

## TSWV & INSV DIAGNOSTIC GUIDE

Tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV) are two closely related viruses in the genus Orthotospovirus, vectored by several thrips species including Western Flower Thrips (*Frankliniella occidentalis*). Symptoms of TSWV and INSV can vary tremendously and include chlorotic or necrotic spotting, ring spotting, stunting, mosaic, mottling and necrotic leaf veins or stem lesions. Some plants may readily express symptoms while others remain latent, or symptomless, but still infectious. TSWV and INSV affect a wide range of species, but the following are photos of symptoms on key floriculture and vegetable crops. ***A list of susceptible genera is provided at the end of this document with links to specific diagnostic resources, where available.***

### Begonia (*Begonia sp.*)



Mottling from TSWV in begonia. (Photo credit: Ball Seed Company)

### New Guinea (*Impatiens hawkerii*) & Interspecific Impatiens (*Impatiens × hybrida*)



Chlorosis, necrotic spots, and leaf distortion from TSWV in interspecific impatiens. (Photo Credit: Nick Flax)

### Bedding Impatiens (*Impatiens walleriana*)



Necrotic ring spotting from TSWV on impatiens. (Photo Credit: Ball Helix Plant Disease Diagnostic Lab)



Necrotic ring spotting from INSV on impatiens. (Photo Credit: Robert Wick, University of Massachusetts, Bugwood.org)

**Coleus (*Coleus scutellarioides*)**



**Necrotic ring spotting from INSV on coleus.** (Photo Credit: Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org)



**Necrotic ring spotting from INSV on coleus.** (Photo Credit: Josh Henry)

**Garden Mum (*Chrysanthemum morifolium*)**



**Chlorotic spotting and ring spots from TSWV on chrysanthemum.** (Photo Credit: Ball Helix Plant Disease Diagnostic Lab)



**Distortion and ring spots from TSWV on chrysanthemum.** (Photo Credit: Ball Helix Plant Disease Diagnostic Lab)

**Tomato (*Solanum lycopersicum*)**

Both TSWV and INSV can affect tomatoes, causing symptoms on foliage, stems and fruit.



**Necrotic spotting from TSWV on tomato.** (Photo Credit: Ball Helix Plant Disease Diagnostic Lab)



**Necrotic spotting from TSWV on tomato.** (Photo credit: Ball Seed Company)



## Pepper (*Capsicum annuum*)

Both TSWV and INSV can affect peppers, causing symptoms on foliage, stems and fruit.



Ring spots from TSWV on pepper. (Photo credit: Elizabeth Bush, Virginia Polytechnic Institute and State University, Bugwood.org)



Ring spots from TSWV on pepper. (Photo credit: Metin GULESCI, Leaf Tobacco, Bugwood.org)

## Virus Testing

Always test plants displaying symptoms that resemble TSWV or INSV before you discard plant material.

- Lab-based testing is always the most accurate. When possible, consult your local diagnostic lab.
- ImmunoStrip test kits are a good in-house testing method for these viruses. See more info on proper [On-Site Pathogen Testing HERE](#).

**Table 1.** List of common greenhouse crops susceptible to TSWV and INSV.

Anemone	<a href="#">Echinacea (Coneflower)</a>	<a href="#">Pericallis</a>
<a href="#">Aster</a>	Fuchsia	Plectranthus
Aquilegia (Columbine)	Gardenia	<a href="#">Ranunculus</a>
<a href="#">Begonia</a>	<a href="#">Gerbera</a>	Saintpaulia (African Violet)
Browallia	<a href="#">Impatiens</a>	Schizanthus
Calceolaria	<a href="#">Justicia (Shrimp Plant)</a>	Schlumbergera (Holiday Cactus)
Campanula	<a href="#">Kalanchoe</a>	<a href="#">Sempervivum (Hens and Chicks)</a>
Capsicum (Pepper)	Lactuca (Lettuce)	<a href="#">Solanum (Tomato)</a>
<a href="#">Catharanthus (Vinca)</a>	Lantana	Streptocarpus
Chrysanthemum	<a href="#">Lobelia</a>	<a href="#">Stephanotis</a>
Clerodendrum	<a href="#">Lupinus (Lupine)</a>	<a href="#">Tagetes (Marigold)</a>
<a href="#">Coleus</a>	Mimulus	<a href="#">Torenia</a>
Dahlia	<a href="#">Nemesia</a>	<a href="#">Xerochrysum (Bracteantha)</a>
<a href="#">Daphne</a>	<a href="#">Osteospermum</a>	<a href="#">Zantedeschia</a>
Diascia	<a href="#">Pelargonium (Geranium)</a>	Zinnia
Dieffenbachia	<a href="#">Penstemon</a>	

### Additional References.

e-GRO. 2023. TSWV and INSV on annual bedding plants. <https://e-gro.org/pdf/2023-12-20.pdf>

e-GRO. 2015. A Pictorial Guide to Common Symptoms of INSV in Greenhouse Crops. [https://e-gro.org/pdf/2015\\_429.pdf](https://e-gro.org/pdf/2015_429.pdf)

e-GRO. 2014. Tips for Diagnosing Impatiens Necrotic Spot Virus (INSV). <https://www.e-gro.org/pdf/353.pdf>

UMASS. Western Flower Thrips, Management and Tospoviruses. <https://ag.umass.edu/greenhouse-floriculture/factsheets/western-flower-thrips-management-tospoviruses>