

Wisconsin Department of Agriculture, Trade and Consumer Protection

Wisconsin Pest Survey Report

Gallery of Plant Virus Symptoms



Photo credits: Anette Phibbs, Sam Christianson and Susan Lueloff DATCP Plant Industry Laboratory unless otherwise noted.

We hope this gallery of symptoms will be helpful to nursery professionals and plant enthusiasts in recognizing annuals and perennials that may be infected with plant viruses. Viruses can cause plant diseases that affect the quality and viability of plants. The plant materials shown in these photographs were collected from 2007 to 2018, that started as a collaborative survey by DATCP's Plant Industry Laboratory, the University of Minnesota, Plant Disease Clinic, Michigan, Minnesota and Ohio Departments of Agriculture.

The material is sorted alphabetically by host genus. High resolution images are also available at <http://www.ipmimages.org/browse/Archivethumb.cfm?Arc=8> a Bugwood image archive. There are of course many more plant virus diseases than are depicted here.

DISCLAIMER: Final diagnosis should include appropriate test methods and should not be based on visual symptoms alone.

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Gallery of Plant Virus Symptoms



'Azure' Monkshood (*Aconitum fischeri*) infected with aconitum latent virus (AcLV), cucumber mosaic virus (CMV), and a potexvirus.

Detection methods:

Electron microscopy, University of Minnesota, Plant Disease Clinic.

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Gallery of Plant Virus Symptoms

'Azure' Monkshood (*Aconitum fischeri*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Monkshood (*Aconitum*) infected with filamentous virus particles.



Detection method: Electron microscopy, University of Minnesota, Plant Disease Clinic.

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Gallery of Plant Virus Symptoms

Black cohosh, (*Actaea racemosa*) infected with an undetermined potyvirus.



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Gallery of Plant Virus Symptoms

Mexican giant hyssop 'Acapulco Orange' (*Agastache*)
infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Bugleweed (*Ajuga*) infected with alfalfa mosaic virus (AMV).



Catlin's giant

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Gallery of Plant Virus Symptoms

Bugleweed 'Gaiety' (*Ajuga*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Hollyhock 'Chaters Double Mix' (*Alcea rosea*) infected with TRV.



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Peruvian lily (*Alstroemeria*) infected with tomato spotted wilt virus (TSWV).



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Grape-leaf anemone 'Robustissima' (*Anemone tomentosa*)
infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Grape-leaf anemone 'Robustissima' (*Anemone tomentosa*) infected with TRV.



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Anemone 'Serenade' infected with TRV and root knot nematode.

Female root knot nematode
(*Meloidogyne hapla*)



Root knot

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Summer snapdragon (*Angelonia*) infected with Alternanthera mosaic (AltMV) virus or Papaya mosaic virus (PapMV)*.

*Agdia, Inc. ELISA testing.

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Horseradish (*Armoracia rusticana*)
infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Astilbe arendsii 'Fanal' infected with cucumber mosaic virus (CMV).



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Astilbe arendsii 'Fanal' infected with CMV and TRV.



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Astilbe arendsii 'Deutschland' infected with cucumber mosaic virus (CMV) and tobacco streak virus (TSV).



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Astilbe chinensis 'Heart and Soul' infected with tobacco streak virus (TSV).



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Astilbe japonica 'Deutschland' testing positive for Ilarvirus/Bromoviridae (TSV).



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Astilbe infected with tobacco rattle virus (TRV).



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Birch (*Betula nigra*) testing positive for Ilarvirus/Bromoviridae group



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Gallery of Plant Virus Symptoms

Tuberous begonia
(*Begonia x hiemalis*)
infected with CMV.
'Non-Stop Rose Petticoat' and
'Go-Go Rose Bicolor'
on the left,
healthy 'Non-Stop Apricot'
on the right.



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Gallery of Plant Virus Symptoms

Tuberous begonia infected with CMV.



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Gallery of Plant Virus Symptoms

Begonia x hiemalis 'Cindy Fringed' infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

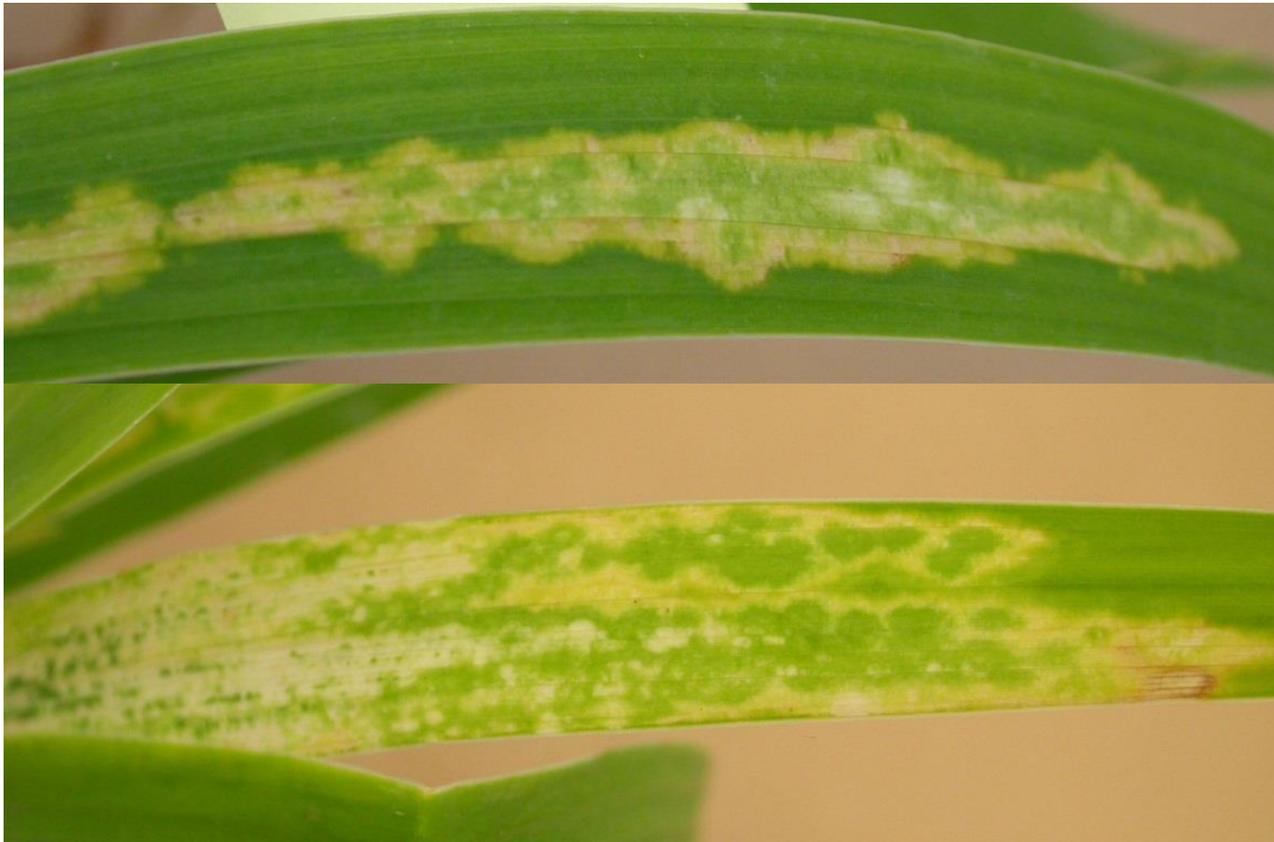
Begonia x hiemalis 'Dark Britt' infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Blackberry lily (*Belamcanda chinensis*)
infected with tomato spotted wilt virus (TSWV).



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Gallery of Plant Virus Symptoms

Bergenia infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Angel's trumpet (*Brugmansia insignis*) 'Charles Grimaldi' infected with tobacco mosaic virus (TMV).



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Gallery of Plant Virus Symptoms



Bellflower (*Campanula*)
infected with
cucumber mosaic virus (CMV).

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Canna (*Canna indica*) 'Orange Chocolate' infected with canna yellow mottle badnavirus (CaYMV).



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Gallery of Plant Virus Symptoms

Canna 'Cannova Yellow' infected with canna yellow mottle virus (CaYMV).



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Gallery of Plant Virus Symptoms

Canna 'Banana Punch' and 'Tropicanna' infected with canna yellow streak potyvirus (CaYSV).



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Gallery of Plant Virus Symptoms

Canna 'Crimson Beauty' infected with canna yellow streak potyvirus (CaYSV).



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Taro (*Colocasia*) infected with
Dasheen mosaic virus (DsMV).



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Gallery of Plant Virus Symptoms

Hackberry (*Celtis occidentalis*) with "hackberry island chlorosis", believed to be associated with virus, and seed transmitted.



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Gallery of Plant Virus Symptoms

Coreopsis (*Coreopsis verticillata*) 'Zagreb' infected with tomato spotted wilt tospovirus (TSWV)



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Gallery of Plant Virus Symptoms

Clematis 'Dancing Queen' (left) and 'Dancing Dorian' (right) infected with clematis chlorotic mottle tobusvirus (CICMoV).



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Gallery of Plant Virus Symptoms

Clematis 'Dancing Smile' (left) and 'Natascha' (right) infected with clematis chlorotic mottle tombusvirus (CICMoV).



University MN,
Plant Disease Clinic.

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Gallery of Plant Virus Symptoms

Clematis 'Multi Blue' left infected with CICMoV and 'Guernsey Cream' right with TRV.



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Dahlia infected with dahlia common mosaic virus (DCMV).



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Gallery of Plant Virus Symptoms

Larkspur (*Delphinium*) 'Magic Fountain' infected with tobacco mosaic virus (TMV).

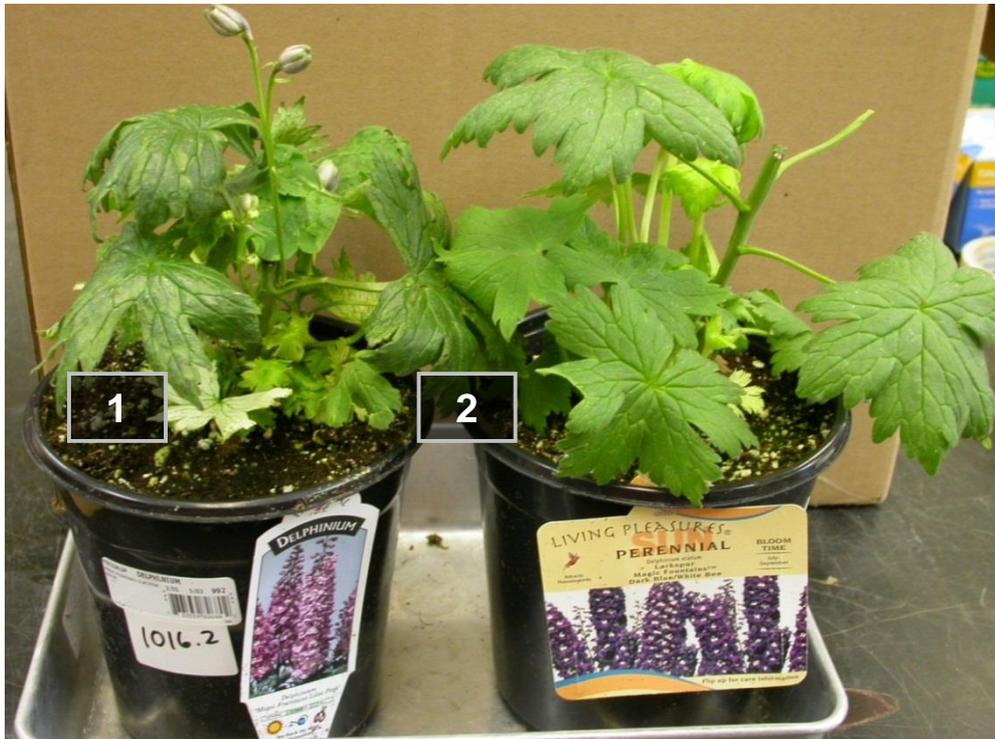


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Gallery of Plant Virus Symptoms

Larkspur (*Delphinium elatum*) infected with TRV.

1. 'Lilac Pink',
2. 'Magic Fountain' dark blue/white bee,
3. 'Magic Fountain' pure white.



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Gallery of Plant Virus Symptoms

Larkspur (*Delphinium elatum*) infected with TRV.



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Gallery of Plant Virus Symptoms

Bleeding heart (*Dicentra spectabilis*, new name: *Lamprocapnos spectabilis*)
infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Bleeding heart (*Dicentra spectabilis*) infected with TRV.



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Gallery of Plant Virus Symptoms

Bleeding heart (*Dicentra spectabilis*) infected with TRV.



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Gallery of Plant Virus Symptoms

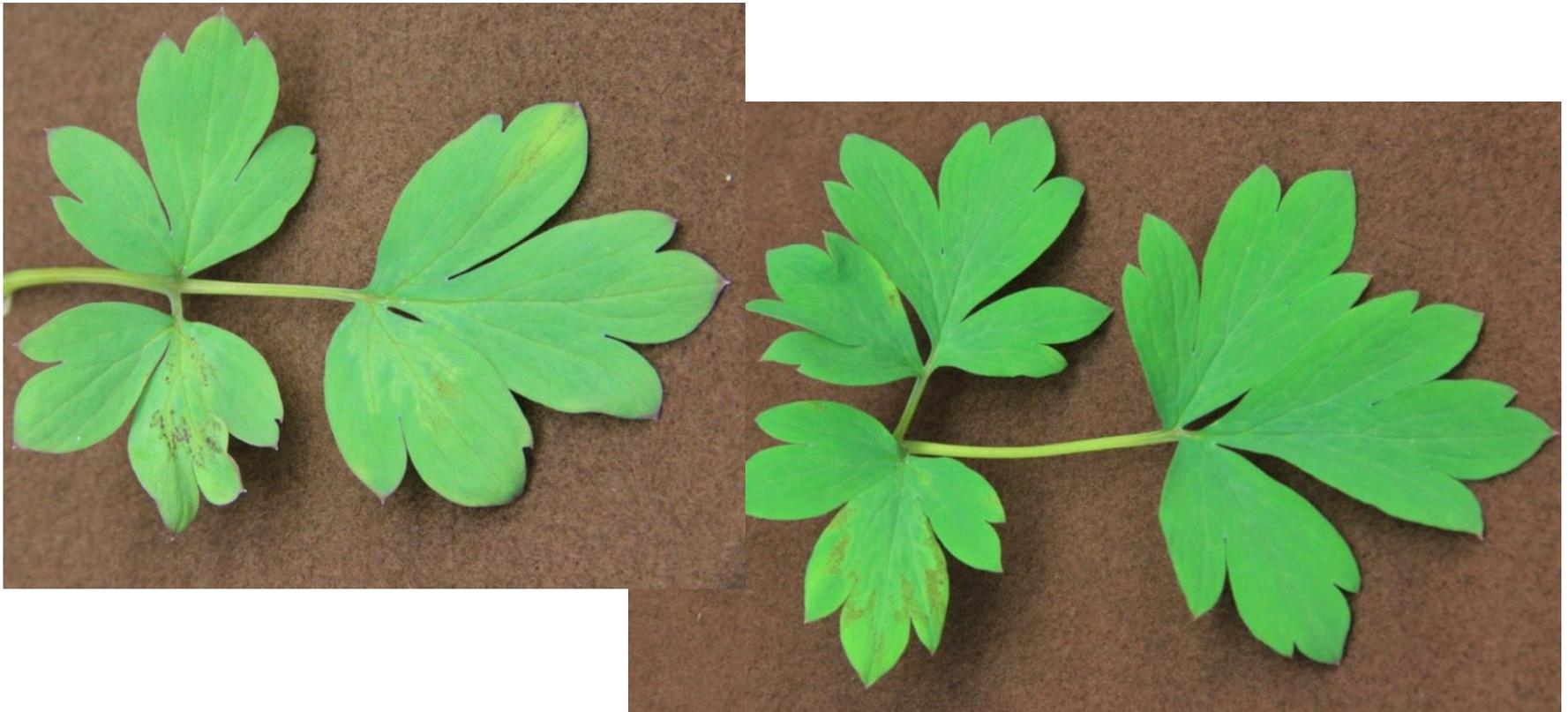
Bleeding heart (*Dicentra spectabilis*) infected with TRV.



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Gallery of Plant Virus Symptoms

Bleeding heart 'Pink' (*Dicentra*) infected with CMV and TRV.



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Gallery of Plant Virus Symptoms

Bleeding heart (*Dicentra*) infected with CMV and TRV.



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Gallery of Plant Virus Symptoms

Digiplexis (*Digitalis x Isoplexis*) infected with tobacco mosaic virus (TMV).



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Gallery of Plant Virus Symptoms

Purple Coneflower (*Echinacea purpurea*) 'Magnus' infected with CMV.



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Gallery of Plant Virus Symptoms

Barrenwort infected with tobacco rattle virus (TRV).



- 1) *Epimedium pubigerum* 'Orange Queen'
- 2) *Epimedium pinnata elegans*
- 3) *Epimedium youngianum* 'Niveum'

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Gallery of Plant Virus Symptoms

Barrenwort `Rubrum' (*Epimedium alpinum*) infected with TRV.



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Gallery of Plant Virus Symptoms

Barrenwort 'Creeping yellow' (*Epimedium pubigerum*) infected with TRV.



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Gallery of Plant Virus Symptoms

Barrenwort (*Epimedium pubigerum*) infected with TRV.



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Gallery of Plant Virus Symptoms

Barrenwort (*Epimedium x rubrum*) infected with TRV.



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Gallery of Plant Virus Symptoms

Barrenwort 'Sulphureum' (*Epimedium x versicolor*) infected with TRV.



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'Black Jack' fig (*Ficus carica*) infected with fig mosaic virus (FMV).



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Gallery of Plant Virus Symptoms

Freesia (*Freesia refracta*) infected with undetermined potyvirus.



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Gallery of Plant Virus Symptoms



Gladiolus infected with bean yellow mosaic virus (BYMV) on left and cucumber mosaic virus (CMV) on right.

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Gallery of Plant Virus Symptoms

Sneezeweed (*Helenium*) 'Chelsey' infected with CMV.



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Gallery of Plant Virus Symptoms

Sneezeweed (*Helenium autumnale*) 'Tie Die' infected with undetermined potyvirus.



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Gallery of Plant Virus Symptoms

Coral bells 'Swirling Fantasy' (*Heuchera*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Coral bells (*Heuchera*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Hosta or plantain lily 'Albo-Marginata' infected with arabis mosaic virus (ArMV).



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Gallery of Plant Virus Symptoms

Hosta 'Paul's Glory' infected with hosta virus X (HVX) and arabis mosaic virus (ArMV).



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Gallery of Plant Virus Symptoms

Hosta 'Albo-Marginata' infected with HVX.



Hosta 'Daybreak' infected with HVX.



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Gallery of Plant Virus Symptoms

Hosta 'Sum & Substance' infected with hosta virus X (HVX).



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Gallery of Plant Virus Symptoms

Hosta 'Undulata' infected with hosta virus X (HVX) and tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms



Hosta 'Blue Angel'
infected with TRV.



Hosta 'Honeybells'
infected with TRV.

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Gallery of Plant Virus Symptoms



Hosta
'Magic Fire'



Hosta funkia
'Regal Splendor'



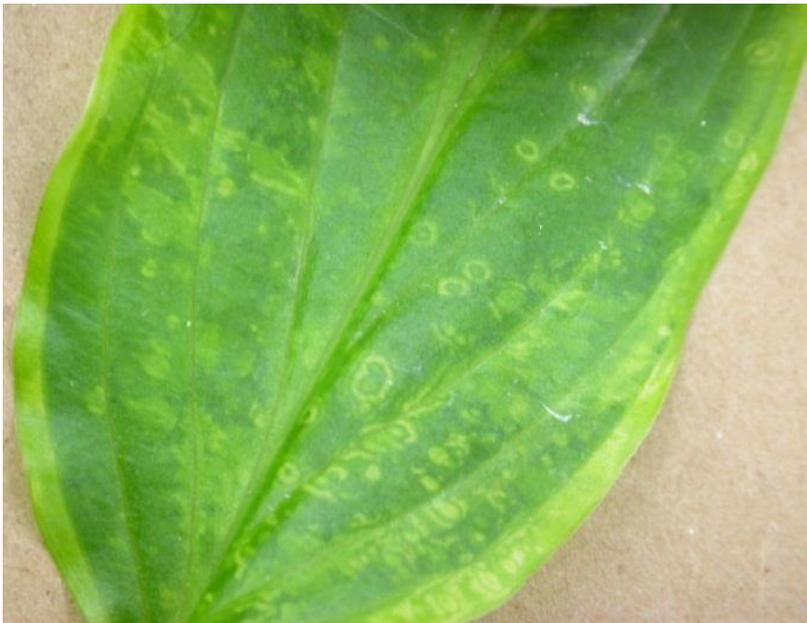
Hosta funkia 'Krossa Regal'

Hosta varieties
infected with
tobacco rattle virus
(TRV).

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Gallery of Plant Virus Symptoms

Hosta varieties infected with tobacco rattle virus (TRV).



Hosta 'So Sweet'
ringspot pattern symptom.



Hosta 'Christmas Tree'
color bleeding symptom.

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Gallery of Plant Virus Symptoms

Hosta 'Blue Angel' infected with tomato spotted wilt virus (TSWV).



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Gallery of Plant Virus Symptoms

Wax plant (*Hoya carnosa*)
infected with
impatiens necrotic spot virus
(INSV).



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Gallery of Plant Virus Symptoms

Dwarf German iris (*Iris*) infected with iris severe mosaic potyvirus (ISMV).



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Gallery of Plant Virus Symptoms

Bearded iris 'Avalon Sunset' infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Iris 'Mt. Fujiyama' infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Leopard plant (*Ligularia*) infected with tomato spotted wilt virus (TSWV).



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Gallery of Plant Virus Symptoms

Lily 'Scarlet Delight' (*Lilium*) infected with lily mottle potyvirus (LMoV).



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Gallery of Plant Virus Symptoms

Oriental lily 'Casablanca' (*Lilium*) infected with lily symptomless virus (LYLSV).



Detection Method: ELISA, Ohio Department of Agriculture.

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Gallery of Plant Virus Symptoms

Oriental lily 'Angelique' (*Lilium oriental*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Cardinal flower (*Lobelia*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Cardinal flower (*Lobelia*) infected with spherical virus particles.



Detection method: Electron microscopy, University of Minnesota, Plant Disease Clinic.

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Gallery of Plant Virus Symptoms

Cardinal flower 'Ruby Slippers' (*Lobelia*) infected with cucumber mosaic (CMV), tobacco rattle (TRV) and turnip mosaic potyvirus (TuMV).



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Gallery of Plant Virus Symptoms



Lupine (*Lupinus*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Lupine 'Minarette' (*Lupinus*) infected with tomato spotted wilt virus (TSWV).



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Gallery of Plant Virus Symptoms

Maltese cross 'Vesuvius'
(*Lychnis x arkwrightii*) infected
with impatiens necrotic spot virus
(INSV).



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Gallery of Plant Virus Symptoms



Maltese cross (*Lychnis x arkwrightii*) 'Orange Gnome' infected with impatiens necrotic spot virus (INSV).

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Gallery of Plant Virus Symptoms

Creeping Jenny (*Lysimachia*) infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Mandevilla 'Fury Fancy Pink' and 'Teepee Mini Pink' infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Mandevilla 'Red Riding Hood' (*Mandevilla sanderi*)
infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Mandevilla 'Sun Parasol' with ringspots testing positive for potyvirus group.



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Gallery of Plant Virus Symptoms

Virginia bluebells (*Mertensia virginica*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Shamrock (*Oxalis regnellii*) infected with Shamrock chlorotic ringspot virus (SCRV) and Beet ringspot virus (BRSV).



Detection method: Electron microscopy, RT-PCR and sequencing. University of Minnesota, Plant Disease Clinic.

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Gallery of Plant Virus Symptoms

Japanese pachysandra 'Green Carpet' (*Pachysandra terminalis*) with alfalfa mosaic virus (AMV) and an undetermined filamentous virus.



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Gallery of Plant Virus Symptoms

Peony 'Sarah Bernhardt' (*Paeonia*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Peony (*Paeonia*) infected with tobacco rattle virus (TRV).



Peony 'Yellow Crown'



Peony 'Edens Perfume'

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Gallery of Plant Virus Symptoms

Peony (*Paeonia*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Peony 'Momoyama' (*Paenia suffruticosa*) infected with unknown virus.



Filamentous virus particles of 500-600nm length observed with electron microscope (TEM) at University of Minnesota.

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Gallery of Plant Virus Symptoms

Pepper (*Capsicum annuum*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Beardtongue (*Penstemon*) infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Petunia 'Portunia Plus Papaya' (left) and 'Sweetunia Orange Flash' (right) infected with tobacco mosaic virus (TMV).



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Gallery of Plant Virus Symptoms

Petunia 'Sunflower Ray' infected with tobacco mosaic virus (TMV).



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Gallery of Plant Virus Symptoms

Petunia 'Cobalt Blue' (left) and 'Pink Lemonade' (right) infected with TMV.



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Gallery of Plant Virus Symptoms

Phlox 'Pink Lady' infected with
CMV and TRV.



Phlox testing positive for
potyvirus group and TRV.



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Gallery of Plant Virus Symptoms

Phlox 'Orange-Red' testing positive for potyvirus group.



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Gallery of Plant Virus Symptoms

Phlox 'Peppermint Twist' infected with TRV.



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Gallery of Plant Virus Symptoms

Jacob's ladder (*Polemonium caeruleum*) infected with impatiens necrotic spot virus (INSV).



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Gallery of Plant Virus Symptoms

Jacob's ladder (*Polemonium caeruleum*) infected with INSV.



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Gallery of Plant Virus Symptoms

Yellow moss rose (*Portulaca oleracea*) infected with papaya mosaic virus (PapMV).



Detection method: ELISA by Agdia, Inc.

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Gallery of Plant Virus Symptoms

Rhubarb (*Rheum rhabarbarum*) infected with tobacco streak virus (TSV)



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Gallery of Plant Virus Symptoms



'Black Satin' Blackberry
(*Rubus subgenus Watson*)
with virus symptoms.

Note: *Rubus* is host to over 40 viruses.

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Gallery of Plant Virus Symptoms

Britton's wild petunia (*Ruellia simplex*) 'Purple Showers'
infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms



Elderberry with undetermined virus causing ringspot symptoms.



Elderberry 'Yellow Leaf' (*Sambucus*) infected with filamentous & spherical virus particles (University of MN).

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Gallery of Plant Virus Symptoms

Pincushion flower (*Scabiosa*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms

Stonecrop (*Sedum*) infected with cucumber mosaic virus (CMV).



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Gallery of Plant Virus Symptoms

Stonecrop 'Strawberries and Cream' (*Sedum*) infected with undetermined potyvirus.



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Gallery of Plant Virus Symptoms



Stonecrop 'Matrona' (*Sedum*) also on 'Maestro' infected with kalanchoe mosaic potyvirus (KMV) and arabis mosaic virus (ArMV).

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Gallery of Plant Virus Symptoms

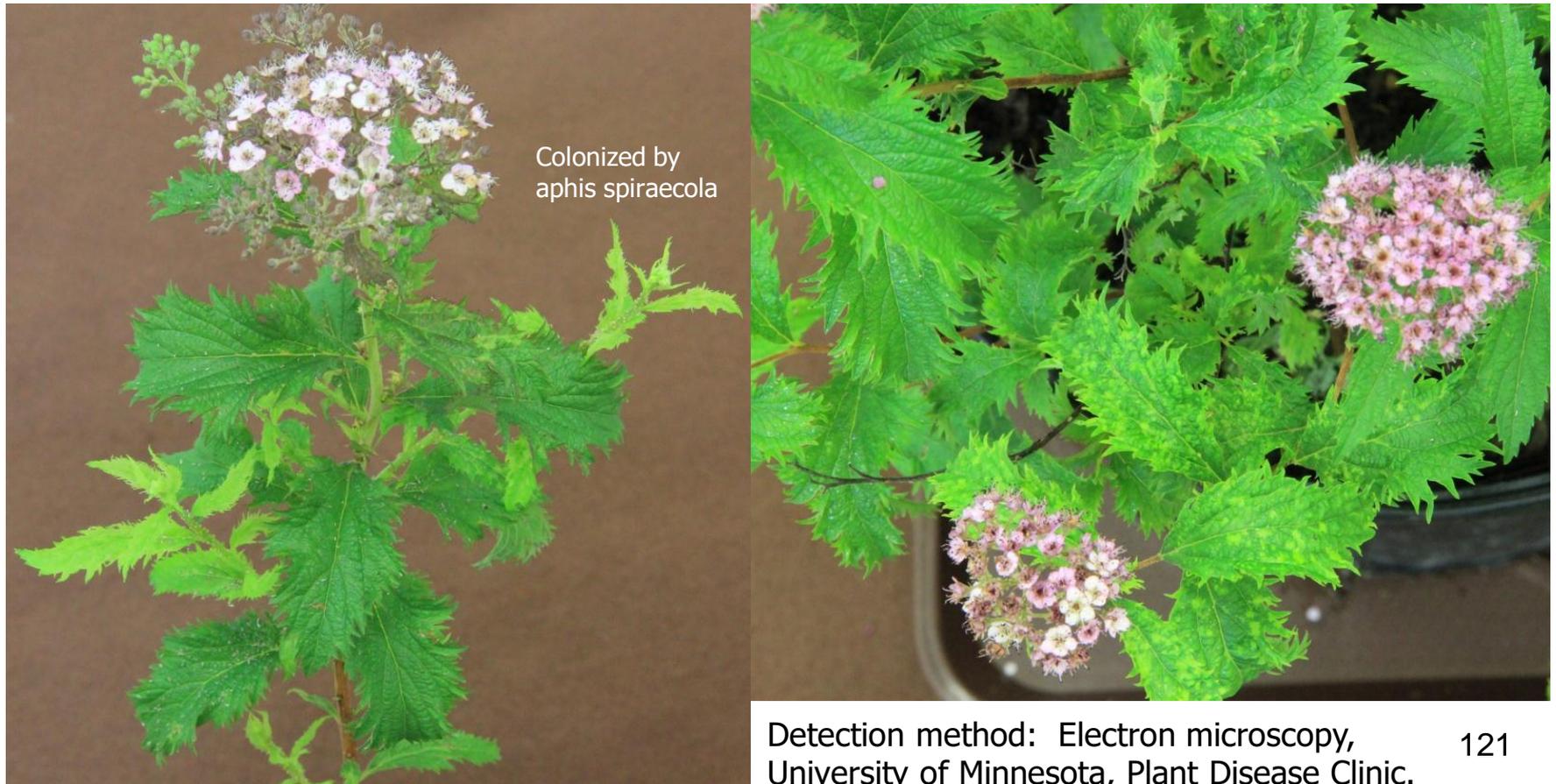


Prairie mallow (*Sidalcea*) 'Candy Girl'
testing positive for potyvirus group.

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Gallery of Plant Virus Symptoms

Spirea (*Spiraea japonica*) infected with spiraea yellow leafspot virus (SYLSV) and spiraea leafspot spherical virus (SLSSV).



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Gallery of Plant Virus Symptoms

Celandine poppy (*Stylophorum diphyllum*) infected with tobacco rattle virus (TRV).



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Gallery of Plant Virus Symptoms



Lilac (*Syringa vulgaris*) infected with lilac leaf chlorosis virus (LLCV).

Image by M. Wensing, DATCP

Detection: D. Mollow USDA ARS

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Gallery of Plant Virus Symptoms

Carolina lupine (*Thermopsis*) infected with clover yellow vein virus (CIYVV).



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Gallery of Plant Virus Symptoms

Spiderwort (*Tradescantia*) 'Zwanenburg Blue' positive for potyvirus group.



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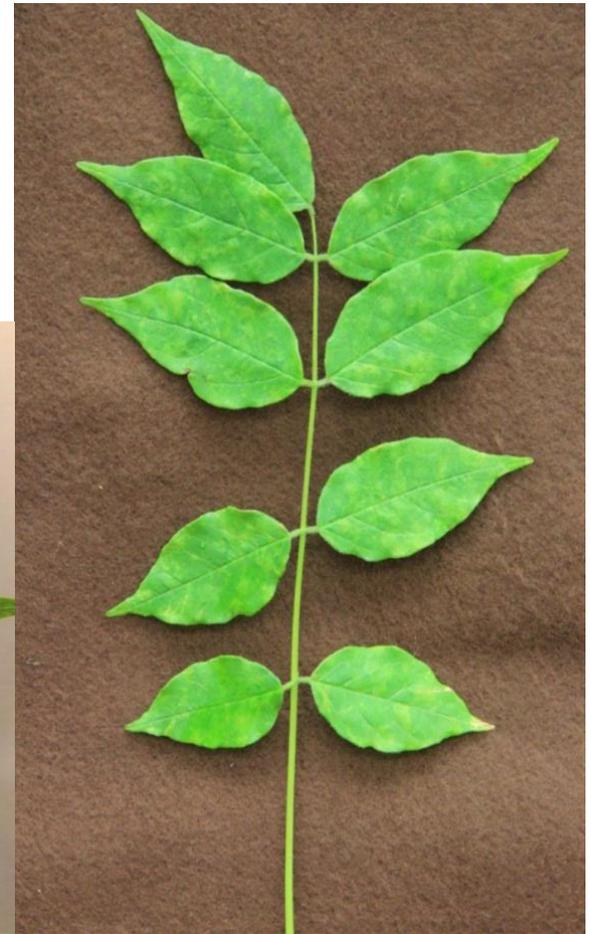
Wisteria infected with wisteria vein mosaic potyvirus (WVMV).



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Gallery of Plant Virus Symptoms

Wisteria 'Aunt Dee' (*Wisteria macrostachya*)
infected with wisteria vein mosaic virus (WVMV).



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Gallery of Plant Virus Symptoms

Zinnia 'Uptown Sunstruck' infected with tomato spotted wilt virus (TSWV).



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Gallery of Plant Virus Symptoms

Virus diagnosis performed at Plant Industry Laboratory unless otherwise noted.
Detection methods for each virus are listed below:

1. Alfalfa mosaic virus (AMV) – RT-PCR (Martinez et al. Plant Disease (2004) 88:908).
2. Alternanthera mosaic virus (AltMV)/Papaya mosaic virus (PapMV) - ELISA testing service (Agdia, Inc.)
3. Arabis mosaic virus (ArMV) – Immunostrip (Agdia, Inc.).
4. Canna yellow mottle virus –RT-PCR (Pappu et al. Plant Disease (2008) 92:1136).
5. Cucumber mosaic virus (CMV) - Immunostrip (Agdia, Inc.).
6. Cucumber mosaic virus (CMV) - RT-PCR (Blas et. al. Journal of Phytopathology, 141 (1994) 323-329).
7. Dahlia mosaic virus – PCR (M. Nicolaisen, Plant Disease (2003) 87, 945-948).
8. Fig mosaic virus (FMV) - RT-PCR (Elbeaino et al. Journal of General Virology (2009) 90, 1281-1288).
9. Hosta virus X (HVX) - Immunostrip (Agdia, Inc.).
10. Ilarvirus / Bromoviridae - RT-PCR and sequencing (Untiveros et al. Journal of Virological Methods 165 (2010) 97-104).
11. Impatiens necrotic spot virus (INSV) - Immunostrip (Agdia, Inc.).
12. Tomato spotted wilt virus (TSWV) - Immunostrip (Agdia, Inc.).
13. Tobacco mosaic virus (TMV) - Immunostrip (Agdia, Inc.).
14. Potyvirus group – Immunostrip (Agdia, Inc.), RT-PCR (Zheng et. al. Plant Pathology (2010) 59, 211–220).
15. Tobacco rattle virus (TRV) – Endpoint and real time RT-PCR (D.J. Robinson (1992) Journal of Virological Methods, 40 (1992) 57-66).
16. Sequencing services by Functional Biosciences, Inc., <http://functionalbio.com/web/index.php>.
17. BLASTX National Library of Medicine (Altschul et al. (1997), Nucleic Acids Res. 25:3389-3402).

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Comments welcome!

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We also wish to thank the scientists at Functional Biosciences, Inc., <http://functionalbio.com/web/index.php>, for providing excellent sequencing services.

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48	Dicentra spectabilis		TRV	72	Hosta	Magic Fire, Krossa Regal, Regal Splendor	TRV
49	Dicentra spectabilis		CMV, TRV	73	Hosta	Christmas Tree, So Sweet	TRV
50	Dicentra spectabilis		CMV, TRV	74	Hosta	Blue Angel	TSWV
51	Digiplexis		TMV	75	Hoya carnosa		INSV
52	Echinacea purpurea	Magnus	CMV	76	Iris	Dwarf German	ISMV
53	Epimedium	Orange Queen, Elegans, Niveum	TRV	77	Iris	Avalon Sunset	TRV
54	Epimedium alpinum	Rubrum	TRV	78	Iris	Mt. Fujiyama	INSV
55	Epimedium pubigerum	Creeping Yellow	TRV	79	Ligularia		TSWV
56	Epimedium pubigerum		TRV	80	Lilium	Scarlet Delight	LMoV
57	Epimedium x rubrum		TRV	81	Lilium	Casablanca	LYLSV
58	Epimedium x versicolor	Sulphureum	TRV	82	Lilium oriental	Angelique	TRV
59	Ficus carica	Black Jack	FMV	83	Lobelia		CMV
60	Freesia refracta		potyvirus	84	Lobelia		undetermined virus
61	Gladiolus		BYMV, CMV	85	Lobelia sp.	Ruby Slippers	CMV, TRV, TuMV
62	Helenium	Chelsey	CMV	86	Lupinus	Russell's hybrid Mix	CMV
63	Helenium autumnale	Tie Die	potyvirus	87	Lupinus hybrid	Minarette	TSWV
64	Heuchera	Swirling Fantasy	TRV	88	Lychnis x arkwrightii	Vesuvius	INSV
65	Heuchera		TRV	89	Lychnis x arkwrightii	Orange Gnome	INSV
66	Hosta	Albo-Marginata	ArMV	90	Lysimachia		INSV
67	Hosta	Paul's Glory	ArMV, HVX	91	Mandevilla	Fury Fancy Pink, Teepee Mini Pink	CMV
68	Hosta	Albo-Marginata, Daybreak	HVX	92	Mandevilla sanderi	Red Riding Hood	CMV
69	Hosta	Sum & Substance	HVX				
70	Hosta	Undulata	HVX, TRV				
71	Hosta	Blue Angel, Honeybells	TRV				

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Slide	Host	Variety	Virus
93	Mandevilla	Sun Parasol	potyvirus
94	Mertensia virginica		TRV
95	Oxalis regnellii		BRSV, SCRIV
96	Pachysandra terminalis	Green Carpet	AMV & undetermined
97	Paeonia	Sarah Bernhardt	TRV
98	Paeonia	Yellow Crown, Edens Perfume	TRV
99	Paeonia		TRV
100	Paeonia suffruticosa	Momoyama	undetermined virus
101	Pepper	Capsicum annum	CMV
102	Penstemon		INSV
103	Petunia	Portunia Plus Papaya, Sweetunia Orange Flash	TMV
104	Petunia	Sunflower Ray	TMV
105	Petunia	Cobalt Blue, Pink Lemonade	TMV
106	Phlox	Pink Lady	CMV, TRV, potyvirus
107	Phlox	Orange-Red	potyvirus
108	Phlox	Peppermint Twist	TRV
109	Polemonium caeruleum		INSV
110	Polemonium caeruleum		INSV
111	Portulaca oleracea		PapMV
112	Rheum rhabarbarum		TSV
113	Rubus subgenus Watson	Black Satin	virus symptoms
114	Ruella simplex	Purple Showers	TRV

Slide	Host	Variety	Virus
115	Sambucus	Yellow Leaf	undetermined virus
116	Scabiosa		TRV
117	Sedum		CMV
118	Sedum	Strawberries and Cream	potyvirus
119	Sedum	Matrona, Maestro	potyvirus
120	Sidalcea	Candy Girl	potyvirus
121	Spiraea japonica		SYLSV, SLSSV
122	Stylophorum diphyllum		TRV
123	Syringa vulgaris		LLCV
124	Thermopsis		CIYW
125	Tradescantia x andersoniana	Zwanenburg Blue	potyvirus
126	Wisteria		WVMV
127	Wisteria macrostachya	Aunt Dee	WVMV
128	Zinnia	Uptown Sunstruck	TSWV
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