

Stem Bleeding Disease of Coconut: Current Status and Approaches for Its Control

K.K.N. Nambiar and R. Kalpana Sastry*

Phil. J. Coco. Studies 12(1) P 30-32 ; 1988

The etiology, types and control of the stem bleeding disease were reviewed. It was traced as caused by either *Thielaviopsis paradoxa*, *Ganoderma lucidum*, stem borers species, physiological disorders, or lightning attack.

Key Words: Stem bleeding disease, *Thielaviopsis paradoxa*, *Geratocystic paradoxa*, *Ganoderma lucidum*, phytosanitation, Bavistin, BHC

INTRODUCTION

Stem bleeding disease has been reported from all tropical countries where coconut is grown. It was first noted in Sri Lanka (Petch 1906), then in India (Sundaraman 1922), the Philippines (Lee 1922), Malaysia (Sharples 1923), Trinidad (Briton-Jones 1940), Papua New Guinea (Dwyer 1953), Fiji (Mc Paul 1962), and Indonesia (Renard et al. 1984). In India, the disease is prevalent in most of the coconut growing regions: Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Goa, Maharashtra, Andamans, etc.

There are mixed findings about the effects of the disease. Ohler (1984) considered the disease to be of minor importance. Brahamana (1986) reported that in Indonesia, the disease had no negative effects on the number of female flowers, nuts harvested, etc. during 1 yr of observation. In India, however, the disease caused considerable yield reduction in the late stages, and even death of affected palms in very advanced stages. Gapasin (1983) reported that the disease decreased the yield and killed trees in the Philippines.

Symptoms

This disease, which develops faster among young palms, is characterized by dark brown patches on areas of the stem, appearing more towards the base. A dark reddish brown liquid exudes from the longitudinal growth cracks in the bark (Fig. 1). The irregular streaks of exudation may then coalesce to form larger lesions. The exudates eventually dry up, while the lesions become black with a brownish orange margin. The external symptoms do not readily reflect, however, the extent of internal damage. Underneath, the internal tissues of the bark discolor and decay often beyond the perimeter of the external lesion. Especially in young palms, these decayed tissues become fibrous and form cavities from which a clear liquid gushes out when the bark is pressed or punctured with a knife. The bleeding symptoms are noticeable during rainy season, more so especially after the monsoon season.

When the affected portion of the bark is chiselled away, the decay can be seen confined to the bark only and seldom enters deep inside the core. However, in cooler conditions and also in young palms, it has been noticed that the decay can reach the deep lying tissues. In advanced stages, stem borer pests like *Diocalandra* invade these affected tissues.

As a result of stem decay, the crown nature also changes. The leaves in the outer whorl become yellow rather prematurely, droop, and finally dry up. Nuts fall, more so in palms exposed to drought conditions. The trunk gradually tapers towards the apex, while crown size is reduced. Though affected trees sometimes recover and yield well, they are less resistant to wind. The crown symptoms are more pronounced during the summer season. During the rainy season, however, as well as in well-managed irrigated gardens, they are not always conspicuous.

*Central Plantation Crops Research Institute, Kasaragod 670 124 Kerala, India.

Etiology

Thielaviopsis paradoxa (de Seynes) von Hohnel has been isolated from tissues underlying bleeding patches and also from gummy exudations. The perithecial stage (*Geratocystis paradoxa*) has also been recorded from the affected palms. Though this fungus has till now been only a suspected pathogen (Menon and Pandalai 1956, Ohler 1984, Davis et al. 1985), recently, Nambiar et al. (in press) could reproduce the symptoms by inoculating healthy trees with the fungus, and thus establish its pathogenicity.

Predisposing Factors

The fungus is a weak pathogen entering the stem tissues through wounds or growth cracks occurring naturally on the palms (Petch 1908). According to Ohler (1984), the growth cracks may develop after sudden rains following prolonged dry period. Britton-Jones (1940) opined that sudden heavy manuring causes the cracks. Goberdhan (1961) and La Broma (1973) reported that trash burning at the palm base damages the stem paving way for infection. The senior author has noted recently similar instances in India (unpublished). Other predisposing factors may include ill drainage, hard lateritic pan formation leading to crippled root growth, imbalanced mineral nutrition, or other physiological causes (Salgado 1942). Potty and Radhakrishnan (1978) found that increasing levels of P tended to increase the disease incidence, while application of N at the rate of 0.35 kg/palm reduced the disease, though a further rise did not reduce the incidence. Mathew and Ramanand (1980) could not find any significant difference in major nutrient content between healthy and diseased palm nor in soil pH and electrical conductivity. Renard et al. (1984) reported that the disease could be prevented if chlorine deficiency is corrected. Van Ulxkull (1985) also believed that chlorine played an important role in the manifestation of bleeding symptoms. Nagarajan (1985) found that excessive salinity with high sodium during summer caused stem bleeding.

Types of Stem Bleeding

Five types of stem bleeding are known to occur on coconut in different parts of India.

1. Decay of bark tissues and tissues underlying the cortex. In cooler climates and also in young succulent palms, the decay can be traced to deeper tissues. *T. paradoxa* (*C. paradoxa*) is found to be the causative agent. This is the common type of bleeding disease.
2. Stem bleeding due to Thanjavur wilt/*Ganoderma* disease. This is caused by *Ganoderma lucidum*. The decay of the tissues can be traced to very deep layers.
3. Bleeding due to physiological disorders. This may include ill drainage resulting in submerged root-zones, or supersaturation of soil with moisture in rainy season, followed by prolonged drought, or vice versa, or excessive salinity, etc.
4. Lightning attack, if severe, kills the tree outright. In cases of mild attack, bleeding symptoms can be seen within 2-3 days of lightning strike.
5. Infestation by stem borer pests like *Xyleborus*, *Diocalandra*, etc. may also cause stem bleeding symptoms.

Management of the Disease

Since the etiology of the disease is not clearly understood, the removal of tissues in the stem and the application of hot coal tar as a control measure are recommended. In many cases, however, this does not result in the effective control of the disease, so other measures based on pilot trials and field experiences may be used for the effective management of the disease.

1. Phytosanitation

When the disease is diagnosed early, the infested patch may be removed by chiselling and carefully removing all decayed tissues. The exposed portion of the stem is protected by applying 10% Bordeaux paste. After 40-45 days, the Bordeaux paste is likely to be washed out by rains, so the portion may have to be coated with coal tar. This prevents further damage caused by insects. The chiselled tissues from the infected patches may be destroyed by burning.
2. Nutrient application
 - i. A recommended dose of organic (50 kg cattle manure or green leaf or compost) and inorganic fertilizers (NPK 500:320:1200 g) may be applied per palm per year.
 - ii. In addition, neemcake may be applied at 5 kg/palm/year in September.
 - iii. With a view to increasing the organic matter content in the basin, growing of cover crops like *Mimosa invisa*, *Calapogonium muconoides* in the basin and incorporation *in situ* may be done.
3. Cultural practices
 - i. Irrigation may be given during summer.
 - ii. Good drainage facilities may be provided in the garden.

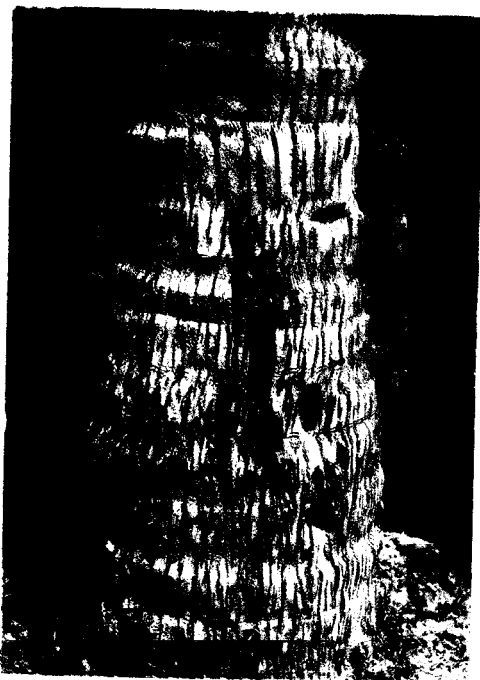


Figure 1. Exudation of dark reddish brown gummy liquid.

iii. Care is taken to see that the least injury is done to stem, especially while tractor ploughing.

4. Pesticide application

- i. The affected palms may be treated with Bavistin. The fungicide may be given through root feeding (0.5 g/100 ml/palm), thrice at 3 months interval starting from June. In pilot studies, Bavistin application has been found to give encouraging results.
- ii. In case where stem borer infestation has taken hold, the affected portion may be swabbed with BHC 0.2% to control the pests.

5. The long-term approach to the control of the disease, however, is the selection of coconut cultivars resistant/tolerant to this disease.

REFERENCES

BRAHMANA, J. 1986. The effects to stem bleeding disease on the flowering and fruit of coconut hybrid PB 121. *CORD* 2(2): 41-51.

BRITON-JONES H.R. 1940. *The Disease of the Coconut Palm*. London: Brailliers, Tindall and Cox.

DAVIS, T.A., H. SUDASRIP, and S.N. DARWIS. 1985. Coconut Research Institute, Manado, Indonesia: An Overview of Research Activities. Coconut Research Institute, Manado.

DWYER, P. 1953. Coconut on deltaic estuarine deposits of New Guinea. Annual report of the Department of Agriculture for the year ending 30-6-1939. *New Guinea Agric. Gaz.* 2:13-19.

GAPASIN, DELY P. 1983 Crop protection management on coconut. *Lembaga Pendidikan Perkebunan*. Medan, Indonesia.

GOBERDHAN, L.C. 1961. Coconut diseases in Trinidad: Bleeding stem. *J. Agric. Soc. of Trinidad and Tobago* 61: 33-39.

LA BROMA, O. 1961. Talodrillo en cocoteroz puede controlarse. *Noticias Agrícolas* 6(31): 4.

LEE, H.A. 1922. Observations on plant diseases in the Philippines. *Phil. Agric. Rev.* 14: 422-434.

MATHEW A.S. and P.L. RAMANANDAN. 1980. Incidence of stem bleeding disease of coconut palm in relation to pH and electrical conductivity of soils. *J. Plant Crops* 8(1): 40-42

MC PAUL, J.W. 1962. Coconut growing in Fiji. *Bull. Dept. Agric. Fiji* 38: 84-89.

MENON, K.P.V. and K.M. PANDALAI. 1958. *The Coconut Palm: A Monograph*. Indian Central Coconut Committee, Ernakulam.

NAGARAJAN, M. 1985. Influence of saline environment on the incidence of stem bleeding in coconut (*Cocos nucifera* L.). *Science and Culture* 51: 349-354.

OHLER, J.G. 1985. *Coconut: Tree of Life*. FAO, Rome.

PETCH, T. 1906. Diseases of coconut palm. *Tropical Agriculturist* 27: 489-491.

PETCH, T. 1908. Coconut stem bleeding disease, *Tropical Agriculturist* 30: 193-194.

POTTY N.N. and T.C. RADHAKRISHNAN. 1978. Stem bleeding diseases of coconut — nutritional relationships. Proc: PLACROSYM. 1: 347-350.

RENARD, J.L., J. BRAHMANA, and F. ROGNON. 1984. Performance of the Yellow Dwarf West African Tall hybrid in Indonesia: Revelation of the role of chlorine in the expression of symptoms. *Oleagineux* 39(6): 311-319.

SALGADO, M.L.M. 1942. Note on physiological stem bleeding of mature coconut palm. *Tropical Agriculturist* 98:31-35.

SHARPLES, A. 1923. Annual Report of the Mycologist for the year 1922. *Malay Agric. J.* 11: 267-272.

SUNDARAMAN, S. 1922. The coconut bleeding disease, *Agric. Research Institute, Pusa Bull.*

VON ULXKULL, H.R. 1985. Chlorine in the nutrition of palm tress *Oleagineux* 40(2): 67-74.