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For hydroponic growers, a waterborne pathogen can signal the death of an entire crop. How do you deal with these ruthless killers? Begin with proper identification, move to a healthy dose of preventative measures and then finish them off with the proper treatment procedures.
THE WATERBORNE ULTIMATUM

The best way to interact with a waterborne pathogen is, well, not to. Unfortunately, and inevitably, these ruthless killers will rear their ugly heads at some point in many growers’ careers. When a waterborne pathogen has got your plants by the pistils, you’ll need to act fast to have a shot at restoring their good health. Severe plant diseases caused by waterborne pathogens, such as pythium, phytophthora, fusarium and rhizoctonia, usually bring with them some tell-tale signs an observant grower can watch for.

COMMON DISEASES

Damping Off
Damping off occurs when a part of the plant begins to rot. This disease is most common in seedlings and clones. If you’ve ever had a seemingly healthy young plant suddenly collapse at the base near the surface of the grow media, it likely fell victim to damping off. In older plants, the rot may spread to other areas, such as the stems or roots.

Root Rot
Pythium, which induces root rot, is the most widespread pathogen in hydroponics. In some cases, it is used as a general term to refer to any number of fungal, bacterial or viral infections causing visibly severe plant stress. What makes pythium so formidable is that it can survive on very little sustenance for long periods of time. Some types of pythium can survive on dead and decaying organic matter in soil for a year or more. This makes it particularly important for soil farmers to stay vigilant between crops and take necessary measures to cleanse grow media before introducing new, healthy plants into the environment.

While it can hang around uninvited for long periods of time, root rot is slower to spread in a soil setting and tends to remain more isolated in a limited space. The soil can also act as a barrier, trapping bad bacteria in the inner-workings of the soil mix. In hydroponics, the spores will move and spread as the water moves around the entire system. Symptoms of root rot include yellowing leaves, stunted growth, leaf curling, wilting and, most obviously, browning of the roots. The roots may also be soft, squishy and lacking in root hairs instead of thick and firm with a substantial mass. Some root rots will get so severe, the disease will travel up the spine of the plant, eventually splitting it down the middle and causing it to collapse.

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Keeping the grow space free and clear of dead or decaying matter, as well as any and all pests, will also reduce the transfer rate and survival of pathogens.

Vascular Wilt

Certain fungal pathogens attack the vascular systems of plants, preventing them from moving adequate supplies of water and nutrients to different areas as needed. Several species of fusarium are notorious for inducing vascular wilt in their hosts. Yellowing, premature leaf drop and wilting are common signs of vascular wilt. Your plants will continue to deteriorate until they eventually die if left untreated. Discoloration of the vascular system is the most distinguishing feature of this disease.

PREVENTATIVE PROCEDURES

Many pathogens originate from contaminated soil since that is where they are best able to feed in between growth cycles, lying in wait for their next host. This doesn’t negate the possibility that these invaders will make their way into a hydro system and wreak havoc. For cuttings rooted in soil, it is important to sterilize them prior to transplanting so as not to carry a potential pathogen from one environment to another. Natural water sources that may have come into contact with soil along the way, such as river or stream water, will also need to be properly treated before irrigating.
These diseases thrive in warm, moist conditions as a result of overwatering, warmer temperatures and higher humidity levels. Increasing dissolved oxygen levels through proper aeration and maintaining cooler water temperatures helps inhibit these diseases. Maintaining an efficient drainage system through the use of breathable media is also key to allow the oxygen to reach plant roots. Keeping the grow space free and clear of dead or decaying matter, as well as any and all pests, will also reduce the transfer rate and survival of pathogens.

**TREATMENT AND CONTROL**

**In a Sterile Environment**

Hydroponic growers need to be prepared for mass devastation should a strong pathogen enter the environment. Because of this high risk factor, many hydroponic growers maintain a sterile environment at all times, rather than waiting to respond to an issue. Sterilizing agents such as hydrogen peroxide and hypochlorous acid are commonly used for this reason. Hypochlorous acid is recognized as a safe, non-toxic water additive that helps make the growing environment unsuitable for pathogen development. Higher dosages of these chemicals may be administered when trying to avert a disease that has already made itself at home in your growroom. In severe cases, a fungicide might even be necessary.

**In an Organic Environment**

If you’re growing organically, treatment and control of unwanted bacteria and foreign organisms becomes trickier. Because the organic environment is inundated with bacteria, you must be skilled in monitoring how the bacteria interact with and affect the crop. Beneficial microbe species are commonly used as biocontrol agents against harmful pathogens. Several strains of trichoderma, for example, are highly effective against many different pathogenic micro-organisms, including pythium and fusarium. The mode of action that certain beneficials employ varies depending on the crop, their competition and various other circumstances:

**Competition** — When a larger, stronger micro-organism competes for resources with other micro-organisms in the environment, the weaker of the two is unable to survive. If the bad bacteria cannot sustain themselves with the proper nutrients to survive, the beneficial microbes will consume the available nutrients in this limited-resource environment and the bad bacteria will starve and subsequently die off.

**Parasitism** — One of the most popular ways organic growers combat harmful pathogens, parasitism is where antagonistic bacteria are introduced into the system to directly target and attack the bad bacteria.

**Antibiosis** — Antibiosis occurs when a host or micro-organism produces and secretes secondary, toxic byproducts that are harmful to other potentially harmful bacteria living in the same environment. The producer of these chemicals remains unharmed, but will weaken or even kill the pathogenic micro-organism.

While the best way to deal with a waterborne pathogen is to ensure you don’t have to in the first place, there are options to try before writing off your crops. It’s all about identifying the problem, deploying a few disease suppression tactics and then following up with the right treatment protocols.