

DID YOU KNOW?



Photocredits: Solpot T.C. (2020)

BLACK POD ROT OF CACAO



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Photocredits: BPI-Crop Pest Management Division

DISEASE NAME: Black Pod Rot

CAUSAL TYPE: Oomycete

PATHOGEN: *Phytophthora palmivora* or *P. capsici*

CROP STAGE AFFECTED: Pre-emergence, Seedling stage, Vegetative growing stage, Flowering stage, and Fruiting stage

AFFECTED PLANT PARTS: Whole plant



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BLACK POD ROT OF CACAO

Phytophthora palmivora or *P. capsici*

- Black pod rot of cacao is caused by a fungus called *Phytophthora*, which spreads rapidly in conditions of excessive rain, humidity, and insufficient sunshine.
- The cacao pod rot caused by *P. palmivora* Butler. Butler was first reported on the island of Luzon, the Philippines, by Reinking (1918), causing severe losses.
- It has been a significant issue for cacao growers in the Philippines and other regions where cacao is commercially grown, leading to substantial losses in cacao pods and trees.
- Black pod rot, has a significant economic impact on cacao production. It is considered an economically serious problem, causing significant pod losses of up to 30% and killing up to 10% of the trees annually.
- Globally, it is estimated that black pod disease results in losses of 20–25% in cacao production, which amounts to a reduction of about 700,000 metric tons of cocoa on a global scale.



TYPICAL SYMPTOMS



Figure 1. Incipient infections (arrows) occurring on a ripe cacao pod caused by *Phytophthora palmivora*.



Figure 2. Unripe cacao pod showing signs of black pod rot caused by *Phytophthora palmivora*.

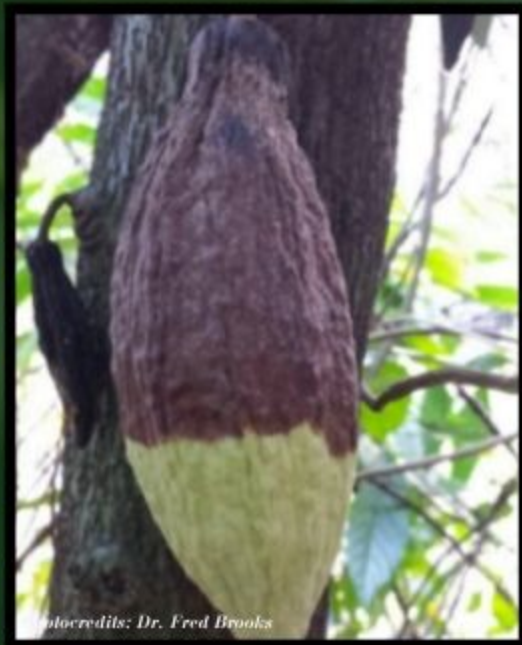


Figure 3. Unripe cacao pod showing increased signs of black pod rot caused by *Phytophthora palmivora*.



Figure 4. Severely infected cacao pod covered with the white sporangia of *Phytophthora palmivora*. This pod is in the beginning stage of becoming mummified.



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TYPICAL SYMPTOMS



Figure 5. A cacao pod consumed by *Phytophthora palmivora*. Note the infected bean mass.



Figure 6 (top). Early symptoms of a branch canker caused by *Phytophthora palmivora*.



Figure 7 (middle). Branch canker with the bark removed to show the extent of infection. (Note: this is the same branch as in the previous photo. It indicates that internal damage can be more severe than it appears on the surface.)



Figure 8 (above). Branches killed by cankers. Dead leaves often remain attached after death of the branch.



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SYMPTOM DEVELOPMENT

- **Brownish spots on fruit.** When cacao is infected by *P. palmivora*, the pathogen penetrates the waxy cuticle and attacks the epidermis. A small brownish spot appears at the point of infection (Figure 1). Such infections can begin at the stem- or blossom-ends of fruits.
- **Spread of infection and symptoms on fruit.** Infection spreads rapidly across the outer surface, covering the entire pod in a few days (Figures 2 and 3). Infected areas turn from brown to black and, if conditions are favorable, clusters of white sporangia appear on the outer surfaces of the pod (Figures 3 and 4).
- **Infection of cocoa beans.** As visible symptoms progress, the pathogen moves deeper into the pod, infecting and destroying the beans (Figure 5). Infected beans quickly deteriorate and rot, rendering the pod useless. The pods then dry up and mummify on the tree, becoming a major source of inoculum to nearby pods, leaves, and stems.
- **Cankers.** Cankers can form under the bark of infected stems and branches. There may be a dark spot on the bark that oozes reddish fluid. The canker can continue to expand until it girdles and kills the branch. Dead and dying leaves are sometimes the first indication of branch dieback. The leaves die because the branch they are on is killed; the pathogen does not directly infect and kill the leaves. (Figure 6).



DISEASE MANAGEMENT RECOMMENDATIONS

USE OF RESISTANT VARIETIES

- If available, use of resistant or tolerant cultivars is the most cost-effective strategy in managing this disease.

CULTURAL CONTROL

- At the end of the harvest season, pruning is highly recommended;
- Removal of suckers when they are still young;
- Weed management;
- Drainage management; keep the fields drained;
- Complete removal of fruits to avoid the presence of inoculum and spread of the disease (for healthy and infected fruits).

BIOLOGICAL CONTROL

- Drench the soil near stem regions with *Trichoderma* powder mixed in a liter of water (don't use chemical fungicides after application).

CHEMICAL CONTROL

- Application of fungicides with chlorothalonil, cuprous oxide and dichlofluanid compound if and only needed;
- Systemic oxathiin fungicides flutolanil may protect young pods in particular.



PHOTOCREDIT:

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