

Wisconsin Department of Agriculture, Trade and Consumer Protection

# *Plant Industry Laboratory*

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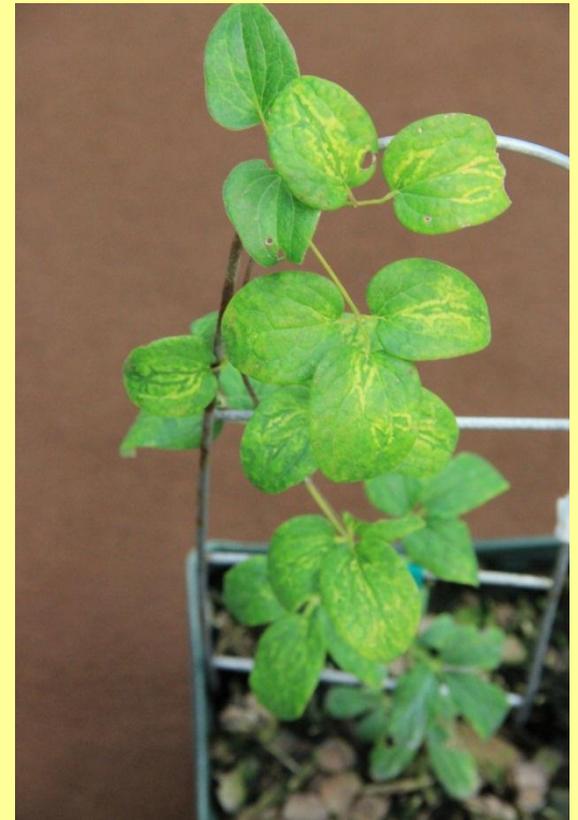
Plant Industry Laboratory (**PIB LAB**) tests a wide range of crops and soils. PIB lab provides official diagnostic services to DATCP programs:

- Pest Survey (corn, beans, soy, potatoes)
- Phytosanitary Certification
- **Nursery (ornamentals, perennials, greenhouse annuals)**
- Christmas tree (conifers)
- Environmental enforcement (drift issues into gardens, fields, vineyards)

# *Plant Industry Laboratory*

## Survey of Viruses in Imported and Domestically Produced Ornamentals

- Collaborative Survey by Midwest Dept. of Ag. (OH, MI, MN, WI, MO) and University of MN Plant Disease Clinic.
- Screen for & intercept virus infected plants, to reduce the risk of introducing pathogens of regulatory and economic significance to nursery industry and agriculture.
- Share image collection of plant symptoms, to raise awareness and educate growers.
- Funded by 2011 and 2012 Farm Bill.



# *Plant Industry Laboratory*

## Plant Viruses

- Plant viruses can cause diseases that affect the quality and viability of annuals and perennials.
- Viruses on ornamentals can spread to other agricultural crops, such as potatoes, tomatoes, cucurbits, grapes, other vegetables and wild plants.
- Plant viruses can be transmitted in plant sap on cutting tools.
- Viruses are spread by propagating infected mother stock.
- Viruses can be transmitted by aphids, thrips, white flies and nematodes.
- Weeds can serve as a reservoir for viruses.

# *Plant Industry Laboratory*

## Laboratory Methods

- Immunostrip tests (Agdia Inc.)  
ArMV, HVX, CMV, INSV, TMV, TSWV.
- RT-PCR (gene based detection)  
AMV, FMV, Potyvirus group, TRV.
- Sequencing (gene based detection)  
(Functional Biosciences, Inc.).
- Electron Microscopy and PCR  
(UM Disease Clinic).



Photos by David Brabender

# Plant Industry Laboratory

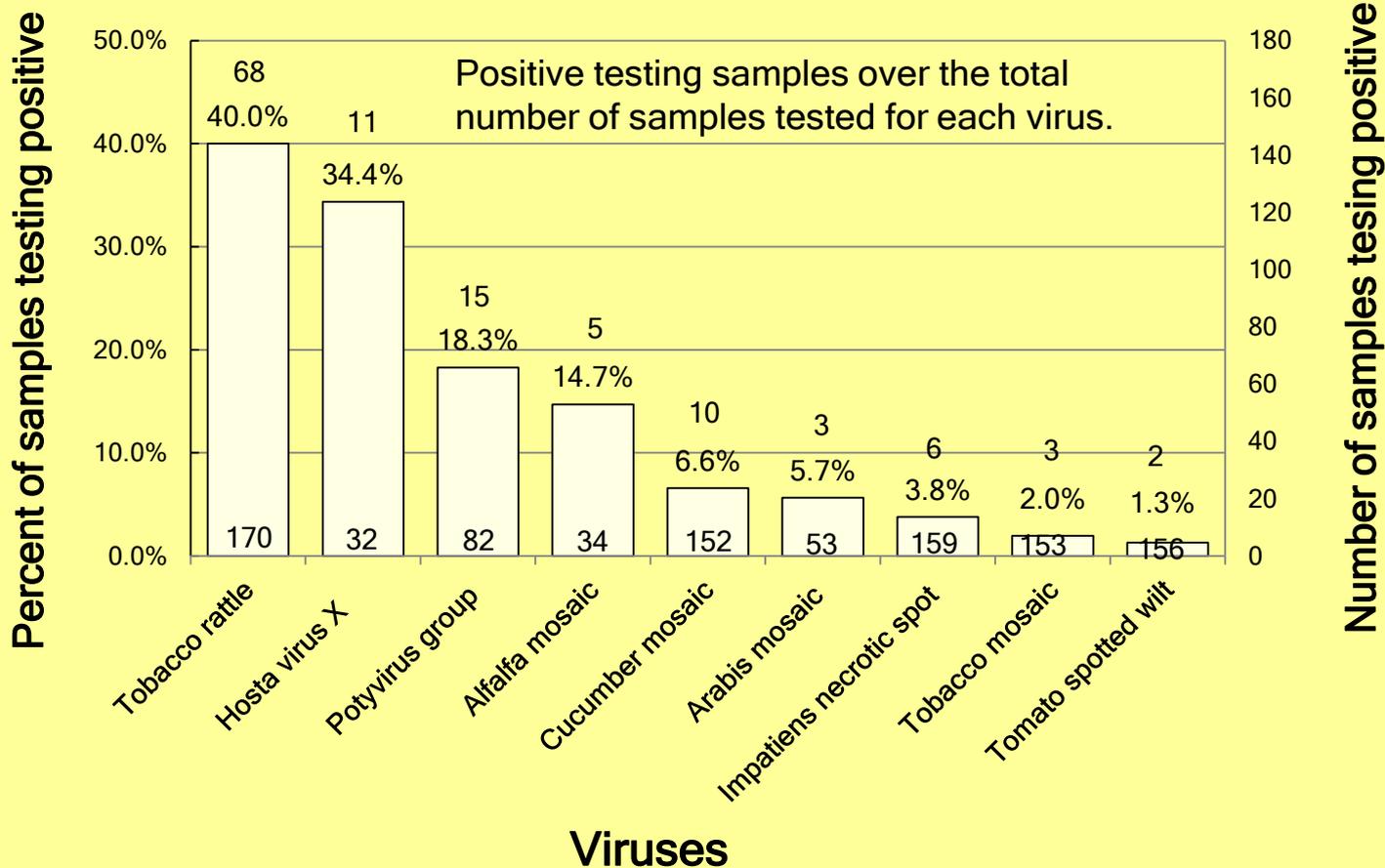
## 2013 Viruses of Ornamentals Survey Results

- 216 Ornamental samples screened for 9 plus plant viruses.
- 53 host plant genera (annuals, perennials).
- Inspectors sampled 53 greenhouses, 6 nurseries & retailers.
- 60% of samples tested positive for at least 1 virus.
- 40% of samples tested positive for TRV.
- Several “unkown” viruses detected.
- Images published on two websites:  
DATCP website [pestsurvey.wi.gov](http://pestsurvey.wi.gov)  
Bugwood.org [ipmimages.org](http://ipmimages.org)



# Plant Industry Laboratory

## 2013 Viruses of Ornamentals Survey



Wisconsin Department of Agriculture, Trade and Consumer Protection

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Viruses in Imported and Domestically Produced Ornamentals

Images of symptoms are published on University of Georgia  
Bugwood website <http://www.ipmimages.org>





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Advanced Search

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- [Vegetables](#)
- [Fruits and Nuts](#)
- [Ornamentals](#)
- [Other Crops](#)
- [Taxonomy](#)
- [Damage Types](#)

**Narrow Results by:**  
**Subject Specific Filters:**

Category:  
[Virus and Bacteria \(9\)](#)

[Foliage Diseases \(2\)](#)

Order:

[Unassigned single stranded positive-sense RNA viruses \(11\)](#)

[Picornavirales \(2\)](#)

[Unassigned single stranded negative-sense RNA viruses \(2\)](#)

[Unassigned single stranded DNA viruses \(1\)](#)

[Unknown \(1\)](#)

**Image Specific Filters:**

Descriptor:

[Symptoms \(133\)](#)

[Survey \(1\)](#)

Commodity:

**VIRUSES IN IMPORTED AND DOMESTICALLY PRODUCED ORNAMENTALS**



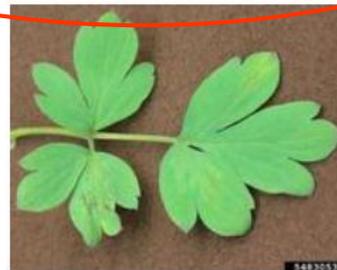
"Viruses in Imported and Domestically Produced Ornamentals" is a collaborative survey by Midwest Departments of Agriculture and the University of Minnesota to screen for and intercept virus infected herbaceous annuals and perennials. We diagnose and document virus diseases, their associated hosts and take images of plant symptoms to educate growers and consumers. By reducing the rate of viral infections of imported plant materials, we hope to reduce the risk of introducing pathogens of regulatory and economic significance to the Nursery industry and Agriculture. The project was funded through the 2011 and 2012 appropriations of the 2008 Farm Bill Section 10201.

134 Images of 17 Subjects [View Subject List](#) [View Image Descriptions](#) [View Thumbnails](#)

134 Images Page: 1/3 Display: 60



**5483065**  
Undescribed Tombusvirus  
*Tombusvirus (Undescribed)*  
Symptoms  
Anette Pihbbe



**5483053**  
Tobacco Rattle Virus  
*Tobravirus TRV*



**5483054**  
Tobacco Rattle Virus  
*Tobravirus TRV*  
Symptoms  
Anette Pihbbe



search  
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- Agronomic Crops
- Vegetables
- Fruits and Nuts
- Ornamentals
- Other Crops
- Taxonomy
- Damage Types



Tobacco Rattle Virus  
*Tobravirus TRV*

Click shows all images with TRV

Host: *hosta* (*Hosta sp. var. blue angel*)  
Descriptor: Symptoms  
Image type: Laboratory  
Image location: DATCP, , United States

Photographer Information

Name: Anette Phibbs  
Organization: DATCP  
Country: United States

More Images:

Image Number: 5483046



Light Box<sup>(?)</sup>

For Batch Downloading, Requesting Commercial Use, Creating Presentations, and Creating Image Collections

PowerPoint - 768x512

Small Print - 1536x1024

Large Print - 3072x2048

Need help with choosing a size?



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**Image Citation:**<sup>(?)</sup> Anette Phibbs, DATCP, Bugwood.org

**Node Affiliation:** Bugwood - UGA

Available Images Resolutions:

# Plant Industry Laboratory

Tobacco rattle virus (TRV)

## Plant Hosts Genera infected with TRV PIB Lab Results 2008 - 2013

Alcea	Hosta
Anemone	Oriental Liliium
Aquilegia	Lobelia
Armoracia	Mertensia
Astilbe	Pachysandra
Bergenia	<b>Paeonia (47%)</b>
Brunnera	Petunia
Clematis	<b>Phlox (40%)</b>
<b>Delphinium (75%)</b>	Ruellia
<b>Dicentra (95%)</b>	Scabiosa
<b>Epimedium</b>	



Paeonia

# *Plant Industry Laboratory*

## Tobacco rattle virus (TRV)

### **Vectors**

Stubby-Root

Nematodes

Paratrichodorus

Trichodorus

### **Transmission**

Mechanical inoculation;

transmitted by grafting;

transmitted by seed

not by contact between plants;

### **Many Hosts:**

Ornamentals, vegetables  
and weeds

(tulips, narcissus, beets,  
spinach, peppers, potato)



# *Plant Industry Laboratory*

Cucumber mosaic virus (CMV)

## **Plant Hosts Genera infected with CMV PIB Lab Test Results 2008 - 2013**

Aconitum

Ajuga

Astilbe

Begonia

Campanula

Dicentra

Delphinium

Echinacea

Epimedium

Helenium

Lobelia

Mandevilla

Phlox

Sedum



# *Plant Industry Laboratory*

## Cucumber mosaic virus (CMV)

### **Vectors**

60 plus different insects,  
pea aphid, peach aphid,  
cowpea aphid.

### **Transmission**

Mechanical inoculation;  
transmitted by seed

### **Many Hosts**

Ornamentals,  
vegetables, weeds.



Aconitum



Begonia

# *Plant Industry Laboratory*

## **Potyvirus**

### **Plant Hosts Genera infected with Potyviruses PIB Lab Test Results 2008 - 2013**

<b>Host Plant</b>	<b>Potyvirus Species</b>
Canna	Canna yellow streak virus
Iris	Iris severe mosaic virus
Lilium	Lily mottle virus
Lobelia	Turnip mosaic virus
Phlox	unknown potyvirus
Sedum	unknown potyvirus



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## **Tospoviruses**

### **Plant Hosts Genera infected with Tospoviruses PIB Lab Test Results 2008 - 2013**

#### **Impatiens Necrotic Spot Virus (INSV)**

Agastache

Begonia

Lobelia

Lychnis

Penstemon

Polemonium

Verbena

#### **Tomato Spotted Wilt Virus (TSWV)**

Alstroemeria

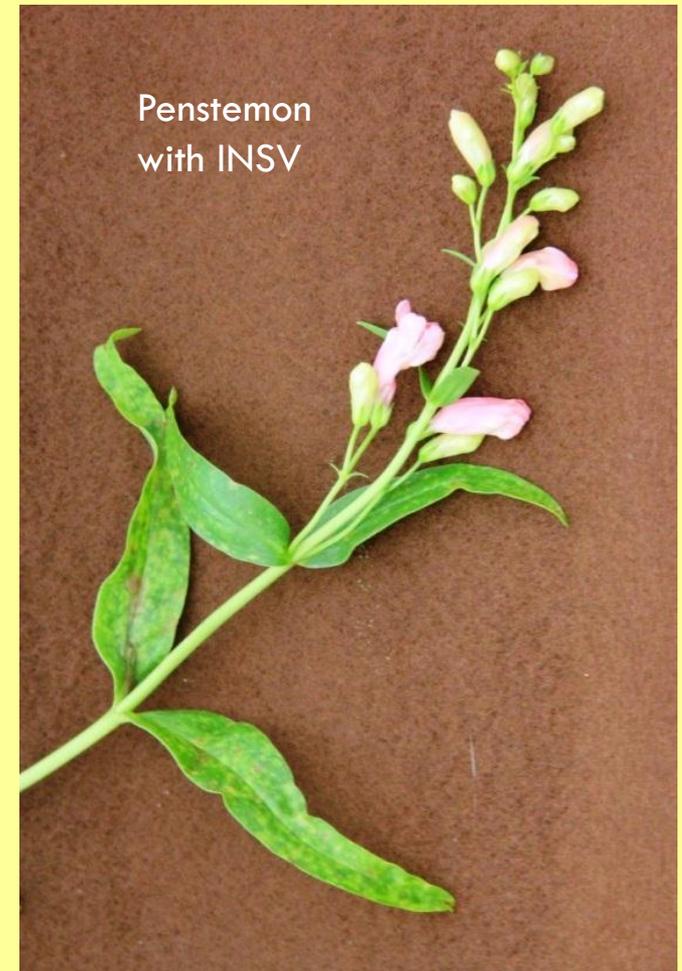
Belamcanda

Hosta

Ligularia

Lupinus

Zinnia



# *Plant Industry Laboratory*

## **Tospoviruses**

### **Vectors**

Thrips

### **Transmission**

Mechanical inoculation;  
transmitted by grafting;  
transmitted by seed  
not by contact between plants

### **Many Hosts:**

Greenhouse annuals, perennials,  
vegetables and weeds



Agastache with INSV



Zinnia with TSWV

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## Best Management Practices

- Start with clean stock.
- Screen for virus symptoms.
- Control insect vectors (aphids, thrips, white flies) and weeds.
- Cull out suspect plants.
- Practice good sanitation.
- Web links to Best Management Practices.

<http://extension.umass.edu/floriculture/sites/floriculture/files/manual/f/GreenhouseBMPfb.pdf>

[http://ohioline.osu.edu/hyg-fact/3000/pdf/PP401\\_05.pdf](http://ohioline.osu.edu/hyg-fact/3000/pdf/PP401_05.pdf)

<http://extension.psu.edu/pests/plant-diseases/all-fact-sheets/impatiens-necrotic-spot-virus>

# *Plant Industry Laboratory*

## Resources

- Contact DATCP Nursery Inspector.  
for testing at PIB lab.
- County Extension Agents.
- UW-Madison Diagnostic Clinic.
- Send samples directly to Agdia Inc.



# *Plant Industry Laboratory*

## **Thank you to Nursery Growers**

and to DATCP inspectors:

Brooke Sanneh, Sara Ott,  
Konnie Jerabek, Christel Zillmer,  
Lenny Weiss, Marcia Wensing,  
Liz Meils, Greg Helmbrecht,  
Ellen Hermanson, Adrian Barta,  
Kevin Meyer,  
and Susan Lueloff at PIB LAB.

## **Funding provided by:**

2011 and 2012 appropriations of the 2008 Farm Bill Section 10201, DATCP.

