



## Stem Bleeding of Coconut Palm

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Coconut palm (*Cocos nucifera*) is a key plant in Hawaiian landscapes and a valuable source of food and material throughout the tropics. A number of plant diseases plague the coconut palm in Hawaii, including a stem-bleeding disease. A reddish-brown liquid oozes from cracks and holes in the stem. It seeps out and runs down the stem, turning black and staining the stem as it dries.

The disease is caused by *Chalara paradoxa*, a mainly soilborne plant-pathogenic fungus that infects wounds and openings in the coconut stem. Severely affected or untreated palms may rot out completely inside and die, although it can take years for a fatal rot to develop. Such palms must be removed from the landscape and destroyed and the areas replanted at great expense.

Even slightly black-stained stems of diseased palms are considered a great eyesore at some high-end resorts and must be treated or removed. Although it can be avoided by careful harvest, handling, and transport of palms, the disease creates irreversible damage and becomes untreatable in its advanced stages.

### Symptom

The diagnostic symptom is the conspicuous black stain coming from a hole or wound and seeping down the coconut stem. At first there is a soft, slowly expanding stem decay that blackens with age. Darkly pigmented liquid bleeds down the trunk from the point of infection, covering the stem surface with a black layer of flu-



Symptoms of coconut stem bleeding: conspicuous black stain on trunks, associated with wounds or holes; basal stem rot; root rot; cavities and internal stem discoloration and decay; plant decline and death. These palms all had sprinkler irrigation hitting the stems.

ids. A cavity may develop beneath the affected area. Over the years, the fungal invasion of the interior stem can rot the stem entirely, causing plant decline and death. Basal stem invasion may occur in wet areas, producing a black collar of diseased stem tissue at the plant-soil interface. Roots may be blackened and decayed.

### Cause

The disease is caused by stem wounding in the presence of the soilborne plant-pathogenic fungus, *Chalara paradoxa* (syn. *Thielaviopsis paradoxa*, *Ceratocystis paradoxa*) in a moist environment. *Chalara* is pathogenic to various palm species, causing a range of bud rots and stem rots. The fungus is mainly an opportunist that survives on plant debris in soils. The disease is severe on palms because as monocots they lack the woody dicot's ability to seal off or heal wounds before opportunistic pathogens, such as *Chalara*, can cause disease.

### Epidemiology

The disease is most common where wounds occur to palm stems in highly irrigated or moist landscapes. Wounds exposed to *Chalara*-infested soil are prone to infection, especially where nozzle irrigation impacts the wound. Infections can start from *Chalara* spores or mycelium that survive on decaying plant litter. The pathogen can be spread from soils to coconut stems by splashing rain or irrigation water. *C. paradoxa* infests most soils in Hawaii, especially where sugarcane, pineapple, or banana are or were grown. Growth cracks on the coconut trunk, severe downpours, water stagnation, imbalances in nutrition, excess salinity, and plant stress can act as predisposing and aggravating factors.

### Management

#### Prevention and avoidance

Avoid wounding palm trunks at all stages of growth, maintenance, and during their harvest and transport for installation in a landscape. Do not drive stakes into palm trunks to secure them to trucks. Avoid contact of wounded palm stems with soil. Do not install sprinkler irrigation emitters that spray water on coconut trunks. Place irrigation emitters at least 12 inches from a coco-

nut palm and direct them away from the trunk. Inspect plants for symptoms regularly; early treatment carries the best chance for success. Minimize stress by providing the palm with adequate nutrition, maintaining equitable levels of soil moisture, and avoiding unnecessary cosmetic pruning. Avoid using spikes to climb the palms for pruning maintenance.

#### Treatment

For early infections, chisel or scrape out the rotten portion. Treat wounded or infected areas with fungicide and tar (for example, Bordeaux paste, mancozeb, or copper oxychloride), followed by sealing with coal tar two days later. Burn or destroy the chiseled pieces. Apply neem cake to the base of affected plants. Advanced symptoms may be virtually untreatable, requiring palm removal and destruction. Weakened coconut palms with rotting stems may be a toppling hazard in high winds.

#### Replanting

Avoid replanting in the same spot. Consider treating or replacing infested soil. Avoid wounding and over-watering.

**Palm species susceptible to *Chalara paradoxa*** are *Areca catechu*, *Brahea edulis*, *Caryota* spp., *Cocos nucifera*, *Elaeis guineensis*, *Phoenix africanus*, *Phoenix canariensis*, *Phoenix dactylifera*, *Raphis* sp., *Roystonea elata*, *Sabal palmetto*, *Sygarus roman-zoffinia*, *Washingtonia filifera*.

**Common host-reservoirs of *Chalara paradoxa*** are banana fruits, pineapple fruits, and plantation soils.

#### Further reading

- Elliott, M.L., T.K. Broschat, J.Y. Uchida, and G.W. Simone (eds.). 2004. Compendium of ornamental palm diseases and disorders. American Phytopathological Society, Minneapolis, Minn. 71 p.
- Ploetz, R., N. Harrison, and P. Jones. 1999. Common names of plant diseases: Diseases of coconut palm. American Phytopathological Society. <http://www.apsnet.org/online/common/names/coconut.asp> (link active August 23, 2005).

Caution: Pesticide use is governed by state and federal regulations. Read the pesticide label to ensure that the intended use is included on it, and follow all label directions.