

Incidence and intensity of stem bleeding disease in northern Kerala - *status and strategies for integrated management*

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Coconut is the major cultivated crop in the northern districts of Kerala which provides livelihood to lakhs of farm families. Farmers of this region experience various constraints in coconut farming crop loss due to incidence of various pests and diseases. Stem bleeding disease caused by the fungus *Theilaviopsis paradoxa* is widely prevalent in coconut orchards of northern Kerala, especially in districts like Kasaragod, Kannur and Kozhikode, which adversely affects the coconut production of this region. Even though earlier studies conducted by CPCRI revealed the intensity of the incidence of stem bleeding disease in northern Kerala and indicated the need for effective steps for the integrated management of the disease to avoid economic loss, no field level interventions in substantial terms have been implemented yet. Concerted efforts are required ensuring active participation of coconut growers and other stakeholders to control and prevent the spread of the stem bleeding disease of coconut in northern Kerala.

Stem bleeding is one of the major diseases causing heavy loss in coconut. First report of the disease from India was in 1922. Stem bleeding, a debilitating disease, is prevalent in almost all the coconut growing areas of the country. In the early stages of the disease, yield loss is limited. However, later on, there is a steady yield decline causing considerable loss which eventually leads to death of affected palms unless managed in time.

Symptoms of stem bleeding disease

○ Exudation of reddish brown gummy fluid from growth cracks on the trunk, which becomes black on drying.

● In the initial stages of infection, bleeding symptoms appears as one or two longitudinal cracks at the base and later spreads upward on the stem. The longitudinal patches may coalesce to form larger patches.

● In advanced stages of infection, the bleeding

patches may extend up to the crown.

○ The tissue inside the lesions shows discoloration and decay. The internal damage is confined to the hypodermal region.

○ In young palms under cooler conditions, the decay may extend into the deeper layers of central cylinder

○ As a result of extensive damage in the stem tissue, the outer whorl of the leaves turn yellow, dry and shed prematurely.

● The trunk tapers and reduces the crown size.

● In the advanced stages, scolytid beetles like *Dicolandra* and *Xyleborus* infest the palms and further weaken the stem.



Symptoms of stem bleeding disease

Etiology

Stem bleeding disease is caused by a fungus, *Theilaviopsis paradoxa*. It is a soil borne weak pathogen which enters the trunk through wounds/growth cracks. Growth cracks may develop after sudden heavy rains following prolonged dry period or after heavy manuring. Development of growth cracks, poor drainage, soil moisture stress, hard pan formation in soil, imbalanced nutrition, excessive soil salinity, stem injury, lightning attack and insect attack are the predisposing factors for disease development. The disease growth is faster during July- November when high humidity and optimum temperature prevail. Some of earlier investigations reveal that inoculum was high in red loam soil followed by



laterite soil and the least in the sandy soil. The pathogen also attacks intercrops, viz. arecanut, banana, pineapple and papaya.

Integrated Disease Management

- Removal and destruction of disease advanced and dead palms.

- Application of recommended dose of fertilizers in two splits, one third during April-May and two-third during September–October

- The affected tissues should be completely removed using a chisel and smear the wound with 10% Carbendazim50WP (10g in 100 ml of water) and basin drenching with 40 liters of 0.1% Carbendazim50WP at quarterly intervals up to one year.

- Root feeding with 100 ml of 5% Carbendazim50WP at quarterly intervals up to one year. Or

- Smearing of Trichoderma talc powder paste on the bleeding patches of the stem (The paste can be prepared by adding 50g of Trichoderma talc powder to 25 ml of water).

- Soil application of Trichoderma harzianum (CPTD 28) enriched neem cake @ 5 kg/palm at quarterly intervals up to one year and irrigating the palms once in a week followed by mulching around the palm basin.

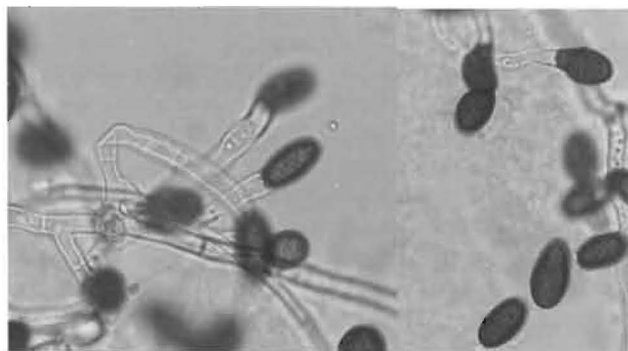
Status of incidence and strategies for IDM against stem bleeding in northern Kerala

Recently, a study was conducted by ICAR- CPCRI with the support of State Planning Board, Government of Kerala, to assess the incidence and intensity of stem bleeding disease in Kasaragod and Kannur districts. The disease incidence was calculated by taking into account the number of palms infected to the total number of palms in the garden. Severity of the disease was computed using formula given by Jacob Mathew et al. (1989), $1.81 + 4.3t$, where l = lesion size (in 1000 cm²) and t = tapering of

palm ranging from 0 to 4. If the disease severity score is <10 then it is considered as mild, if 10-25 then it is moderate and if it is >25 considered as severe. The study showed that overall incidence of disease was 2.27% and 1.78% in Kasaragod and Kannur districts, respectively. In Kasaragod district, highest incidence (6.2%) was observed in Padanne panchayath followed by Delampady (5.6%) and Pilicode (4.8%) panchayaths. The incidence was lowest in Panathady (0.4%) and Puthige (0.6%) panchayaths. In Kannur district the disease incidence was high (3.3%) in Cheruthazham panchayath compared to other panchayaths included in the study. Study revealed that stem bleeding disease incidence is more prevalent in Agro Ecology Unit (AEU) 11 i.e. Northern Laterites. The region is characterized by more dry spells and higher temperature and hard laterite soils which favours the pathogen to infect the palm. Eastern high land region had fewer incidences.

Assessment of severity of stem bleeding disease of coconut in Kasaragod district revealed that incidence was severe in two third (66.52 %) of the palms affected by the disease, moderate in one fourth (24.67%) and mild in 8.81% palms. In Kannur district the incidence of disease was severe in 82% palms, moderate in 14% palms and mild in 4% palms. The results clearly indicate that incidence of stem bleeding disease of coconut in northern Kerala is mostly severe in nature and hence it is imperative that urgent necessary steps are taken up to implement integrated disease management strategies to prevent further crop loss. It was observed that in many cases coconut growers did not adopt any control measures. The seriousness of the disease incidence was not properly perceived by the farmers mainly because the palms affected by the disease do not perish quickly but only gradually. Further, most of the farmers fail to observe the bleeding patches on the tree trunk at the initial stages of the disease.

The practices adopted by farmers for managing the stem bleeding disease indicate that the level of adoption of integrated disease management package is very



Conidia of Theilaviopsis paradoxa



Root feeding with 5% Carbendazim



No fresh bleeding patches after application of Trichoderma talc powder paste

low. Only in 10% of affected coconut gardens, some kind of control measures were adopted against stem bleeding disease, that too mostly incomplete or incorrect adoption. Less than 1% farmers adopted the practice of removing the affected tissues completely using a chisel and smearing the wound with fungicide, the main component of the IDM practices recommended against stem bleeding disease.

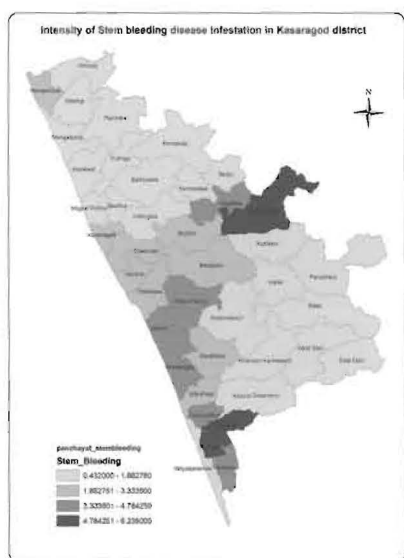
It was also revealed that farmers were not having adequate level of knowledge about the IDM package for managing stem bleeding disease. Some of the constraints farmers mentioned in adopting the recommendations included lack of availability of quality neem cake, lack of availability of fungicides, lack of labour etc. Even though stem bleeding disease was prevalent in most of the coastal and midland grama panchayaths, extension personnel from only few Krishi Bhavans perceived the need for implementing major interventions to manage stem bleeding disease. Compared to bud rot disease, palms affected by stem bleeding disease do not perish quickly and remain in the field for many years living with the disease but of course with visible decline in yield and health. The seriousness of the disease incidence was not properly perceived by the farmers mainly because the palms affected by the disease do not perish quickly. Hence, in most of the cases farmers did not adopt any control measures against the disease under the impression that it will not kill the palm.

Estimated loss due to stem bleeding disease in Kasaragod district alone amounts to Rs. 70 crores, which is almost half the loss due to all the pests and diseases in the district. Interventions in plant protection

implemented through Krishi bhavans were very few indicating that the importance given to the stem bleeding disease is very low as compared to its adverse impact by way of crop loss.

ICAR- CPCRI has made continuous efforts in creating awareness among the coconut farmers on the importance of managing stem bleeding disease and popularizing its integrated control measures, in addition to the development and refinement of IDM package. Under the IVLP programme during 1995-96, the effectiveness of integrated control of stem bleeding disease was assessed in field conditions in Pady and Nekraje villages of Kasaragod district. Farmers were of the opinion that the control measures were not effective after 50% of the stem got infected with visible symptoms. During 2006-07, off-campus training - cum - demonstration programme on 'Integrated management of stem bleeding disease of coconut' was organised in collaboration with the Madikkai grama panchayath. In addition, KVK, Kasaragod had conducted FLD on stem bleeding management in many of the farmer's fields in Kasaragod district over the period. Training programmes on stem bleeding management was also conducted in 2009 at Madikkai, Bedadukka and Ajanoor grama panchayaths where the severe occurrence of the disease was reported.

Despite the efforts from the research institutes and developmental agencies, incidence of stem bleeding disease is still alarmingly severe. Hence, it is suggested to implement appropriate interventions on a priority basis for the integrated management of stem bleeding disease to avoid crop loss. The interventions may include:



(i) Capacity development programmes including training programmes to enhance awareness and knowledge of farmers and labourers on identification and integrated management of the disease

(ii) Arranging demonstrations on Integrated Disease Management (IDM) practices for the control of stem bleeding in farmers' gardens which should also include demonstrations on management of nutrient deficiencies in coconut. These demonstrations can be taken up in selected localities as part of ongoing technology transfer initiatives under ATMA with technical support from research organisations like ICAR-CPCRI.

(iii) Making available service of skilled labour force who will be able to render their service to coconut growers for adopting IDM measures against stem bleeding disease through Agro Service Centres managed by Department of Agriculture. Location specific schemes can be implemented by LSGs through Krishibhavs for supporting coconut growers for adopting the IDM practices. Grass root level interventions on farmer participatory disease management by Coconut Producer Societies/Federations with support from

Coconut Development Board can also be implemented. Availability of quality critical inputs including neem cake and Trichoderma is to be ensured.

(iv) A sustainable mechanism for disease surveillance needs to be evolved so as to streamline the field level implementation of interventions on IDM practices against stem bleeding disease.

(v) Efforts are to be made to ensure stakeholder synergy while formulating and implementing interventions for the management of stem bleeding disease in coconut gardens. Coordination among different stakeholders including coconut farmers organizations, local self governments, department of agriculture, CDB, CPCRI etc is to be ensured.

Conclusion

Studies by ICAR-CPCRI have clearly revealed that stem bleeding disease caused by the fungus *Theilaviopsis paradoxa* is widely prevalent in coconut gardens of northern Kerala which adversely affects the coconut production in this region. Though technologies are available for the management of the disease, farmers are unable to adopt the IDM practices due to various socio-economic and other reasons. In spite of the widespread incidence of the disease, field level interventions in substantial terms have not been implemented yet to manage the disease incidence. Hence, it is necessary that appropriate interventions are formulated and implemented with the active participation of coconut growers for the integrated management of stem bleeding disease to avoid economic loss. Effective co-ordination among various stakeholders including coconut producer organisations, development/extension agencies like State Department of Agriculture, ATMA, Coconut Development Board and research organisations like ICAR-CPCRI would be a key element in ensuring the efficacy of such interventions. ■

