



## Disease management in Coconut

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### *Abstract*

Coconut trees scientifically known as *Cocos nucifera*, are highly valued for their diverse uses and economic importance. They are widely cultivated in tropical regions around the world, providing food, oil, fibre and various byproducts. However, like any other crop, coconut trees are susceptible to various diseases that can significantly impact on health and productivity. Identifying and managing coconut diseases is crucial for maintaining the health and sustainability of coconut plantations. Timely detection, prevention and appropriate disease management practices can help mitigate the impact of these diseases and ensure the continued production and profitability of coconut crops.

### **Introduction**

Coconut cultivation faces several significant diseases that pose serious threats to the health and productivity of coconut palms. Among the important diseases, basal stem rot, bud rot, stem bleeding and root wilt that require more attention. Coconut diseases encompass a range of fungal, bacterial and viral infections that affect different parts of the coconut tree including the leaves, trunk, roots and fruits. These diseases can result in reduced yield, poor fruit quality and even tree mortality, causing significant losses to coconut farmers and industries.

Identifying and managing coconut diseases is crucial for maintaining the health and sustainability of coconut plantations. Timely detection, prevention and appropriate disease management practices can help to mitigate the impact of these diseases and ensure the continued production and profitability of coconut crops. By understanding these diseases and implementing appropriate prevention and control measures, it is possible to mitigate their impact and safeguard the sustainability of coconut production worldwide.



### 1. Basal Stem Rot

Basal Stem Rot disease of coconut, hitherto called as Thanjavur wilt, foot rot, Bole rot, Ganoderma or Anabe, is a major disease limiting coconut production. Basal Stem Rot is evident in its severe form at one place or the other in almost all coconut growing areas that are poorly maintained. It is caused by two *Ganoderma* spp, *G. applanatum* (pers.) Pat., and *G. lucidum* (leys) Karst.

#### Symptoms

The pathogen first infects the root system and during the very early stage of infection no external disease symptoms are clearly visible. Initially a few roots get infected and become rotten. Extensive rotting and discoloration of root system is a characteristic symptom of the disease and the rotting proceeds towards the bole thus, cortical tissues disintegrate and turn brown. The production of new roots decreases in the infected palm. From the roots, the infection slowly progresses up the stem leading to internal disintegration of cortical tissues. Exudation of reddish-brown viscous fluid from the basal portions of the stem is the first visible symptom of the disease in the affected palm. The internal tissues of the affected stem turn brown in color and rotting in the stem can be seen up to the height of the bleeding. Bleeding on the stem begins at the base and may extend up to 15 feet in severe cases. The infestation of bark beetle is also seen in severely infected palms. The fungal sporophore may be present in the basal part of the tree prior to wilting or just after the death of the palm.

The leaflets exhibit wilting symptoms and outer one or two whorls of leaves turn yellow. Later, they exhibit light to moderate browning followed by drooping and drying. As the disease advances, the remaining leaves also droop down in quick succession and the spindle alone remains. The spindle leaves which emerge subsequently are reduced in size and do not unfold properly. Later stem shrivels and dries up. As the disease progresses, all the leaves drop off leaving decapitated stem. Favorable conditions like high soil temperature, less soil moisture and drought condition can easily predispose the palms to BSR. Pathogen spread from infected tree to healthy palms by root contact.

#### Management

Removal of dead palms, palms in advanced stage of the disease as well as destruction of the boles and root bits of the diseased palms to remove disease inoculum. Isolation of neighboring healthy palms, by digging isolation trenches (90 cm deep and 30 cm wide) around the affected palm. Adopt basin method of irrigation or drip method of irrigation to irrigate the individual palms. Irrigate the palms in summer months once in 7-10 days regularly, depending upon the soil type. Intercropping in coconut



with banana may reduce the disease severity. Growing of green manures like sunhemp and *Kolingi* and the ploughed *in situ* may reduce the disease severity with the increased soil health.

The disease affected trees should be treated by soil drenching with 40 litres of 1% Bordeaux mixture in the basin area. In addition to the soil drenching, root feeding with 2 ml of hexaconazole in 100 ml of water. The chemical treatment should be given at quarterly interval as 3-4 times in a year. Soil application of bio agents 200 g of *Trichoderma viride* and 200 g of *Bacillus subtilis* along with 50 kg of farm yard manure and 200g each of *Acetobactor* and *Phosphobacteria* may reduce the disease and increase the nut yield. Application of Neem cake @ 5 kg/tree can be applied along with fertilizers and biofertilizers

## 2. Bud rot

Bud rot disease caused by the fungus *Phytophthora palmivora* Butl. The fungal disease attacks the crown region, mostly in young seedlings and young trees below 20 years old. The occurrence of the disease is more during monsoon season. Hybrid palms are more prone to this disease.

### Symptoms

Initially yellowing, drooping and wilting of young leaves in crown region. Appearance of brown leaf spots in older leaves and basal part will be affected and spreads to the terminal portion. Subsequently, the slight browning of leaves and dried at basal portion. Sometimes, the terminal shoot may rot in crown region and can easily be pulled off from the crown region and also emit unpleasant odour. Rotting may spread to nearby leaves and yellowing progress in the affected leaves. No new leaf formation from the affected inner part due the severe rotting and outer leaves are present for a few months. Finally, bud rot disease affected tree will ultimately die.

### Management

Adopt control measures immediately after noticing the initial stage of disease development to save the crop. Cutting off below the affected rotten portion of the young leaves and burn them. Apply Bordeaux paste and cover with pot to protect the crown from the rain till the emergence of new leaves. Spray 1% Bordeaux mixture or 0.3% Copper oxy chloride to the other leaves and nearby trees of bud rot affected trees. Add sticking agent teepol @ 1ml in 1 litre of fungicide. In case of the regular occurrence of bud rot in any of the coconut gardens, adopt preventive fungicidal spray before monsoon and during monsoon.



### 3. Stem bleeding

The sporadic occurrence of stem bleeding disease in coconut gardens of east coastal regions of Tamil Nadu after the cyclone was observed.

#### Symptom

Stem bleeding disease is caused by *Theilaviopsis paradoxa*. It is a fungal disease and the expression of bleeding symptom often confused with basal stem rot disease. In contrast, the bleeding symptom starts at mid portion of the stem and not from the basal part of the stem as in basal stem rot disease and the reduced numbers of lesions and the production of large area of lesion, blackish red bleeding, outer tissue of stem only rotten, no death of roots and no death of palm are the very predominant symptoms of stem bleeding disease.

#### Management

Initially the removal of the rotten portion of stem and the underneath apparently healthy portion may be done. Apply Bordeaux paste or Copper oxy chloride to the cleaned area. Root feeding with 2ml of hexaconazole in 100 ml of water thrice at three months interval effectively controls the disease. Apply 5 kg of neem cake along with the second dose of fertilizer in August and September. Soil application of 200 g of *Trichoderma viride* and 200 g of *Pseudomonas* along with 50 kg of farm yard manure is highly beneficial in increasing soil antagonists to suppress the pathogen. Conserve the soil moisture with the application of green manure and farm yard manure in soil is also essential for the control of the disease.

### 4. Root (wilt) or Kerala wilt (Phytoplasma)

The occurrence of root (wilt) disease of coconut was first noticed in 1882 in Kottayam district of Kerala. Root (wilt) disease is non-lethal but debilitating. If the palms are affected at the seedling stage, flowering is delayed and also yield is considerably reduced. The reduction in yield of nuts up to 80% has been reported in palms in the advanced stages of disease.

#### Symptom

Flaccidity, yellowing, and marginal necrosis of leaflets of the leaves of central and outer whorls are considered to be the typical foliar symptoms. The characteristic bending or ribbing of leaflets is the earliest consistent visual symptom. Symptom expression varies with the age, nutritional status/management practices, variety, and the time lag after disease incidence.

#### Management:

In the heavily diseased area, the yield of palms can be sustained or even improved through adoption of integrated management practices. All disease advanced and uneconomic palms with annual



yield of less than 10 nuts are to be removed. Replanting with released, disease resistant varieties or elite seedlings from high yielding disease free palms located in heavily disease affected tracts. Application of 25 kg farm yard manure or 10 kg vermicompost enriched with *Trichoderma viride* @100g. Application of leguminous green manure crops and glyricidia leaves. Application of recommended dose of fertilisers (500g N, 300 g P<sub>2</sub>O<sub>5</sub>, 1250 K<sub>2</sub>O and 250 g MgSO<sub>4</sub> palm<sup>-1</sup>year<sup>-1</sup>) in two splits. Irrigation with 250 L of water palm<sup>-1</sup> week<sup>-1</sup>, soil moisture conservation and providing adequate drainage wherever necessary. Raise inter crops in rotation, adopting mixed cropping/ mixed farming coupled with recycling of organic matter.

Adopting recommended management strategies for leaf rot disease, rhinoceros beetle and red palm weevil.

### 5. Immature nut fall or Fruit rot

Buttons and immature nut shedding before and after fertilization is a common problem in coconut. The immature nut fall is observed in all the coconut growing areas; however, it is sporadic in nature. Immature nut fall has been attributed to several factors viz., characteristic feature of mother palm, high soil acidity or alkalinity, drought condition or water logging and sudden changes in soil moisture and also imbalance or deficiency of nutrients. Poor pollination is also one of the major factors responsible for button shedding in coconut. Shedding of buttons is also caused by insect attack and Eriophyid mite attack also leads to immature nut fall to some extent. Nut fall or fruit rot is caused by *Phytophthora palmivora* (Butl.) and *Lasiodiplodia theobromae* Pat.

#### Symptoms

By *Phytophthora palmivora*: Appearance of water-soaked lesions on the surface of the nuts. The lesions turn brown and the nut detaches from the bunch. More common during rainy season and occurs in high humid area

By *Lasiodiplodia theobromae* : Dark grey to brown lesions with wavy to undulated margins appear from the apex of the nuts . Decay and discoloration of mesocarp and endosperm of nuts. Desiccation, shriveling, deformation and premature dropping of nuts

Infection severe in mite infested nuts. Occurs throughout the year more prevalent in dry areas

#### Management

Nut fall caused by *Phytophthora palmivora*: **Removal** of bud rot affected dead coconut palms from the orchard before monsoon and burning. Crown cleaning just before monsoon and prophylactic spraying of Bordeaux mixture 1% to the bunches two sprays at 30 days interval depending on severity of disease.

Nut fall caused by *Lasiodiplodia theobromae*: **Removal** of all the infected nuts from the palm. Spraying of 0.1% carbendazim to bunch of the affected palms at 30 days interval depending on severity of disease.



## Conclusion

Effective management of coconut diseases is crucial for ensuring the health and productivity of coconut plantations. By adopting integrated disease management strategies, including preventive measures, cultural practices, biological controls, and chemical treatments, coconut growers can mitigate the impact of diseases and maintain sustainable production. Preventive measures such as selecting disease-resistant coconut varieties, practicing crop rotation, and maintaining proper sanitation can significantly reduce the incidence and spread of diseases. Cultural practices like balanced nutrition, adequate irrigation, and timely pruning help enhance the vigor and resilience of coconut palms, making them less susceptible to infections.

Overall, a holistic approach that combines preventive measures, cultural practices, biological controls, and use of chemical treatments is key to effectively managing coconut diseases. By implementing these strategies, coconut growers can safeguard their plantations, protect the livelihoods of farmers, and sustain the long-term viability of the coconut industry.

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