Bacterial Heart Rot and Fruit Collapse of Pineapple
Dickeya sp.

Hosts: Pineapple (*Ananas comosus*). The pathogen has a broad host range (see Bradbury, 1986).

Disease common names: Bacterial heart rot of pineapple and fruit collapse of pineapple.

Pathogen:; *Dickeya* sp.; syn. *Erwinia chrysanthemi*

Taxonomy: Recent phylogenetic work by Samson et al. (2005) reclassified the pathogen into the new genus, *Dickeya*. Most of the strains that cause heart rot of pineapple have not been classified, but one strain causing this disease was *Dickeya zeae*.

Disease Cycle

Inoculum: The main source is thought to be juice from collapsed infected fruit.

Transmission: The bacterium is commonly disseminated by wind and rain splash. Disease incidence increases during the rainy season and subsides with the onset of dry weather. Ants, souring beetles (*Haptoncus* sp.), flies, and pineapple fruit mites (*Steneotarsonemus ananas*) are attracted to bacterial exudate from infected ripening fruit and disseminate the pathogen to immature plants throughout the plantation.

Infection: The plant is most susceptible to the disease during the early growth stage immediately after planting and during rapid vegetative development between the ages of 5–13 months. The ratoon crop is less susceptible. Infection occurs through leaf wounds on young plants, open flowers, and cracks in immature fruit. The bacterium has a systemic phase and colonizes the vascular system. During dry weather, leaf symptoms on young plants may become arrested, giving the impression that infection has halted and the plant has recovered. However, the disease may be in a latent stage since symptoms commonly recur during early flowering or the fruiting stage. Immature pineapple fruit that are latently infected through the peduncle begin to exhibit a soft rot and collapse approximately 2–3 weeks before ripening. Suckers from latently infected plants perpetuate the disease when they are later used as planting stocks. Differences in varietal susceptibility have been described.

Symptoms and signs: Infected leaves have an olive green, puffy appearance (Fig. 1). Rotting initially appears at the base of the leaf and the rot expands outward, forming brown gas-filled “blisters” on the leaf lamina (Fig. 2). Lesions at the bases of the central heart leaves surrounding the apical meristem become dark and necrotic during dry weather (Fig. 3). With wet weather, the disease progresses and infected leaf tissues display a typical bloated appearance at the midportion of the central heart leaves (whorl) (Fig. 4). At an advanced stage, leaf bases become necrotic, leaves are olive green in color, and the midportions have a bloated appearance (Fig. 5). Leaves later become hardened and brittle, and the stem is easily detached from the underground portion of the plant. Leaves of infected plants often turn red, another symptom of the disease (Fig. 6). Infected pineapple fruit exhibit a distinctive olive green shell color compared with that of normal fruit (Fig. 7). At later stages of the disease, infected fruit exude juice and bubbles appear between the bracts; diseased mature fruit are also discolored (Fig. 8). In severe fruit collapse, cavities may be visible when the fruit is dissected (Fig. 9). Spread of infection outward from the core to the fruit surface is visible in a longitudinal section (Fig. 10).

Survival: The bacterium survives in soil and on plant debris and can infect subsequent plantings of susceptible crops.

Disease Management

Sound cultural practices are paramount in mitigating initial outbreaks and spread of the pathogen. Selecting crowns and slips from noninfected plants as planting materials and planting in areas historically free of bacterial heart rot decreases the likelihood of an outbreak. Successive plantings should be timed so that the rapid phase of vegetative growth, when the plant is most susceptible to infection, does not coincide with the onset of the rainy season. Roguing of infected plants limits secondary spread of the bacterium, but this should not be done during wet conditions because this disseminates bacteria to healthy plants. Specific fertilization practices, such as reducing nitrogen application rates during the vegetative stage of the crop and using fertilizers low in ammonium nitrogen to reduce salt injury, are useful for disease management. There are no completely effective chemical controls for bacterial heart rot, although bactericides may provide limited control. Decreases in disease incidence have been observed by managing the vectors with miticides and insecticides.

References

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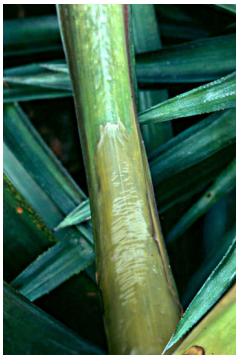

Figure 1. Infected leaf with olive green, puffy diseased area. (Courtesy G. Taniguchi)

Figure 2. Characteristic gas-filled “blister” on the left leaf and decayed, dried leaf on the right. (Courtesy A. de Silva)

Figure 3. Necrosis of bases of central heart leaves (whorl) with dark borders at margins between diseased and healthy tissues. (Courtesy G. Taniguchi)

Figure 4. Puffy appearance of midportion of central heart leaves, advanced stage of disease. (Courtesy C. V. Subere)

Figure 5. Necrosis of leaf bases of central heart leaves. Advanced stage is characterized by olive green color and bloated appearance of midportion of the leaves. (Courtesy K. Rohrbach)

Figure 6. Affected plant with reddening of leaves, another symptom of disease. (Courtesy G. Taniguchi)

Figure 7. Infected immature fruit (right) with distinctive olive green shell color. Healthy fruit (left). (Courtesy K. Rohrbach)

Figure 8. Diseased ripe fruit with external discoloration and rot of heart leaves. (Courtesy A. de Silva)

Figure 9. Fruit section with rotted tissues and cavities at the base. (Courtesy C. V. Subere)

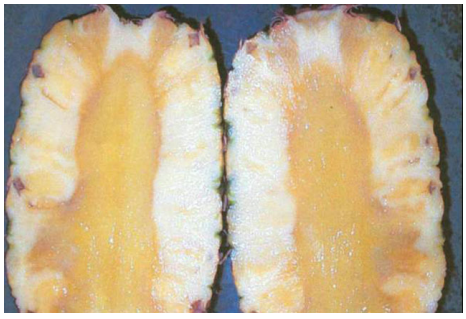

Figure 10. Longitudinal section of fruit core with outward spread of the infection. (Courtesy C. V. Subere)