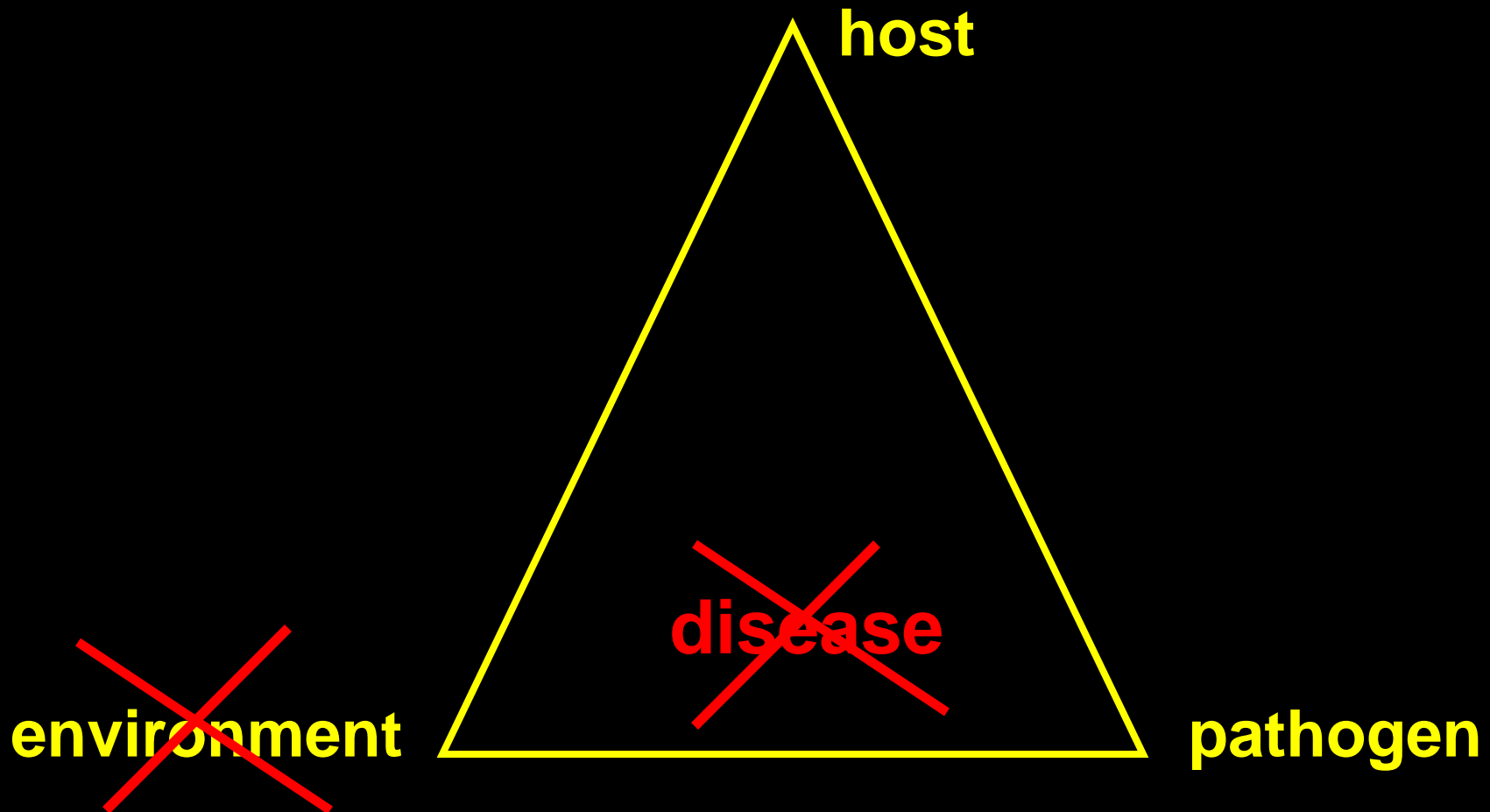
Phytophthora stem canker

<i>Highly Susceptible</i>	<i>Slightly Susceptible</i>	<i>Resistant</i>
Annual vinca	Wax begonia	French Marigolds
Snapdragon	Impatiens	Zinnias
Salvia		Mums
Verbena		Dianthus
Pansy		Geranium
Petunia		Coreopsis
		Portulaca
		Rudbeckia

Cultural remedies

- **Deep plow.**
- **Clean up crop debris.**

The Disease Triangle



J.P. Jones APS Images



A.A. MacNab APS Images



J.P. Jones APS Images



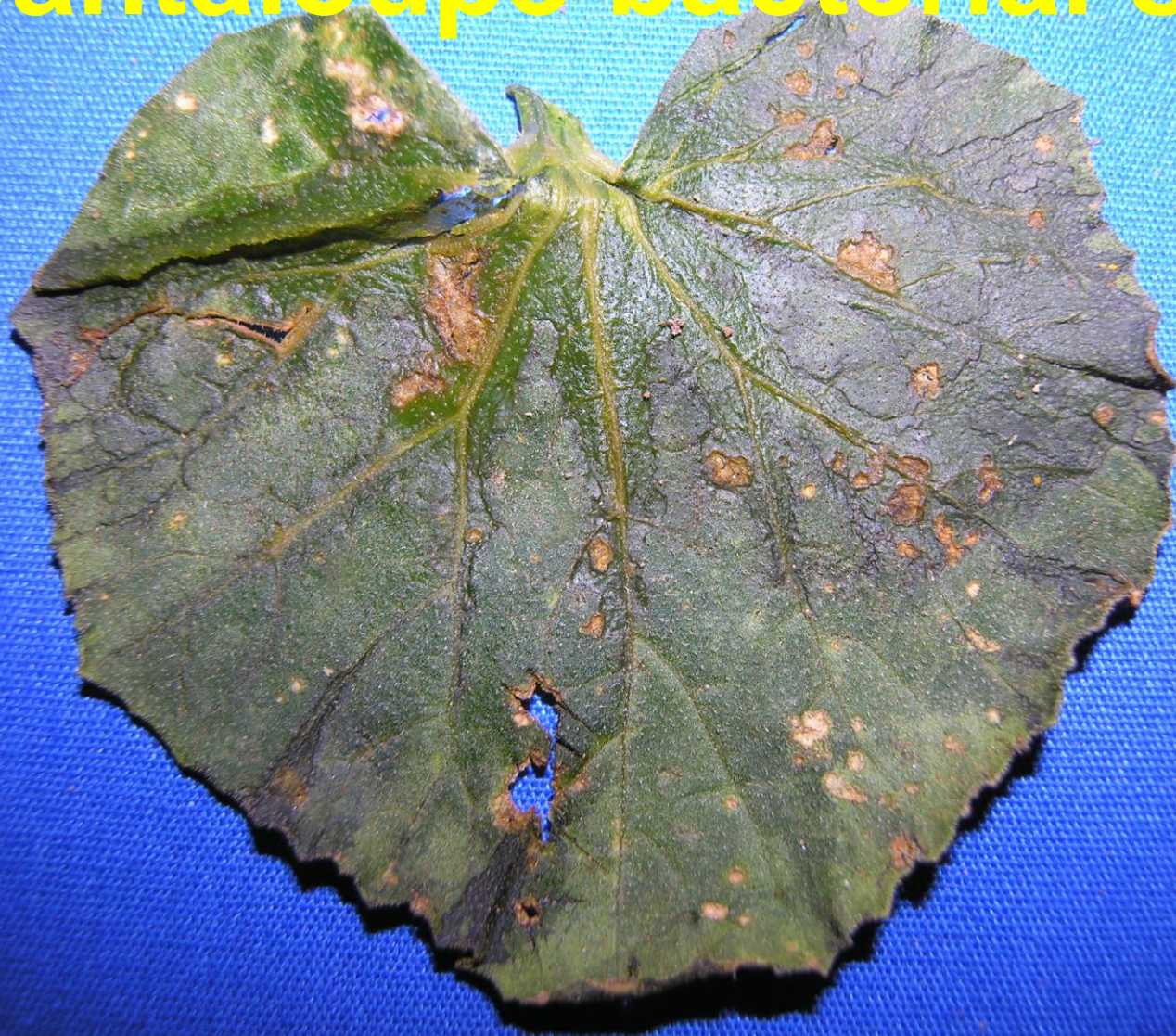
J.P. Jones APS Images

Bacterial Diseases

Soft rot



Cantaloupe bacterial spot



Bacterial diseases



Sand cherry bacterial shot hole



Excessive thatch



Healthy roots



[ttpucdnema.ucdavis.edu/imagemap/nemmapEnt156html/204NEMTNEMSAMP.htm](http://pucdnema.ucdavis.edu/imagemap/nemmapEnt156html/204NEMTNEMSAMP.htm)

Tomato root knot nematode



Southern blight



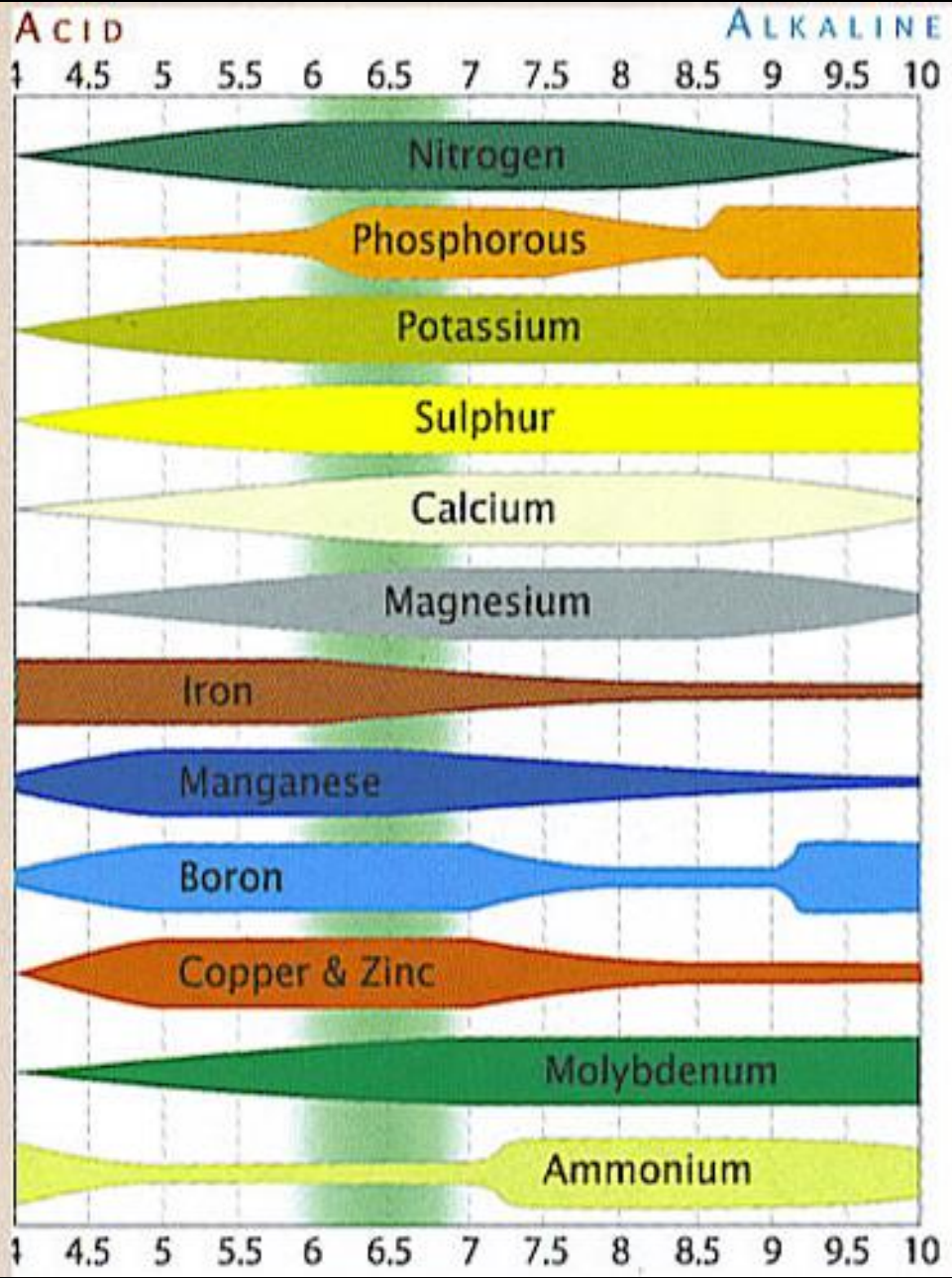
J.C.Watterson APS Images

Soil Solarization



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- **Leave plastic for 4-6 weeks.**



Iron deficiency



Nitrogen deficiency



Iron deficiency on bean



Manganese toxicity on watermelon





Phosphorous deficiency

Blossom end rot



Catfacing



Bacterial diseases



Sand cherry bacterial shot hole



Excessive thatch



- **Soil Test.**
- **Resistant varieties.**
- **Rotate**
- **Clean up crop debris.**
- **Avoid overhead irrigation**

Plant Health Clinic

Sherrie Smith-Plant Diagnostician

University of Arkansas Cooperative Extension

2601 N. Young Ave.

Fayetteville, AR 72704

479-575-2727

ssmith@uaex.edu

Plant health clinic

<http://uaex.edu/farm-ranch/pest-management/plant-health-clinic/>