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Bacterial Blight of Geranium

By: Karen Rane, UMD Plant Diagnostic Lab

We recently received samples of zonal geranium showing the classic symptoms of bacterial blight, caused by *Xanthomonas hortorum* pv *pelargonii* (Xhp). Plants were somewhat stunted compared to uninfected plants, with wilted leaves and wedge-shaped brown lesions (Figure 1). Infected plants eventually collapsed and died. We examined the petioles of wilted leaves under the microscope, and observed large amounts of bacteria oozing from the vascular tissue. We isolated *Xanthomonas* from the streaming vascular tissue to confirm the diagnosis.

This disease can be spread through propagation of infected stock plants, as well as through splashing water. Infection from bacterial spread by splashing irrigation water often results in a leaf spot symptom in addition to wilting and plant collapse.

This disease can also occur on ivy geraniums, causing leaf spots, loss of leaf turgor and eventual death of infected plants. The same bacterial pathogen also causes leaf spots (but not vascular wilting) on perennial cranesbill (*Geranium* sp.). Because symptoms of bacterial blight can resemble those of other diseases, such as Pythium root rot or southern bacterial wilt caused by *Ralstonia solanacearum* Race 3 Biovar 2 (a federally quarantined pathogen), it's important to get a laboratory diagnosis of wilting geraniums to confirm the cause. [Agdia, Inc.](https://www.agdia.com/) produces an Immunostrip quick-test for Xhp that can assist growers in scouting.

There is no cure for bacterial blight in geranium. Management involves roguing out and destroying diseased plants as well as those surrounding the diseased plants in case they are infected but presymptomatic. Removing any plant debris (such as fallen leaves) and sanitizing benches, tools, pots and flats with a greenhouse disinfectant are also important practices aimed at eliminating the pathogen.



Bacterial blight of geranium

Photo: Nancy Gregory, University of Delaware, Bugwood.org

Disinfecting a Greenhouse

By: Stanton Gill

There are several products on the market for cleaning and disinfecting floors, benches, and greenhouse flats. Controlling algae has always been a major issue in greenhouses. It is an important activity for several reasons. Over the years, some companies have brought products to the market for cleaning, disinfecting, and algae management. In general, the cleaners combine sulfuric acid or caustic soda (lye) plus detergents and wetting agents. The disinfectants and algaecides utilize quaternary ammonia compounds or hydrogen peroxide plus peroxyacetic acid (H₂O₂ +PAA), or a stabilized hydrogen peroxide. These products seem to be fairly effective in cleaning and disinfecting greenhouse floors and walkways. Products such as Sanidate 5.0 GreenClean PRO, Strip-It PRO and Kleengrow are often used by growers to clean, disinfect, and kill algae in greenhouses. Keep in mind that none of these products are labeled for insect control. Such use would be in violation of E.P.A. registration rules. Also note that disinfectants are classified as pesticides and must be registered with the E.P.A. However, the steps of cleaning to remove visible soil followed by use of an effective algaecide and/or disinfectant can impact pest populations by removing hiding places and food sources.

Gretchen Pettis, PhD, Principal Entomologist for BioSafe Systems, provided the following comments on facility cleaning and disinfection:

“BioSafe Systems has not pursued an insecticidal label for GreenClean PRO even though we often see significant reductions in insect pests such as thrips, fungus gnats, and shore flies after use. Instead, we choose to discuss this product as the algaecide/fungicide/bactericide that it is. We emphasize to clients how cleaning and disinfection play a significant role in the reduction of food and harborage for pests, thereby reducing insect populations. For complete disinfection of the greenhouse and all its surfaces we recommend a two-step process: GreenClean Alkaline Cleaner to emulsify and remove organic matter (seen and unseen), followed by the no rinse Sanidate 5.0 application as a spray or foam. GreenClean PRO, a granular product, can be spread on floors for almost instant algae control if you don't have the time or ability to follow the two-step process.”

Product Name	Active Ingredient (s)	Product Type	Formulation	Made By
GreenClean Pro	Stabilized hydrogen peroxide	Sulfuric acid plus detergent(s)	granular	BioSafe Systems
GreenClean Alkaline Cleaner	Caustic soda (lye) plus detergent(s)	Heavy-duty alkaline cleaner	liquid	
Sanidate 5.0	Hydrogen peroxide, peroxyacetic acid	Sanitizer/ Disinfectant/ Virucide	liquid	
Kleengrow	Quaternary ammonia	Algicide/Fungicide/ Bactericide/ Disinfectant/ Virucide	liquid	Pace
Strip-it PRO	Sulfuric acid plus detergent(s)	Heavy-duty acid cleaner	liquid	

Re-Using Containers: Be Cautious!

By: Karen Rane, UMD Plant Diagnostic Lab

Growers that are considering re-using plastic containers need to take steps to minimize potential problems. Avoid re-using containers from plants that had disease problems. Root rot pathogens such as can survive in root and potting medium debris that clings to used containers, causing disease in the new crop if not cleaned properly. *Berkleyomyces* sp. (formerly called *Thielaviopsis*), the fungus that causes black root rot, can be difficult to completely eradicate from containers, so it's best to use new pots and plug trays when planting highly susceptible crops like pansy. All used containers, regardless of the disease status of the previous crop, should be thoroughly washed to remove all organic debris before treatment with a disinfectant - disinfectant products labeled for cleaning pots, benches and tools work best on clean surfaces, and do not kill pathogens embedded in organic debris.

There are a number of products labeled for sanitizing greenhouse surfaces that contain either quaternary ammonium salts (such as GreenShield, Kleengrow or Physan 20) or hydrogen dioxide (such as Zeritol or SaniDate) as active ingredients.

It's important to follow all label instructions for rates, duration of exposure and crop sensitivity. Remember, these products do not have any residual activity so treated pots and flats need to be stored properly to avoid soil contact prior to use. For more detailed information on greenhouse sanitation, including cleaning pots, check out this fact sheet from the University of Massachusetts - <https://ag.umass.edu/greenhouse-floriculture/fact-sheets/cleaning-disinfecting-greenhouse>



Figure 1. Containers stacked for re-use. All soil and debris in the pots must be washed out before treating with a disinfectant. Once cleaned and disinfected, containers should be stored inside, not in contact with soil to avoid recontamination. Photo: K. Rane

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Read labels carefully before applying any pesticides.

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