Bacterial Diseases on Geranium

Introduction
Some of the bacterial diseases that may occur on geraniums include bacterial blight, ralstonia wilt, pseudomonas leaf spot and bacterial fasciation. The use of culture indexed plant material and increased sanitation efforts to prevent *R. solanacearum* (Race 3, biovar 2) into the US has helped greenhouse growers prevent bacterial diseases on geraniums.

Bacterial Blight of Geraniums
Bacterial blight of geraniums caused by *Xanthomonas hortorum* pv. *pelargonii* can infect zonal geraniums (*Pelargonium x hortorum*), ivy geraniums (*Pelargonium peltatum*), Regal or Martha Washington geraniums (*Pelargonium domesticum*), and cranesbill geranium (*Geranium sanguineum*). Symptoms vary depending upon the species or cultivar of geranium affected and environmental conditions. Warm temperatures favor bacterial diseases such as *Xanthomonas*. Symptoms can develop in as little as seven days at 81° F but may develop in three weeks at 60 ° F. Temperatures below 50◦F or above 90◦F may prevent development of symptoms. The bacterium can spread on infected tools, and splashing irrigation water.

Xanthomonas can cause tiny, round, water-soaked, brown leaf spots that are less than 1/4 inch in diameter. These spots develop first on the leaf undersides and later become visible on the upper leaf surface. Yellow to brown v-shaped wedges may develop on the leaves that could be confused with Botrytis blight. Leaves may wilt down, with the petiole remaining turgid, giving an "umbrellalike appearance". The affected leaves may drop off immediately or hang onto the plant for a week or so. Although the leaves wilt, the roots remain healthy.


Figures 1 & 2: Bacterial Blight on Geraniums. Photos by L. Pundt

Figures 3 & 4: Bacterial Blight on Geraniums. Photos by L. Pundt

Ivy geraniums are very susceptible to bacterial blight, but infected plants do not develop very distinctive symptoms. Infected plants may be off-color resembling a nutrient deficiency symptom or two-spotted spider mite feeding damage.

Avoid placing ivy geranium hanging basket crops over bench or floor grown zonal geraniums to eliminate potential disease spread as water drips unto susceptible zonal geraniums below.

Specific management strategies include the use of culture-indexed cuttings, avoiding overhead watering, and keeping planting stock from different suppliers separate. Do not grow ivy geraniums above zonal geraniums and do not grow cranesbill geraniums (*Geranium sanguineum)* near greenhouse crops. Inspect plants frequently for symptoms. Discard any plants showing symptoms and plants within 3 ft from infected plants, or the water splash area. If you suspect that you have infected plants, you can test incoming plants using an Agdia ImmunoStrip test kit specific for Xanthomonas or send samples to a university plant diagnostic clinic.

Ralstonia solanacearum

R. solanacearum has a wide host range, attacking up to 200 plant species in 33 different plant families. The bacterium can be divided into different races and biovars based upon their host range, and specific properties. Race 1 is commonly found in the southern United States and has a wide host range including impatiens, marigolds, zinnia, salvia, tomatoes, peppers, and petunia. Race 3 is tropical and does not naturally occur in the US. *R. solanacearum* (race 3, biovar 2) is an exotic pathogen, causing brown rot in potato, a major threat to US agriculture. It is regulated under federal quarantine.

When geraniums are infected with *Ralstonia*, lower leaves may wilt, turn yellow and drop off the plant. Sometimes, plants may be infected and show few if any

symptoms. *Ralstonia* is not spread as readily as *Xanthomonas* by splashing water, so no leaf spots occur. *R. solanacerium* is a soil borne pathogen, entering the plant thru the root system causing a vascular wilt. High temperatures (80 to 90 ◦F) and high soil moisture favors this disease. *Ralstonia* spread through the irrigation water, for example, in a sub irrigation system, from one plant's root system to another plant's root system. Under cool conditions, infected plants may not show any visible symptoms.

Pseudomonas Leaf Spot
Pseudomonas leaf spot caused by *Pseudomonas cichorii* develops water-soaked spots from ¼ to ½ inch in diameter. These dark brown to black spots are sometimes surrounded by a yellow halo. Warm temperatures, high relative humidity and water splash favor this disease. Purchase pathogen free cuttings keep leaves dry and discard infected plants.

Bacterial Fasciation
Bacterial fasciation is caused by *Rhodococcus fascians*. Symptoms include short, thick, fleshy leafy galls especially at the plant crown. Symptoms might be confused with a plant growth regulator overdose or herbicide drift. This bacterium survives in live plants or infested soil. It does not require a wound to enter the plant. Management includes the purchase of culture-indexed plants and removal of any infected stock plants and infested media. Bactericides are not effective. Never propagate from a plant showing symptoms of leafy gall or fasciation. The main source of infection is propagation from infected stock plants.

Management of Bacterial Diseases
Good sanitation practices are essential!

- Obtain culture-indexed cuttings from a reliable propagator
- Do not grow ivy geraniums hanging baskets above zonal geraniums
- Keep seed geraniums separate from vegetatively propagated geraniums
- Keep orders from different suppliers and/or locations separate
- Keep newly arrived plant material in a separate quarantine area for 10 to 14 days
- Keep plants from the same shipment in the same greenhouse (as much as possible)
- At the end of the season, do not hold over any plants
- Rake up any debris, as some of the bacteria can survive in dead leaves'
- Thoroughly disinfest your greenhouse including floors, walls, benches, and walkways.

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