

THIELAVIOPSIS DISEASES OF PALMS

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Additional index words. *Thielaviopsis paradoxa*, trunk-rot, bud-rot, stem-bleeding, black scorch, dry basal-rot, bitten leaf, and heart-rot

Abstract. Palm trunk-rot, caused by the vascular pathogen *Thielaviopsis paradoxa* has the potential to devastate global palm resources. Palm rot is found in three states in the continental USA. This range encompasses the subtropical and arid regions where palms are important landscape plants. At least 23 species are susceptible to *T. paradoxa*. Factors relating to stand composition and structure directly influence the incidence and severity of palm trunk-rot. Host susceptibility, the potential for inoculum production, and spatial distributions of different palm spp are all important in determining disease progress. Localized outbreaks have been associated with environmental stress and mechanical damage. The pathogen adapts to all the palm ecotypes, as illustrated by its occurrence in the dry deserts of Arizona and California, and in humid, wet Florida. There are many aspects of palm trunk-rot that are poorly understood, hampering the ability to predict the course of this pathogen. The pathogen can be controlled in the early stages of the disease by applying the systemic fungicide thiophanate methyl.

Thielaviopsis diseases reported on palms in South Florida include *Thielaviopsis* bud-rot (TBR), which has the potential to devastate palm plantings. The present paper was prepared to summarize what is known about these *Thielaviopsis* diseases, and to recommend practices which can suppress occurrence. TBR has also been called trunk-rot, stem-bleeding, black scorch, dry basal-rot, and heart-rot. All these names describe symptoms which may or may not be expressed in a given case.

The seedling disease caused by *Thielaviopsis* is known as bitten-leaf and leaf-scorch (Chase and Broschat, 1991). Though TBR is seen frequently on *Washingtonia* palms, it has been reported in Florida and elsewhere on other palms, on some hardwoods, and on several herbaceous ornamentals (Table 1).

Causal Organism

The causal organism of TBR is a soil-borne fungus which occurs naturally in Florida, and can be efficiently spread both by nature and by man in soil, in plants, and probably in storm water. It enters the palm through wounds and causes the disintegration of the trunk and/or bud, and root-rot. The fungus can also enter through the spear-leaf, young leaf bases, the inflorescence, mechanical damage, growth cracks, and

Table 1. Species in which TBR has been reported in Florida (Alfieri, et al., 1994), and elsewhere (Chase and Broschat, 1991).

<i>Aglaonema commutatum</i> , aglaonema
<i>Ananas comosus</i> , pineapple
<i>Areca cataecheu</i> , betel nut palm ^a
<i>Brahea edulis</i> ^a
<i>Caryota</i> spp., fishtail palms ^a
<i>Cocos nucifera</i> , coconut
<i>Dracaena fragrans</i> , dracena or corn-plant
<i>Elaeis guineensis</i> , African oil palm ^a
<i>Eleocharis dulcis</i> , Chinese water chestnut ^b
<i>Ficus</i> spp., figs
<i>Howeia forsteriana</i> , Kentia palm ^b
<i>Phoenix africanus</i> , date palm ^a
<i>P canariensis</i> , Canary Island date palm
<i>P. dactylifera</i> , true date palm
<i>Rhapis</i> sp., lady palm ^a
<i>Roystonea elata</i> , royal palm ^a
<i>Sabal palmetto</i> , cabbage palm
<i>Saccharum officinarum</i> , sugarcane
<i>Syagrus romanzoffianum</i> , queen palm ^b
<i>Syngonium podophyllum</i> , nephthitis
<i>Veitchia merrillii</i> , Christmas palm
<i>Washingtonia filifera</i> , Washington palm ^a
<i>W. robusta</i> , Mexican Washington palm ^b

^aThe infection was reported outside Florida (Chase and Broschat, 1991).

^b*Thielaviopsis* was reported as *Chalara* (Alfieri et al., 1994).

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leaf pruning cuts. Leaves and stems of seedling palms can also be affected.

The fungus causing this disease is known by several names, including *Thielaviopsis paradoxa*, *Chalara paradoxa*, and *Ceratocystis paradoxa*. These all refer to the same pathogen (Chase and Broschat, 1991). Additional species of *Thielaviopsis* cause diseases in plant species grown in Florida (Alfieri et al., 1994), but here we are discussing only the diseases caused by *T. paradoxa* in palms.

Occurrence

Thielaviopsis diseases of palms have been reported worldwide, just about everywhere palms can be grown. In the United States it occurs in Arizona, California and Florida. Meerow (Meerow, 1994) reported that TBR is increasing in frequency on palms in Florida, and recent experience supports his report. Wherever TBR occurs, the result has been devastated landscapes. Because TBR is so easily spread, it is likely to recur in locations where it has been found, due to the high concentration of susceptible species and the increased amount of inoculum in the area.

Symptoms

Only the most common symptoms of TBR are discussed here, those which may be useful in making an initial or "field" diagnosis, which should be confirmed by a plant disease laboratory. If palms are dying at a location, especially if they are *Washingtonia* palms or others listed in Table I, check for the following symptoms:

1. On mature palms, if infection has occurred through the roots or lower trunk, the palms fall over, with the stem bending about half-way up the bole. (In *Phytophthora* budrot, the stem bends at the tip—the bud falls over.)
2. The trunk begins to bleed from small cracks. This symptom may come before stem-bending or it may occur later. The bleeding involves one to five feet of the trunk, at the base. The cracks are often quite small, and if they aren't at the bleeding stage, you may not notice them at all—the trunk appears normal. When bleeding starts, there may be a foamy, white fluid—in the early stages you may just find wet, soft spots, from penny size on up, with no bleeding down the trunk. Later the foamy fluid smells like wine or beer, and the area down the trunk turns black.
3. In later stages, the trunk will be essentially hollow, with nothing but stringy tissue left inside; the outside (the "bark") appears normal.
4. If infection has occurred on mature palms through leaf pruning cuts, leaves die progressively from the oldest up. The fungus also moves downward, rotting the upper trunk, often causing the crown to fall over or snap off.

Additional symptoms can easily be confused with symptoms of other diseases, but these four are specific for *Thielaviopsis* in mature palms.

Field Trials

Two field trials were conducted at the University of Florida Tropical Research and Education Center in Homestead. To test if seedlings could be protected from root-rot, eight-week-old coconut seedlings were drenched twice with fungicides at the rate 1.5 lb per 100 gal water. The fungicides tested were Benlate (Benomyl), Topsin M (thiophanate methyl), and Cleary's 3336 (thiophanate methyl). They were then inoculated with spores grown in culture by incorporation in the substrate. After 120 d the plants were evaluated. Infection rates were 67.8% (control), 5.2% (Benlate), 6.7% (Topsin M), and 5.9% (Cleary's 3336). All treatments were significantly different from the control.

In the second trial, mature coconut palms with weeping trunk lesions were treated with either Benlate or Cleary's 3336. The fungicides were made into a slurry and painted on the lesions monthly for one year. They were evaluated after six and 12 months and found to be free of fungus.

Prevention and Treatment

If *Thielaviopsis* disease has started on a site, several measures can be taken to reduce spread to nearby palms. These include the following:

- Confirm a field diagnosis with laboratory results.
- Remove and destroy all infected palms, roots and all, then replace the soil in the planting hole (as much as you can) with new, clean soil.
- If you replant, use anything but a palm or other susceptible species (Table 1).
- No chemicals are known to cure TBR or stop its spread, though preliminary data with thiophanate methyl show promise in curing stem lesions and in preventing seedling infections.
- In mature palms, treating the sites of infection on the trunk with a chemical slurry has been shown to kill the fungus at those sites if applied monthly for a year.
- The fungus can be spread in contaminated soil, so be careful not to move contaminated soil on equipment or tools.
- Tools used to prune or remove dead or infected palms should be disinfected before pruning other palms by soaking them for at least 15 minutes in alcohol (diluted 50:50 with water) or 10-50% chlorine bleach.
- As much as possible, avoid injury to palms with mowers or other equipment.
- Avoid over-pruning palms by removing green fronds or cutting them too close to the trunk.

Literature Cited

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