

Virus Diseases of Greenhouse Floral Crops

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Virus-induced diseases of greenhouse grown floral crops result in substantial economic losses to growers every year. There are a variety of viruses that can infect floral crops, most of which are moved from plant to plant by insects. Most virus diseases can be identified by the type of symptom they induce in the plant; however, positive identification needs to be done in cooperation with a plant diagnostic clinic. The five most important viruses infecting floral crops are discussed in this fact sheet.

Symptoms

Symptoms associated with floral crop viruses vary substantially with the virus and the particular host that is affected. The same virus can cause different symptoms in different hosts. Symptoms such as mosaic, ringspot, necrotic spot, leaf blistering and deformation are all symptoms associated with floral plant viruses. Other symptoms of the more general type can also be associated with virus infection. These include yellowing, stunting, and wilting. This general group of symptoms sometimes complicates the diagnostic process, as they are also symptoms associated with other types of floral crop pathogens. Table 1



Figure 1. Dark necrotic ringspots caused by INSV on Impatiens.



Figure 2. Symptoms of INSV on Gloxinia.

summarizes the types of symptoms and hosts affected with the five most common greenhouse floral crop viruses.

Causal Agents and Disease Development

Most virus diseases in the greenhouse are associated with five common viruses. These are, Impatiens Necrotic Spot Virus (INSV), Cucumber Mosaic Virus (CMV), Tobacco Mosaic Virus (TMV), Tomato Ringspot Virus (Tom RSV), and Tobacco Ringspot Virus (TRSV). In impatiens, INSV first expresses itself as a black or necrotic spot associated with the leaves or stems of a small plant or seedlings. These spots can later become larger or develop into black or necrotic ringspots (Figure 1). In other hosts such as Gloxinia (Figure 2), Cineraria (Figure 3), or Dahlia (Figure 4), INSV induces concentric rings of almost perfect proportion. In New Guinea impatiens, symptoms may not be seen until the plants flower, even though plants were infected earlier (Figure 5). CMV, unlike INSV has relatively nondescript symptoms in most hosts. These include mosaic, stunting, and yellowing. Symptoms associated with CMV infection can sometimes be confused with other diseases such as root rots and



Figure 3. Symptoms of INSV on Cineraria.



Figure 4. Symptoms of INSV on Dahlia.

nutritional problems. Since CMV can be seed transmitted, symptoms can be seen in very young plants. TMV is a very common virus often found associated with floral crops in the Solanaceae family, particularly petunia and Nicotiana. Symptoms associated with this virus are mosaic and leaf deformation (Figure 6). This virus can be seed transmitted in some varieties of petunia, so one must take care to purchase seed that is certified virus-free. Tomato and tobacco ringspot viruses, though separate viruses, tend to induce the same types of symptoms in the same hosts. As the name implies, the primary symptom is a ringspot (Figure 7). As with TMV, these viruses tend to be more of a problem with hosts in the Solanaceae family; however, geraniums are also hosts for both of these common plant viruses.

Disease Management

Vector Control

Since most viruses are spread or vectored by insects, one of the most effective ways of controlling viruses in the greenhouse is to control insect vectors. Thrips are the primary means by which INSV spreads about the greenhouse. Getting thrips populations under control can dramatically reduce the incidence of INSV in your crop. Other insects such as aphids and whiteflies can also spread viruses. For additional information please refer

to Ohio State University Extension Bulletin 538, Insect, Mite and Disease Control on Commercial Floral and Foliage Crops.

Clean Seed and Stock

Viruses such as CMV, TomRSV, and TRSV can all be seed transmitted. It is important when purchasing seed for next year's crop that seed be certified by the producer to be free of all viruses as well as other pathogens. The same holds true for stock material. All stock coming into your greenhouse should be virus free. If there is any question, material should be quarantined until it can be determined to be clean. Some producers state on their stock material that the stock is certified virus free.

Sanitation

Tobacco mosaic virus can easily be moved from one plant to another by just the touch of a hand or the carryover of sap on a cutting knife. For this reason it is extremely important to keep hands and propagation tools free of sap when going from plant to plant. Wash hands in warm soapy water and dip (disinfect) tools in a 10% chlorine bleach solution. Weeds can also play a role in the transmission of viruses. Weeds serve as alternate or secondary hosts for plant viruses as well as their insect vectors. Keeping weed populations in and around the



Figure 5. Symptoms of INSV on New Guinea Impatiens.



Figure 6. Symptoms of TMV on Impatiens.



Figure 7. Tom RSV symptoms on Geranium.

greenhouse to a minimum is a good sanitary practice that will aid greatly in controlling viruses.

Resistant Varieties

If possible, always grow floral crops that have some degree of resistance to plant viruses. Sometimes these resistant varieties may not be the exact varieties you would prefer to grow, but the payoff will be a lack of virus-associated problems throughout the growing season.

Chemical Control

There are no chemicals that will cure a plant of a virus infection. Chemicals are helpful in insect and weed control. That is why it is so important to practice all of the nonchemical disease management practices mentioned above.

Table 1. Common Viruses of Floral Crops and the Symptoms They Induce

<i>Virus</i>	<i>Floral Crop Hosts Affected</i>	<i>Symptoms Associated with Infection</i>
Impatiens Necrotic-Spot	Many, particularly hosts that attract thrips	Black/necrotic ringspots, black/necrotic spots, black lesions on affected stems, wilting
Cucumber Mosaic	Many, more hosts than any other virus	Severe to mild mosaic or mottling of leaves or flowers, stunting, yellowing of entire plant
Tobacco Mosaic	Primarily petunias and related species, Impatiens	Severe to mild mosaic or mottling of leaves or flowers, dark green blisters on leaves, and deformation of leaves
Tobacco Ringspot and Tomato Ringspot	Geraniums, petunias and related species	Ringspot, either partial or full on leaves, nondescript yellow spots

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