Pythium

Solution Sheet

The Problem

Diseases caused by Pythium are widespread throughout the ornamental industry. Almost every ornamental tree and shrub, bedding plant, foliage crop, and grass species is susceptible to Pythium at some point in their life. Geraniums, poinsettias, snapdragons, and grasses are especially susceptible. Pythium is especially common on germinating seedlings, causing considerable losses due to damping off. Additionally, Pythium root rot can persist throughout all stages of crop production, attacking the fine feeder roots, inhibiting the plant's ability to take up nutrients and water, resulting in stunted growth and delayed flowering.

Pythium is a water mold and more closely related to algae than to fungi. Other closely related pathogens include downy mildews and Phytophthora. Some isolates of Pythium are aggressive and can cause crown rot and rapid plant death, so quick action is needed once the disease is identified. The spores of Pythium are capable of spreading long distances in the wind and windblown rain, but the pathogen is routinely introduced into greenhouses and nurseries by contaminated stock plants, media or irrigation water. Once introduced, inoculum can spread by splashing irrigation water and through cultural practices such as potting, pruningand handling plant material.

What to Look For

Detecting Pythium early is critical. Preemergence damping off occurs below the soil where Pythium attacks the root or hypocotyl as it is emerging, and results in poor stands. Post-emergence damping off causes root decay and rotten, discolored stems at or near the soil line. Affected seedlings often appear shriveled, brown, collapsed, or stunted. Sometimes sporulation occurs on diseased tissue and appears white to grey.

Plants infected later in production often appear stunted and develop slower than healthy plants. The leaves appear chlorotic (yellow) and may show signs of nutrient deficiency and wilt, especially during the heat of the day. Plants with Pythium root rot will likely not respond to fertilizer and should be examined and tested for the disease. Infected roots appear discolored (brown to black) and water-soaked. Often, when pulling on affected roots, the outer layer readily peels away from the root, as opposed to snapping or breaking, and leaves behind a bare strand of tissue.
Under favorable disease conditions, Pythium can move upward in the plant, further rotting the stem and crown.

Pythium inoculum can increase from undetectable to high levels within a few days under the right environmental conditions. This is due to the rapid and massive production of sporangia and zoospores from infected plant tissues when free moisture is present, often leading to disease outbreaks very quickly, sometimes literally overnight.
The spores of Pythium can spread readily in the wind, so it can be naturally introduced into the greenhouse or nursery. Windblown rain that contains spores of the pathogen and splashing water from overhead irrigation often contribute to outbreaks of Pythium. A further complication is that Pythium can produce oospores, another type of spore that can remain viable for years. To have samples tested for confirmation of disease, consult your local county extension service for recommended diagnostic facilities in the given area.

Favorable Conditions

Wet conditions ultimately favor Pythium, so the presence of free moisture and water-saturated conditions are the most important environmental factors. Temperatures that are not favorable for plant growth tend to favor development of disease. Some Pythium species thrive and cause disease at high temperatures (>86°F), while others grow well at low temperatures (< 60°F). These temperature preferences determine which species are problematic in the greenhouse or nursery at different times of the year.

The Solution

Maximize sanitation practices in the production areas of the nursery or greenhouse. Carefully inspect plugs or newly introduced plant material and reject if any symptoms are present. Clean and remove soil from walkways and beneath benches, and sanitize hard surfaces in the growing area with disinfectants. Remove all diseased plant tissue and dispose offsite.

Taking a preventative approach with fungicide applications is highly recommended. Many fungicides are currently labeled for use on ornamentals for controlling Pythium. Due to a high potential for resistance, it's very important to rotate fungicides from different chemical classes. The Envu ornamental portfolio for Pythium includes four different fungicides from three FRAC groups.Aliette® (FRAC Group P07) and Banol® (FRAC Group 28) each provide excellent control. Broadform® (FRAC Group 7 + 11) and Compass® (FRAC Group 11) also provide Pythium control, but offer additional broad-spectrum disease activity against other fungal pathogens, making for excellent rotation options. When applying any pesticide, always refer to the manufacturer's label for recommended rates and application intervals.

Example Rotation Program for Managing Pythium

Week	Trade Names	FRAC Group	Activity	Application Foliar/ Drench	Rate per 100 gal	Notes
1	Banol®	28	Contact	D	20-30 fl. oz	Begin rotation of cuttings and any pythium-prone plants with Banol. Can substitute Terrazole at this point for a lower cost option, or Adorn
2	Aliette®	P07	Systemic	F, D	2.5-5 lb	Aliette is best applied as a sprench. It is the only completely mobile (amphimobile) fungicide and will translocate throughout the plant. Do not use within 2 weeks of copper or chlorothalonil.
3	Terrazole® L or Terrazole® WP	14	Contact Systemic	D	2.5-7 fl oz 3.5-10 oz	Unique MOA for downy mildew control. Apply sprays in sufficient water to provide coverage.
4	Segway® SC	21	Contact Systemic Translaminar	F,D	1.5-3 fl oz	Unique MOA for downy mildew control. Apply sprays in sufficient water to provide coverage.

*Broadform is included to broaden efficacy and provide protection from other leaf spot pathogens that may be present (i.e. Alternaria, Anthracnose, Botrytis, Cylindrocladium, Fusarium, Myrothecium and powdery mildew). Other products to consider as a tank mix or rotation include Aliette® (FRAC P07), Subdue Maxx® (FRAC Group 4), Empress Intrinsic (FRAC Group 11).

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