



ILLINOIS
FIRST DETECTOR

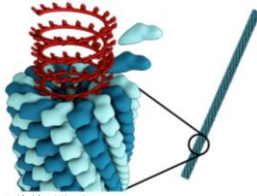
**PATHOGENIC VIRUSES
OF ORNAMENTALS**

Diane Plewa, Plant Diagnostic Outreach Specialist




Introduction to Viruses

- Viruses are infectious agents
- Debate if they're biotic (living) or abiotic (not living)
- Different naming conventions




Modified from Wikimedia content




How Viruses Spread


- Don't have wings/legs/flagella/etc.
- **Spread via vectors**
 - Leafhoppers
 - Aphids
 - Thrips
 - Other insects and arthropods
 - Humans



Modified from J.L. Dames, INRA Centre de Recherches de Bordeaux, bordeaux.org




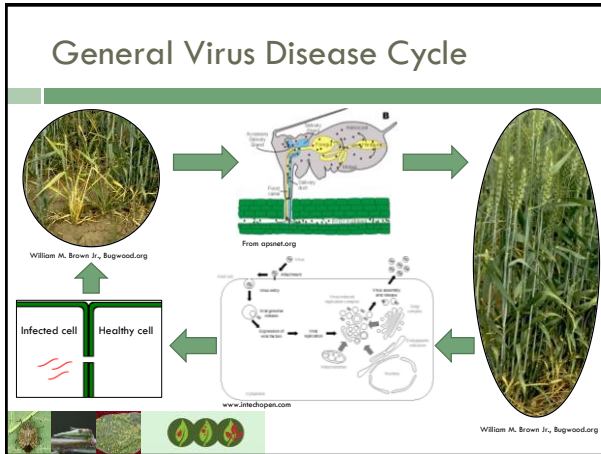
Modified from R.J. Reynolds Tobacco Company Slide Set, R.J. Reynolds Tobacco Company, rugwood.org



How Viruses Spread

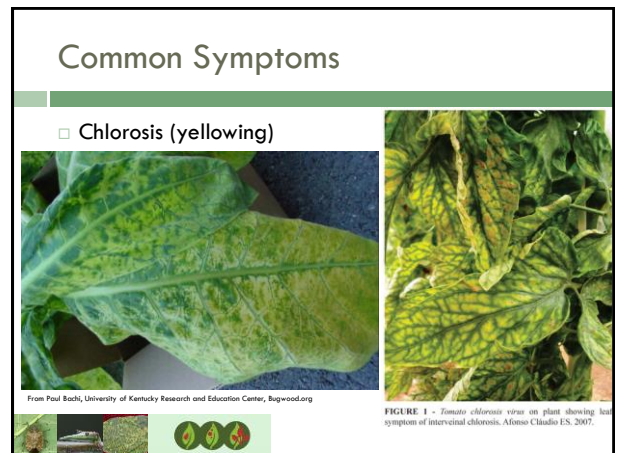
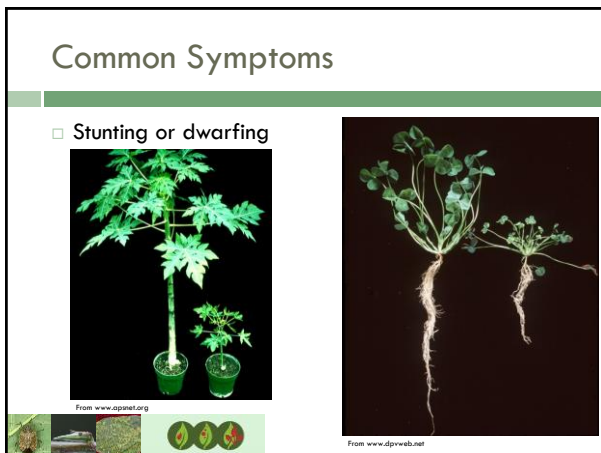
- Spread by tools
- Spread by propagation
 - Cuttings from an infected mother plant
 - Seed
 - Movement of infested plant material into new area
- Spread by contact between plants





- ### Virus Symptoms
- Usually not diagnostic
 - Wide variety of symptoms
 - Most viruses have a wide host range; symptoms often vary by host
 - May vary based on age of plant tissue, overall condition of host, environmental conditions, etc.

 - Rarely cause extensive necrosis



Common Symptoms

□ Mosaic or mottling



From R.J. Reynolds Tobacco Company Slide Set, R.J. Reynolds Tobacco Company, Bugwood.org

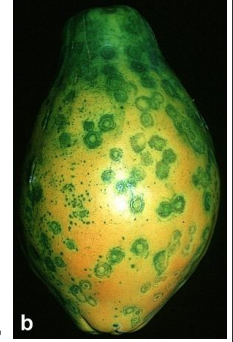


From www.apinet.org



Common Symptoms

□ Ringspot



b



From www.apinet.org

Common Symptoms

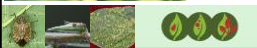
- Distorted growth
 - Leaf strapping
 - Rugosity
 - Generalized other



From Gerald Holmes,
California Polytechnic State
University, Bugwood.org



From North Carolina State University Cooperative Extension



General Management

- To reduce risk of viral infections
 - Remove plant debris and weed hosts
 - Propagate from virus-free mother plants and clean seed
 - Sanitize equipment
 - Reduce crowding
 - Control vectors



General Management

- Once a host is infected
 - Remove and destroy infected plants
 - Prune?

- Pesticides are not effective for curing viral diseases in plants



Case Study – Tobacco Mosaic Virus

- TMV
- First virus to be discovered
- Wide host range
 - Solanaceae family
 - Cucurbitaceae family
 - Ornamental flowering plants



TMV Symptoms

- Mosaic & Mottling

From www.apisnet.org



From www.apisnet.org

Host: Tobacco



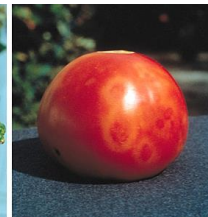
TMV Symptoms

- Discoloration and distorted growth

Host: Tomato



From www.apisnet.org



Host: Orchid



Department of Plant Pathology Archive,
North Carolina State University,
Raleigh, NC



TMV Symptoms

□ Stunting



Host: Tobacco

From www.apisnet.org

TMV Management

- Sanitize equipment with soap or bleach
- Remove and destroy infected plants
- Cross-protection
- Genetically engineered resistance



From www.apisnet.org

Case Study – Rose Rosette Virus

- RRV
- Symptoms first described in early 1940s; pathogen not discovered until 2011
- Vectored by an eriophyid mite

Case Study – Rose Rosette Virus

- Narrow host range (rose only)
 - Multiflora rose
 - Grandiflora
 - Floribunda
 - Hybrid Tea
 - Shrub roses, including Radrazz

RRV Symptoms

- Abnormal red coloration of new tissue



University of Illinois Plant Clinic

Host: Rose



RRV Symptoms

- Distorted growth
- Proliferation of prickles (=thorns)
- Witches' brooms



University of Illinois Plant Clinic



RRV Symptoms

- Decreases host plant's cold hardiness
 - Increases tissue damage and plant death due to low temperatures



RRV Management

- Sanitize equipment with soap or bleach
- Only plant or propagate virus-free plants
- Remove unwanted rose hosts
- Remove and destroy infected plants



Rob Routledge, South College, Bugwood.org



Case Study – Tospoviruses

- Genus of related viruses
- Tomato Spotted Wilt (TSWV), Impatiens Necrotic Spot (INSV), Iris Yellow Spot (IYSV) present in US
- Vecteded by thrips
- Wide host range



Case Study – Tospoviruses

- TSWV primarily infects tobacco, tomato, pepper, and some ornamentals
- INSV primarily infects impatiens, begonia, snapdragon, cyclamen, and other ornamentals



Tospoviruses Symptoms

- Extremely varied!
 - Dependent on species of host, age of tissue, growing conditions, etc.

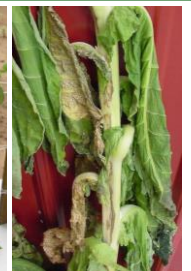


TSWV Symptoms

- Wilting



Don Ferris, Louisiana State University, Bugwood.org



Paul Badi, University of Kentucky, Bugwood.org

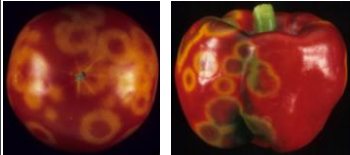
Host: Tomato

Host: Tobacco



TSWV Symptoms

- Ringspots on leaves and fruit



Gerald Holmes, California Polytechnic State University, Bugwood.org

Hosts: Tomato (left), Bell Pepper (right)



Dr. Beckhaus, Biologische Bundesanstalt für Land- und Forstwirtschaft, Bugwood.org

Host: Geranium



INSV Symptoms

- Ringspots



Jeffery W. Lutz, Florida Dept. of Agriculture and Consumer Services, Bugwood.org

Host: Coleus



John Fisher, Ohio Dept. of Ag., Bugwood.org

Host: Hosta



INSV Symptoms

- Necrosis



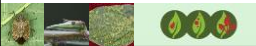
Jennifer Olson, Oklahoma State University, Bugwood.org

Host: Coleus



R.K. Jones, North Carolina State University, Bugwood.org

Host: Gloxinia



Tospovirus Management

- Remove and destroy infected plants
- Only plant or propagate virus-free plants
- Remove weed hosts
- Do not grow vegetable transplants in the same greenhouse with susceptible ornamentals
- Control vector (thrips)



Case Study – Plum Pox Virus

- Plum Pox Virus (PPV)
- Disease is also known as Sharka
- Transmitted by aphids and movement of infected plant material



Case Study – Plum Pox Virus

- Hosts: stone fruits in *Prunus* genus
 - Peaches
 - Apricots
 - Plums
 - Nectarines
 - Almonds
 - Sweet and tart cherries
 - Ornamental *Prunus*



PPV Symptoms

- Fewer, deformed fruits

Host: Plum



Modified from Biologische Bundesanstalt für Land- und Forstwirtschaft Archive, Bugwood.org

UGA0177023



PPV Symptoms

- Mottling and ringspot on leaves and fruits

Host: Plum



Modified from Biologische Bundesanstalt für Land- und Forstwirtschaft Archive, Bugwood.org

Host: Peach

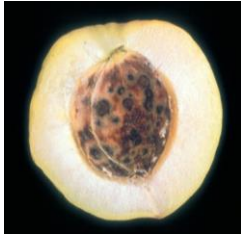


Modified from European and Mediterranean Plant Protection Organization Archive, Bugwood.org



PPV Symptoms

- Ringspot and discoloration on pits



Host: Apricot

Modified from Biologische Bundesanstalt für Land- und Forstwirtschaft Archive, Bugwood.org



PPV Management

- Quarantine
- Surveys
- Destruction of infected plants
- Genetically engineered resistance (plums)



Case Study Summary

- Viruses generally have a wide host range
- Viruses usually have a wide variety of symptoms
 - May depend on host species, age of host, environmental conditions, etc.
- Symptoms may not be diagnostic



I think my plant is infected with a virus. What do I do?

- Remove the suspected host
- Send a sample of symptomatic tissue to a diagnostic lab for virus ID



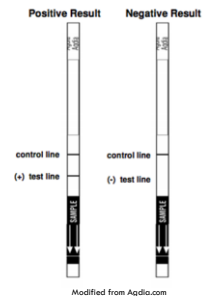
Sampling suspected infected hosts

- Bag the plant before removal
- Send symptomatic tissue to a diagnostic laboratory for identification (usually the above-ground tissue)
- Keep plant tissue cool (refrigerate)
- Send via overnight shipping or send early in the week to avoid weekend delays



Testing for Viruses

- Only signs are viral particles – very small and require specialized equipment to visualize
- Instead, test for the presence of viral proteins or viral genetic material (DNA or RNA)



Questions?



Thank you!

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