THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXTENSION SERVICE
SP370A

Impatiens Necrotic Spot Virus
A Serious Pathogen of Floral Crops

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Impatiens necrotic spot virus (INSV) is quickly becoming one of the most important viral pathogens of floral crops in Tennessee and the United States. INSV has historically been a problem in Mexico, and the western and southwestern parts of the U.S. and Hawaii. During the mid-1980s, INSV has spread rapidly in the Gulf Coast states from Texas to Florida, and north into Tennessee and Kentucky. Although the reasons as to why the virus spread so rapidly are unknown, it may be related to the migration of the thrips from infested regions into new areas and movement of infected plant material between greenhouses.

Hosts of INSV

More than 300 plant species from 50 plant families are susceptible to INSV. A partial listing of ornamental plants susceptible to INSV include: African violet, ageratum, amaranthus, anemone, aster, begonia, calceolaria, calendula, calla lily, Christmas pepper, chrysanthemum, cineraria, coleus, cosmos, cyclamen, dahlia, exacum, fuschia, gloxinia, impatiens (garden and New Guinea), marigold, petunia, primula, snapdragon, verbena and zinnia. Exacum, gloxinia and New Guinea impatiens can be so severely damaged by the virus that they are unsalable.

Symptoms

Diagnosis of INSV on symptoms alone is difficult, as symptoms may vary with host and age of host. One or more of the following symptoms may be present on a plant infected with INSV: stunting, ringspots, brown-to-purple spots on leaves or stems, stem browning (cankers), flower breaking and death. Symptoms of INSV can easily be confused with symptoms of diseases caused by other viruses, fungi, bacteria or nutritional disorders.

Western Flower Thrips: a Vector for INSV

Importance

The western flower thrips (WFT) is reported to be the primary vector (transmitter) of INSV. Populations of this species are on the increase and may be displacing other species of thrips due to its ability to develop resistance to insecticides.

Biology and Description

Eggs are laid within leaf, bract or petal tissue. The insect passes through larval stages before dropping down to pupate in the potting soil, leaf litter or under the bench. Adults then emerge after the pupal stage. This insect requires seven to 13 days to develop from egg to adult.

Adult WFT are small and yellow to dark-brown. Positive identification is determined by the

arrangement of spines, setae and antenna! segments. These features can be seen only under high magnification. Thus, it is suggested that thrips samples be taken to the local county Extension office and shipped to the University of Tennessee Plant and Pest Diagnostic Center for positive identification.

Damage

Damage by the WFT occurs by:

1) Direct feeding-fluid is withdrawn from the plant cell, resulting in death. Feeding injury to flowers results in dark petals showing white streaks and light petals showing brown scars.

2) INSV transmission—movement of the virus from plant to plant occurs due to feeding activity of the thrips. Larvae acquire the virus by feeding on an infected host plant. Adults transmit the virus to healthy plants after five to 30 minutes of feeding.

Management of INSV

1. Remove and destroy infected plants that may be a threat to the rest of your crop. Discard "pet plants" that may harbor the virus. Do not carry over highly susceptible plants throughout summer months.
2. Control all weeds in and around the greenhouse. Weeds serve as a reservoir for the virus and also for thrips that may eventually enter the greenhouse. Before killing weeds or discarding plants, spray for thrips to reduce their activity when weeds begin to die or plants are moved.
3. Screen vents to reduce thrips movement into greenhouses. Fine screens or barriers should be placed over intake vents and doorways. Fan capacity may have to be increased.
4. Monitor thrips using blue sticky cards. Cards should be placed near vents and doors, as well as placed over the crops. Change cards once a week.
5. If treatment becomes necessary, apply one of the insecticides listed in the following table at five-day intervals (at least two applications will be needed to reduce high populations).
6. Rotate classes of insecticides. Relying on a single insecticide often results in thrips developing resistance to that particular insecticide or class of insecticides. Rotate chemicals in a different class every two weeks or two to three applications.
7. Maintain good coverage and penetration of insecticides. Thrips are protected from contact with insecticides when located deep within plant flowers or foliage.

Class	Insecticide
Organophosphates	diazinon (PT 265 Knox Out 2FM, PT 1500R Knox Out 0.5A) chloropyrifos (PT 1325 ME Duraguard) acephate (Orthene Turf, Tree & Ornamental Spray 75SP, PT 1300 Orthene 3A)
Carbamates	bendiocarb (Dycarb 76WP, Turcam 76WP) oxamyl (Oxamyl 10G)
Pyrethroids	fluvalinate (Mavrik Aquaflow 22.3F) resmethrin (Resmethrin EC 26 Insect Spray, SBP 1382A, PT 1200 Resmethrin A) cyfluthrin (Tempo 2EC, Decathlon 20WP) bifenthrin (Talstar 10WP, PT 1800 Attain 0.5A)
Chloronicotinyls	imidacloprid (Marathon IG)
Botanicals	pyrethrins plus piperonyl butoxide (Pyrenone, Natural Pyrethrin Concentrate) azadriachtin (Margosan-O, Safer Bioneem, Azatin EC)

8. Some studies suggest that tank-mixing a pyrethroid (such as Tempo, Talstar or Mavrik) with one of the materials listed above may be helpful. The pyrethroid "flushes" thrips out of hiding so they come into contact with more of the insecticide. However, these tank mixes may actually enhance the development of resistance.

Diagnosis

If you wish submit a plant sample and have it assayed for INSV, contact your county Extension agent for assistance. Your agent can provide forms to accompany the sample to the University of Tennessee Plant and Pest Diagnostic Center in Nashville. Please submit whole plants (more than one if possible), packaged to withstand transport by the postal service.

SP370A-2M-3/98 (Rep) E12-2015-00-056-98(Rev)
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