



Viruses and Viral Diseases of Cacti and Succulents

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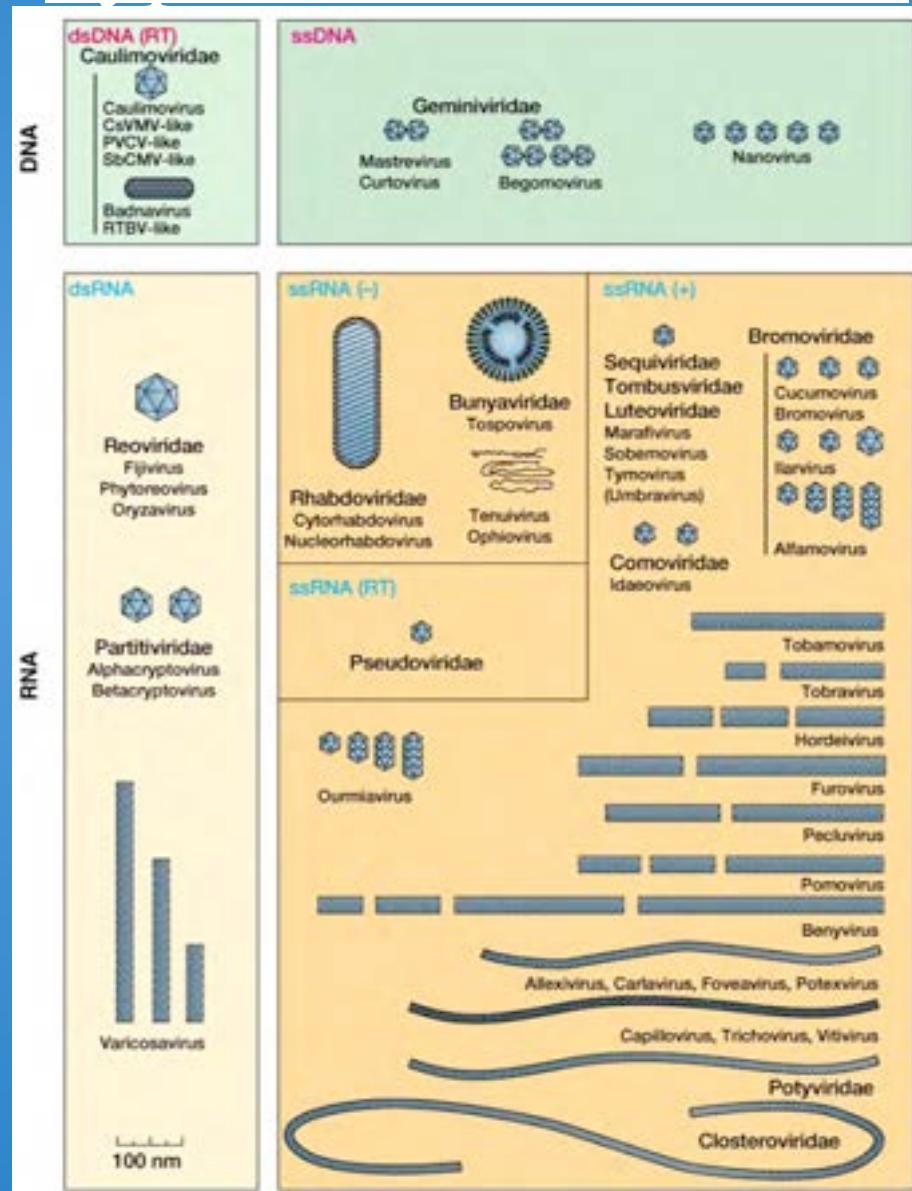
Introduction

- Overview of viruses
- Common diseases and symptoms in plants
- Cactus/succulent specific diseases
- Prevention and management

What are Viruses?

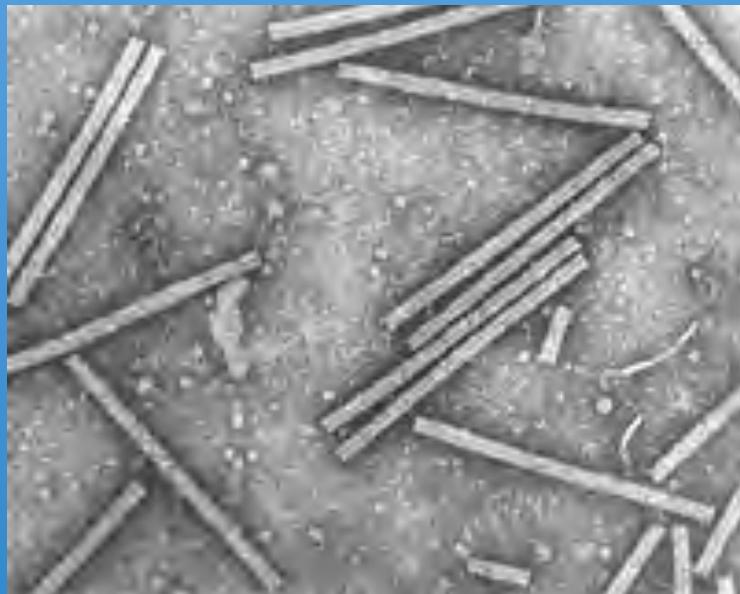
- Small plant pathogens, 20-2000 nm
(1 nm=25 millionth of an inch)

Types of Plant Viruses

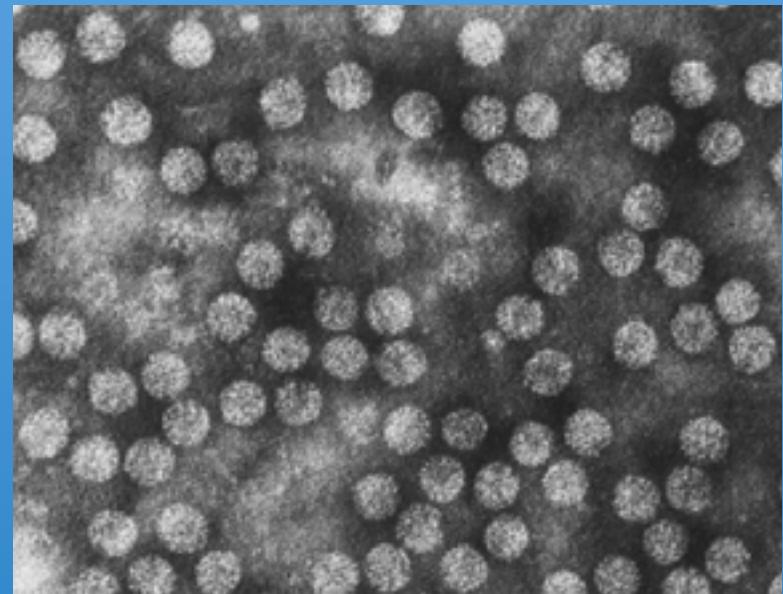


Viruses

- Composed of nucleic acid (DNA or RNA) surrounded by a self made protective coat protein



Tobacco mosaic virus



Cucumber mosaic virus

Viruses

- Require host components and living cells to multiply (=replicate)
- Can survive on surfaces for various times
- Enter through wounds or via vectors

insects

nematodes

fungi

HUMANS

- propagation
- tools
- any touching



Viruses

- Over 1,000 species of plant viruses
- Each species may have many strains
- Named for first host and symptoms
 - *Tobacco mosaic virus* (tobamoviruses)
 - *Tomato spotted wilt virus* (tosspoviruses)
- Host range may be narrow (few) or wide (many)

Host range of Impatiens Necrotic Spot and Tomato Spotted Wilt Tospoviruses-over 1,000 total

Ornamentals

ageratum	chrysanthemum	geranium	poppy
amaranthus	cineraria	gladiolus	primrose
amaryllis	coleus	gloxinia	ranunculus
anemone	columbine	hydrangea	salvia
aster	coreopsis	impatiens	sinningia
baby's breath	cosmos	lobelia	snapdragon
begonia	cyclamen	marigold	stock
calceolaria	dahlia	nasturtium	tiger lily
calendula	delphinium	N.G. impatiens	verbena
calla lily	exacum	peony	zinnia
campanula	forget-me-not	petunia	
china aster	gaillardia	phlox	

Host range of Impatiens Necrotic Spot and Tomato Spotted Wilt Tospoviruses-over 1,000 total

Vegetables

broad bean
cauliflower
celery
eggplant
lettuce
pea
pepper
potato
snap bean
spinach
tomato

Weeds

beggar ticks
black nightshade
morning glory
burdock
chickweed
galinsoga
lamb's quarters
shepherd's purse
sowthistle
purslane
yellow clover



Viruses

Types of Symptoms

– Mosaic/Mottle



Mandevilla



Fern



Hosta

Viruses

Types of Symptoms

– Mosaic/Mottle



Bean



Lettuce

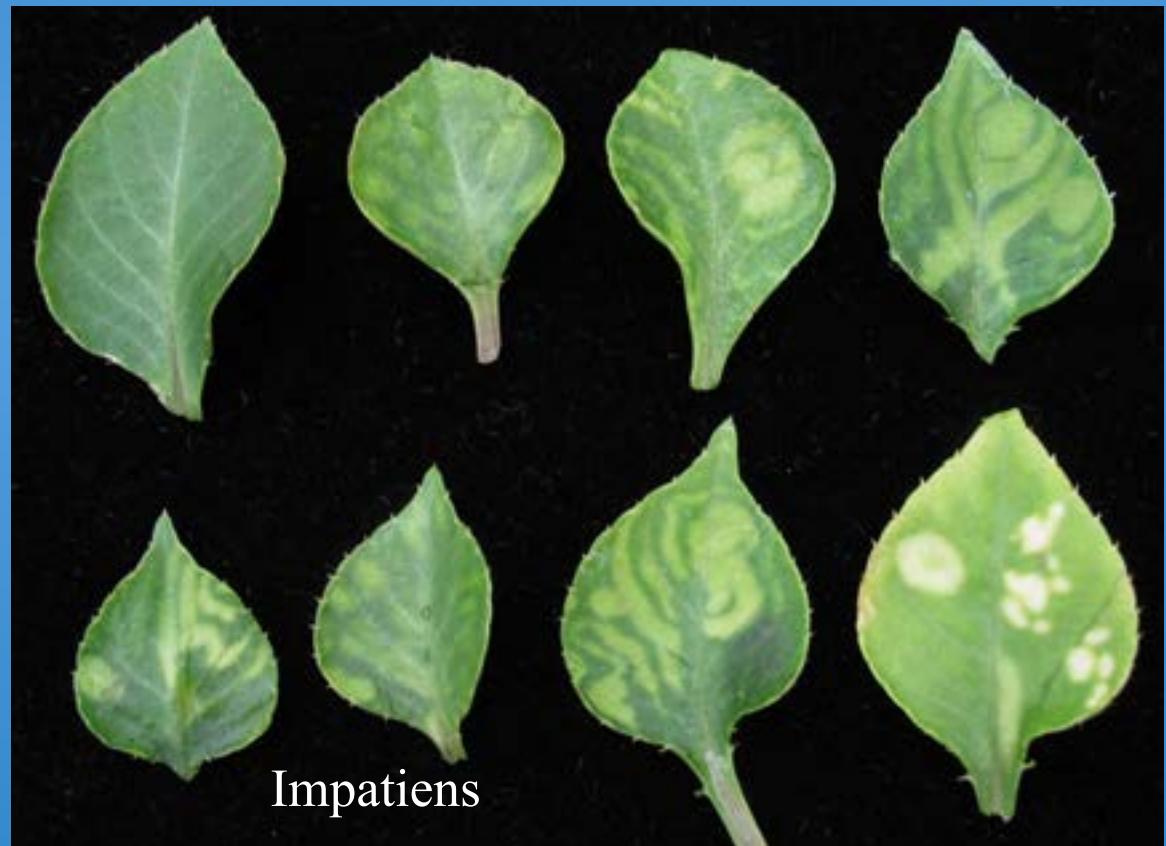


Monocots

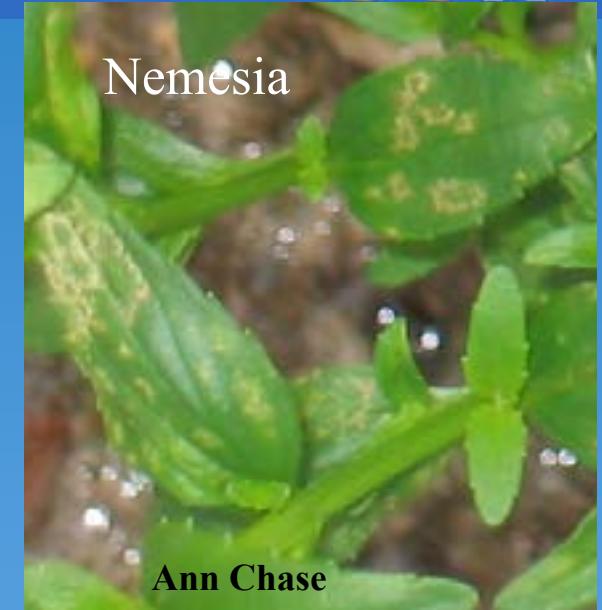
Viruses

Types of Symptoms

– Ringspots/Line Patterns



Impatiens



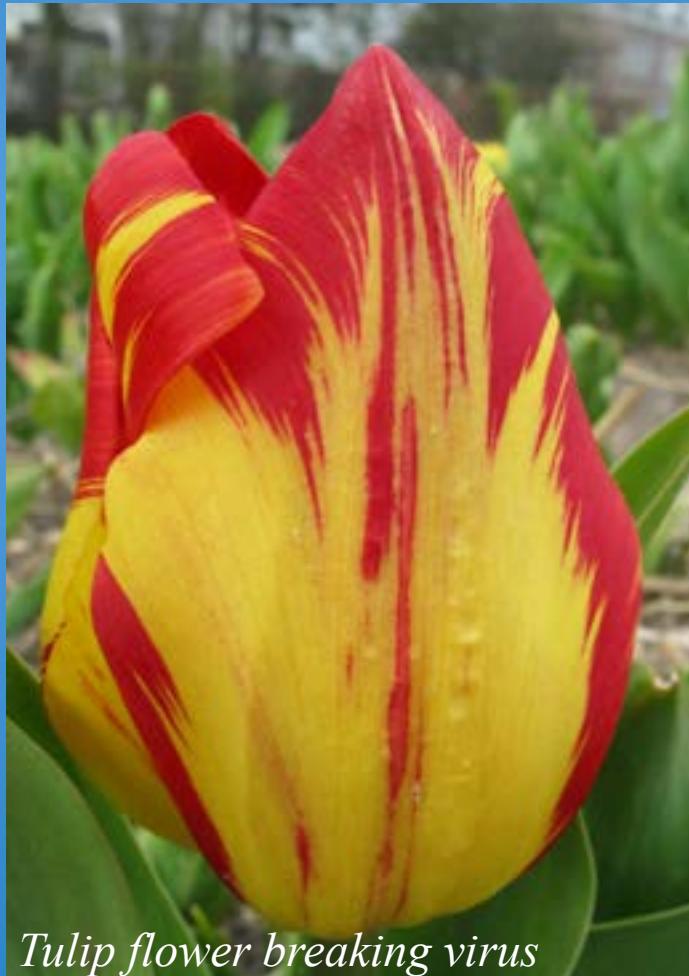
Nemesia



Tobacco

Viruses

Types of Symptoms



Tulip flower breaking virus

– Flower break



Angelonia flower break virus



Viruses

Types of Symptoms

– Leaf deformation



Healthy

Portulaca



Infected

Viruses

Types of Symptoms

– Fruit deformation





Viruses

Types of disease

- Stunting

Citrus tristeza virus



Viruses

Types of Symptoms

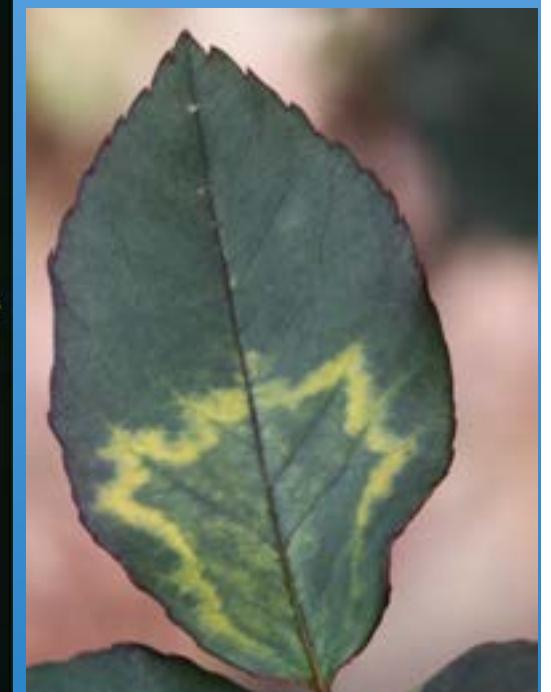
- None



Rose Mosaic

Multiple viruses involved

- *Rose mosaic virus (=Apple mosaic virus)*
- *Prunus necrotic ringspot virus*
- *Arabis mosaic virus*



Cucumber mosaic virus and Nandina mosaic virus

Healthy



Infected



Viruses of Cacti and Succulents

- Difficult to work with due to gelatinous tissue
- Distribution of viruses can be uneven in plants
- Not a lot of research on these plant hosts

Viruses of Cacti and Succulents

Cactus virus X

- Infects many species in *Cactaceae*: *Cereus*, *Saguaro*, *Opuntia*, *Zygocactus* and *Hylocereus*
- Found worldwide
- Symptoms range from none to distorted areoles, deformed spines, necrosis, mottling
- 3 main strains known to date
- Transmitted by grafting, mechanical, plant contact
- NOT transmitted by seed; NO known vector
- Found in all plant parts including buds, flowers and fruit
- Relatively high infection levels in most hosts

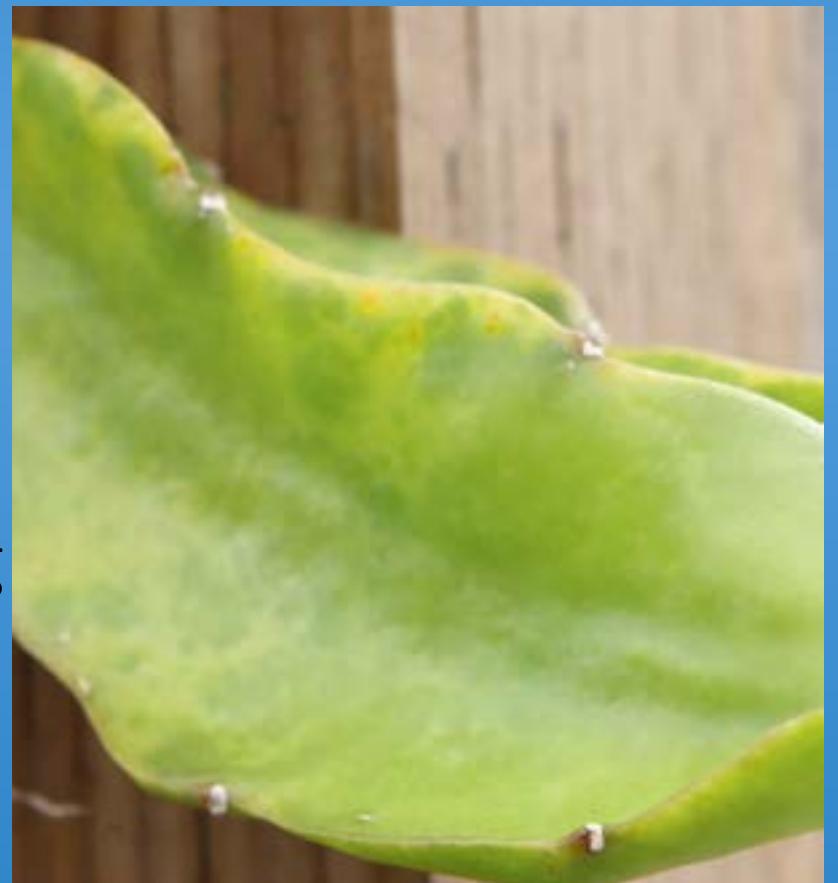
Cactus virus X on Hylocereus (Dragon fruit)



Cactus virus X on Hylocereus (Dragon fruit)



Chlorosis and Mottling



Cactus virus X on Hylocereus (Dragon fruit)



Twisting of arms

Cactus virus X on Hylocereus (Dragon fruit)



Reddening



Speckling

Viruses of Cacti and Succulents

Other Viruses

- *Zygocactus* virus X, *Schlumbergera* virus X
- *Opuntia* tobamovirus
- *Cactus 2* virus (carlavirus)
- *Saguaro cactus* virus (carmovirus, sphere, AZ)

Management

- No “cure”
- Destroy infected stock
- Avoid mechanical transmission: handling, tools, pots, remove plant debris
- Decontaminate tools and surfaces with bleach, quaternary ammonium, chlorhexidine, etc (follow labels)

Avoidance/Testing Protocols

- Scout routinely for symptoms
- Isolate particularly susceptible varieties
- Eliminate hosts outside GH, weeds, landscape plants
- Regular testing for most common pathogen/host combos
- Collect younger leaves, with symptoms if available



Thank you

