Tomato Spotted Wilt Virus on Cool Season Pot Crops

Leanne Pundt
Extension Educator
Commercial Greenhouse IPM Coordinator

Tomato spotted wilt virus (TSWV) has a wide host range. Nearly all greenhouse-grown crops except roses are susceptible to the virus. Over 550 species in 62 different plant families, including many weed species, are confirmed hosts of TSWV.

TSWV causes spotting of tomato leaves and fruit. The strain of TSWV that affects tomato is known as the lettuce (L) strain. It is most often found in dahlias and chrysanthemums in the greenhouse.

A relatively new strain of TSWV has been isolated from New Guinea impatiens and is now known as impatiens spotted necrotic virus (ISNV) or the impatiens (I) strain of TSWV. In Pennsylvania, a recent survey reported that over 90% of the bedding plants, pot crops and perennials that showed TSWV symptoms were infected with the I strain of TSWV.

The primary vector of TSWV is the western flower thrips (WFT), Frankliniella occidentalis. In Massachusetts, a 1991 survey reported that WFT was the dominant thrips species in greenhouses and has displaced the eastern flower thrips. The incidence of TSWV has increased as the difficult-to-control vector (WFT) has spread throughout the greenhouse industry.

General symptoms of TSWV include spotting of the leaves, necrotic areas, mottling and mosaic patterns. Less commonly observed symptoms include distortion, stunt-

Pests on Easter Lilies

Leanne Pundt
Associate Extension Educator

Growers are focused on crop scheduling for Easter Lilies, but need to monitor for certain key pests including root rots, *botrytis*, aphids, bulb mites and fungus gnats. Physiological problems may occur as growers adjust their heat and light levels to keep Easter lilies "on track". Blasting of flowers is common and may be due to high soluble salt levels, fluctuating water levels and, occasionally, to viruses.

**Root Rots**

Root rot is most often due to *Pythium*, but *Rhizoctonia* can also cause problems. As the roots become decayed, growers will see a gradual yellowing of the lower leaves. Growers tend to have a problem when they are running their houses "warm", when roots have been stressed by high soluble salt levels or when wounded by water stress, i.e. letting the plants become very dry and then watering.

The *New England Floricultural Crop Pest Management...Guide* recommends Banrot 40 WP, or 8G, Subdue, Truban 25 EC, or Terrazole 35 WP for management of root rots. Dr. Goldsberry, a plant pathologist with Colorado State University, suggested that growers use a more acidic growing medium, with a pH of 6.0 instead of the recommended pH of 6.8 to 7.2, to manage *Pythium*.

**Botrytis**

*Botrytis cinerea* or Gray Mold may cause spotting on the petals. Easter lilies that are held in cold storage and whose tissues are physiologically aged and weakened are more susceptible to attack by *Botrytis*.

*Botrytis ellipítica*, causes streaking of lily leaves, especially during commercial bulb production. However, *B. ellipítica* has occurred on greenhouse-grown lilies in New England. Growers should look for distinct yellow streaks and a "green
Insurance lighting should not be required this year (see Comments on the Easter Lily Schedule for exceptions).

Greenhouse Forcing

Once 1,000 hours of cooling has accumulated, greenhouse forcing begins. Move pot-cooled bulbs to forcing house and plant case-cooled bulbs. If case-cooled bulbs are sprouted, they can be planted on their side with the shoot in the center of the pot. Plant bulbs deep to stimulate stem roots. Raise bulb temperature to 60° to 63°F. Do not allow bulb temperature to reach or exceed 65°F as some of the cooling effect will be lost.

Bud Initiation typically occurs in mid- to late-January when lily shoots are about 3" to 5" tall. The development of stem roots usually coincides with flower bud initiation. During this period, maintain potting medium temperatures at 60° to 63°F. Do not let soil temperatures fall below 60°F or bud count and root development will be reduced, and do not allow temperatures to reach or exceed 65°F or initiation will be delayed.

Forcing Temperatures

Typical leaf unfolding rates vary from approximately 1 leaf/day at an average daily temperature of 53°F to 1.5 leaves/day at 65°F, 2 leaves/day at 72°F and 2.5 leaves/day at 82°F. Forcing temperatures between 55° to 70°F are most fuel efficient and produce the highest quality lilies.

Once lilies reach visible bud, they will typically flower in 30 days at 70°F and 35 days at 65°F. Uneven greenhouse temperatures may cause uneven development. Use horizontal air flow to equalize temperatures. If a small group of lilies is slow, a plastic tent over a bench with bottom heat will keep plants warmer without affecting the rest of the crop. Open the tent if the temperature goes above 80°F. Maintain adequate soil moisture and humidity.

Each year the Easter lily crop presents a new challenge. After being spoiled by ideal bulb quality last year, growers may encounter the opposite situation this year. However, changing circumstances are nothing new to Easter lily forcers and with proper attention to detail and crop monitoring, growers should look forward to a good Easter crop in 1994.

Connecticut Greenhouse Newsletter
oles become necrotic and collapse. When cyclamen is grown at cooler temperatures (13°C or 55.4°F), symptoms may take from three to four months to develop. However, symptom expression is suppressed at higher temperatures (22°C or 72°F). During this latent period, production continues and serious losses may occur.

**Gloxinia**

Symptoms in gloxinia will vary depending upon the age of the host plant. When young gloxinia plants are infected, plants may turn brown and collapse. Symptoms may be confused with a fungus crown rot caused by *Phytophthora parasitica*. When older gloxinia plants are infected, yellow or brown leaf spotting, or brown oak-leaf patterns may occur on the leaves.

**Thanksgiving Cactus**

Both strains of TSWV have been isolated from Thanksgiving cactus. The lettuce strain has been isolated from plants not showing any viral symptoms and any signs of thrips feeding or injury. However, even only very mild symptoms of infection may occur, including sunken chlorotic lesions, dark green spots and distortion. Ringspots are less commonly seen.

Young vegetable transplants may be particularly vulnerable. Both pepper and tomato transplants were reported to become infected with the I strain of TSWV.

Become familiar with TSWV symptoms on your cool season pot crops. Crop loss can then be minimized, when roguing of diseased plants and strict thrips control is practiced. Avoid carrying over thanksgiving cactus and cyclamen that may not show any obvious symptoms of TSWV infection or thrips feeding damage.

**References**

must take special care in handling and forcing the crop. Temperatures during bulb cooling (vernalization) and flower bud initiation are especially critical. Use the 1994 Easter Lily Schedule in this article as a general guide to lily development, and use the following tips to properly cool and flower your crop.

Bulb Handling

The condition of this year's commercial bulb crop will not be fully evaluated until bulbs begin to arrive in October. Growers should ask for an update from their suppliers at that time.

Bulb mites (Rbizoglyphus robingi) are always present (in various degrees) on lily bulbs. Most growers do not treat for bulb mites and still produce good crops. However, because the 1993 field conditions were stressful on the crop and warmer vernalizing temperatures will be required to speed bulb maturity this year, bulb mites are a concern. Growers are strongly encouraged to treat the 1994 Easter crop for bulb mites. Bulbs should be soaked in Kelthane (5 oz/25 gal.) or Dursban (2 to 4 oz/25 gal) for 30 minutes prior to potting. Oxamyl 10G (1/4 to 1/2 tsp/pot) can be used to control bulb mites after planting.

Bulb cooling

The forcing process begins as soon as bulbs arrive. Growers can either case cool or pot cool their bulbs. Bulbs can be pot cooled naturally or in a controlled temperature cooler, usually referred to as CTF. Alternatively, commercially case-cooled bulbs can be purchased later in the season. Bulb cooling or vernalization must precede flower initiation. The number of hours bulbs are held at vernalizing temperatures affects both number of days to flower and bud count. As vernalization time increases, forcing time decreases at the expense of bud count. This is the trade-off for the grower - rapid forcing verses high bud count!


