



BACTERIAL BLIGHT OF ANTHURIUM

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Introduction

Bacterial blight of anthurium was first observed on the island of Kauai in 1971. In 1980, a new outbreak of the disease was reported on the islands of Oahu and Hawaii. This new outbreak was of major economic importance because the majority of commercial anthurium farms are located on the island of Hawaii. Since then, the disease has been diagnosed from backyard plantings and from small and large commercial farms throughout the islands of Oahu, Hawaii, and Kauai.

The Causal Bacterium

The bacterium has been identified as *Xanthomonas campestris* pv. *dieffenbachiae* (syn. *X. dieffenbachiae*). The bacterium can cause disease in anthuriums by entering natural openings such as hydathodes and stomata or through wounds. Since bacteria multiply and move best in water, the disease and its symptoms are more severe during warm, wet weather conditions usually found in commercial anthurium fields on Hawaii. The disease is called blight because of the rapid killing of plant tissues.



Figure 1. Characteristic early foliar blight symptoms. Water-soaked spots occur on the underside and along margins of leaves.

Symptoms

There are two main types of symptoms caused by the bacterium. The first type is the foliar or leaf symptoms that occur when infection begins in the leaf or spathe. The second type is the systemic or vascular symptoms that occur when the bacterium becomes established in the stem and spreads to other parts of the plant. Infection of the spadix with symptoms resembling anthracnose has been found to occur naturally and has been reproduced in the laboratory but is not common in field situations.

Foliar symptoms usually start at or close to the leaf margins on the underside of the leaf where stomata are most numerous. They usually begin as a slight yellowing with water-soaked spots that later become necrotic (Fig. 1). These water-soaked spots may not appear during dry weather, beginning instead as small brown spots. As the disease progresses, more leaf tissue is killed and the large, irregular, brown area is surrounded by a bright yellow border (Fig. 2). If the infected leaves are not removed, the bacterium will move down the petiole into the stem and will manifest itself in the systemic stage.



Figure 2. Advanced foliar blight with necrotic areas surrounded by a bright yellow margin. The spread of the bacterium in the leaf is characterized by a lighter, diffused yellow area.



Figure 3. Yellowing of leaf on a systemically infected plant.



Figure 4. An advanced systemically infected plant with the growing point killed. Petioles often rot at the base and fall off prematurely.

Systemic or vascular infections usually appear first as a general yellowing of entire leaf blades of older leaves (Fig. 3). This is because the bacterium has become established in the vascular system; since water, mineral nutrients, and food cannot translocate to or from these leaves, they die. The petioles of these leaves and systemically infected flowers break off readily from the stem (Fig. 4). In some cultivars, the leaf and spathe petioles abscise or fall away from the stem so rapidly that the leaf blades may not turn yellow. The bases of these petioles have distinct brown spots (Fig. 5) when removed from the stem or thin brown lines or streaks when the petiole is cut lengthwise. This dark discoloration corresponds to the infected vascular bundles in the petiole and can also occur in the stem and leaf veins. Eventually, the leaf sheaths, the newly emerging leaf and flower buds, or the entire plant is killed.

Systemic infection may sometimes resemble foliar infection. This occurs when the bacterium moves upward from the vascular system in the



Figure 5. A rapid test to determine if plants are systemically infected. Break off a petiole from an older leaf with or without foliar symptoms and examine the petiole base or the leaf scar on the stem. Systemically infected petioles will break off easily and have numerous discolored vascular bundles (left); petiole from a healthy plant (right).

stem into the leaf blade. In this case, water-soaked spots will occur near the main veins near the center of the leaf (Fig. 6). As the disease progresses, it will look very similar to foliar blight. Remember, however, that with foliar blight, the spots usually start at the leaf margins. Plants with systemic infection in the stem, petioles, leaves, and spathes have very high bacterial populations and usually die. If you determine that a plant has a systemic infection, remove the entire plant; do not try to save the plant by removing yellow leaves or systemically infected leaf blades.

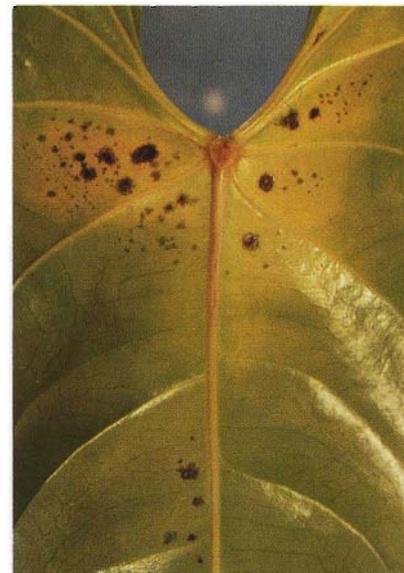


Figure 6. A young leaf with water-soaked and necrotic spots near the point of attachment and along major veins as a result of the bacterium moving up from the stem through the petiole and into the leaf.

Host and Pathogen Variability

Only Kansako red in a mixed planting was affected in the 1971 outbreak. The disease was limited to the leaves and spathes, causing blight and defoliation. Subsequent outbreaks on Oahu, Hawaii, and Kauai, however, have affected most commercial anthurium cultivars. Young plants, especially small seedlings and tissue-cultured plantlets in community pots, appear to be extremely susceptible to the blight.

There are at least two strains of the bacterium; each strain can cause both foliar and systemic infections. Foliar infections are severe on Ozaki, the most widely grown commercial cultivar. Foliar infections seem relatively less severe on other cultivars.

Although certain cultivars seem more susceptible to systemic infections, Kansako red has not been one of them. This may be the basis for the absence of systemic infection in the 1971 outbreak. Alternatively, new, more virulent strains of the bacterium may have developed since 1971. Severe vascular infection has been observed in such commercial cultivars as Marian Seefurth, De Weese, Hawaiian Butterfly, Brown, Blush, Splash, many obakes, and to a lesser degree Kozohara, Ozaki, Nitta, and Kaumana. Because of systemic infections, bacterial blight of anthurium is a very serious disease that the anthurium industry has to deal with.

Other natural hosts on which this bacterium has been reported are *Aglaonema robelinii*, *A. commutatum*, *A. "pseudobracteatum"*, *Anthurium scherzerianum* (highly susceptible), *Dieffenbachia picta*, *Philodendron oxycardium*, and *Syngonium podophyllum*. *Aglaonema "trubii"* (resistant), *A. pictum* (highly susceptible), and *Dracaena fragrans* have been artificially infected.

Spread

The disease can be spread by the following methods:

1. Planting diseased plants.
2. Splashing rain or irrigation water can spread the bacterium from infected plants to healthy plants. The foliar infection usually is spread in this way.

3. The use of contaminated cutting tools during harvesting, leaf pruning, planting, and other cultural operations.

4. Wet clothes can easily spread the bacterium during rainy weather if an individual brushes against an infected leaf and then a healthy leaf.

5. The movement of infested soil on footwear, vehicles, tools, and equipment.

Control

1. Do not plant infected planting materials. When plants can be obtained only from sources known to have blight, keep new plants isolated from the remainder of the field.

2. Implement strict sanitation measures. Remove all leaves with foliar infection. It is better to remove leaves by breaking the petiole near the leaf blade than by cutting leaves off. Remove all systemically infected plants. Since it takes at least 2 to 3 weeks after inoculation for symptoms to show, symptoms will continue to develop for several weeks. Spray affected beds thoroughly with streptomycin sulfate or oxytetracycline. Sanitize and treat on a weekly schedule for 6 to 8 weeks; then discontinue sprays but maintain strict sanitation. Read "Guidelines for the Control of Anthurium Bacterial Blight" (HITAHR Instant Information Series) or see your county agent for rates and other information.

3. Prevent the spread of disease during harvesting or leaf pruning operations by disinfecting tools. If possible, use one set of tools for infested sections or houses and another set for uninfested areas. Try to plan harvesting so affected areas are harvested last. Keep the aisle clear of leaves to prevent the spread by workers brushing against infected leaves.

4. Do not use copper fungicides/bactericides such as copper hydroxide and tribasic copper sulfate. Laboratory and field tests have shown that the bacterium is resistant to the copper compounds and that phytotoxicity of anthuriums may occur.

5. The sooner control measures are implemented, the easier and less costly it will be to control the outbreak.