Integrated Management of **Basal Stem Rot Disease and Black Headed Caterpillar of coconut** in Karnataka

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Of the major diseases, Basal Stem Rot (BSR) incited by *Ganoderma spp.* is a serious disease affecting coconut. The disease has been called with variety of names viz., Ganoderma wilt, Basal Stem Rot, Anabe Roga and Thanjavur wilt. This disease was reported way back in 1906 by Buttler in India. Later, during 1952 the disease appeared in Thanjavur district of Tamil Nadu and hence, the name Thanjavur wilt. The disease is prevalent in most of the growing areas of Southern India. The disease is considered as lethal disease, as it completely kills the palm in advanced stages. The surveys conducted in major growing areas of Karnataka indicated, that on an average 10-15 per cent of palms are infected with BSR. The worst case of the disease is that, it remains asymptomatic till bleeding patches occur on stem. In general this disease is observed in all growing packets of Karnatka. However, Hassan, Tumkur and Chickmagalur districts have severe incidence of this disease. The leaf eating black headed caterpillar, *Opisina arenosella* is a serious pest of coconut palm causing significant yield loss in all the coconut growing tracts of India. It infests coconut of all age groups and is a prolific feeder of coconut leaves. On the adult palms, the infestation starts on the outer whorls of leaves and due to the feeding damage, the photosynthetic efficiency especially of the lower fronds will be impaired and in severe cases, whole plantation presents a burnt up appearance due to the drying of leaves. In case of severe out breaks the attacked leaves droop, bunches buckle and the immature nuts are shed heavily, in extreme cases feeding by the caterpillar on the green nut surface is also observed.

Demonstration of root feeding of Hexaconazole

Basal stem rot is a major disease of coconut in Tumkur and Hassan districts of Karnataka coupled with incidence of Black headed caterpillar. In order to manage the disease attack, the Coconut Development Board sanctioned a project entitled Demonstration of Integrated Management Practices for Basal Stem Rot Disease and Black Headed Caterpillar in Coconut growing regions of Karnataka and the same is in operation at Horticulture Research

and Extension Station under All India Coordinated Research Project on Palms, Arsikre centre. Under the guidance of Dr. H.P. Maheswarappa Project Coordinator (Palms), inorder to make aware of the management techniques available at the AICRP centre, one day training programme was organised on 18th June 2018 at Shashivala village in Arsikere Taluk of Hassan District in Karnataka. Dr. Y. K. Kotekal, Director of Extension, University of Horticulture Sciences, Bagalkot inaugurated the training programme and addressed farmers regarding pest and diseases of coconut and also challenges faced by coconut growers. Dr. Manjunath Hubballi, Scientist and Principal Investigator of the project gave training on coconut diseases and in particular basal stem rot disease and its integrated management. Further, he demonstrated the root feeding of Hexaconazole 2 ml per 100 ml of water to the farmers. Dr. Chandrashekar, G. S. Scientist and Co-PI of the project highlighted the importance of Black Headed Caterpillar in coconut plantation and its management. The field demonstration on release

Demonstration of release of parasitoids

of parasitoids viz., *Bracon bravicornis* and *Goniozus nephantidis,* which were mass produced at biological control laboratory, Horticulture Research Station, Arsikere for the management of black Headed caterpillar in coconut was conducted. More than 200 farmers participated in the programme and had interaction with scientists.■

The Symptomology of BSR

BSR produces multiple symptoms on roots, stem and on crown region of the palm and identification of the disease is often confused with stem bleeding disease. Disease symptoms progress slowly, but usually every infected plant eventually dies. Disease develops from the roots and the first visual symptoms are visible on stem as reddish brown exudation. *Peries et al.* (1975) presented a detailed description of the symptomatology of the disease. Nambiar and Rethinam (1986) made some distinguishing characteristics that help in disease diagnosis as both Ganoderma wilt and stem bleeding diseases in coconut produces similar type of symptom such as exudation of reddish brown fluid from the stem. According to *Thirumalaiswamy et al.* (1992), palms in Thanjavur wilt, sometimes succumb without expressing external symptoms. Palms aged 10 years and older were more susceptible to the disease than younger palms.

Roots: 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 rot. 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 the stele turns brown. The roots are watery with a distinct alcoholic smell. The production of new roots decreases in the infected palm. In severely infected palms, more than 70 % root rotting was observed (Rethinam 1984, Bhaskaran 1986, Srinivasulu and Rao 2007).

Stem: From the roots, the infection slowly progresses up the stem leading to internal disintegration of cortical and stele 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. By that time, the rotting would have progressed from the bole to the basal portion of stem. Karthikeyan et al. (2006a) reported that the disease caused 15 to 25% damage to roots and bole below the ground level by the time external symptoms are visible. 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 (Vijayan and Natarajan 1972, Bhaskaran *et al.* 1989). Occasionally, some infected palms do not show bleeding symptoms (Thirumalaiswamy *et al.* 1992). The bark from the base of the stem peels off. Infestation of scolytid beetle, Xyloborus perforans and the weevil, Diocalandra stigmaticollis are found infesting the stem in severely infected palms. Sporophores of the fungus, *G. lucidum* appear at the base of the affected palms prior to wilting or just after the death of the palm (Bhaskaran et al. 1982, Vijayan et al. 1973, Rethinam 1984, Bhaskaran 1986, Srinivasulu and Rao 2007).

Crown: 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. Vijayan and Natarajan (1972) reported that the first external symptoms are flaccidity and folding of leaflets, chlorosis and bronzing of lower whorl of leaves. Under prolonged infection, the outer leaves falloff one by one, leaving only the spindle with a few unhealthy leaves around. The spindle leaves which emerge subsequently are reduced in size and do not unfold properly. Later stem shrivels and dries up. In some cases leaves breakoff near the base along the midrib. Soft rot of bud may also set in some cases emitting bad smell. In advanced stages, all the leaves drop off leaving very thin decapitated stem (Vijayan and Natarajan 1972, Bhaskaran et al. 1982, Bhaskaran 1986). As the disease progresses, number of flowers, number of buttons reduces and normal development is arrested leading to button shedding. The leaves droop down resulting in hanging down of the subtended bunches. Most of the palms bear profusely, just prior to and at the time of initiation of symptoms

(Snehalatharani, A & H.P, Maheswarappa & Venkat, Devappa & Malhotra, Suresh. (2016). Status of coconut basal stem rot disease in India – A review. Indian Journal of Agricultural Sciences. 86. 1519-1529.) ■

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