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Integrated Disease Management Strategy for Basal Stem Rot in Coconut

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Abstract

Basal stem rot incited by *Ganoderma lucidum* is one of the important diseases of coconut causing severe yield loss. The disease is found to occur in southern parts of India encompassing coconut growing states viz., Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. The symptoms are manifested in the form of yellowing, withering and drooping of the outer fronds and oozing out reddish brown liquid from the base of the trunk. If the infected trees are left uncared, it become major threat to coconut, resulted in death of the palm. Hence, it is highly imperative to adopt suitable management strategy at the early stage itself. The disease can be effectively contained by integrating cultural, biological and chemical methods.

Introduction

Coconut (*Cocos nucifera* Linn.) is an important plantation crop in India. It is called as Kalpavriksha or Tree of Heaven or tree of Abundance, because each and every part of the coconut is useful to human being. The coconut palm is globally cultivated in around 93 countries and in India; it is grown in 2.1 million ha with a production of 14,075 million nuts and an average productivity of 6,702 nuts /ha/year. Coconut farming provides livelihood security to millions of people across India and it provides improved nutrition, employment and income generation as well. Though coconut palm is hardy in nature is affected by many diseases. The fungal diseases viz., bud rot, basal stem rot or Thanjavur wilt, stem bleeding, leaf blight and grey leaf spot are widely prevalent in Tamil Nadu. Among these, basal stem rot or Thanjavur wilt is the most devastating disease as it causes the death of the palm if it is unattended at the early stage of infection. The disease is reported to occur in South Indian State viz., Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. In Tamil Nadu the incidence of disease varied between 3-20 percent and recently the disease severe epidemic was observed in Tirupur and Kanyakumari districts of Tamil Nadu.

Symptoms

Crown

The trees in the age group of 10-30 years are easily infected by the pathogen. The most usual symptoms are yellowing, withering and drooping of the outer fronds which remain hanging around the trunk for several months before shedding. The younger leaves remain green for some time and later turn yellowish brown. The new fronds produced become successively smaller and yellowish in colour which does not unfold properly. Soft rot occurs in the bud and newly formed leaves wither away. During heavy wind the spindle is blown off leaving the decapitated stem.

Roots

Initially a few roots get infected and rot followed by extensive rotting and discoloration is a characteristic symptom of the disease. The rotting continues towards the bole (basal trunk) disintegrates the cortical tissues which turns into brown colour. The roots are watery in nature with a separate alcoholic stink. The reduced the production of new roots in the affected palm. More than 70 percent of rotting occurs in roots in the severely infected palms.

Trunk

In the affected palm, the first visible symptom of the disease is exudation of reddish brown gummy fluid from the cracks on the basal portions of the trunk. The external symptoms are visible on the bole when the palm roots damaged at 15 to 25 percent. The first bleeding batch started from below 3 feet level and may be extend up to 15 feet in severe cases. Few infected palms do not show bleeding symptoms and base of the bark peels off. In severely infected palms, the plague of scolytid beetle, *Xyloborus perforans* and the weevil, *Diocalandra stigmaticollis* are observed in the trunk portion. In the advanced stages of infection, Sporophores of the fungus produces fruiting body (Bracket) appear at the base or collar region of the affected palms. It seems on prior to wilting or immediately after the death of the palm.

Symptoms of Thanjavur Wilt



Figure 1: Hanging of fronds



Figure 2: Bleeding patches on the base of the trunk



Figure 3: Formation of bracket Figure 4: Decapitated stem

Causal Organism: *Ganoderma lucidum*

The fungus produces a semi circular basidiocarp (bracket), which is attached to the tree with a stalk. The bracket is very big about 10-12 cm diameter and woody. The upper surface is tough, shining, light to dark brown or almost black with concentric furrows. The lower surface is white and soft with numerous minute pores. These pores represent the opening of the hymenial tubes, which are lined with basidia and basidio-spores. Basidiospores are oval, brown and thick walled.

Favourable Conditions

Sandy loam and sandy soils, water logging during severe rains, low soil moisture content during summer months and damages caused by weevils and beetles. Presence

of old infected stumps in the garden, injury to roots and non-adoption of recommended cultural practices are highly favoured for the development of the disease.

Disease Cycle

The fungus is soil-borne and survives in the soil for long time. The primary infection is through soil borne basidiospores. The irrigation water and rain water also help in the spread of the fungus.

Management

Cultural Methods

- Removal and destruction of severely affected dead palms.
- Irrigation water should be restricted from the infected palm to healthy palms by forming isolation drenches around the infected palms.
- Intercropping with banana reduced the severity of the disease.
- Application of 50 kg FYM per palm per year.
- Growing intercrops viz., *Desmodium tortuosum*, *Calopogonium mucunoides*, *Tephrosia purpurea*, *Crotalaria juncea*, *Curcuma domestica* [*Curcuma longa*] and *Musa* sp. reduced the disease incidence.

Biological Methods

- Application of *Bacillus subtilis*, and *Trichoderma viride* @ 100 g each per palm per year along with neem cake of FYM was found more effective in reducing the disease (Snehalatharani *et al.* 2016).
- Application of BS1 TNAU mixture and 50 g of *T. viride* along with 10 Kg of farm yard manure per palm at once in 6 months interval (Rajendran *et al.*, 2010).

Chemical Methods

- Soil drenching of 1 percent Bordeaux mixture @ 40 litres/palm.
- Root feeding of or Hexaconazole @ 2ml in 100 ml of water for thrice at 3 months intervals.
- Root feeding with Propiconazole @ 2ml in 100 ml of water at quarterly intervals (Thangeswari *et al.*, 2019).

Conclusion

Basal stem rot or Thanjavur wilt is one of the important biotic constraints in coconut production which drastically reduces the nut yield. Detection of disease at early stage is highly essential to combat the disease and preventing the palm from death. Therefore the constant monitoring of the coconut garden is needed. The disease can be effectively managed by imposing the above said integrated disease management strategies.

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