Assessment and Mitigation of Tomato Spotted Wilt Virus (TSWV) on Chrysanthemums

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Introduction and Objective

Michigan greenhouse growers have sustained significant losses in their chrysanthemum crops in recent years due to the tomato spotted wilt virus (TSWV) which is vectored by the western flower thrips. Insecticides are less effective than in the past due to resistant thrips populations. By implementing a bimonthly tomato spotted wilt virus (TSWV) sampling program and monitoring the western flower thrips pressure in two cooperating greenhouses, we aimed to better understand the interaction between thrips populations, incoming plant material, carryover between crops, and other risk factors for TSWV.

Materials and Methods

I worked with two commercial greenhouses who were producing chrysanthemums to better understand the interaction between thrips populations, incoming plant material, carryover between crops, and other risk factors for developing TSWV on chrysanthemums. One greenhouse was implementing biological control pest management and the other was using chemical pest control. To estimate the population of western flower thrips coming in on the plant material, approximately 55 cuttings were chosen at random from the last two shipments of chrysanthemum cuttings at each greenhouse. These cuttings were from different bags and were representative of the cultivars and suppliers. The samples were sent to Dr. Dave Smitley's lab for testing for the presence of adult thrips and other life stages. Growers at both greenhouses used passive scouting techniques for western flower thrips by placing 1 yellow sticky card per 1,000 square feet, just above the crop height. The cooperating grower or greenhouse scout recorded the number of thrips per sticky card weekly. Every 12 to 14 days, the greenhouses were scouted for plants with viral symptoms. On each scouting day, ten to fifteen plants were chosen for TSWV testing using an Agdia ImmunoStrip assay.

Results

There were a total of 11 thrips found on 97 cuttings from 2 shipments at 2 different greenhouses businesses. The sample came from multiple suppliers. While this infestation level is low, it is sufficient to begin a population of thrips population within the crop as thrips reproduce rapidly during summer growing conditions.

A total of 110 samples that were suspect of having symptoms consistent with TSWV were chosen for virus testing from June 14 to August 30, 2016. Eleven samples or 10% tested positive for TSWV. The symptoms developed on the leaves included: chlorotic spots and rings and necrotic leaf margins and spots (Figure 1).

Figure 1. Chlorotic spotting and rings and marginal and necrotic spotting from TSWV on chrysanthemums.

Greenhouse 1

TSWV was detected on 4" Jasoda Red chrysanthemums by the greenhouse grower during the last week of July in Greenhouse 1. The first sample to test positive in Lindberg's sampling was on August 5, 2016 also in a Jasoda Red chrysanthemum. Two weeks later, two more samples (1 Jasoda Purple and 1 Jasoda Orange) tested positive in Greenhouse 1. One sample (Jasoda Orange) tested positive during scouting on August 30, 2016.

Greenhouse 2

TSWV was first detected by the greenhouse growers during the last week of July on a 5" Jasoda Purple chrysanthemum. Eight samples (n=18) tested positive for TSWV on August 5, 2016 at Greenhouse 2. Positive

results were found on the following cultivars: Jasoda Purple, Jasoda Yellow, and Dandelion Wine.

Future Research

In order to determine the susceptibility of cultivars to TSWV, an experiment would need to be performed in a controlled environment. Sample sizes of cuttings sent for thrips testing and those tested in the greenhouse for TSWV would need to be increased to truly understand the effects of cultivar, pest pressure, and plant size on the risk for developing TSWV.

Recommendations

TSWV symptoms may initially appear on a few leaves or on one branch of the plant and some cultivars may show symptoms of the virus more readily than others. Managing thrips populations (≤30 thrips per card per week) is essential to preventing the spread the spread of TSWV in a crop. TSWV was only detected on chrysanthemums grown in smaller container sizes (4”, 5”) likely because they are more susceptible to plant stress, which increases the likelihood of plants showing symptoms of plant viruses. Growers should know the symptoms, scout for early detection, perform consistent in-greenhouse viral testing, and immediately dispose of plants testing positive for TSWV.