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Are Recent Rains Holding Up Your Bedding Crops? Time To Consider Fungicidal Treatments!

May and early June has been unusually wet for most of the eastern United States. The frequency of rain events has put holds on site finishing, and hence installation of bedding plants. Quite a few greenhouse producers wind up holding these contracted plants outdoors, or plants are stored in holding areas owned by the landscaper. Of greatest concern to the bedding plant producer is the returns and complaints that occur as these plants are damaged by the delay. As days of wet weather go by, plants become more susceptible to plant diseases, including root and aerial blights caused by *Pythium*, *Phytophthora*, and *Botrytis*. Saturated soil, high humidity and the inevitable early summer warm up of day and night temperatures favor disease development. It is important that growers and landscapers coordinate how they address this situation. Protective fungicide applications can help reduce disease problems. Once symptoms of disease are present, fungicides will not cure infected and plants. Symptomatic plants should be discarded, rather than planted. Remember that adjacent plants may be infected.

Saturated soils favor *Pythium* root rot. *Pythium* is a “water-mold” pathogen that infects root tips. *Pythium* is a fungal-like, Oomycete pathogen that produces a motile spore (zoospore) that can swim in water. The spores are attracted to Infection causes root discoloration, softening, and disintegration (Figure 1). One diagnostic characteristic of *Pythium* infection is the sloughing of the root cortex away from the inner stele when roots are gently pulled (Figure 2),

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Often the first symptom seen with *Pythium* root rot is off-color, wilting plants (Figure 6). Multiple species of *Pythium* cause root disease on bedding plants. The most common species are *Pythium aphanidermatum*, *P. irregulare*, and *P. ultimum*. *Pythium* infection can be reduced through fungicide drenches.

Fungicide efficacy can vary among *Pythium* species. In general, fungicide drenches of etridiazole (Truban, Terrazole, Banrot), mefenoxam (Subdue Maxx), and fosetyl-Al (Aliette) are effective against *Pythium*. Repeated use of mefenoxam for *Pythium* control has resulted in fungicide resistance development. If you are seeing control failure, then it is possible that the *Pythium* population is resistant, and a different fungicide should be used. Other fungicides including fenamidone (Fenstop), pyraclostrobin + boscalid (Pageant), fluopicolide (Adorn), and cyazofamid (Segway) also provide good *Pythium* control depending upon disease pressure and species.

Phytophthora root and aerial blights are also a concern, especially on annual vinca and petunia. *Phytophthora* is also a “water-mold” similar to *Pythium*. Wet conditions favor *Phytophthora* infection. There are several species of *Phytophthora* that affect bedding plants, with *Phytophthora nicotianae* being the most common and damaging. In addition to causing root and crown rot, *P. nicotianae* can also cause

an aerial blight that results in stem cankers and death of plant shoots (Figure 3). Splashing water spreads the pathogen spores to adjacent foliage and plants. Control relies on prevention! Protective fungicide drenches can help reduce *Phytophthora* infection.



Figure 1. *Pythium* starts out as off-colored roots and quickly spreads to the entire root system. The roots discolor and eventually die and disintegrate. When a root system looks like this, it will be unlikely the plant will recover.



Figure 2. “Sloughing” of a root infected with *Pythium*. The outer root cortex strips off, leaving the thinner vascular tissue. Photo credit Anissa Poleatewich, Univ. of New Hampshire.

The same fungicides that help protect against *Pythium* also reduce *Phytophthora* infection with some variation. Etridiazole is excellent on *Pythium*, but is not as effective on *Phytophthora*. Other fungicides are more effective on *Phytophthora* than *Pythium*, including fosetyl-AI (Aliette) and other phosphorous acid derivative fungicides (Alude, Vital, K-Phite, etc.), cyazofamid (Segway), pyraclostrobin + boscalid (Pageant), fluopicolide (Adorn), and oxathiapiprolin (Segovis).



Figure 3. These vinca are collapsing from a significant infection of *Phytophthora* and are not salvageable.

Botrytis is another fungal pathogen that can become a bigger problem when plants are held and flowers and lower leaves begin to senesce. *Botrytis* infection is favored by moist and humid conditions. Symptoms of *Botrytis* infection can include flower spotting and rapid decline, zonate leaf lesions, and stem cankers that can result in plant collapse (Figure 4). A profuse amount of gray-colored spores is produced on the

infected tissues that are easily spread by wind or water splashing. Removal of senescing tissues can reduce *Botrytis* infection and spread. Protective fungicide applications can also help reduce infection. There are numerous fungicide labeled for *Botrytis* management, including fenhexamid (Decree), chlorothalonil (Daconil), iprodione (Chipco 26019), cyprodinil + fludioxonil (Palladium), pyraclostrobin + boscalid (Pageant), polyoxin D zinc salt (Affirm), and fludioxinil (Medallion). Several of these fungicides can cause phytotoxicity when applying to plants in bloom. Chlorothalonil can discolor blooms. Pageant (pyraclostrobin + boscalid) can discolor impatiens and petunia blooms. Several others can cause stunting and phytotoxicity on impatiens, New Guinea impatiens, ferns, Pothos, or some geranium cultivars.



Figure 4. The initial signs of *Botrytis* on Calibrachoa flowers. Continued exposure to rain and flowers staying wet at night will spread the infection quickly if not treated immediately.



Be sure to read all fungicide labels and follow directions for rates and use precautions. Apply no more than two applications of a fungicide before rotating to a fungicide with a different mode of action (different numerical FRAC code on the label) to reduce fungicide resistance development.

In the southeast, May is usually our driest month. It has been the wettest on record in many areas. Given there is no assurance this wet pattern won't continue, both producers and landscapers should consider altering plant spacing to increase air flow.

Serious consideration of the final mid-summer size of the plant should be taken and planned for accordingly. Commercial producers of bedding plants may want to apply one last application of fungicide as part of a preventative program to reduce problems in the future.

More information can be found at:

What Is Swimming Around Your Roots?
(https://e-gro.org/pdf/2018_307.pdf)

Pythium Problems (https://e-gro.org/pdf/2017_608.pdf)

Oh Bother, Botrytis Again? (https://e-gro.org/pdf/2016_507.pdf)

Botrytis Taking the Big Image Approach to Preventing This Common and Avoidable Disease (https://e-gro.org/pdf/2015_432.pdf)



Figure 5. High temperatures and relatively high humidity for long periods of time allows botrytis to grow quickly on dead or dying leaves. Sanitation when handling wet bedding crops and preventative treatment programs applied prior to the staging event can reduce the spread.



Figure 6. Rapid wilting plants despite the crop being rain soaked is a pretty good indication the root system may have been compromised by disease. Inspect the roots immediately and treat all surrounding plants if staged in a group. Remember that soil-borne root disease are spread by water, and adjoining plants are very likely to become infected.

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