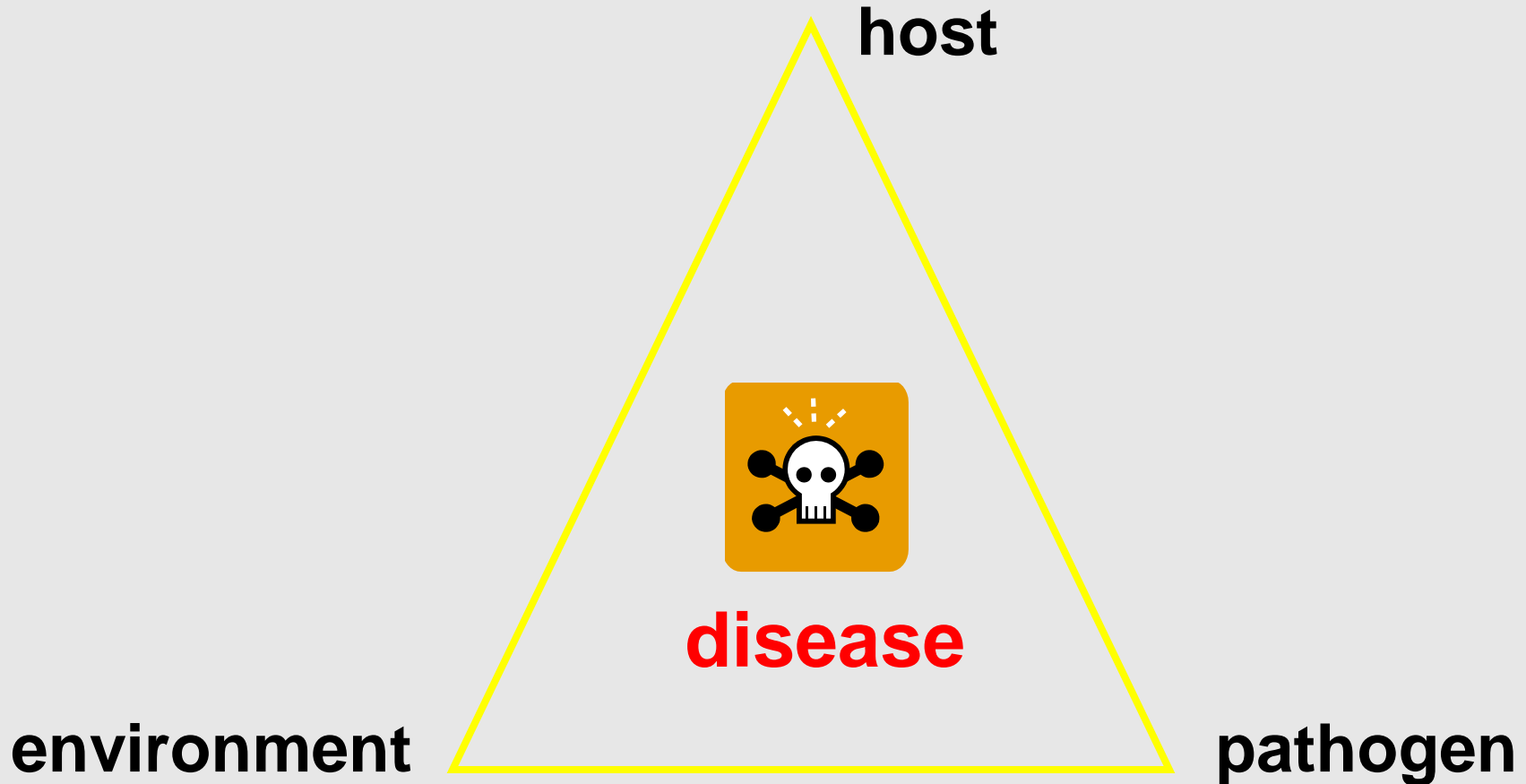


The Disease Triangle

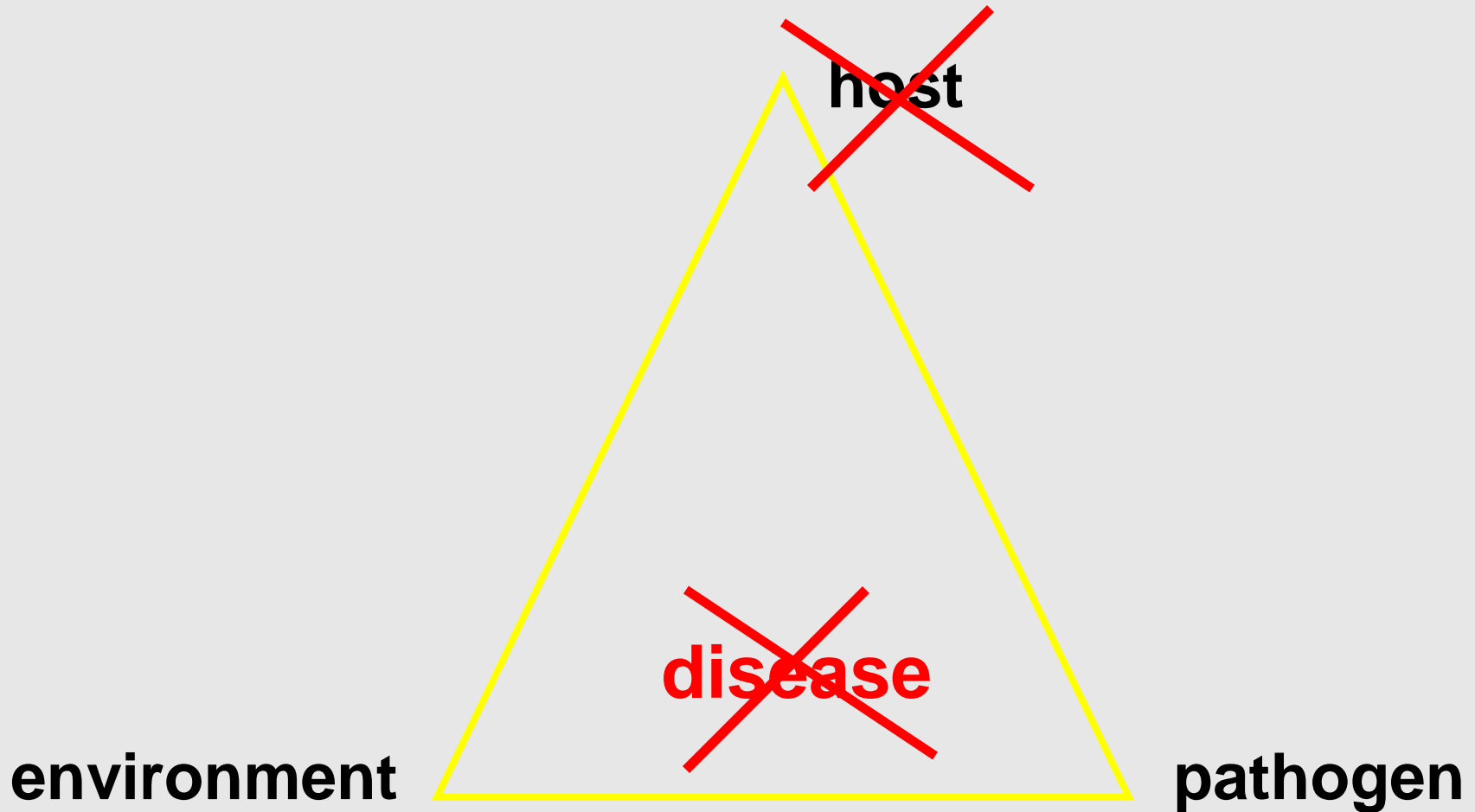
Sherrie Smith University of Arkansas Cooperative Extension



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



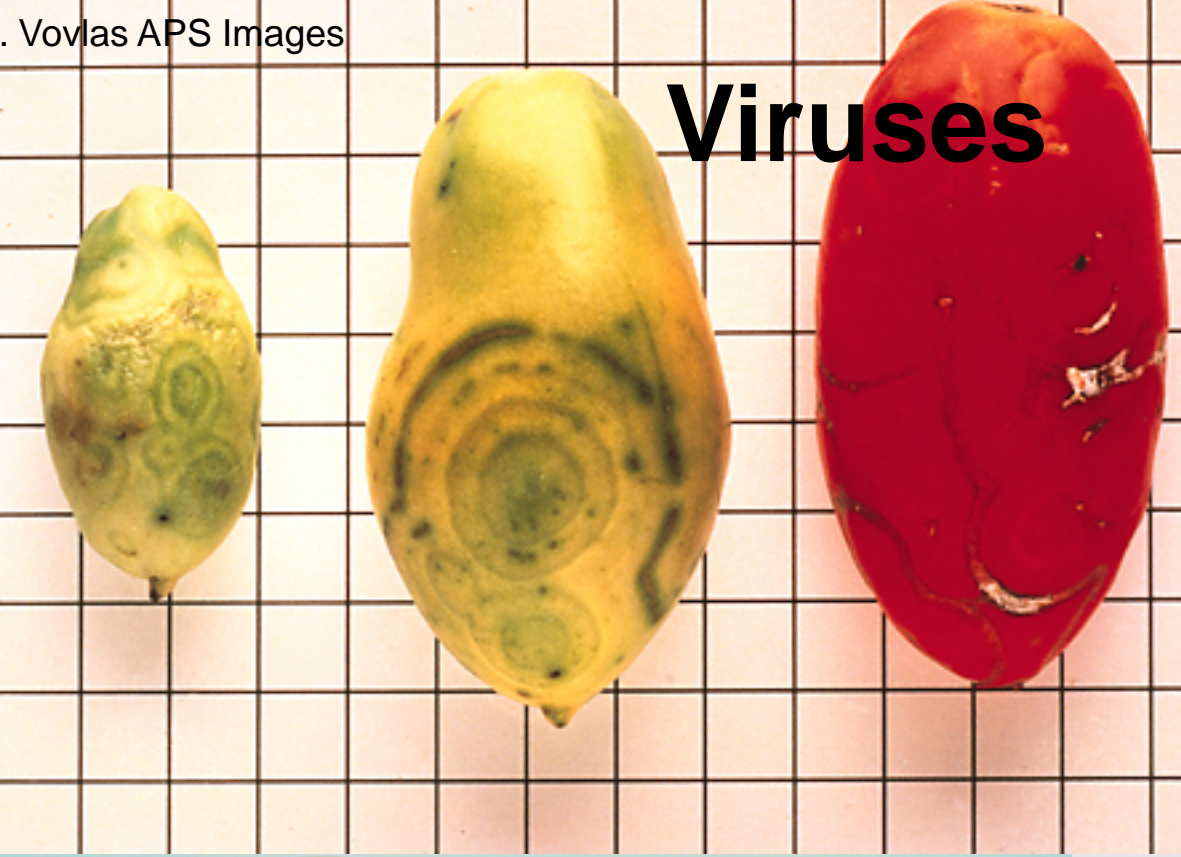
J.P. Jones APS Images

Verticillium wilt

VFNTA

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 | Vegetables | |
|-------------|------------|-------------|
| Tobacco | Tomato | Celery |
| Peanut | Pepper | Bean |
| | Potato | Cowpea |
| | Eggplant | Spinach |
| | Lettuce | Cucumber |
| | Endive | Cauliflower |

Ornamentals

| | | |
|-----------------------|-------------------|------------------|
| Mums | Zinnias | Phlox |
| African Violet | Snapdragon | Salvia |
| Primrose | Dahlia | Poppy |
| Begonia | Cosmos | Petunias |
| Gerbera | Peony | Impatiens |
| Calla lily | Geranium | Marigold |

Weeds

Amaranth

Lamb's quarters

Chickweed

Smooth rattlepod

Burdock

Cheese weed

Beggar ticks

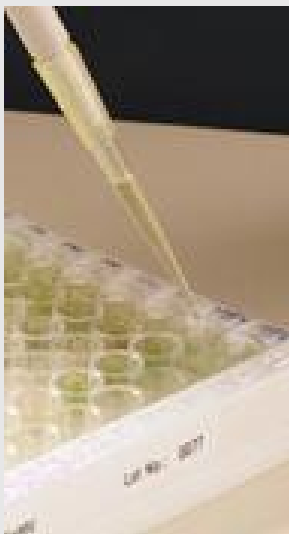
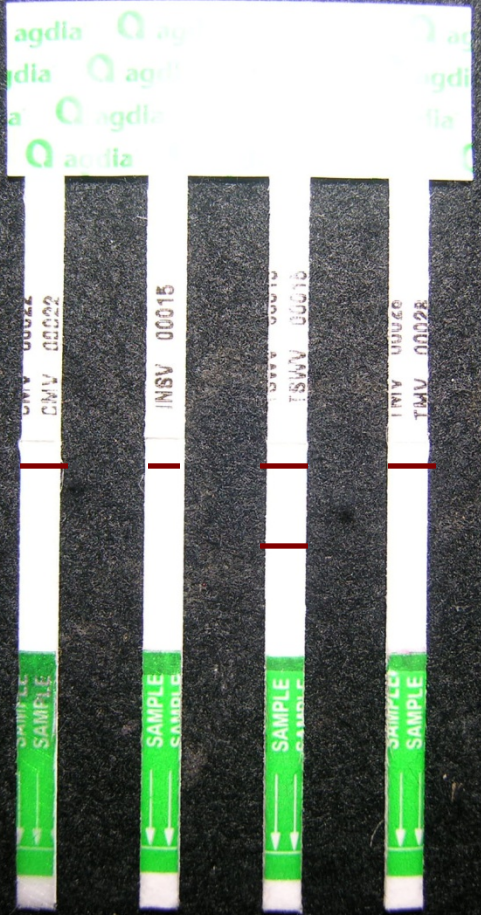
Stalice

Sowthistle

Sweet clover

Morning glory

Shepherd's purse



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

- **Amelia**
- **TSWV Resistant**
- **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

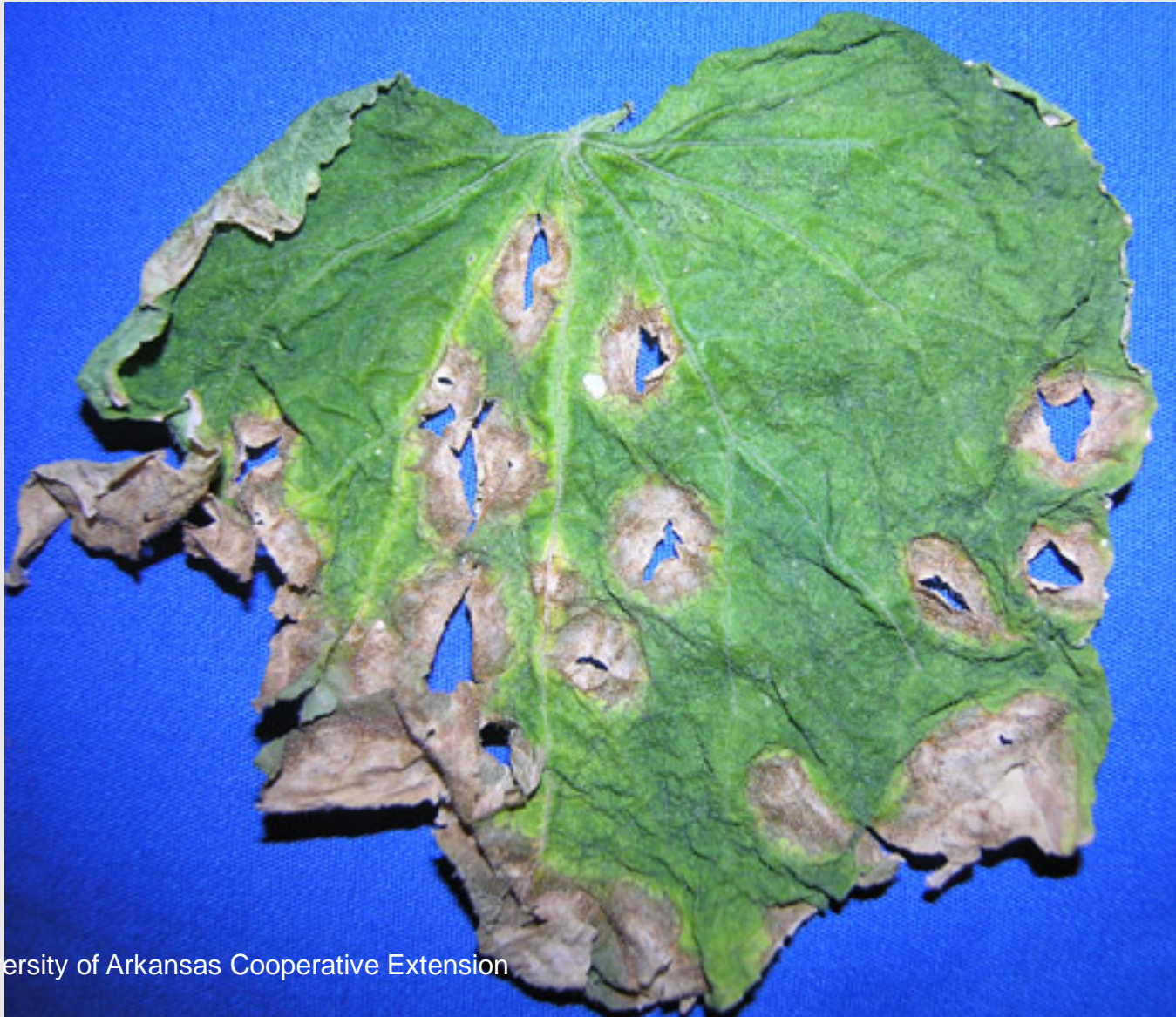


<http://pucdnema.ucdavis.edu/imagemap/nemmap/Ent156.html#204NEMTNEMSAMP.htm>

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/>



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 |

Dogwood anthracnose-*Discula destructiva*



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



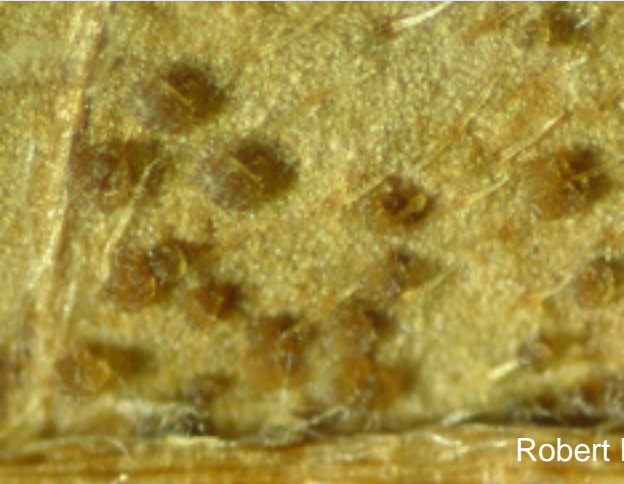
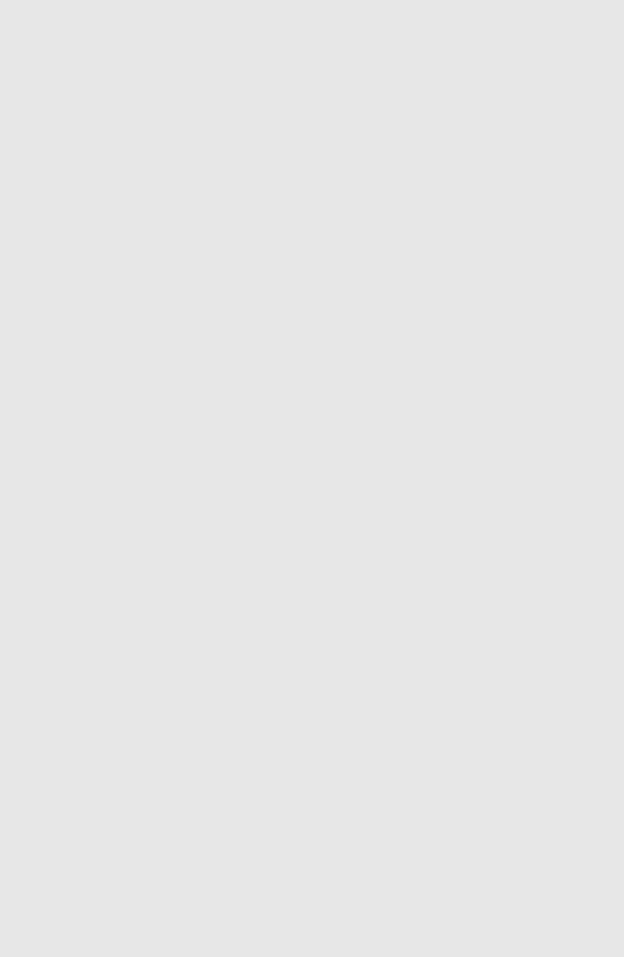
Robert L. Anderson, USDA Forest Service, Bugwood.org



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



Photo by
Michael Masiuk

Resistant cultivars

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



Pear Fire blight

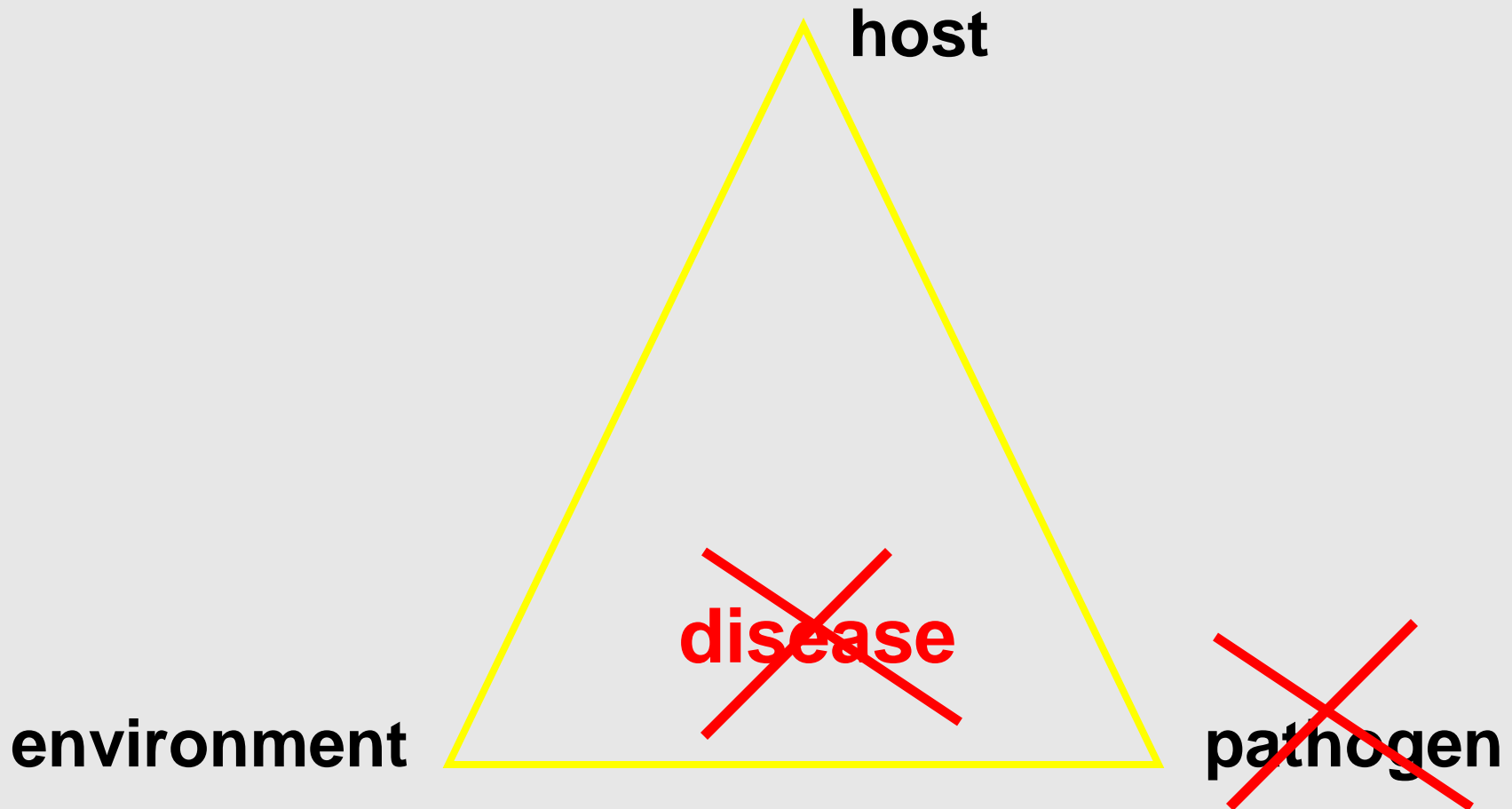


Fire Blight Resistant Pear

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.**
- **Wet the area.**
- **Transparent plastic sheeting.**
- **Seal plastic edges around treated area by burying the edges in soil.**
- **Leave plastic for 4-6 weeks.**

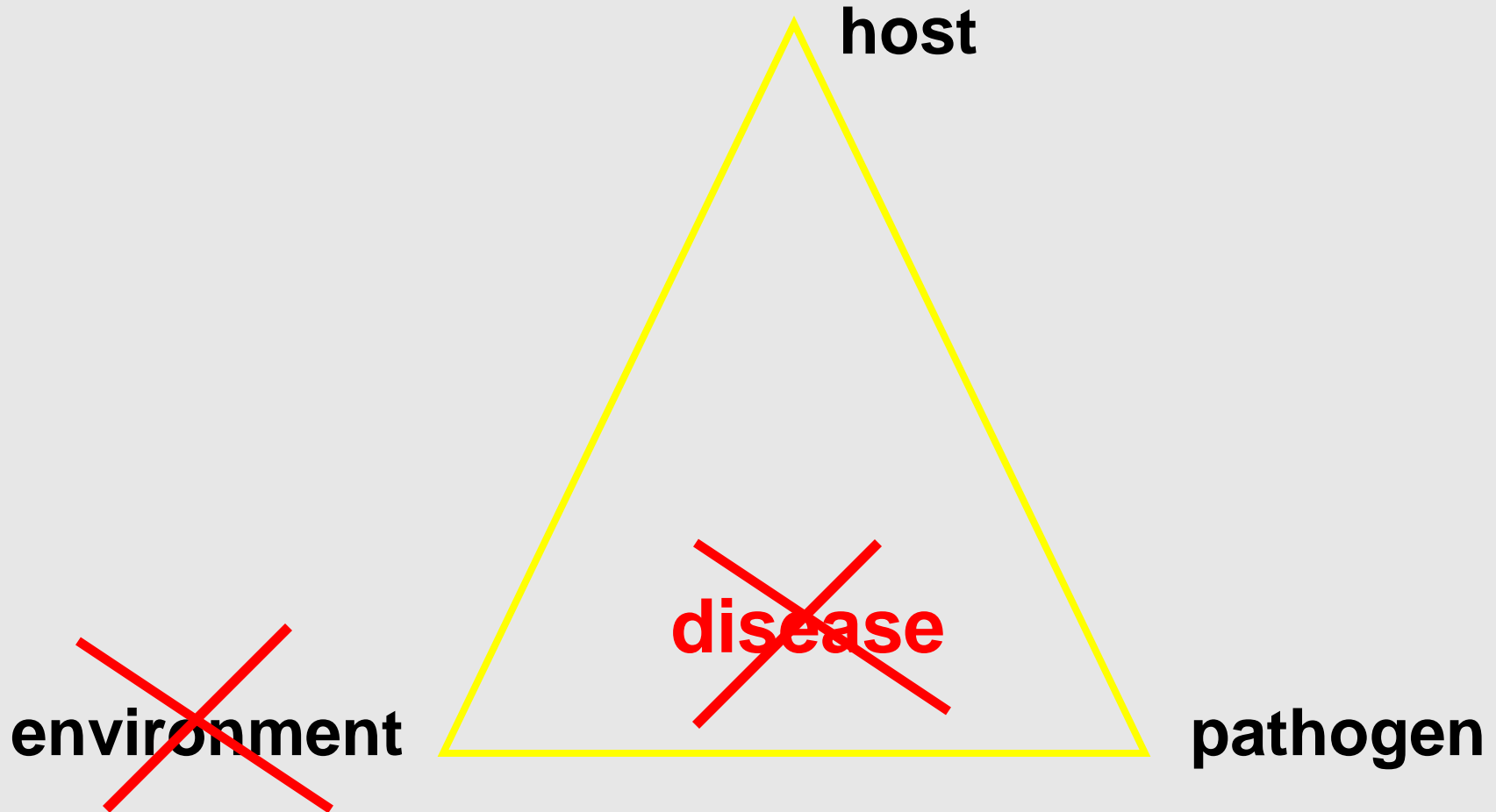
Divide the garden into three sections.

- ✓ **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.**

Cultural remedies

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

The Disease Triangle



J.P. Jones APS Images



J.P. Jones APS Images

A.A. MacNab 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



<http://pucdnema.ucdavis.edu/imagemap/nemmapEnt156.html#204NEMTNEMSAMP.htm>

Tomato root knot nematode



Southern blight



J.C.Watterson APS Images

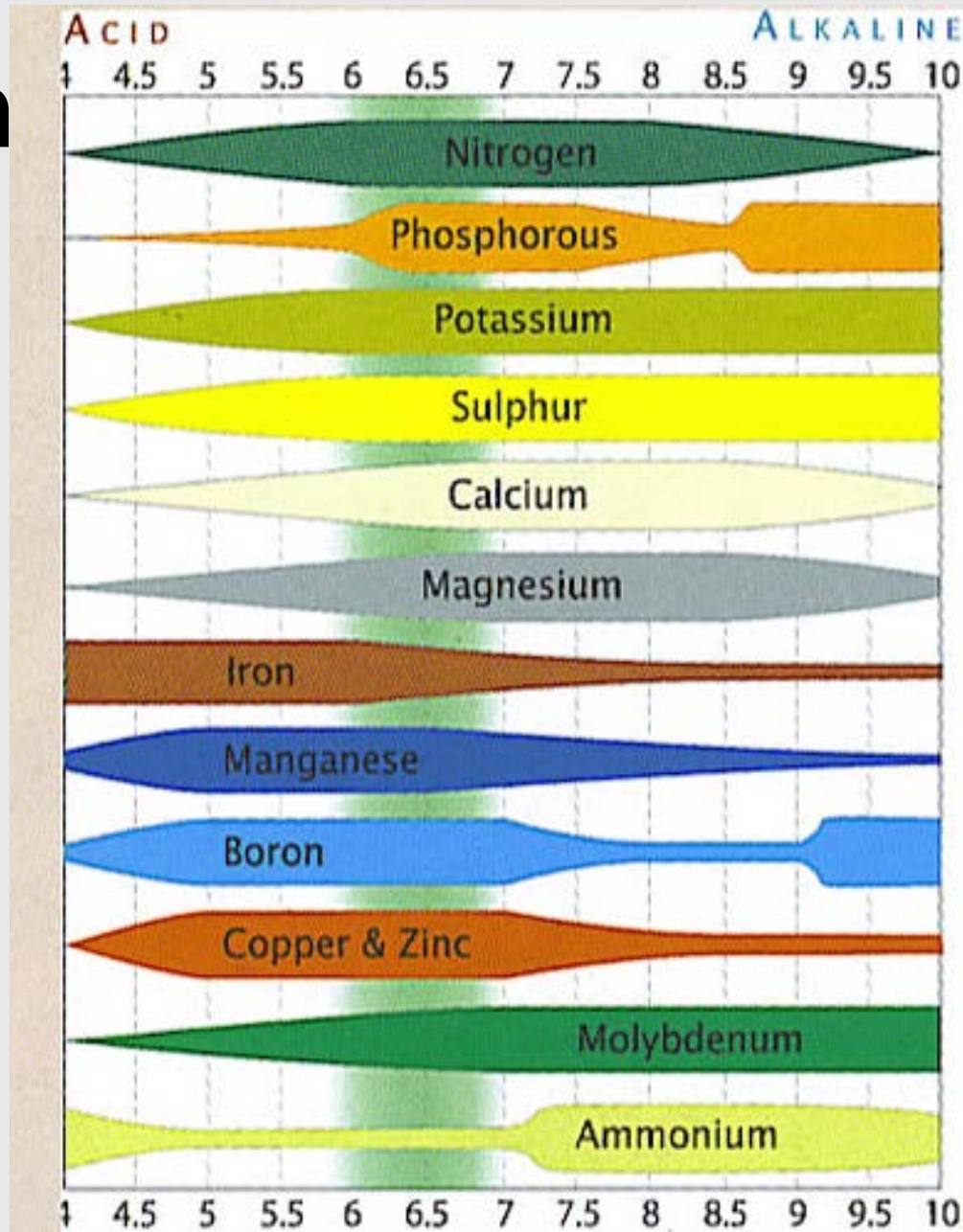
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Ph

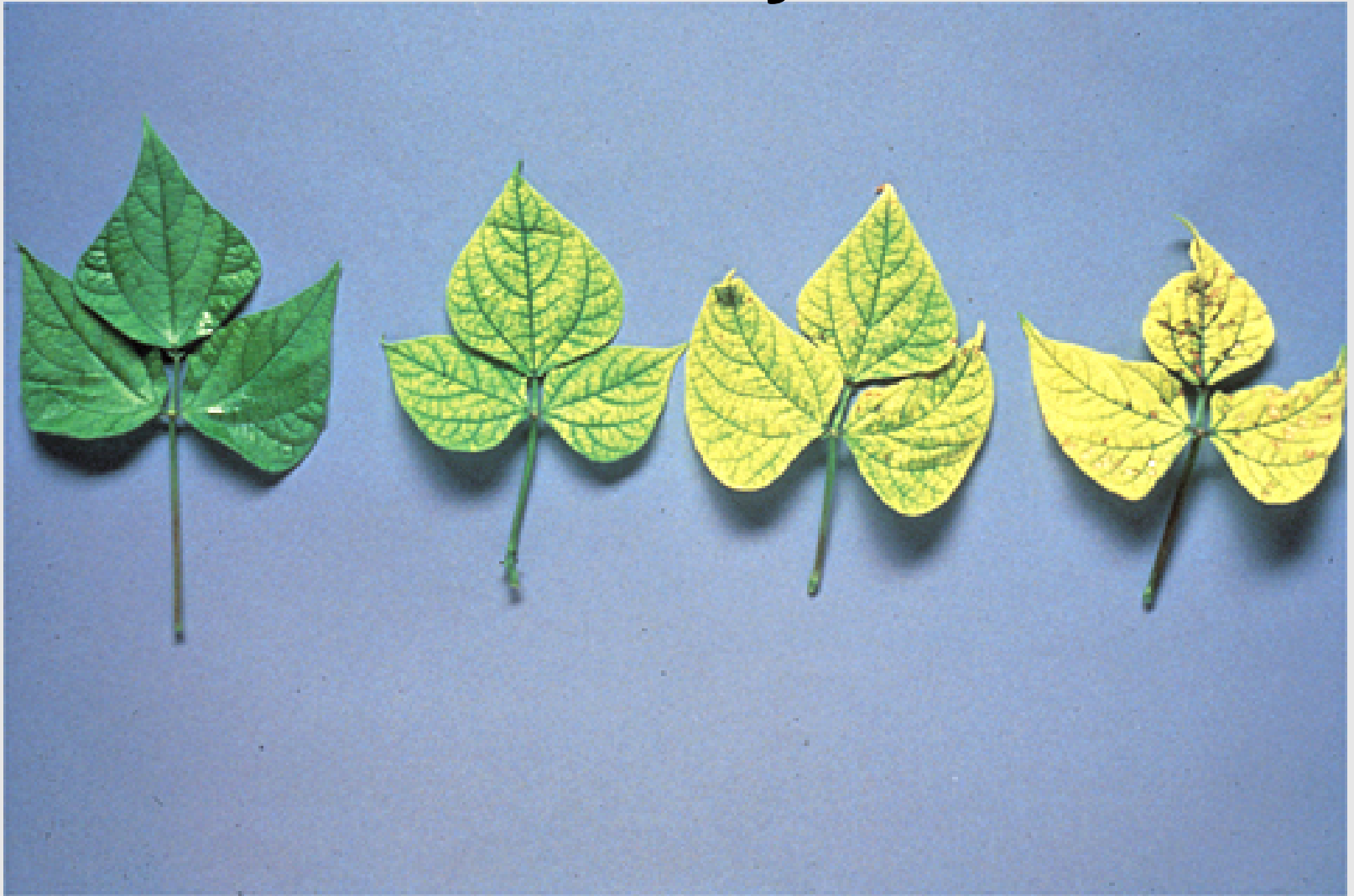


art

Iron deficiency



Iron deficiency on bean



Nitrogen deficiency



Manganese toxicity on watermelon



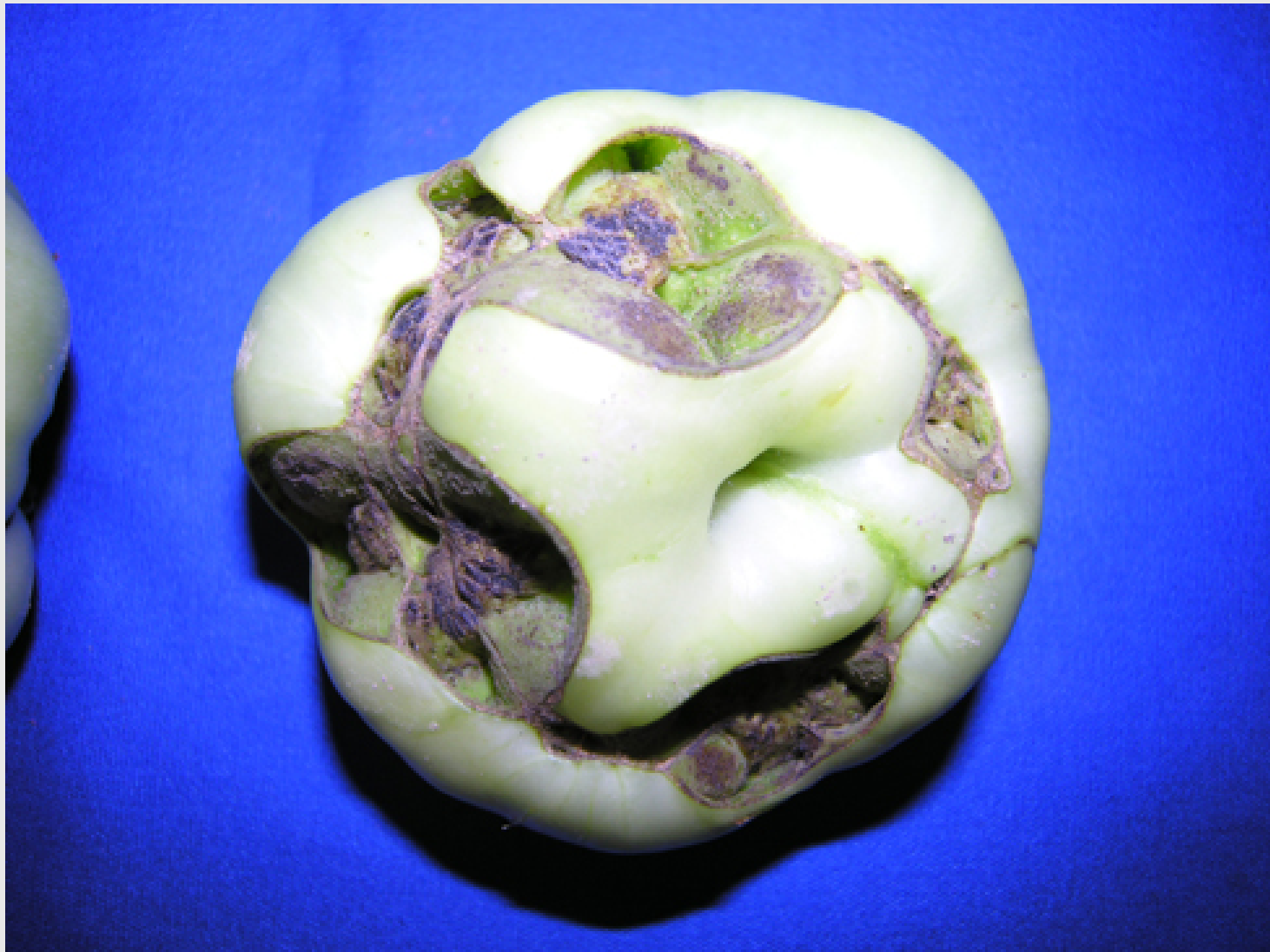


Phosphorous deficiency

Blossom end rot



Catfacing



- **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/>