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Marigolds: Tomato Spotted Wilt Virus (TSWV)

White ringspots, leaf mottling, and leaf distortion were observed on a crop of marigolds. These symptoms are typical of what occurs with a virus. This Alert will aid in identification of a tomato spotted wilt virus (TSWV) infection in marigolds.



Figure 1. Top view of a marigold plant with tomato spotted wilt virus (TSWV). (Photo: Brian Whipker)

A single marigold plant (Fig. 1) developed white ringspots on the upper foliage (Fig. 2) over a 4-week production cycle. There was also an initial development of mottling, which given additional time most likely would have become more pronounced (Fig. 3). Distortion of the upper leaves was also present indicating Western flower thrips (WFT) feeding (Fig. 4), but there were limited insects found when scouting the plants. There was a lack of overall major stunting that one also typically observes with advanced TSWV infections. This is the first time the authors have observed TSWV on marigolds, and a

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quick internet search only found one other photograph on the University of Massachusetts-Amherst website. Together, these images provide an excellent visual tool for diagnosing TSWV symptoms on marigolds.

The plant was tested for tomato spotted wilt virus (TSWV) and it was confirmed with an enzyme-linked immunosorbent assay (ELISA) test. 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/>). It is important to test multiple leaves from the same plant that is **exhibiting symptoms**. The total leaf area tested should be around 1 square cm (postage stamp size).

Management

Once a plant has TSWV or the other common virus found in greenhouse production, impatiens necrotic spot virus (INSV), it cannot be cured. Discarding infected plants is the only option, and this will help prevent the virus from spreading further.



Figure 2. White ringspotting due to a tomato spotted wilt virus (TSWV) infection (A-C). (Photo: Brian Whipker)

It is important to note that some plants may be asymptomatic, but still have TSWV or INSV. Since the primary method of spreading these viruses in greenhouses is via Western Flower thrips (*Frankliniella occidentalis*) feeding, it is critical to keep them under control. Frank and Baker (2020) report, “Larvae of the western flower thrips can become infected with tomato spotted wilt virus (TSWV) or impatiens necrotic spot virus (INSV) by feeding on an infected plant for only 30 minutes. After a latent period of 3 to 18 days, these thrips can then infect new plants after feeding only 5 to 15 minutes.” For additional information about WFT, view their online publication. Adult WFT lifespan varies by temperature (Robb, 1989). They can live between 31 to 75 days, at 25C (77F) to 20C (68F), respectively, and this would have been ample time for an insect to overlap between the two research projects grown in this greenhouse.

Note: With the warmer temperatures, one has to be concerned about Western flower thrips (WFT) in the greenhouse. Our NCSU greenhouses are no exception. We tried to practice a clear-out crop rotation between experiments, and the glass greenhouse with concrete floors had been fallow for 2 weeks before starting an experiment with marigolds. A low population of WFT had been present in the prior crop, with the pressure most likely coming from the next greenhouse compartment even though there is a glass wall and door separating them. The cuttings from a prior crop of New Guinea impatiens that we obtained from a grower had been battling TSWV. None of our plants developed any signs of the virus. We speculate that a plant had TSWV but



Figure 3. Mottling beginning to develop on the young leaves of marigolds. (Photo: Brian Whipker)

was symptomless, and a WFT survived the two-week clean out period and then fed on and infected this marigold plant. Thus when trying to prevent TSWV infestations from continuing, keep in mind that symptomless plants can still harbor the virus and spread it by WFT even after a 2-week period of no plants being present.

Additional Information: There is an excellent, online publication that discusses TSWV in great detail. The abstract lists the following outline: “This datasheet on Tomato spotted wilt orthotospovirus covers Identity, Overview, Distribution, Dispersal, Hosts/Species

Affected, Vectors & Intermediate Hosts, Diagnosis, Biology & Ecology, Environmental Requirements, Seedborne Aspects, Impacts, Uses, Prevention/Control, Further Information”. Check it out if you want to learn more.

<https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.54086>

References

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Figure 4. Leaf distortion on marigolds from Western flower thrips feeding. (Photo: Brian Whipker)

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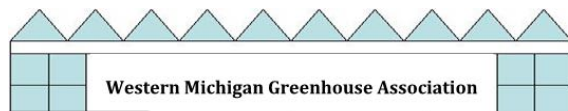


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