e-GRO Alert
Volume 5, Number 39 December 2016

Brandon Huber
NC State University

Brian E. Whipker
bwhipker@ncsu.edu

Stevia rebaudiana:
Tomato Spotted Wilt Virus (TSWV)[1]

Tomato Spotted Wilt Virus (TSWV) can be found in both field or greenhouse environments and is characterized by its chlorotic rings, followed by necrosis and wilt. Submit a sample to a diagnostic clinic to confirm your diagnosis.

Tomato Spotted Wilt Virus (TSWV) is known to affect many genera of plants including a recent find in *Stevia rebaudiana*. TSWV can be found in both field or greenhouse environments. Typical symptoms include chlorotic ring spots, followed by necrosis and wilt (Figs. 1-4). We confirmed our case of TSWV in stevia through the NC State University Plant Disease and Insect Clinic.

Stevia (*Stevia rebaudiana*) is a herbaceous perennial of the Asteraceae or Compositae family hardy in zone 8-11, but can be successfully grown as an annual in the northern climate. Stevia is commonly grown as a natural sweetener and alternative to sugar. The foliage is known to be 200-300 times sweeter than sugar with zero calories and no glycemic index, being safe for diabetics. It is a popular choice for the home gardener, but also grown as an agricultural crop for use in sodas, candies and more. Plants are commonly sold in garden centers across the

Figure 1. Chlorotic and necrotic spotting on a stevia plant infected by Tomato Spotted Wilt Virus (TSWV). Photos copyright by Brandon Huber.

[1] Brandon Huber, Todd Wehner, David Shew and Brian Whipker. North Carolina State University

e-GRO Alert
www.e-gro.org

CONTRIBUTORS

Dr. Nora Catlin
Floriculture Specialist
Cornell Cooperative Extension - Suffolk County
nora.catlin@cornell.edu

Dr. Chris Currey
Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

Thomas Ford
Commercial Horticulture Educator
Penn State Extension
tgf2@psu.edu

Dan Gilrein
Entomology Specialist
Cornell Cooperative Extension - Suffolk County
dog1@cornell.edu

Dr. Joyce Latimer
Floriculture Extension & Research
Virginia Tech
jlatime@vt.edu

Dr. Roberto Lopez
Floriculture Extension & Research
Purdue University
rglopez@purdue.edu

Dr. Neil Mattson
Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

Dr. Rosa E. Raudales
Greenhouse Extension Specialist
University of Connecticut
rosa.raudales@uconn.edu

Dr. Beth Scheckelhoff
Ext. Educator – Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

Lee Stivers
Extension Educator – Horticulture
Penn State Extension, Washington County
ljs32@psu.edu

Dr. Paul Thomas
Floriculture Extension & Research
University of Georgia
pathomas@uga.edu

Dr. Brian Whipker
Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

Heidi Wollaeger
Floriculture Outreach Specialist
Michigan State University
wolleage@anr.msu.edu

US and seed catalogs. Stevia has been used in Brazil for thousands of years, but didn't receive FDA approval in the US until 2008; therefore, it is just recently making an appearance in the garden center. Stevia grows well in containers or in a garden in full sun and on average grows 24" high by 18" wide. Small white flowers are formed in masses in the fall on these short-day plants.

Typically, stevia is grown from seed, however cutting propagated plants are on the rise due to improved selections through plant breeding. TSWV is not a seed borne virus, but can be transmitted to young plants via insect vectors such as Western Flower Thrips (*Frankliniella occidentallis*) from nearby infected plants. Infected viral plants could include stock plants, or other overwintered plants from outside. Virus can even come from weeds growing nearby a greenhouse or garden. Be on the lookout for virus infected plants in a greenhouse especially with overwintering stock plants. An infected stock plant that is used for propagation will continue to propagate more viral plants and continue the spread of the virus.

The symptoms were first noticed in young seedlings in a research greenhouse, however were vectored by thrips from nearby plants, previously dug from the field. Thrips

Figure 2. Chlorotic spotting on a stevia plant infected by Tomato Spotted Wilt Virus (TSWV).
Photos copyright by Brian Whipker.

are major pests of stevia in a greenhouse, and in particular feed on young developing growth. The field dug plants that were brought from the field were later confirmed to be infected by TSWV, however symptoms were not initially noted until later due to the plant's dormancy in December. Be sure to scout plants for symptoms during the growing season before moving them indoors and keep plants in temporary isolation if possible.

This is the first noted case of TSWV here in the US, however it was first reported in Greece in 2007 (Chatzivassiliou et al., 2007). TSWV is primarily spread by the feeding of Western flower thrips. A plant was tested for tomato spotted wilt virus (TSWV) and it was confirmed with an enzyme-linked immunosorbent assay (ELISA) test by Mike Munster at the NC State University Plant Disease and Insect Clinic (http://www.cals.ncsu.edu/plantpath/extension/clinic/).

Figure 3. Chlorosis, necrosis, and ringspotting on a stevia plant infected by Tomato Spotted Wilt Virus (TSWV).
Photos copyright by Brian Whipker.

Cooperating Universities

UCONN

Cornell University

The University of Georgia

Iowa State University

Michigan State University

NC State

The Ohio State University

PennState Cooperative Extension College of Agricultural Sciences

Purdue University

VirginiaTech Invent the Future®

In cooperation with our local and state greenhouse organizations

Maumee Valley Growers Choose the Very Best.

Connecticut Greenhouse Growers Association

Indiana Flower Growers Association

New Hampshire Plant Growers Quality Garden Centers & Growers

Michigan Floriculture Growers Council

Virginia Flower Growers Association Since 1954

lifga

NC Flower Power

If you suspect a virus problem, have the plants tested by a diagnostic clinic. You can also conduct in-house testing with ELISA kits from Agdia (http://www.agdia.com/).

Management

The best practice in managing the spread of virus is to control the population of Western flower thrips (*Frankliniella occidentallis*), as they are the insect vector responsible for transmitting the virus. If a plant is confirmed for TSWV, there is no treatment and the plant should be discarded to prevent further spread of the virus. If virus is found on a greenhouse plant one should scout long after removing the infected plant, as it can reoccur through the thrips population if they have fed on the previous infected plant. See e-GRO Alert 4.18 for management options.

References

First Report of Tomato spotted wilt virus in *Stevia rebaudiana* in North Carolina.

A.M. Koehler, J.A. Brown, B. Huber, T.C. Wehner, and H.D. Shew. Plant Disease 2016 100:6, 1251-1251.

Occurrence of Tomato spotted wilt virus in *Stevia rebaudiana* and *Solanum tuberosum* in Northern Greece. E. K. Chatzivassiliou, D. Peters, and P. Lolas

Plant Disease 2007 91:9, 1205-1205

Figure 4. Necrotic spotting and wilt on a stevia plant infected by Tomato Spotted Wilt Virus (TSWV). Photos copyright by Brandon Huber.