

GROWERTALKS

Features

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Fusarium: What Can You Do?

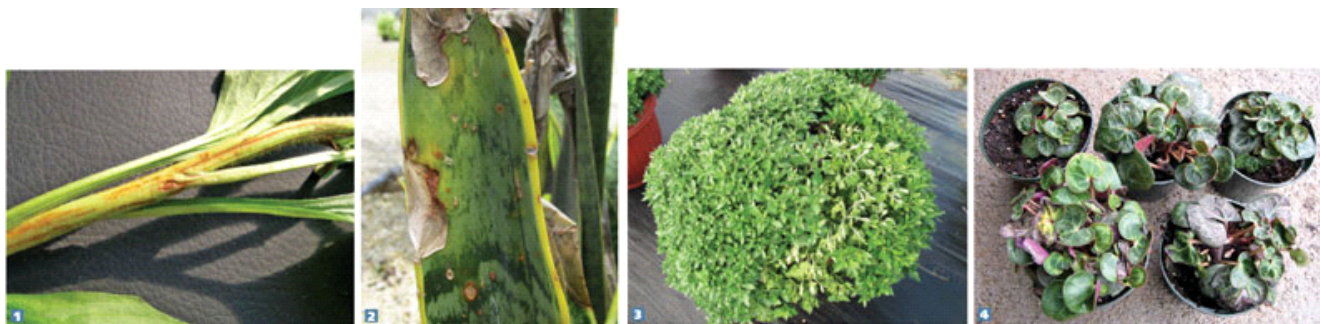
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Fusarium diseases are among the most difficult to control in nearly all plants. They cause significant losses in field-grown crops like cotton, banana, tomato and lettuce. This is unlucky for the farmers producing these crops, but lucky for ornamental growers. Observations/ research on Fusarium on important (large dollar) food and fiber crops can be applied to our ornamentals crops (small dollar).

A few ornamental crops that have been researched extensively for control of Fusarium diseases are gladiolus and chrysanthemum. Table 1 lists some of the most common ornamentals that get Fusarium diseases.

Some Fusarium species have a wide host range, while *F. oxysporum* are identified as form species and are often specific to a single host genus or family of plants. Disease onset can be associated with plant stress, especially for the wilt diseases.

Fusarium spores spread easily by water and some are spread by insects through ingestion or simply external contamination. In the absence of its host crop, Fusarium can persist for years and even reproduce on roots of a wide range of crops and weeds. Fusarium fungi are very good saprophytes, making them harder to control through standard means.



1. Aster showing signs of Fusarium wilt—vascular browning—that's sometimes visible from the outside of the stem.
2. Fusarium leaf spot on sansevieria.
3. Mum showing early signs of Fusarium stem rot.
4. Cyclamen in various stages of Fusarium wilt.

Symptoms of Fusarium on many ornamentals are root, crown and stem rot or wilt, and on a few plants, leaf spots. Stem rot is usually somewhat mushy, mistaken for Erwinia infections, but can be dry, too. Reddish coloration on the margins of the stem lesions or crown rot are typical for Fusarium infections. Vascular wilt is usually accompanied by brown streaks in the xylem and above-ground symptoms are often one-sided. Yellowing and wilting of a single

branch or section of an infected plant can occur.

Plants with root rot can be yellow and stunted, show irregular growth within a planting and have rotted roots. Root rot, which can often be present with another pathogen like Pythium, isn't very characteristic and cannot be identified by appearance. You should either get a lab diagnosis or treat broadly for a variety of soil-borne pathogens.

Sanitation

Fusarium spp. are very good saprophytes and live for a long time (often years) in the soil on organic matter even when the host plant isn't present. Strict sanitation of propagation areas is a critical first step.

We performed a series of trials on efficacy of quaternary ammonium products, peroxide and bleach to kill spores of a *Fusarium* wilt fungus on greenhouse surfaces. The work showed the following was the best treatment of plastic, concrete and wood surfaces: spray the surface with Strip-It, and then rinse and spray with KleenGrow (no rinsing after). It's especially important to use a product with some residual activity like KleenGrow to break the disease cycle. Follow label directions.

Propagation

Fusarium can start as a cutting rot in propagation. This can occur if stock plants are infected or if cuttings are contaminated before the cut end has a chance to heal over. Symptoms appear much like other cutting rots with rot starting at the cut end and spreading upward into the stem, but with a *Fusarium* infection, the leading edge of the rot may have a reddish discoloration.

If the *Fusarium* causes a surface rot (like on callas), then you might use a dip or appropriate biologicals or fungicides and minimize plant stress. It's also important to remember that dipping cuttings or other propagules can spread spores of plant pathogens. Pre-treat stock plants every time cuttings are harvested to reduce use of infected cuttings.

Table 1. Some ornamentals that are affected by *Fusarium* crown rot, stem rot or wilt.

Tropicals	Bulbs	Flowers	Bedding plants
Aglaonema	Caladium	Agapanthus	Aster
Dieffenbachia	Daffodil	Chrysanthemum	Begonia
Dracaena	Freesia	Clematis	Coreopsis
Mandevilla	Gladiolus	Hosta	Dianthus (carnation)
Sansevieria	Iris	Liriope	Gerber daisy
Succulents, cacti	Tulip	Orchids	Lisianthus

Keep in mind that *Fusarium* can also be seedborne—although this is rare in my experience. We recently saw an herb seed with over 50% contamination with *Fusarium*. Symptoms were typical for damping-off, but extremely widespread.

Fertility and pH

Fusarium wilt diseases react to nitrogen form and the effects are often indirect through a plant response and not a pathogen response. Research over the past 120 years consistently shows that managing nitrogen source and maintaining soil/medium pH are still the most effective means of reducing *Fusarium* wilt. When crops are fertilized with lower levels of nitrogen and when the nitrogen is derived from nitrate—not ammonium—sources, *Fusarium* wilt is diminished. *Fusarium* wilt was increased when phosphorous was high and potassium low. Work has been performed on mums, carnations and hebe in containers, as well as tomatoes, cotton and bananas in the field. In some crops, this is the most effective means of control—more effective than fungicides.

Additional experiments have shown that liming to increase pH to 6.5 to 7.5 can reduce severity of *Fusarium* wilt as well. Some studies suggest that when pH is higher, many minor elements are less available. These are required by *Fusarium oxysporum* to make spores.

Fungicides

Most of the fungicides that are helpful in *Fusarium* prevention are just that—helpful. They're often not curative. Since disease can take quite a while to develop, I would always use the most effective products for *Fusarium* and not

those that are merely helpful.

Biological products can be effective, but generally should be applied prior to infection. Trials show that the best biological control for Fusarium is PreStop (*Gliocladium catenulatum*). Trials were performed on cucumber (hydroponic), begonia (greenhouse), onion (field), peppers (greenhouse) and leek (field). The overall control achieved was very good to excellent.

Fungicide rotation should be based on seven- to 21-day intervals depending on growth rate of the crop and disease pressure. This usually means more frequent spraying in the spring-summer than in winter. A successful rotation employs fungicides that are first effective and second in different FRAC groups.

The trials on Fusarium show that the best FRAC groups and specific fungicides are:

- FRAC 11: Heritage or Mural (both have azoxystrobin) or Orkestra Intrinsic (pyraclostrobin and fluxapyroxad)
- FRAC 12: Palladium, Medallion or Spirato (each has fludioxonil) spray stock plants—do not drench with Palladium or drench unrooted cuttings with Medallion or Spirato (fludioxonil can inhibit rooting on some plants)
- FRAC 3: Terraguard, Trinity or Torque (check labels for application sites—if you drench with triflumizole you may inhibit rooting on some plants)
- FRAC 3, 7: Postiva (difenconazole, adepidyn)
- FRAC M1: Thiophanate methyl

Controlling Fusarium diseases on ornamentals

1. Use only healthy cuttings, bulbs, seedlings or liners—if any are available.
2. Be careful of using dips for cuttings as it can spread disease. Spray stock plants the day before taking cuttings. If you use a fungicide dip, consider adding UpTake, which kills fungi and bacteria in the dip solution. Using a dip to control a vascular wilt will not eradicate the fungus inside.
3. Discard infected plants whenever possible.
4. Make sure pots and potting media are new, steam-treated or thoroughly sanitized to minimize carrying over disease from crop to crop.
5. Minimize plant stress and avoid ammoniacal nitrogen on crops susceptible to Fusarium wilt.
6. Rotate fungicides between different FRAC groups. **GT**

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