

TSWV & INSV MANAGEMENT

Tomato Spotted Wilt Virus (TSWV) and Impatiens Necrotic Spot Virus (INSV) are diseases in the Orthotospovirus (formerly Tospovirus) family and can affect hundreds of genera and species of plants. Unlike Tobamoviruses (ex. Tobacco Mosaic Virus), TSWV & INSV are only transmitted by thrips—neither are known to spread via human touch or tools, and are unlikely to transfer between plants via sap.

The keys to effective TSWV/INSV prevention are:

1. Source unrooted cuttings and young plant material from trusted suppliers,
2. Break green bridges to eliminate potential virus reservoirs in and around your greenhouses, and
3. Implement a strong thrips prevention and cleanup program to reduce spread if either disease is detected.

Scouting & Symptom Identification

Early symptoms of TSWV/INSV can be difficult to identify and can be confused with pest damage or mineral nutrient disorders, depending on the crop.

- Symptoms can include general chlorosis, mottling, stunting, distortion, ring-spotting and necrotic lesions on foliage often result as disease progresses.
- Symptoms often manifest on the newest growth. Thrips feeding damage on older growth preceding these symptoms on newer growth is a good indicator of possible disease. See our [TSWV/INSV Diagnostic Guide](#) for examples of disease symptoms and information on virus testing.

Disease Cycle

In addition to a susceptible host, TSWV and INSV require two things to proliferate in your greenhouse: 1) An infected host/virus reservoir, and 2) a vector (thrips). Minimize both factors to lower your risk of an outbreak or carryover to subsequent crops/growing seasons.

- Thrips larvae must ingest virus particles and pupate into adults with the virus in their gut before they can transmit it to another plant. *Adult thrips that did not acquire TSWV/INSV as larvae cannot spread these viruses to healthy plants after feeding upon an infected plant.*
- As such, TSWV/INSV enter your greenhouse via adult thrips from the field with virus particles already in their gut **OR** on infected unrooted cuttings or young plants.
- Many species of weeds in the landscape can harbor TSWV or INSV. Chickweed (*Stellaria media*), Lambsquarter (*Chenopodium album*), and Purslane (*Portulaca oleracea*) are just a few examples.
- Thrips pupate in soil under benches and in growing media, and adult thrips can shelter in cracks, crevices, and plant debris for extended periods. If insecticide coverage is not thorough, virus-carrying pupae and adults that evade sprays may emerge and infect new, healthy crops.
- Growers who encounter TSWV/INSV year after year often have “survivors” with virus in their gut from previous infestations/seasons or infected weeds around the perimeter of their greenhouses.



Fig 1. Tomato spotted wilt virus (TSWV) and Impatiens Necrotic Spot Virus (INSV; above on Zinnia spp.) symptoms can vary across genera. Lobelia spp. are very sensitive to these viruses and express symptoms under low viral loads, but some infected crops may not display symptoms at all. Minimize the risk of a TSWV outbreak by reducing the number of potential virus reservoirs in your greenhouse like weeds, crops from previous seasons, and personal “pet” plants, and control weeds and grasses growing around the perimeter of your greenhouse(s). (Photo Credit: Shannon Carmody)

Management

Effective TSWV/INSV management starts with prevention. Begin each season with a clean growing area that is free of pests, weeds, and organic matter/plant debris. Source young plant inputs from trusted suppliers and implement controls to keep thrips populations low. If a disease outbreak occurs:

1. **Remove symptomatic plants.** Disease cannot be treated curatively, so any plants that test positive for TSWV/INSV should be disposed of ASAP. Bag plants in place and seal bags to contain virus-carrying thrips and prevent them from jumping off as you move material through the greenhouse.
2. **Suppress thrips ASAP.** Suppression of virus-carrying thrips must be your top priority. Break the life cycle, target multiple life stages simultaneously, and ensure thorough coverage is achieved. Increase weed management efforts to eliminate thrips safe-havens—particularly around doors and vents.
3. **Scout rigorously & rogue-out suspicious plants.** Ensure all plant material from previous season/crop cycles is removed from your greenhouses before spring production begins. Clean and sanitize benches and floors thoroughly—particularly if you have dirt or gravel floors.

TSWV/INSV Vector (Thrips) Control Measures

While this document does not provide comprehensive thrips management guidance, the table below contains effective options to control thrips. Keep in mind:

- Not all pesticides are equally effective across different species of thrips. Select the best control option based on the types of thrips found in your crops to maximize control.
- Biocontrol agents (BCAs) are most effective when deployed preventatively and may not knock-down a thrips population quickly. If your IPM program is BCA-centered, use of pesticides may be needed.

Pesticide and BCA Control Options for Thrips

Active Ingredient	Available In (Trade Name)		Life Stage Affected			IRAC Code	Site Activity ¹	App. Method ²
	US	Canada	Egg	Immature	Adult			
abamectin	Avid	Avid		x		6	C,T	SP
sulfoxafor + spinetoram	XXpire	N/A ³		x	x	4C+5	T,S	SP
chlorfenapyr	Pylon	Pylon		x	x	13	C,T	SP
tolfenpyrad	Hachi-Hachi	N/A		x	x	21A	C,I	SP
cyantraniliprole	Mainspring	N/A		x	x	28	T,S	SP, DR
cyfaniliprole	Sarisa	Harvanta		x	x	28	C,I	SP
cyfaniliprole + flonicamid	Pradia	Beleaf (flonicamid only)		x	x	28 + 29	C,I,T,S	SP
<i>Beauveria bassiana</i>	BotaniGard	BotaniGard		x	x	UNF	C	SP
pyridalyl	Overture	N/A		x	x	UN	C,I	SP

Effective BCAs for Preventative Thrips Control

<i>Amblyseius andersoni</i>				x		N/A	P	---
<i>Amblyseius swirskii</i>	<-- Available in both US and Canada; trade names vary by supplier			x		N/A	P	---
<i>Neoseiulus cucumeris</i>				x		N/A	P	---
<i>Orius insidiosus</i>				x	x	N/A	P	---
<i>Steinernema feltiae</i>				x		N/A	PA	---

¹Site Activity: C = contact, I = ingestion, R = residual, T = translaminar, S = systemic, P = predator, PA = parasitoid

²App Method: SP = spray, DR = drench; ³N/A – Not available in Canada or a.i. is registered but not labeled for greenhouse use

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