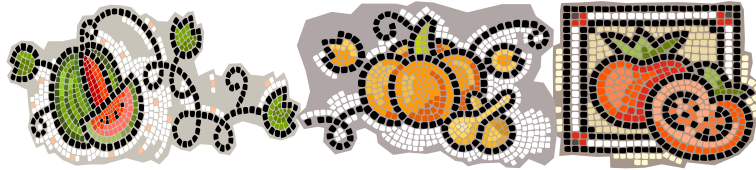


# VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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**TOMATO SPOTTED WILT VIRUS (TSWV)** - (Dan Egel, Rick Foster, Liz Maynard, Jeff Burbrink, Tom Creswell, Gail Ruhl) - *The following article was written as a Vegetable Crops Hotline BULLETIN on May 3, 2011. If you didn't receive this bulletin either by email or fax, please call the SWPAC office at (812) 886-0198 for more information or to be placed on the list.*

This disease was confirmed on tomatoes grown for production in a greenhouse in northern Indiana.

Symptoms of TSWV on tomatoes include dark, brown necrotic spots on leaves, dark streaks on stems, stunted growth and discolored fruit (see Figures 1-3). Symptoms vary according to host. Other vegetable plants affected by TSWV include tomato, pepper, potato, eggplant, lettuce, spinach and cucumber. Several ornamental plants are also affected by TSWV and many weeds may serve as hosts.



**Figure 1:** The tomato plants in the row to the right are stunted and chlorotic due to infection with Tomato Spotted Wilt Virus. (Photo by Jeff Burbrink)

TSWV is spread from plant to plant by thrips. Thrips are insects less than 1/20<sup>th</sup> of an inch long (see Figure 4, next page). TSWV can be vectored by western flower thrips, eastern flower thrips, and onion thrips. The western and eastern flower thrips are the most efficient vectors, but they don't survive our cold winters well. Onion thrips survive just fine in our climate, but they are not as effective in vectoring TSWV. TSWV is acquired by thrips in the larval stage, however the adults are responsible for most of the spread of the disease. Adults cannot pass on the virus particle to the larvae. The entire life cycle of thrips is about 30 days. Insecticide control of thrips is complicated by the fact that eggs are inserted into the flesh of the plant host and the larvae pupate in the soil—both spots are beyond the reach of insecticides.

TSWV has usually been a more serious disease of vegetables in tropical and subtropical climates than areas of the Midwest such as Indiana. This is because the thrips vector does not overwinter well here. Greenhouses provide an excellent opportunity for thrips survival and population growth. Where thrips are abundant, TSWV can become a problem. TSWV can move from a greenhouse to a nearby field of susceptible crops, such as tomato. If you have TSWV and thrips in a greenhouse near where you plan to grow field tomatoes, you should make every effort to eliminate the virus and thrips before you plant in the field.



**Figure 2:** Necrosis and chlorosis on tomato leaves caused by infection of Tomato Spotted Wilt Virus. (Photo by Liz Maynard)



**Figure 3:** Tomato Spotted Wilt Virus may cause necrotic and deformed tomato fruit. (Photo by Jeff Burbrink)

Management of TSWV centers on controlling the thrips vector.

- Preventing TSWV is easier than halting the spread of this important disease. **Do not plant ornamentals and vegetables in the same greenhouse!** TSWV may be introduced on ornamentals that are propagated by cuttings. The disease can then spread to vegetables.
- Use transplants known to be free of both TSWV and thrips.
- Plant resistant varieties if possible. For example, there are a few tomato cultivars with resistance.
- Use yellow sticky traps to monitor thrips populations or by direct observations of the flowers.
- Thrips should be managed with insecticides when populations reach an average of 5 thrips per flower. However, if plants show symptoms of TSWV and thrips are present, control measures should be implemented. Effective insecticides that can be used in the greenhouse include Conserve<sup>®</sup>, Rimon<sup>®</sup>, and Venom<sup>®</sup>. When using insecticides to control thrips, coverage is critical. Thrips are very small and often will hide in seams and crevices, so make sure you have sufficient water and pressure to get the insecticide mixture to where the thrips are. If TSWV symptoms are suspected, send samples to the Purdue University Plant Pest and Diagnostic Laboratory.
- Remove symptomatic plants from a greenhouse with TSWV. Do not compost such plants; instead destroy them. Avoid crop debris in the greenhouse such as older leaves that have fallen or pruned leaves.
- Keep the area clear of weeds that may serve as hosts for TSWV.

Vegetable growers, particularly those who produce greenhouse tomatoes, should be on the look out for TSWV symptoms and implement the preventative measures above.



**Figure 4:** The thrips responsible for the spread of Tomato Spotted Wilt Virus in tomato will look similar to the thrips marked with arrows on this tulip tree flower. Thrips will readily move about a flower when disturbed, making them easier to observe. (magnification-about 2X) (Photo by Dan Egel)



**STRIPED CUCUMBER BEETLES - (Rick Foster)** - Striped cucumber beetles are out in many areas of the state. If you have cucurbits in the field, you should visit your fields at least 3 times per week to catch the beetles as soon as they arrive. Young plants tend to be especially susceptible to beetle feeding and/or bacterial wilt, so detecting the infestation early is important. Treatment with a foliar insecticide is recommended when populations exceed an average of 1 beetle per plant on muskmelons, cucumbers, and young pumpkin plants. Cucurbit crops that are not susceptible to bacterial wilt, such as watermelons and squash, should be treated when populations exceed 5 beetles per plant, or if young plants are being defoliated. The pyrethroid insecticides (Ambush<sup>®</sup>/Pounce<sup>®</sup>, Asana<sup>®</sup>, Baythroid<sup>®</sup>, Brigade<sup>®</sup>, Danitol<sup>®</sup>, Mustang Max<sup>®</sup> and Warrior<sup>®</sup>) will all provide excellent control of cucumber beetles. Products with the active ingredient imidacloprid (e.g., Admire<sup>®</sup>, Macho<sup>®</sup> and Montana<sup>®</sup>) or the active ingredient thiamethoxam (e.g., Platinum<sup>®</sup>) may be applied to the soil for systemic protection. Newer products listed in the *Midwest Vegetable Production Guide for Commercial Growers 2011* < <http://www.btny.purdue.edu/Pubs/ID/ID-56/> > for cucumber beetle control include Hero<sup>®</sup> and Volium Xpress<sup>®</sup>.



**ALTERNARIA LEAF BLIGHT ON MUSKMELON - (Dan Egel)**  
- This disease is common on muskmelon grown in the Midwest. Symptoms of Alternaria leaf blight (ALB) include necrotic lesions with chlorotic halos. Lesions form only on leaves and not on stems or fruit.

The photographs that accompany this article show ALB on transplants grown in a greenhouse (see Figures 5 and 6). This disease is unusual in the greenhouse. The fungus is not known to be transmitted on seed. Sufficient residue in the greenhouse to cause an outbreak of this disease is uncommon, to say the least. Nevertheless, overhead irrigation and the relatively cool evenings of spring would lead to the development and spread of this disease.

The management of ALB in the greenhouse would include sanitation to reduce residue on transplant trays and greenhouse floors. Water seedlings early enough in the day to allow seedling to dry out before night-fall will reduce leaf wetness, a prerequisite to disease. Fungicides labeled for ALB and the greenhouse would include those with the active ingredient mancozeb (e.g., Dithane®, Manzate® and Penncozeb®).

In the field, management of ALB includes crop rotations to reduce crop residue and proper fungicide applications. ALB can be managed using MELCAST under field conditions. Fungicides labeled for field use include products with the active ingredient chlorothalonil (e.g., Bravo®, Echo®, Equus®), Inspire Super®, Pristine®, Quadris®, Switch® and Tanos®. Not all of these products are effective against gummy stem blight, another common fungal disease in muskmelon and watermelon fields.

Scout greenhouses and commercial fields so that diseases such as ALB can be identified and proper control measures can be implemented.



**Figure 5:** A lesion of Alternaria leaf blight on muskmelon at an early stage. (Photo by Dan Egel)



**Figure 6:** Older lesions of Alternaria leaf blight show the concentric ring structure that is typical of this disease on muskmelon. (Photo by Dan Egel)



**FARMERS MARKET DIRECTORY** - There is still time to update your listing in the USDA Farmers Market. The directory captures information about where farmers markets operate, when they are open, if they accept food assistance programs, what types of produce are available and how many vendors see produce. To update a listing follow the following link or call Dan Egel at (812) 886-0198. [http://www.usdadirectoryupdate.com/\(S\(t0ht5fa4djka4wy212thk13s\)\)/Survey.html](http://www.usdadirectoryupdate.com/(S(t0ht5fa4djka4wy212thk13s))/Survey.html) .

Similarly, the Indiana State Department of Agriculture (ISDA) maintains an Indiana Agro-tourism and Farmers Market online directory. At this site it is possible to search for local foods and agricultural destinations throughout the state. To include your farmers market in the directory, go to this link [http://www.in.gov/apps/ISDA\\_FarmersMarket/](http://www.in.gov/apps/ISDA_FarmersMarket/) and follow the instructions.