GROWERTALKS

Pest Management

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Calibrachoa Disease Guidelines

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“What’s new,” seems to be the standard ice breaker question when talking with plant pathologists. Sometimes I even sense the inquirer actually hopes that I’ll have some fascinating new disease to tell them about.

The fortunate reality is that seeing new diseases doesn’t happen that often, especially in a well-established and widely grown crop. Do we see unusual or unexplainable symptoms? Yes, but most of the time they fall into the “undetermined or suspected cultural problem” category that really means “I don’t have a clue, but I can’t find any evidence of a pathogen.”

While I’ve encountered Tomato chlorotic dwarf viroid (appears to be symptomless), Tomato mosaic virus (causes a mosaic/mottling) and Calibrachoa mottle virus (mottled leaf) in the industry, the diseases I diagnose most frequently on calibrachoa are powdery mildew and black root rot. These diseases may not be new, they may not be exciting, but they can still ruin the salability of your crop in 2018. The good news is that they can be preventively managed.

Progression of Powdery Mildew. Yellowing begins on the lower leaves in the interior of the canopy, leaves turn necrotic and die, leaving the center of the plant bare.

Powdery Mildew *(Podosphaera xanthii)*

- Early stages of infection are difficult to see; look closely
- Basal leaves in the interior of the plant typically show symptoms first
- Subtle yellowing of leaves, sometimes with gray spotting, is observed

- Infected leaves become necrotic (tan in color) and die over time
- Center of the plant becomes bare
- White, talcum-like fungal colonies may or may not be visible on leaves, stems or flowers

Background on Powdery Mildew

Powdery mildew on calibrachoa was first observed about seven years ago and the frequency of this disease appears to be increasing each year. The powdery mildew (*Podosphaera xanthii*) infecting calibrachoa can be easily transferred to or from cucumber, squash and verbena. Attempts to inoculate petunia have not been successful. However, there are two additional powdery mildew species that have been identified on calibrachoa in Germany (one that also infects tomato, and one that can also infect petunia and verbena). Both of these powdery mildews species do occur in the U.S., but have not been reported on calibrachoa (to date).

Powdery mildews produce an abundance of spores that are easily dispersed by wind and air currents. The pathogen also produces a sexual spore that allows it to survive over the winter in crop debris. The movement of this pathogen from agricultural fields to greenhouse production could have important implications in the successful management of *P. xanthii* on greenhouse ornamentals.

Application of fungicides is the principal practice for managing powdery mildew on cucurbit crops, but successful control is being challenged by the development of resistance to key fungicides. Cucurbit-infecting powdery mildew strains have been detected with resistance to as many as four classes of fungicides. This means that fungicide-resistant populations pose a similar threat to successful control of powdery mildew on calibrachoa in the greenhouse.

Cultural practices to manage Powdery Mildew

- Frequently and carefully scout crops, especially the lower, interior leaves
- Increase spacing between plants to lower humidity in the canopy
- Free water inhibits powdery mildew, so cuttings under mist may not be as likely to become infected and/or exhibit symptoms
- Adhere to a strict fungicide spray schedule and have a program in place of what to apply and in what sequence

Chemical management of Powdery Mildew

Alternate between systemic fungicides with different modes of action and apply with a protectant fungicide (Daconil) in order to delay resistance.
Suggested rotation:

- 1st spray: Eagle (Nova), Trinity or Terraguard + Daconil
- 2nd spray: Pageant (Pristine) + Daconil
- 3rd spray: Compass + Daconil

Note: Sulfur pots can be quite effective for managing powdery mildew in the greenhouse.

Black Root Rot Signs and Symptoms. Plants may wilt under heat stress, roots appear black, roots washed free of substrate have black lesions and/or root tips. Rotted crown and lower stem appears black. Thick-walled, black chlamydospores in root tissue.

Black Root Rot *(Thielaviopsis basicola)*

- Plants may appear to have a nutritional deficiency (chlorosis)
- Plants are typically stunted and fail to grow
- Roots of plants infected at the plug stage are less likely to grow out of the root ball once transplanted
- Roots and root tips may appear black (wash roots to observe)
- Eventually the entire root system may appear black
- Plants may wilt, especially under heat stress
- Infected crown and lower stems may appear black in color and rot
- Plants are often infected with both Pythium and Thielaviopsis

Cultural practices to manage Black Root Rot

- Clean floors and surfaces in the potting area to remove old substrate. Pre-rinse and disinfest benches and potting lines with 1:50 dilution of ZeroTol
- Use new trays and pots if possible; avoid using old flats unless they've been steamed or disinfested by pre-rinsing in water and then soaking in fresh 10% bleach or 1:50 dilution ZeroTol for a minimum of 10 minutes
- Maintain substrate pH within the range of 5.4 to 5.8, which is optimum for growing calibrachoa
- Monitor fertility to avoid stressing plants; a stressed plant is a more susceptible plant
- Careful water management to avoid:

1. Long periods of saturated substrate
2. Hard dry downs or wilts

- Control fungus gnats, which can move the pathogen around the greenhouse
- Preventive fungicide drenches
- lRoot rots can look similar: get a lab diagnosis for confirmation

Chemical management practices for Black Root Rot

Preventive fungicide applications are the most effective, as it's very difficult, if not impossible, to reverse a root rot problem once it has started.

- Rooting stations: Drench rooted cuttings about 18 days after sticking when roots are well-developed

- Finish growers: Drench transplants immediately after transplanting
- Thielaviopsis control: Drench with thiophanate-methyl

Cleary 3336 50WP or OHP-6672 50W: Apply 12 oz./100 gal; retreat in 21 to 28 days
In Canada: Senator 70WP apply 850 g/1,000 L; retreat in 21 to 28 days

- lPythium and Phytophthora control: Drench with etridiazole

Terrazole 35WP apply 10 oz./100gal; retreat in 28 days

In California: Terrazole CA apply 6 oz./100 gal; retreat once in 30 days. May only be used if a Pythium or Phytophthora metalaxyl-or mefenoxam-resistant isolate is documented.

California alternative: Subdue MAXX 22%EC apply 1 fl. oz./100gal; retreat in six weeks

In Canada: Truban 30WP apply 900 g/1200L, retreat in 28 days

List of Fungicides and FRAC codes for Powdery Mildew fungicides

- Daconil Weatherstik (chlorothalonil) = Daconil 2787 in Candada (FRAC code M5 protectant)
- Eagle (myclobutanil) = Nova in Canada (FRAC code 3)
- Trinity (triticonazole) in U.S. only (FRAC code 3)
- Terraguard (triflumizole) in U.S. only (FRAC code 3)
- Trigo (triadimefon+trifloxystrobin) in U.S. only (FRAC code 3+11)
- Pageant (boscalid + pyraclostrobin) = Pristine WG in Canada (FRAC code 11+7)
- Compass (trifloxystrobin) = Compass 50 WG in Canada (FRAC code 11) **GT**

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