

# GALLERY OF ORNAMENTAL PLANT VIRUS SYMPTOMS

PLANT INDUSTRY BUREAU LAB

WISCONSIN DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION

## Introduction

Plant viruses are microscopic agents that can infect plants and cause diseases that affect the quality and viability of those plants. Some plant viruses have large host ranges while others only infect one host. Symptoms of viral infections vary greatly between viruses and even between hosts infected with the same virus. Some general symptoms of a viral infection include leaf mottling, mosaic, ringspot, necrosis, turgidity, distortion, stunting, and death. Insects, nematodes, plant sap, plant propagation, and humans can transmit viruses between plants. Once infected, there is no good way to eliminate or treat the virus without damaging the host plant. One of the best ways to manage plant viruses is to remove and destroy symptomatic plants.

We created the *Gallery of Ornamental Plant Virus Symptoms* to help nursery professionals, growers, diagnosticians, and plant enthusiasts recognize the symptoms of different viruses on common ornamental plants. The final diagnosis of a viral infection must include appropriate test methods and cannot be based on visual symptoms alone.

Viruses can be detected and identified in plant material using a variety of methods. The viruses in the *Gallery* were identified using one or more of the following methods: electron microscopy, enzyme-linked immunosorbent assay (ELISA), high throughput sequencing, lateral flow device (LFD), polymerase chain reaction (PCR), reverse transcription polymerase chain reaction (RT-PCR), and sequencing.

The *Gallery* is an assembly of the viruses detected on samples submitted to the Wisconsin Department of Agriculture, Trade and Consumer Protection's Plant Industry Bureau Laboratory (PIB Lab) from 2007 to 2025. All diagnostic work was completed at the PIB Lab unless otherwise indicated. This *Gallery* does not include all plant viruses or host-virus combinations, only those observed at the PIB Lab.

## How to Use This Gallery

The *Gallery* is organized alphabetically by the host plant's scientific name. Each entry contains the host plant's scientific name, common name, variety (if known), virus(es) detected, laboratory methods used for identification, and images of the plant and symptoms.

One of the easiest ways to navigate this document is to use the "Find" feature. Use the keys CTRL + F to pull up the find function and search the document using keywords. At the end of this document, we have included an index to find entries by host plant scientific name, host plant common name, and virus.

Additional photos are available in the Bugwood image archive:

<http://www.ipmimages.org/browse/Archivethumb.cfm?Arc=8>.

# Viruses and Their Abbreviations

aconitum latent virus (AcLV)	impatiens necrotic spot virus (INSV)
alternanthera mosaic virus (AltMV)	iris severe mosaic virus (ISMV)
alfalfa mosaic virus (AMV)	kalanchoe mosaic virus (KMV)
arabis mosaic virus (ArMV)	lilac leaf chlorosis virus (LLCV)
beet ringspot virus (BRSV)	lily mottle virus (LMOV)
bean yellow mosaic virus (BYMV)	lily symptomless virus (LYLSV)
canna yellow mottle virus (CaYMV)	papaya mosaic virus (PapMV)
canna yellow streak virus (CaYSV)	potato virus S (PVS)
chili pepper mild mottle virus (CPMMoV)	Potyvirus group (potyvirus)
clematis chlorotic mottle virus (CICMoV)	shamrock chlorotic ringspot virus (SCRV)
clover yellow vein virus (CIYVV)	spiraea leafspot spherical virus (SLSSV)
cucumber mosaic virus (CMV)	spiraea yellow leafspot virus (SYLSV)
cycas necrotic stunt virus (CNSV)	tobacco mosaic virus (TMV)
dahlia mosaic virus (DMV)	tobacco rattle virus (TRV)
dasheen mosaic virus (DsMV)	tobacco streak virus (TSV)
elderberry virus C	tomato ringspot virus (ToRSV)
elderberry virus D	tomato spotted wilt virus (TSWV)
figwort mosaic virus (FMV)	tradescantia mild mosaic virus (TraMMV)
hosta virus X (HVX)	turnip mosaic virus (TuMV)
Ilarvirus group (Ilarvirus)	wisteria vein mosaic virus (WVMV)

# *Aconitum fisheri*, Monkshood, 'Azure'

## Viruses Detected:

aconitum latent virus (AcLV)  
cucumber mosaic virus (CMV)  
undetermined potyvirus

## Detection Method:

Agdia CMV and Potyvirus LFD  
Electron Microscopy conducted by University of Minnesota, Plant Disease Clinic



# *Aconitum fisheri*, Monkshood

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Aconitum* sp., Monkshood

**Virus Detected:**

Unknown – filamentous virus particles found

**Detection Method:**

Electron Microscopy conducted by University of Minnesota, Plant Disease Clinic



## *Actaea racemosa*, Black Cohosh

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## *Actinidia arguta*, Hardy Kiwi, 'Issai'

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



# ***Agastache* sp., Mexican Giant Hyssop, 'Acapulco Orange'**

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Ajuga* sp., Bugleweed, 'Catlin's Giant'

**Virus Detected:**

alfalfa mosaic virus (AMV)

**Detection Method:**

RT-PCR



## *Ajuga sp.*, Bugleweed, 'Gaiety'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Alcea rosea*, Hollyhock, 'Chaters Double Mix'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Alstroemeria* sp., Peruvian Lily

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Anemone sp.*, Windflower

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Anemone sp.*, Windflower

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Anemone sp.*, Windflower

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Anemone tomentosa*, Windflower, 'September Charm'

**Virus Detected:**

undetermined ilarvirus

**Detection Method:**

RT-PCR



## ***Angelonia* sp., Summer Snapdragon**

**Virus Detected:**

alternanthera mosaic virus (AltMV) or papaya mosaic virus (PapMV)

**Detection Method:**

ELISA conducted by Agdia, Inc.



## *Antirrhinum sp.*, Snapdragon

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



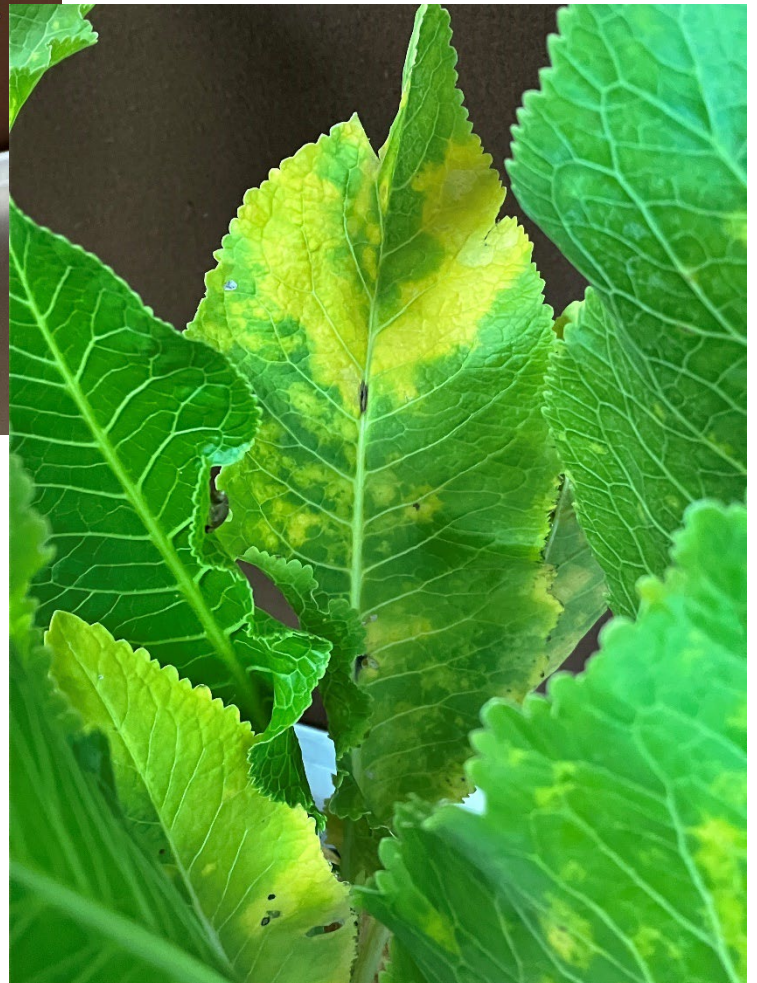
# *Armoracia rusticana*, Horseradish

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Astilbe arendsii*, False Spiraea

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Astilbe arendsii*, False Spiraea

**Virus Detected:**

cucumber mosaic virus (CMV)

tobacco rattle virus (TRV)

**Detection Method:**

Agdia CMV LFD and RT-PCR



## *Astilbe arendsii*, False Spiraea

**Virus Detected:**

cucumber mosaic virus (CMV)

tobacco streak virus (TSV)

**Detection Method:**

Agdia CMV LFD, RT-PCR, and sequencing



## *Astilbe arendsii*, False Spiraea

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Astilbe arendsii*, False Spiraea

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

Agdia TSV LFD



## *Astilbe chinensis*, False Spiraea

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Astilbe chinensis*, False Spiraea

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

Agdia TSV LFD



## *Astilbe chinensis*, False Spiraea

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

RT-PCR and sequencing



## *Astilbe japonica*, False Spiraea

**Virus Detected:**

undetermined ilarvirus

**Detection Method:**

RT-PCR



## *Astilbe japonica*, False Spiraea

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Astilbe japonica*, False Spiraea

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

Agdia TSV LFD



## *Astilbe* sp., False Spiraea

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Astilbe* sp., False Spiraea

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Astilbe* sp., False Spiraea

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

Agdia TSV LFD



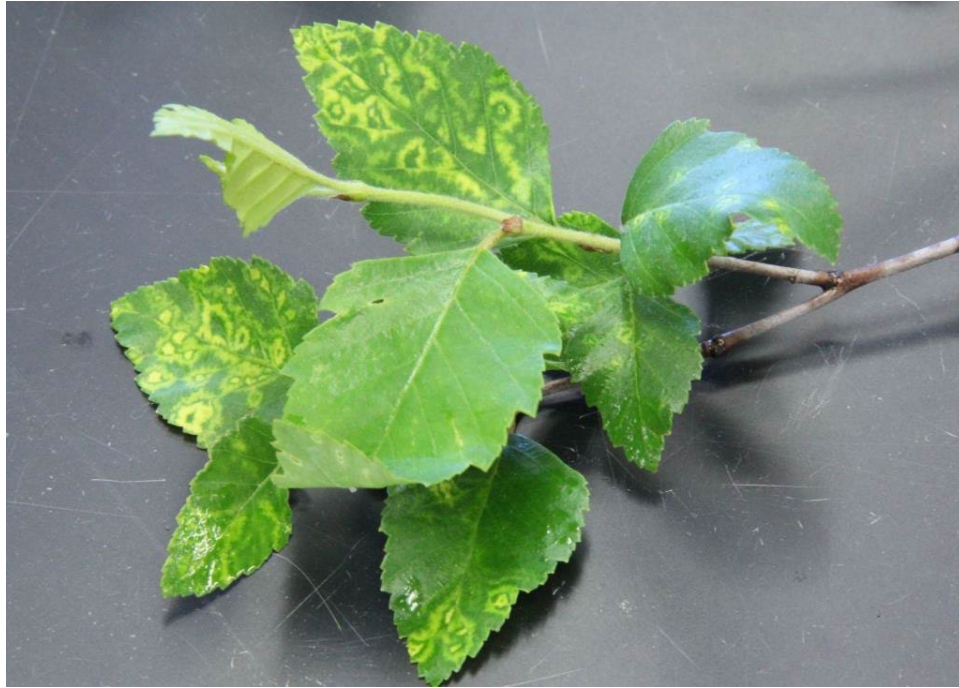
## *Betula nigra*, River Birch

**Virus Detected:**

undetermined ilarvirus

**Detection Method:**

RT-PCR



# *Begonia x hiemalis*, Tuberous Begonia, 'Non-Stop Rose Petticoat', 'Go-Go Rose Bicolor'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



Top Left: CMV infected 'Non-Stop Rose Petticoat'

Top Right: Healthy 'Non-Stop Apricot'

Bottom: CMV infected 'Go-Go Rose Bicolor'

## ***Begonia x hiemalis*, Tuberous Begonia**

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Begonia x hiemalis*, Tuberous Begonia

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



# *Belamcanda chinensis*, Blackberry Lily

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Bergenia* sp., Pig Squeak

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# ***Brugmansia insignis*, Angel's Trumpet, 'Charles Grimaldi'**

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TM LFD



## ***Buddleia davidii*, Butterfly Bush, 'Pink Delight'**

**Virus Detected:**

undetermined ilarvirus

**Detection Method:**

RT-PCR



## ***Calibrachoa* sp., Million Bells**

**Virus Detected:**

Suspected chili pepper mild mottle virus (CPMMoV)

**Detection Method:**

Agdia TMV LFD; CPMMoV is known to cross react with TMV LFD.



## *Calibrachoa* sp., Million Bells

**Virus Detected:**

Suspected chili pepper mild mottle virus (CPMMoV)

**Detection Method:**

Agdia TMV LFD; CPMMoV is known to cross react with TMV LFD.



## *Campanula* sp., Bellflower

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Canna indica*, Canna Lily, 'Orange Chocolate'

**Virus Detected:**

canna yellow mottle virus (CaYMV)

**Detection Method:**

RT-PCR



## ***Canna sp.*, Canna Lily, 'Banana Punch'**

**Virus Detected:**

Canna yellow streak virus (CaYSV)

**Detection Method:**

RT-PCR



## *Canna* sp., Canna Lily, 'Burning Ember'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## *Canna* sp., Canna Lily, 'Cannova Yellow'

**Virus Detected:**

canna yellow mottle virus (CaYMV)

**Detection Method:**

RT-PCR



## *Canna* sp., Canna Lily, 'City of Portland'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## ***Canna* sp., Canna Lily, 'Crimson Beauty'**

**Virus Detected:**

Canna yellow streak virus (CaYSV)

**Detection Method:**

RT-PCR



## *Canna sp.*, Canna Lily, 'Futurity'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## *Canna sp.*, Canna Lily, 'Red King Humbert'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## *Canna sp.*, Canna Lily, 'Tropicanna'

**Virus Detected:**

Canna yellow streak virus (CaYSV)

**Detection Method:**

RT-PCR



## *Capsicum annuum*, Pepper

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Celtis occidentalis*, Hackberry

**Disease Detected:**

hackberry island chlorosis

**Detection Method:**

Electron Microscopy conducted by University of Minnesota, Plant Disease Clinic



## *Chelone oblique*, Turtlehead

**Disease Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Clematis* sp., Clematis

**Virus Detected:**

clematis chlorotic mottle virus (CICMoV)

**Detection Method:**

RT-PCR



## *Clematis sp.*, Clematis

**Virus Detected:**

clematis chlorotic mottle virus (CICMoV)

**Detection Method:**

RT-PCR



## *Clematis sp.*, Clematis

**Virus Detected:**

clematis chlorotic mottle virus (CICMoV)

**Detection Method:**

RT-PCR and Electron Microscopy conducted by the University of Minnesota, Plant Disease Clinic



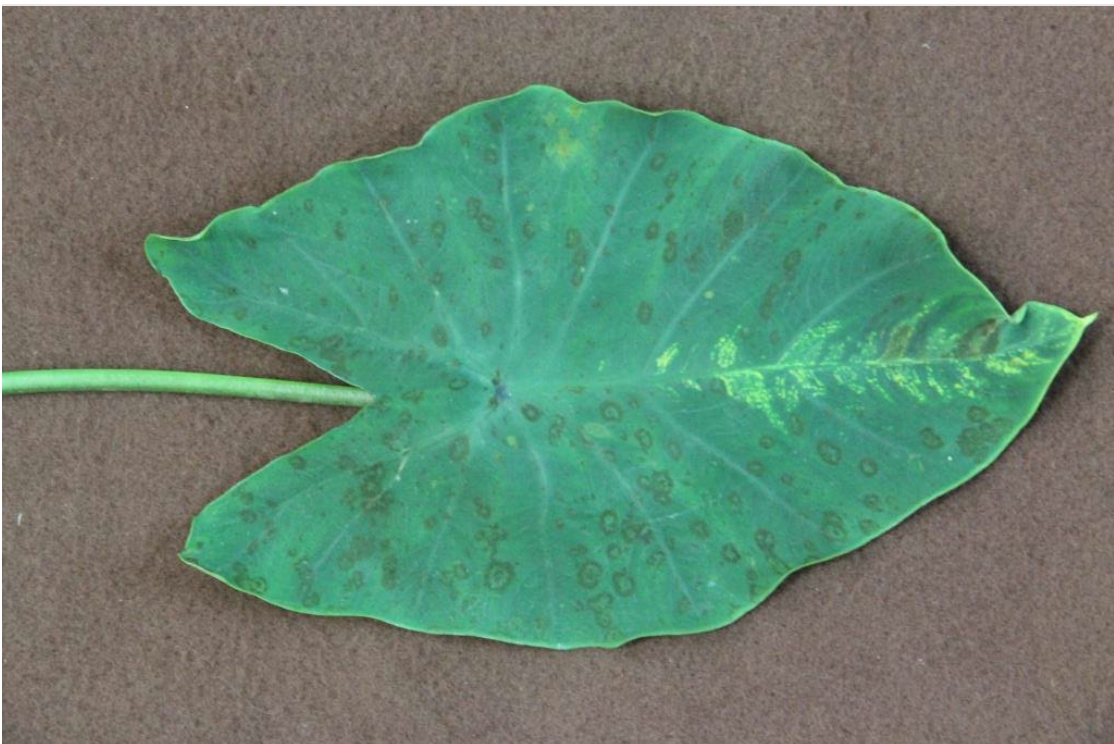
## *Colocasia sp.*, Elephant Ear

**Virus Detected:**

dasheen mosaic virus (DsMV)

**Detection Method:**

RT-PCR and sequencing



## *Coreopsis verticillata*, Coreopsis, 'Zagreb'

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Dahlia sp.*, Dahlia

**Virus Detected:**

dahlia mosaic virus (DMV)

**Detection Method:**

PCR



## *Dahlia sp.*, Dahlia

**Virus Detected:**

dahlia mosaic virus (DMV)

**Detection Method:**

PCR



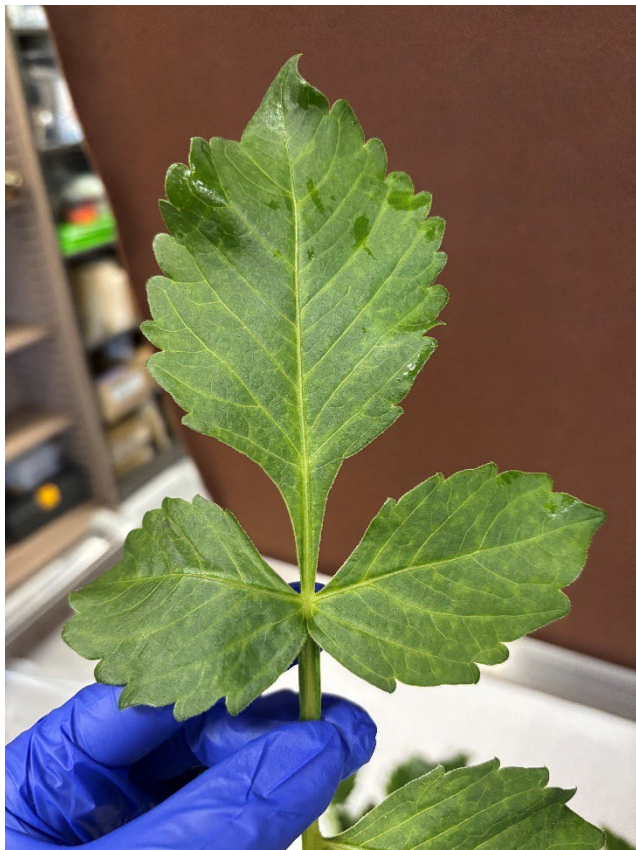
## *Dahlia sp.*, Dahlia

**Virus Detected:**

Tobacco streak virus (TSV)

**Detection Method:**

Agdia LFD



# *Dahlia sp.*, Dahlia

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Delphinium elatum*, Larkspur

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Delphinium elatum*, Larkspur, 'Black Knight'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Delphinium elatum*, Larkspur, 'Lilac Pink'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Delphinium elatum*, Larkspur, 'Magic Fountain'

**Virus Detected:**

potato virus S (PVS)

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR and sequencing for PSV conducted by USDA ARS

RT-PCR



## *Delphinium elatum*, Larkspur, 'Magic Fountain'

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Delphinium elatum.*, Larkspur, 'Magic Fountain Mix'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Dianthus sp.*, Carnation

**Virus Detected:**

impatiens necrotic spot virus (INSV) (INSV)

**Detection Method:**

Agdia INSV LFD



# ***Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart**

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart

**Virus Detected:**

cucumber mosaic virus (CMV)

tobacco rattle virus (TRV)

**Detection Method:**

Agdia CMV LFD

RT-PCR



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart, 'Gold Heart'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



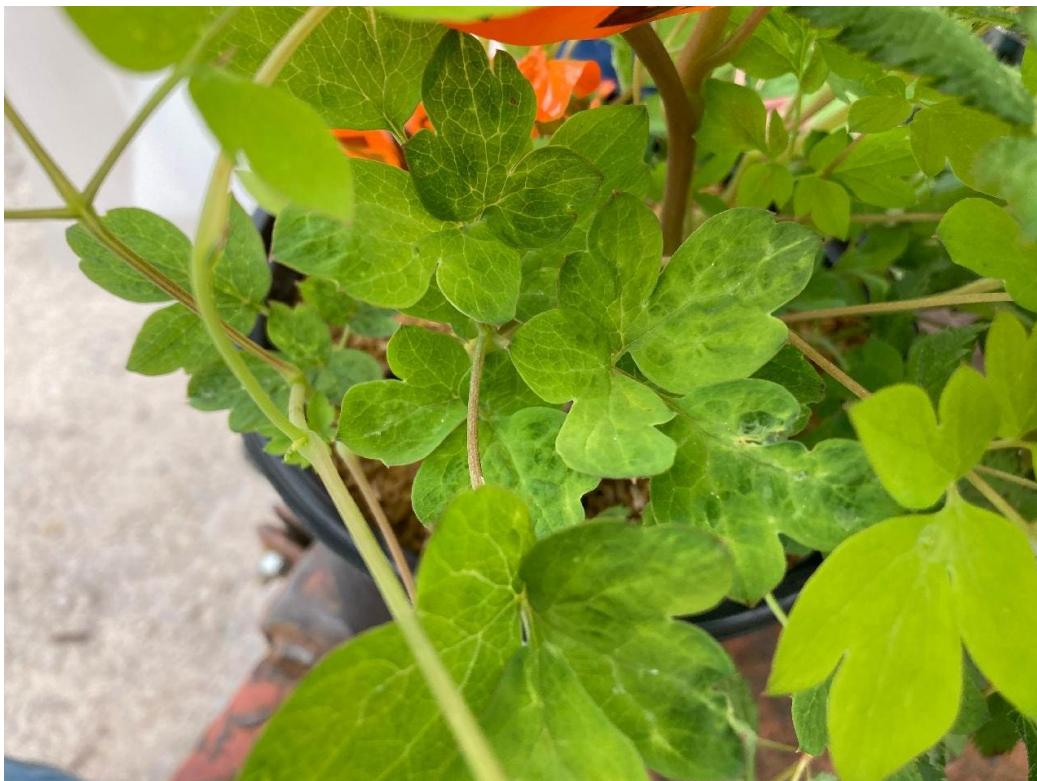
# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart, 'Gold Heart'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Dicentra spectabilis* (*Lamprocapnos spectabilis*), Bleeding Heart, 'Gold Leaf'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Digitalis x isoplexis*, Tender Foxglove

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Echinacea purpurea*, Purple Coneflower, 'Magnus'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Epimedium grandiflorum*, Barrenwort, 'Lilafee'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## ***Epimedium grandiflorum*, Barrenwort, 'Purple Pixie'**

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium x rubrum*, Barrenwort

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium sp.*, Barrenwort

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium* sp., Barrenwort, 'Amber Queen'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium sp.*, Barrenwort, 'Lilac Fairy'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium sp.*, Barrenwort, 'Rose Queen'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Epimedium x versicolor*, Barrenwort, 'Sulpureum'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Ficus carica*, Fig, 'Black Jack'

**Virus Detected:**

figwort mosaic virus (FMV)

**Detection Method:**

Electron microscopy and RT-PCR University of Minnesota, Plant Disease Clinic



## *Freesia refracta*, Freesia

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## ***Geranium sp.*, Cranesbill Geranium, 'Rozanne'**

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Gladiolus* sp., Gladiolus, 'Mona Lisa'

**Virus Detected:**

bean yellow mosaic virus (BYMV)

**Detection Method:**

RT-PCR and sequencing



## *Gladiolus* sp., Gladiolus

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Helleborus* sp., Hellebore, 'Royal Heritage Mix'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## ***Helenium autumnale*, Sneezeweed, 'Tie Dye'**

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD



## *Helenium sp.*, Sneezeweed, 'Chelsey'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Hemerocallis* sp., Day Lily

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



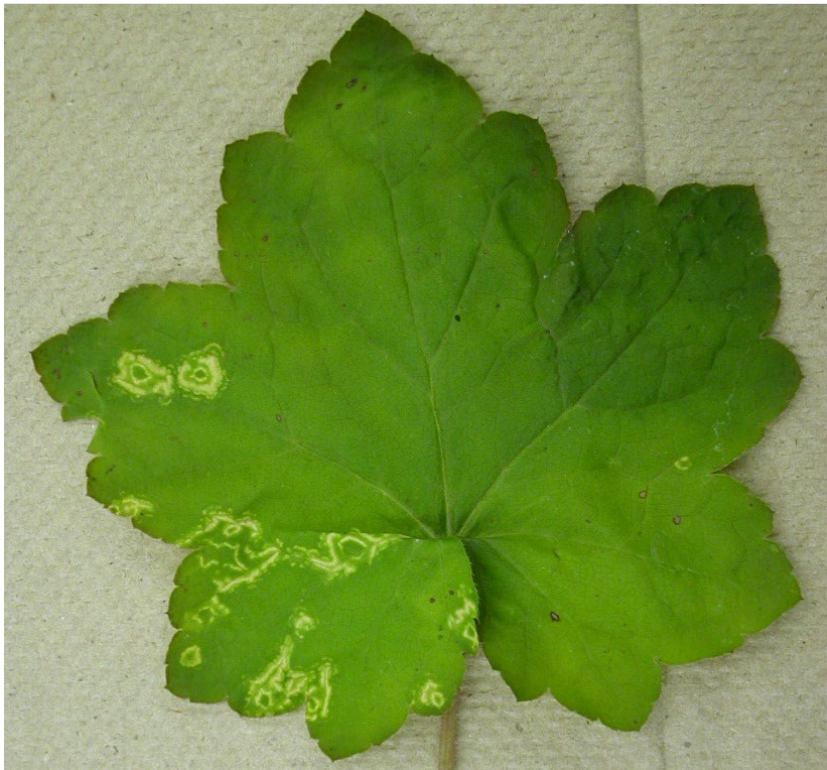
## *Heuchera* sp., Coral Bells

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Heuchera* sp., Coral Bells, 'Swirling Fantasy'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Hosta plantaginea*, Hosta

**Virus Detected:**

hosta virus X (HVX)

**Detection Method:**

Agdia HVX LFD



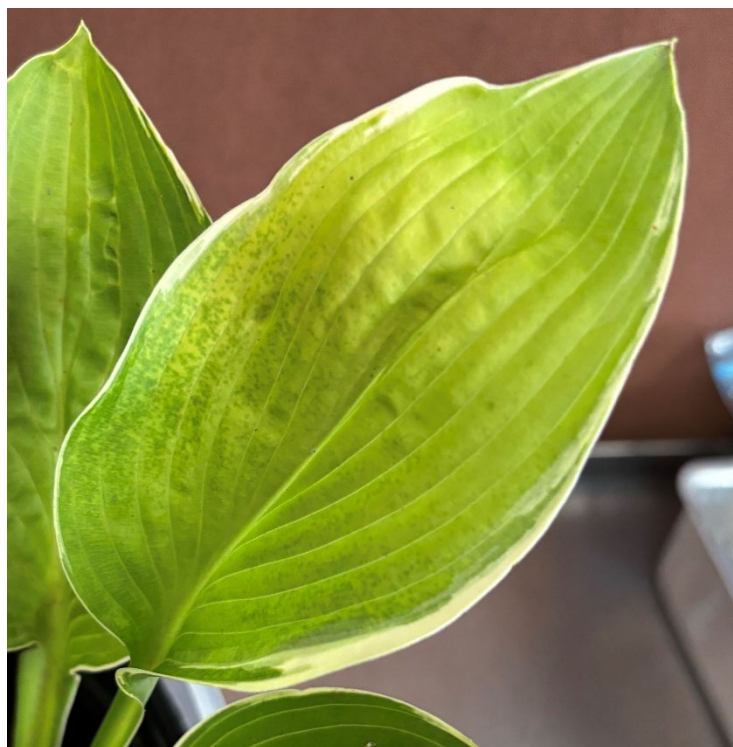
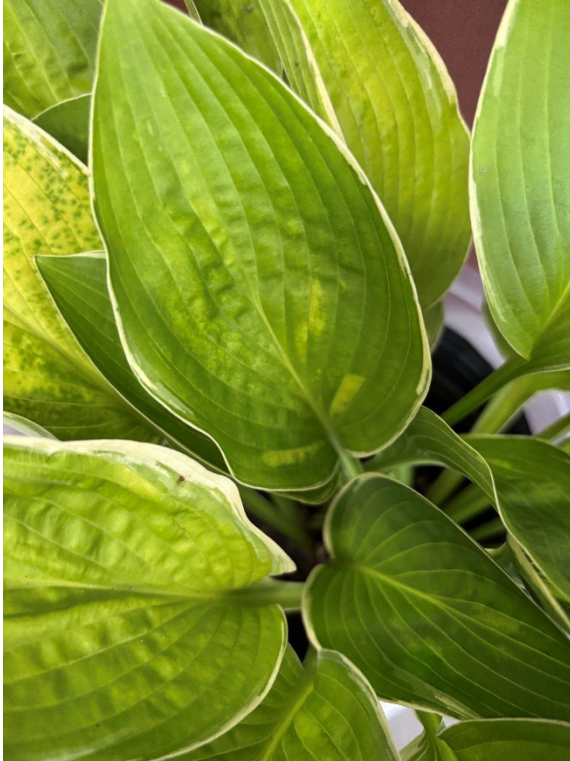
## *Hosta sp.*, Hosta

**Virus Detected:**

arabis mosaic virus (ArMV)

**Detection Method:**

Agdia ArMV LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

arabis mosaic virus (ArMV)

hosta virus X (HVX)

**Detection Method:**

Agdia ArMV LFD and Agdia HVX LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

hosta virus X (HVX)

**Detection Method:**

Agdia HVX LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

hosta virus X (HVX)

**Detection Method:**

Agdia HVX LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

hosta virus X (HVX)

**Detection Method:**

Agdia HVX LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

hosta virus X (HVX)

**Detection Method:**

Agdia HVX LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

hosta virus X (HVX)

tobacco rattle virus (TRV)

**Detection Method:**

Agdia HVX LFD and RT-PCR



# *Hosta sp.*, Hosta

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia POTY LFD, RT-PCR



## *Hosta sp.*, Hosta

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Hosta sp.*, Hosta

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



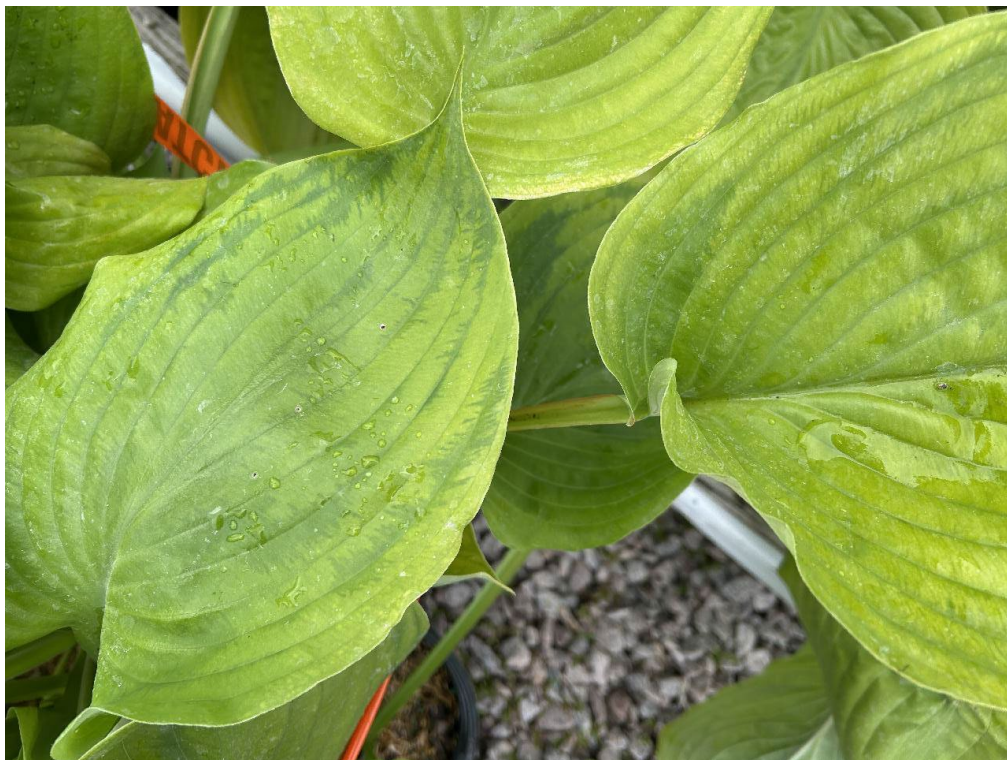
## *Hosta sp.*, Hosta

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Hosta sp.*, Hosta

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Hosta sp.*, Hosta

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Hoya carnosa*, Wax Plant

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



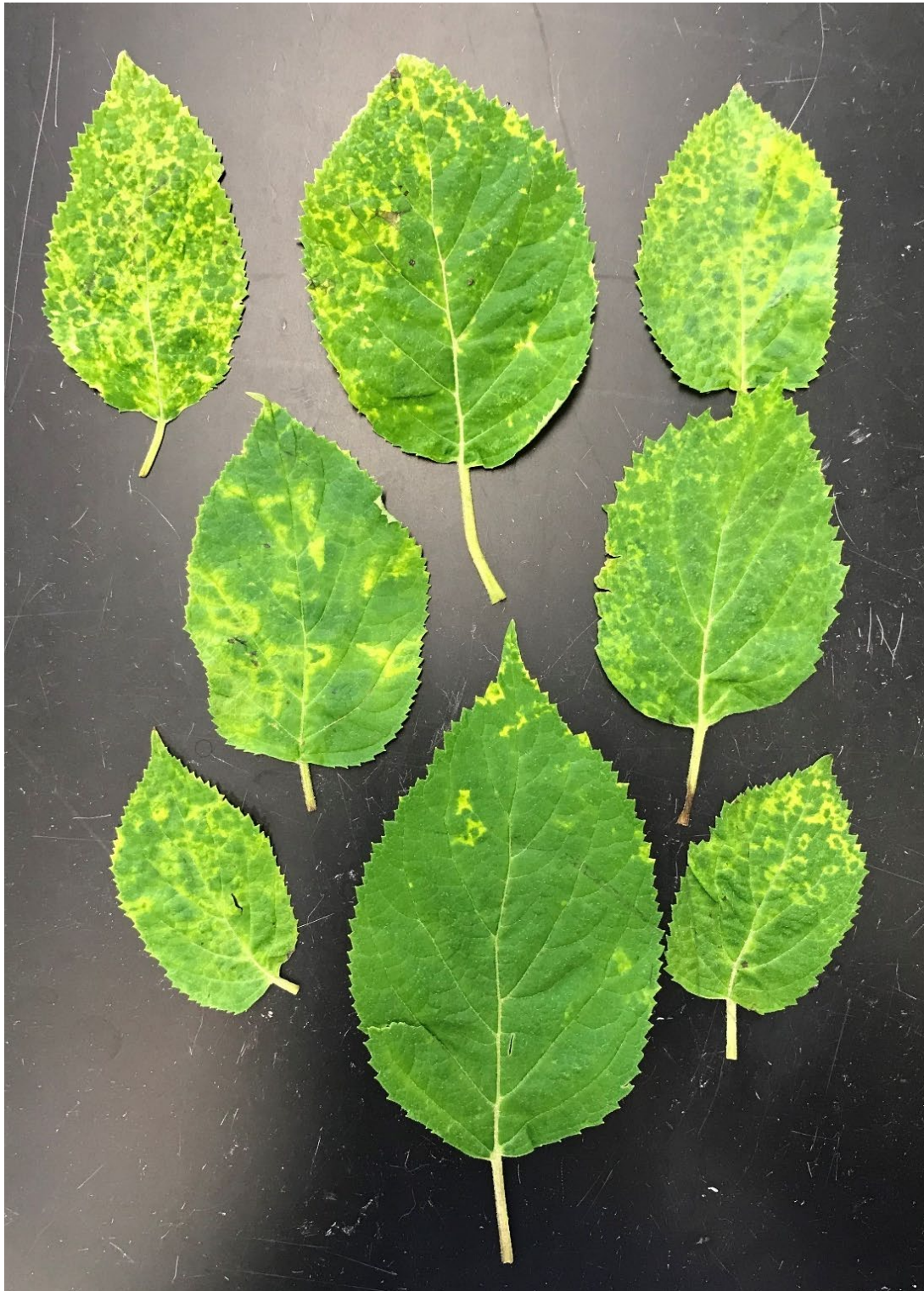
## *Hydrangea* sp., Hydrangea, 'Incrediball'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Iris ensata*, Japanese Iris, 'Mt. Fujiyama'

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Iris* sp., Dwarf German Iris

**Virus Detected:**

iris severe mosaic virus (ISMV)

**Detection Method:**

RT-PCR and sequencing



## *Iris* sp., Bearded Iris, 'Avalon Sunset'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Iris versicolor*, Northern Blue Flag Iris

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Lathyrus latifolius*, Sweet Pea, 'Pearl Mix'

**Virus Detected:**

undetermined Ilarvirus

**Detection Method:**

RT-PCR



## *Ligularia* sp., Leopard Plant

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Lilium sp.*, Oriental Lily

**Virus Detected:**

lily symptomless virus (LYLSV)

**Detection Method:**

ELISA conducted by Ohio Department of Agriculture



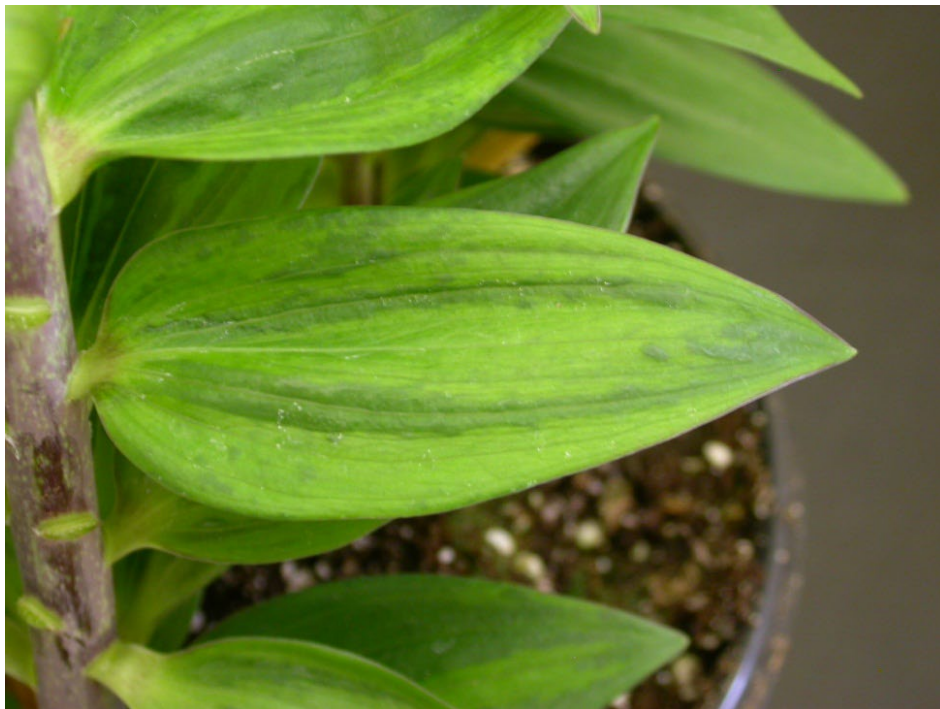
## *Lilium sp.*, Oriental Lily, 'Angelique'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Lilium sp.*, Lily, 'Scarlet Delight'

**Virus Detected:**

lily mottle virus (LMoV)

**Detection Method:**

RT-PCR and sequencing



## *Lilium sp.*, Oriental Lily, 'Sorbonne'

**Virus Detected:**

tomato ringspot virus (ToRSV)

**Detection Method:**

Agdia ToRSV LFD



## *Lobelia sp.*, Cardinal Flower

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



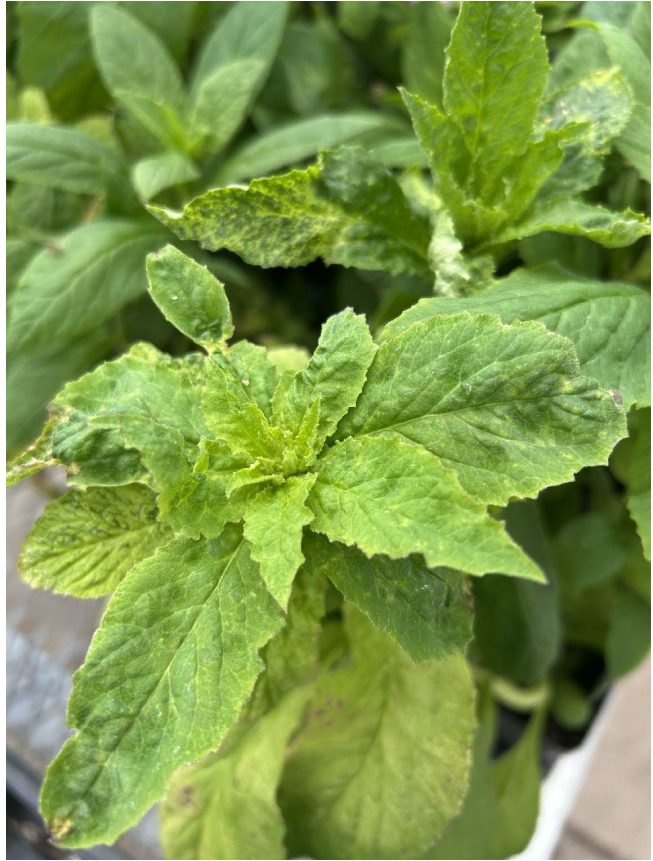
## *Lobelia sp.*, Cardinal Flower

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Lobelia sp.*, Cardinal Flower

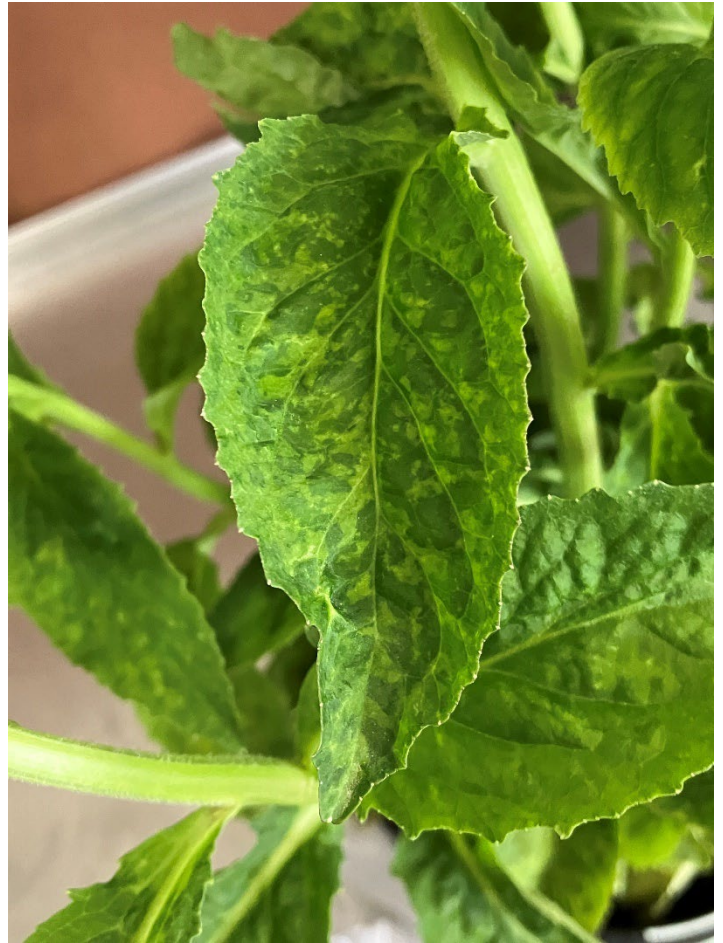
**V Virus Detected:**

cucumber mosaic virus (CMV)

tobacco rattle virus (TRV)

**Detection Method:**

Agdia CMV LFD, RT-PCR



## ***Lobelia sp.*, Cardinal Flower**

**Virus Detected:**

unknown virus, spherical virus particles present

**Detection Method:**

Electron Microscopy conducted by the University of Minnesota, Plant Disease Clinic



## ***Lobelia sp.*, Cardinal Flower, 'Ruby Slippers'**

### **Virus Detected:**

cucumber mosaic virus (CMV)

tobacco rattle virus (TRV)

turnip mosaic virus (TuMV)

### **Detection Method:**

Agdia CMV LFD, RT-PCR, and sequencing



## *Lupinus sp.*, Lupine

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Lupinus sp.*, Lupine, 'Minarette'

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## ***Lychnis x arkwrightii*, Maltese Cross, 'Orange Gnome'**

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Lychnis x arkwrightii*, Maltese Cross, 'Vesuvius'

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Lychnis chalconica*, Maltese Cross, 'Lipstick'

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Lysimachia sp.*, Creeping Jenny

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## *Mandevilla sp.*, Mandevilla

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Mandevilla* sp., Mandevilla, 'Sun Parasol'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia POTY LFD



## *Mertensia virginica*, Virginia Bluebells

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Oxalis regnellii*, Shamrock

**Virus Detected:**

shamrock chlorotic ringspot virus (SCRV)

beet ringspot virus (BRSV)

**Detection Method:**

Electron microscopy, RT-PCR, and sequencing conducted by the University of Minnesota, Plant Disease Clinic



# *Pachysandra terminalis*, Japanese Pachysandra, 'Green Carpet'

**Virus Detected:**

- alfalfa mosaic virus (AMV)
- undetermined filamentous virus

**Detection Method:**

Electron microscopy and RT-PCR conducted by the University of Minnesota, Plant Disease Clinic



## ***Pachysandra terminalis*, Japanese Pachysandra, 'Green Carpet'**

**Virus Detected:**

undetermined ilarvirus  
tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Paeonia lactiflora.*, Peony, 'Kansas'

**Virus Detected:**

cycas necrotic stunt virus (CNSV)

**Detection Method:**

RT-PCR



## *Paeonia* sp., Peony

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Paeonia* sp., Peony

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Paeonia sp.*, Peony, 'Happy Valley'

### Virus Detected:

cycas necrotic stunt virus (CNSV)

### Detection Method:

Electron Microscopy conducted by the University of Minnesota, Plant Disease Clinic

High Throughput Sequencing conducted by the University of Minnesota Plant Disease Clinic



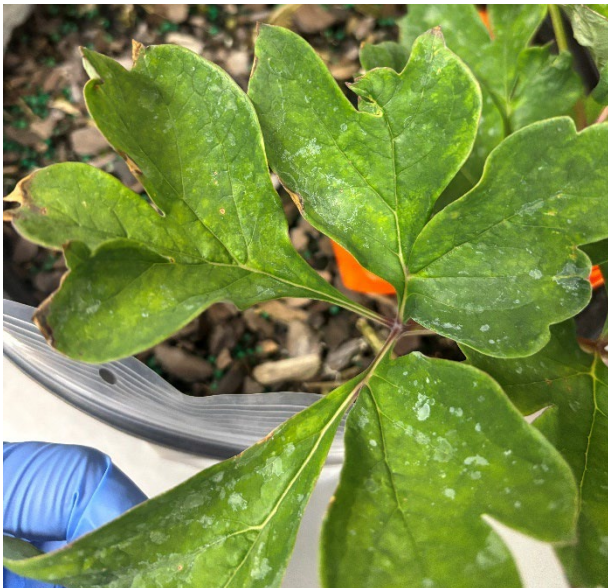
## *Paeonia* sp., Peony, 'Itoh Bartzella'

**Virus Detected:**

cycas necrotic stunt virus (CNSV)

**Detection Method:**

RT-PCR



## *Paeonia suffruticosa*, Peony, 'Momoyama'

### Virus Detected:

unknown virus – filamentous virus particles 500-600 nanometers present

### Detection Method:

Electron Microscopy conducted by the University of Minnesota, Plant Disease Clinic



# *Paeonia suffruticosa*, Peony, 'Wave Spectrum'

**Virus Detected:**

cycas necrotic stunt virus (CNSV)

**Detection Method:**

Electron Microscopy conducted by the University of Minnesota, Plant Disease Clinic



## *Penstemon* sp., Beardtongue

**Virus Detected:**

impatiens necrotic spot virus (INSV) (INSV)

**Detection Method:**

Agdia INSV LFD



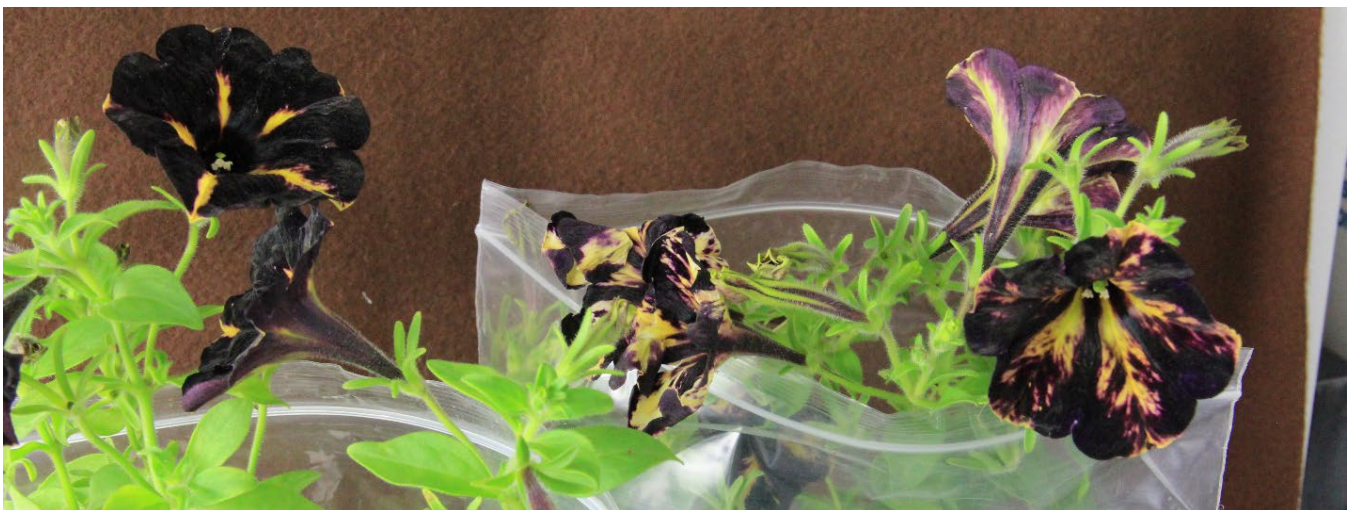
## *Petunia hybrid*, Petunia

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Petunia hybrid*, Petunia

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Petunia hybrid*, Petunia

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Phlox paniculata*, Garden Phlox

**Virus Detected:**

alfalfa mosaic virus (AMV)

**Detection Method:**

RT-PCR



## *Phlox sp.*, Phlox

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Phlox sp.*, Phlox

**Virus Detected:**

tobacco rattle virus (TRV)  
undetermined potyvirus

**Detection Method:**

RT-PCR, Agdia Poty LFD



## *Phlox* sp., Phlox, 'Flame Blue'

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Phlox sp.*, Phlox, 'Orange-Red'

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD



## *Phlox sp.*, Phlox, 'Pink Lady'

**Virus Detected:**

cucumber mosaic virus (CMV)

tobacco rattle virus (TRV)

**Detection Method:**

Agdia CMV LFD and RT-PCR



## *Polemonium caeruleum*, Jacob's Ladder

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



## *Portulaca oleracea*, Yellow Moss Rose

**Virus Detected:**

papaya mosaic virus (PapMV)

**Detection Method:**

ELISA conducted by Agdia, Inc.



## *Pulmonaria* sp., Lungwort

**Virus Detected:**

alfalfa mosaic virus (AMV)

**Detection Method:**

Agdia LFD



## *Rheum rhabarbarum*, Rhubarb

**Virus Detected:**

tobacco streak virus (TSV)

**Detection Method:**

RT-PCR and Sequencing



## *Rosa sp.*, Rose

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

RT-PCR



## ***Rudbeckia fulgida*, Black-Eyed Susan, 'Little Goldstar'**

**Virus Detected:**

undetermined ilarvirus

**Detection Method:**

RT-PCR



## *Ruella simplex*, Britton's Wild Petunia

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



# *Sambucus sp.*, Elderberry

**Virus Detected:**

elderberry virus C  
elderberry virus D

**Detection Method:**

RT-PCR conducted by University of Missouri, Plant Diagnostic Clinic



## *Sambucus sp.*, Elderberry, 'Yellow Leaf'

**Virus Detected:**

unknown virus – filamentous and spherical virus particles present

**Detection Method:**

Electron microscopy conducted by University of Minnesota, Plant Disease Clinic



## *Scabiosa* sp., Pincushion Flower

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Sedum* sp., Stonecrop

**Virus Detected:**

cucumber mosaic virus (CMV)

**Detection Method:**

Agdia CMV LFD



## *Sedum* sp., Stonecrop

**Virus Detected:**

tobacco mosaic virus (TMV)

**Detection Method:**

Agdia TMV LFD



## *Sedum* sp., Stonecrop

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Sedum* sp., Stonecrop

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD, RT-PCR



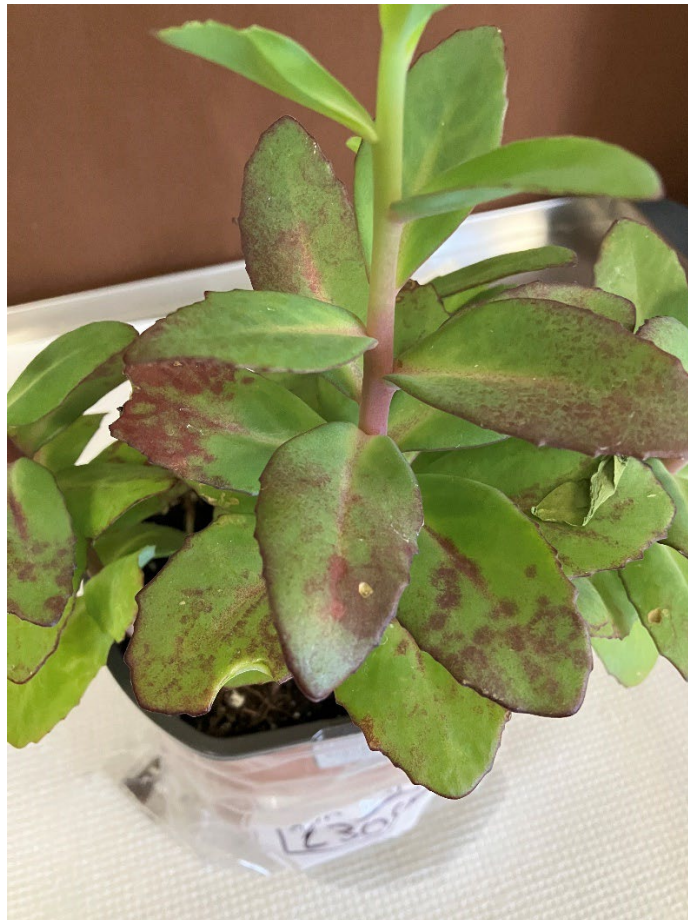
## *Sedum* sp., Stonecrop

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD, RT-PCR



## *Sedum* sp., Stonecrop, 'Matrona'

**Virus Detected:**

kalanchoe mosaic virus (KMV)

arabis mosaic virus (ArMV)

**Detection Method:**

RT-PCR and sequencing, Agdia ArMV LFD



## *Sidalcea* sp., Prairie Mallow

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD



## *Spiraea japonica*, Spiraea

### Virus Detected:

spirea yellow leafspot virus (SYLSV)  
spirea leafspot spherical virus (SLSSV)

### Detection Method:

Electron microscopy conducted by University of Minnesota, Plant Disease Clinic



## *Stokesia laevis*, Stoke's Aster, 'Honeysong Purple'

**Virus Detected:**

impatiens necrotic spot virus (INSV)

**Detection Method:**

Agdia INSV LFD



# *Stylophorum diphyllum*, Celandine Poppy

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Stylophorum diphyllum*, Celandine Poppy

**Virus Detected:**

tobacco rattle virus (TRV)

undetermined ilarvirus

**Detection Method:**

RT-PCR



## *Syringa vulgaris*, Lilac

**Virus Detected:**

lilac leaf chlorosis virus (LLCV)

**Detection Method:**

RT-PCR conducted by Dimitre Mollov USDA – ARS



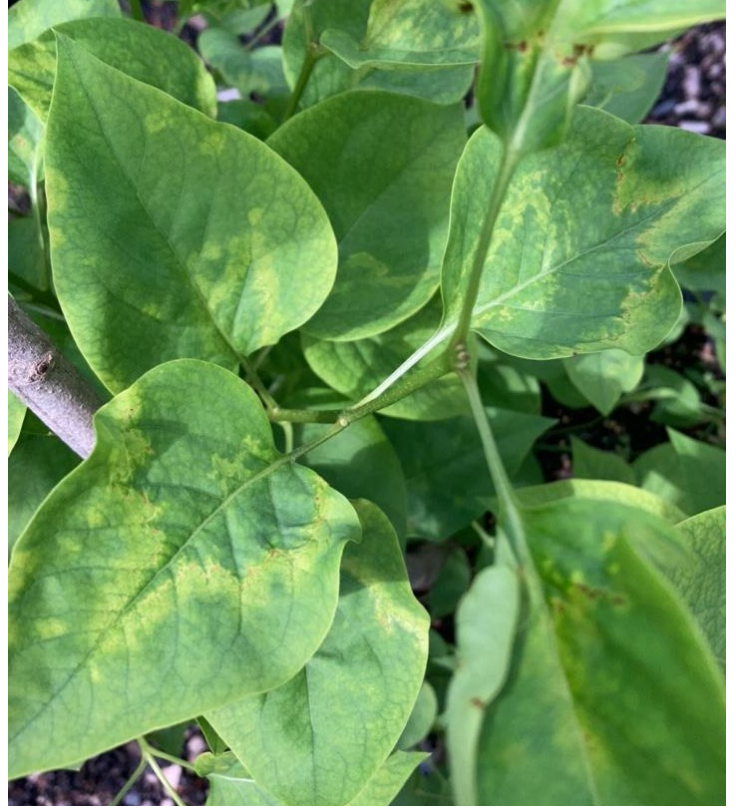
# *Syringa vulgaris*, Lilac

**Virus Detected:**

lilac leaf chlorosis virus (LLCV)

**Detection Method:**

RT-PCR



## *Syringa vulgaris*, Lilac

**Virus Detected:**

lilac leaf chlorosis virus (LLCV)

**Detection Method:**

RT-PCR



## *Thermopsis* sp., Carolina Lupine

**Virus Detected:**

clover yellow vein virus (CIYVV)

**Detection Method:**

RT-PCR and sequencing



# *Tradescantia* sp., Spiderwort

**Virus Detected:**  
tobacco rattle virus (TRV)  
**Detection Method:**  
RT-PCR



## *Tradescantia* sp., Spiderwort, 'Concord Grape'

**Virus Detected:**

turnip mosaic virus (TuMV)

**Detection Method:**

RT-PCR and sequencing



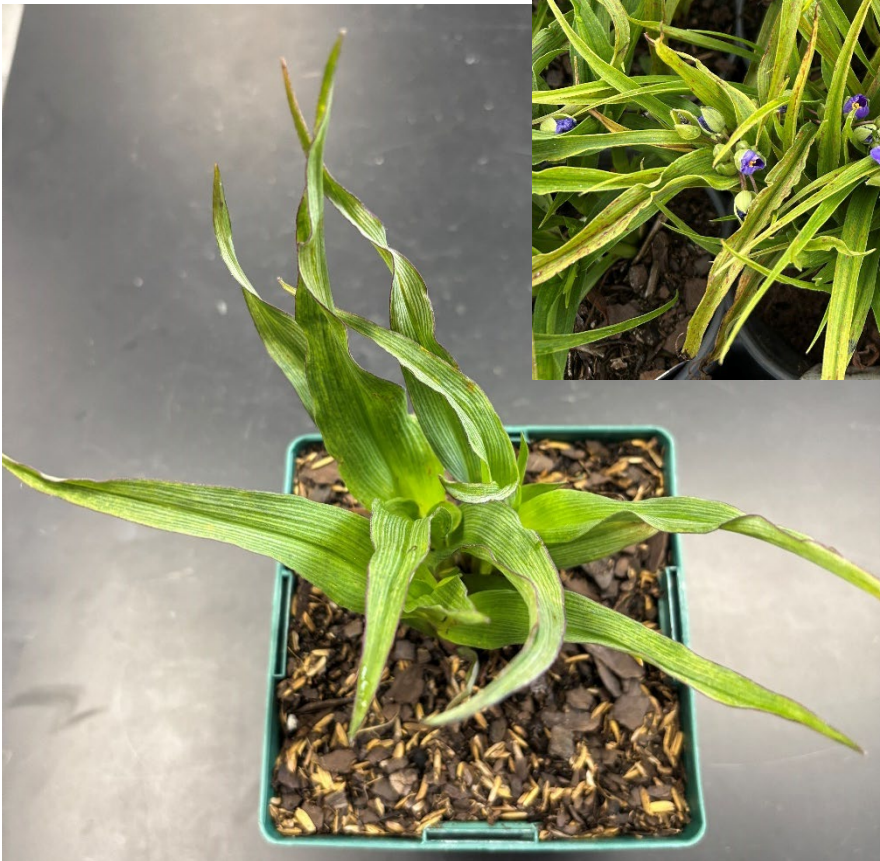
# *Tradescantia* sp., Spiderwort, 'Zwanenburg Blue'

**Virus Detected:**

- tobacco rattle virus (TRV)
- tradescantia mild mosaic virus (TraMMV)

**Detection Method:**

RT-PCR and sanger sequencing conducted at USDA Plant Pathogen Confirmatory Diagnostics Laboratory



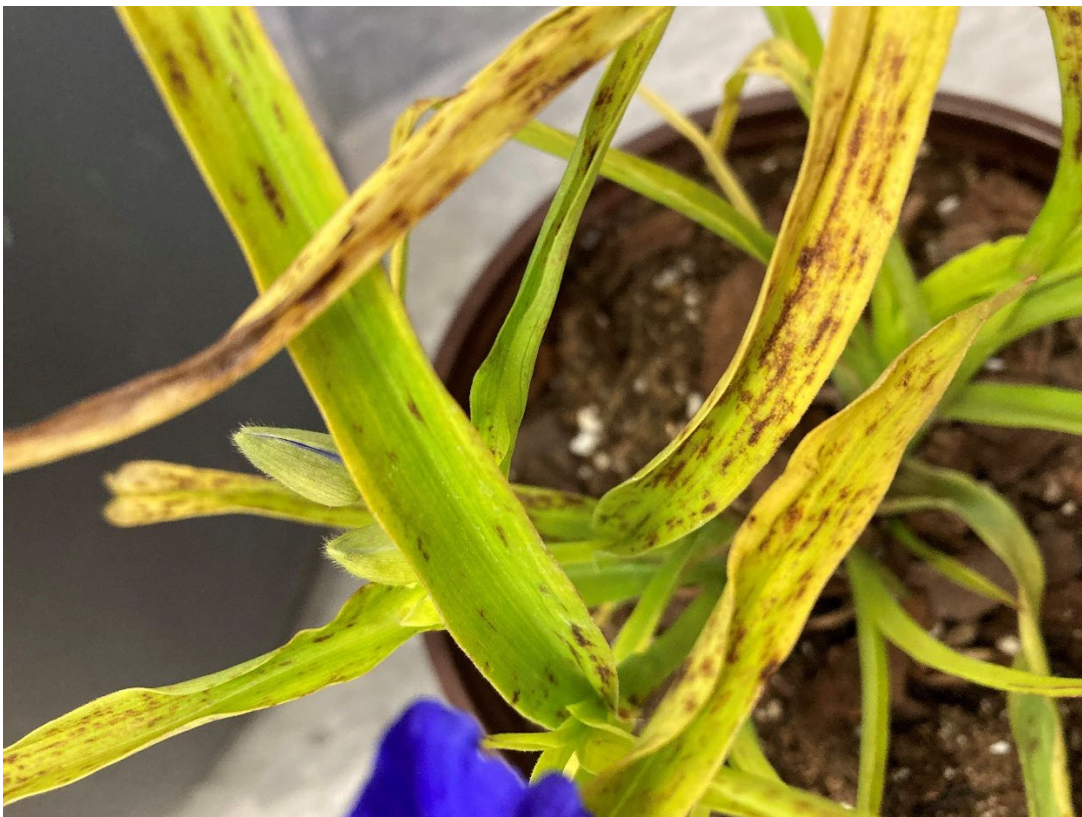
## *Tradescantia* sp., Spiderwort,

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD



## *Veronica* sp., Speedwell, 'Icicle'

**Virus Detected:**

tobacco rattle virus (TRV)

**Detection Method:**

RT-PCR



## *Viburnum dentatum*, Arrowwood

**Virus Detected:**

alfalfa mosaic virus (AMV)

**Detection Method:**

RT-PCR



## *Wisteria macrostachya*, Wisteria, 'Aunt Dee'

**Virus Detected:**

wisteria vein mosaic virus (WVMV)

**Detection Method:**

RT-PCR and sequencing



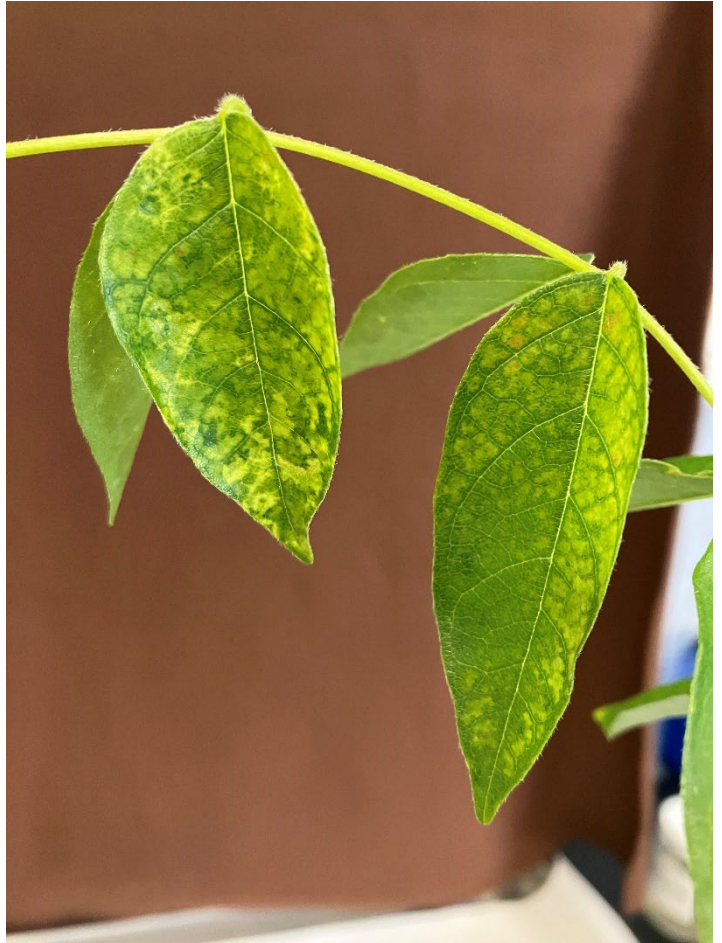
## *Wisteria sp.*, Wisteria

**Virus Detected:**

undetermined potyvirus

**Detection Method:**

Agdia Poty LFD



## *Wisteria* sp., Wisteria

**Virus Detected:**

wisteria vein mosaic virus (WVMV)

**Detection Method:**

RT-PCR and sequencing



## *Zinnia* sp., Zinnia, 'Uptown Sunstruck'

**Virus Detected:**

tomato spotted wilt virus (TSWV)

**Detection Method:**

Agdia TSWV LFD



## Detection Method by Virus

Below is a list of the tests and sources used for all the viruses mentioned in the *Gallery*.

### aconitum latent virus (AcLV)

Electron microscopy conducted at University of Minnesota, Plant Disease Clinic

### alternanthera mosaic virus (AltMV)

ELISA conducted at Agdia, Inc.

### alfalfa mosaic virus (AMV)

LFD, Agdia, Inc.

RT-PCR, Martínez-Priego, Ll., Córdoba, M. C., & Jordá, C. (2004). First report of alfalfa mosaic virus in *lavandula officinalis*. *Plant Disease*, 88(8), 908–908. <https://doi.org/10.1094/pdis.2004.88.8.908c>

### arabis mosaic virus (ArMV)

LFD, Agdia, Inc

### beet ringspot virus (BRSV)

Electron microscopy, RT-PCR, and sequencing conducted at University of Minnesota Plant Disease Clinic

### bean yellow mosaic virus (BYMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

### canna yellow mottle virus (CaYMV)

RT-PCR, Pappu, H. R., Druffel, K. B., & Eastwell, K. C. (2008). Canna yellow mottle virus in canna spp. in Washington State. *Plant Disease*, 92(7), 1136–1136. <https://doi.org/10.1094/pdis-92-7-1136c>

### canna yellow streak virus (CaYSV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

### chili pepper mild mottle virus (CPMMoV)

TMV LFD, Agdia, Inc. Tobacco mosaic virus Agdia LFD known to cross react with CPMMoV.

### clematis chlorotic mottle virus (CICMoV)

RT-PCR and Electron microscopy conducted at University of Minnesota, Plant Disease Clinic

### clover yellow vein virus (CIYVV)

RT-PCR and sequencing Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

### cucumber mosaic virus (CMV)

LFD, Agdia, Inc.

RT-PCR, De Blas, C., Borja, M. J., Saiz, M., & Romero, J. (1994). Broad spectrum detection of cucumber mosaic virus (CMV) using the polymerase chain reaction. *Journal of Phytopathology*, 141(3), 323–329. <https://doi.org/10.1111/j.1439-0434.1994.tb01476.x>

### cycas necrotic stunt virus (CNSV)

RT-PCR, Vlasava, N.B., Michener, D.C., Kharytonchyk, S., & Cortés-Ortiz, L. (2024). Co-Infection of Tobacco Rattle and Cycas Necrotic Stunt Viruses in *Paeonia lactiflora*: Detection Strategies, Potential Origins of Infection, and Implications for *Paeonia* Germplasm Conservation. *Viruses*, 16(6), 893. <https://doi.org/10.3390/v16060893>  
Electron microscopy conducted at University of Minnesota, Plant Disease Clinic  
High Throughput Sequencing conducted at University of Minnesota, Plant Disease Clinic

dahlia mosaic virus (DMV)

PCR, Nicolaisen, M. (2003). Partial molecular characterization of dahlia mosaic virus and its detection by PCR. *Plant Disease*, 87(8), 945–948. <https://doi.org/10.1094/pdis.2003.87.8.945>

dasheen mosaic virus (DsMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

elderberry virus C

RT-PCR conducted at University of Missouri Plant Diagnostic Clinic

elderberry virus D

RT-PCR conducted at University of Missouri Plant Diagnostic Clinic

figwort mosaic virus (FMV)

RT-PCR, Elbeaino, T., Digiario, M., Alabdullah, A., De Stradis, A., Minafra, A., Mielke, N., Castellano, M. A., & Martelli, G. P. (2009). A multipartite single-stranded negative-sense RNA virus is the putative agent of Fig Mosaic Disease. *Journal of General Virology*, 90(5), 1281–1288. <https://doi.org/10.1099/vir.0.008649-0>

hosta virus X (HVX)

LFD, Agdia, Inc.

ilarvirus group

RT-PCR and Sequencing, Untiveros, M., Perez-Egusquiza, Z., & Clover, G. (2010). PCR assays for the detection of members of the genus ilarvirus and family Bromoviridae. *Journal of Virological Methods*, 165(1), 97–104. <https://doi.org/10.1016/j.jviromet.2010.01.011>

impatiens necrotic spot virus (INSV) (INSV)

LFD, Agdia, Inc.

iris severe mosaic virus (ISMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

kalanchoe mosaic virus (KMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

lilac leaf chlorosis virus (LLCV)

RT-PCR, James, D., Varga, A., Leippi, L., Godkin, S., & Masters, C. (2010). Sequence Analysis of RNA 2 and RNA 3 of lilac leaf chlorosis virus: A putative new member of the genus ilarvirus. *Archives of Virology*, 155(6), 993–998. <https://doi.org/10.1007/s00705-010-0673-5>

lily mottle virus (LMOV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

lily symptomless virus (LYLSV)

ELISA conducted at Ohio Department of Agriculture.

papaya mosaic virus (PapMV)

ELISA conducted at Agdia, Inc.

potato virus S (PVS)

RT-PCR and sequencing conducted by USDA – ARS.

potyvirus group

LFD, Agdia, Inc.

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

shamrock chlorotic ringspot virus (SCRV)

Electron microscopy, RT-PCR and sequencing conducted by University of Minnesota, Plant Disease Clinic

spiraea leafspot spherical virus (SLSSV)

Electron microscopy conducted by University of Minnesota, Plant Disease Clinic

spiraea yellow leafspot virus (SYLSV)

Electron microscopy conducted by University of Minnesota, Plant Disease Clinic

tobacco mosaic virus (TMV)

LFD, Agdia, Inc.

tobacco rattle virus (TRV)

RT-PCR, Robinson, D. J. (1992). Detection of tobacco rattle virus by reverse transcription and polymerase chain reaction. *Journal of Virological Methods*, 40(1), 57–66. [https://doi.org/10.1016/0166-0934\(92\)90007-z](https://doi.org/10.1016/0166-0934(92)90007-z)

tobacco streak virus (TSV)

RT-PCR and Sequencing, Untiveros, M., Perez-Egusquiza, Z., & Clover, G. (2010). PCR assays for the detection of members of the genus ilarvirus and family Bromoviridae. *Journal of Virological Methods*, 165(1), 97–104. <https://doi.org/10.1016/j.jviromet.2010.01.011>

tomato spotted wilt virus (TSWV)

LFD, Agdia, Inc

tomato ringspot virus (ToRSV)

LFD, Agdia, Inc

tradescantia mild mosaic virus (TraMMV)

RT-PCR and sanger sequencing at the USDA Plant Pathogen Confirmatory Diagnostics Laboratory

turnip mosaic virus (TuMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

wisteria vein mosaic virus (WVMV)

RT-PCR and sequencing, Zheng, L., Rodoni, B. C., Gibbs, M. J., & Gibbs, A. J. (2010). A novel pair of universal primers for the detection of Potyviruses. *Plant Pathology*, 59(2), 211–220. <https://doi.org/10.1111/j.1365-3059.2009.02201.x>

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