



Prevalence and Intensity of Basal Stem Rot Disease of Coconut in Arsikere Taluk of Karnataka

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Introduction

Coconut (*Coco nucifera* L.) belonging to palm family Arecaceae is cultivated widely throughout the tropics of the world. India is the largest producer of coconut in the world with an estimated production of 13.97 billion nuts from 1.796 million hectares (95-96). Coconut is known as Kalpavriksha in view of its enormous contribution to the mankind - every part of the tree and its product having some economic use. It is one of the most important sources of vegetable oil. Nearly seven percent of vegetable oil production in the country is accounted for by coconut oil.

Coconut palm is affected by a large number of diseases and the most prevalent disease in Karnataka is basal stem rot caused by *Ganoderma lucidum* (Leys.) Karst. Basal stem rot disease of coconut, also known as *Anaberoga* in Karnataka, *Thanjavur wilt* in Tamil Nadu and *Ganoderma wilt* in Andhra Pradesh, is the most serious disease limiting coconut production in the above states. It is also reported from Kerala, Maharashtra, Gujarat and Orissa. *Ganoderma* disease was first reported in coconut palms in India by Butler (1906). Venkatarayan (1936) studied this disease which affected both coconut and arecanut in Karnataka.

Symptomatology

The disease first starts in the root system and during the initial period of infection no external disease symptoms are clearly visible. At the beginning, a few roots get infected which start rotting and the rotting proceeds towards the bole region. Discoloration

and extensive rotting of root system are progressively observed which are the characteristics of this disease. In moderately and severely diseased palms, the root decay will be more at 0-30 cm depth. In the crown, leaflets of outermost whorl start showing signs of wilting. Later on, one or two outer whorls of leaves turn yellow. They exhibit light to moderate browning followed by drooping and drying. As the disease advances, the remaining leaves also droop down in quick succession leaving only the spindle with a new unhealthy leaves around. On the stem, the symptoms first appear as exudation of reddish brown viscous fluid from its basal portion. The bleeding patches gradually traverse upwards reaching upto a maximum of 3.5 meter height as the disease progresses. Sporophores of the fungus *Ganoderma lucidum* appear at the base of the affected trunk in some palms prior to wilting or just after the death of the palm. In severely diseased palms, some of the nuts become barren. In the remaining nuts, the quality and quantity of kernel, nut water and copra will vary and there will be a decrease in the oil content also in the kernel.

Disease Spread

Generally, the disease incidence will be more in trees in the age group of 10 to 30 years or more. The disease spreads from palm to palm mostly by root contact. From the original source of infected palm, the disease spreads in all directions. It takes about 6 to 18 months for the disease to spread to the adjacent palm. This time lag is dependent upon the soil conditions and cultural practices adopted.

Prevalence and Intensity of the Disease

As part of management of basal stem rot of coconut caused by *Ganoderma lucidum*, a survey was under taken during kharif 1998-99 in coconut gardens of different villages in Arsikere taluk of Hassan District to know its incidence, severity, distribution and development. The average annual rainfall of this taluk was about 700 mm and this area falls under Central Dry Zone of Region III. The coconut is one of the predominantly cultivated crops having great economic importance to this taluk. Totally about ten randomly selected villages were surveyed in the taluk. The percent incidence of the disease was calculated based on the total number of palms observed in each village. For assessing the severity of the disease in each coconut palm, the disease indexing method developed at Veppankulam by Baskaran *et al* (1996) was followed in the present study and is given as.

Disease Index

$$(DI) = 23.6 + 17.7 h + 3.6 r - 0.6 l$$

Where 'h' is the height in meters upto which bleeding symptom has spread in the stem, 'l' is the number of functional leaves in the crown and 'r' is the score for reduction in leaf size in 0-4 scale. According to this formula, the severity of the disease in a coconut palm is mild if the disease index score is less than 15, moderate if DI is 15 to 40 and severe if DI is above 40. The survey data is presented in Table - 1.

Survey Results and Discussion

The survey revealed that the maximum incidence of the disease was



Table 1. Incidence and intensity of basal stem rot disease in coconut palms of Arsikere taluk, Hassan District, Karnataka during kharif 1998-99

Name of the village	No. of coconut palms		Percent Incidence	Disease Index
	Observed	Infected		
1. Aggunda	260	47	18.08	31.33
2. Banavara	215	61	28.37	54.14
3. Boranakoppalu	305	30	09.84	22.30
4. Geejihally	180	24	13.33	17.16
5. Habbanagatta Kavalu	1100	109	09.91	38.42
6. Haranahally	330	20	06.06	19.88
7. Kasturba Grama	850	92	10.82	40.35
8. Sulekere	285	36	12.63	29.98
9. Thalalur	240	34	14.17	33.19
10. Thimalapura	260	94	36.15	76.92

observed in Thimalapura village (36.15 %) followed by Banavara (28.37%) and the lowest incidence was observed at Haranahally (6.06 %). The severity of disease calculated in terms of disease index (DI) ranged from 17.16 in Geejihally village to 76.92 in Thimalapura village and the mean intensity of disease occurrence in these ten villages was 36.37. The intensity of the disease was severe in Thimalapura, Banavara and Kasturba Grama and this may be due to the soil moisture stress especially during summer months as the coconut cultivation in these villages are mostly rainfed. Further, the coconut gardens in these villages were found to be poorly managed and the farmers have failed to take preventive measures when the sporadic disease incidence was observed initially. It is a well known fact that the above disease will spread horizontally to the adjoining trees through physical translocation of infected roots and soil. In some of the gardens, it was observed that the stumps of disease infected dead palms were not removed which resulted in emergence of the fungus bracket and ultimately helping in the dissemination of spores.

The disease was prevalent in red sandy soil which was preferred for coconut cultivation. However, the disease incidence could be observed in other types of soils also like medium red and medium black soils. The actual yield loss due to the disease is not yet been assessed in Karnataka.

This survey data clearly shows that the prevalence and intensity of the disease is moderate to severe in Arsikere taluk which is a coconut belt in Karnataka. Since, the majority of the farmers in this taluk as well as in adjoining taluks and districts of Karnataka State were cultivating the same local tall cultivar of coconut (*Arsikere Tall*), the disease is likely to be found in other contiguous areas as well.

Ganoderma infected palms were also found in irrigated coconut gardens of this taluk. Though the intensity and incidence of this disease in irrigated gardens, in general, was less owing to good management, an isolated infection in the middle of some well maintained gardens is a big puzzle. Surprisingly, some of the palms infected by the disease were high yielders over the

years and this complicates all the reasoning with the available information.

Early Detection of the Disease

For taking up effective control measures against this disease, it is imperative that the disease is detected in the early stage itself. By the time clear visual symptoms begin to appear on the palms, much damage would have occurred. Hence, for early diagnosis of the disease, before the expression of the external symptoms, the root samples of suspected palms should be tested in the laboratory by chemo-diagnostic methods viz., EDTA, TTC and orthophenanthroline tests.

Integrated Management

It is now globally recognised that the most effective and acceptable plant protection methods from the view point of preservation of the environment are the integrated methods. They help not only in the destruction of the pathogens, but also in the long term control of various harmful organisms at a safe level with minimum adverse consequence on the environment.

As prophylactic measures, the basins of apparently healthy coconut palms surrounding the affected palm should be treated with the chemical to prevent further infection of the disease. However, for effective check of this disease spread, an integrated approach comprising phytosanitary, cultural and chemical methods is necessary.

The integrated methods that could be followed in coconut for the management of basal stem rot disease are as follows :

1. Removal of infected dead palms and stumps in the garden and destruction of the bole and roots of these palms by burning.
2. Isolation of diseased palms from healthy ones by digging circular or square trenches 1 m deep and 30 cm



- wide around the diseased palms at a radial distance of about 3.5 m.
3. Ploughing should be avoided around infected palms so that the translocation of fungal inoculum is prevented to the neighbouring palms.
 4. Irrigation to palms during summer may be provided preferably by drip method or by basin irrigation. Flood irrigation should be avoided.
 5. Moisture conservation techniques like coconut husk burial in the basin may be followed if no irrigation facility is available.
 6. Application of neem cake 5 kg/palm/year in addition to the recommended organic manure (50 kg FYM or green leaves) and chemical fertilizers.
 7. Application of phosphobacteria, 200 g/palm/year, alongwith the organic manures.
 8. Root feeding of 1.3 g aureofungin-sol (0.6 g ai) in 100 ml of water along with soil drenching of coconut basin using 25-40 litres of 1% bordeaux mixture at quarterly intervals. Tridemorph 5% (100ml) can also be used for root feeding as an alternative fungicide. Fungicide treatment will be effective in controlling the basal stem rot disease of palms only in the early stages of disease.
 9. Raising disease antagonistic intercrops like banana wherever irrigation is possible.

REFERENCE

- Bhaskaran R., Rajamanner M. and Kumar S.N.S., 1996. Basal stem rot of coconut. *Technical Bulletin No. 30*, Central Plantation Crops Research Institute, Kasaragod - 671 124, Kerala, India.
- Butler E. J. 1906 Some diseases of palms *Agril. J. India*, 1:297-310
- Venkatarayan S. V., 1936. The biology of *Ganoderma lucidum* on arecanut and coconut palms. *Phytopathology* 26:153-175.

RESEARCH HIGHLIGHT IN HORTICULTURE (KAU)

Two banana hybrids, BRS - 1 and BRS - 2 recommended for cultivation in Kerala were released from BRS, Kannara. Banana pseudostoma borer could be effectively controlled by proper protection of plants four months after planting by swabbing chlorpyrifos 0.05% or carbaryl 0.2% Tracer studies in banana var. Palayankodan revealed the existence of both intermat and intramat competitions. Promising types of mangosteen, lovi lovi, karonda, bilimbi and Indian hog plum were selected after conducting an extensive survey in Kerala. Cultural practices of dendrobium orchid, anthurium and foliage plants were standardised. Promising dendrobium hybrids were evolved at AICFIP, Vellanikkara

Investigations on screening papaya varieties with special reference to post-harvest attributes reveal the overall superiority of cultivars Solo and CO-3 with respect to shelf life. **A novel technology has been developed to retain the quality of tender coconut water at an acceptable level upto 30 days by removing 90 percent of the husk and dipping the nuts in a solution of potassium metabisulphate (0.05 per cent) and citric acid (0.5 per cent).** Technology for development of value added products from papaya like sauces, RTS beverage, fruit bars, jam, jelly, cheese, squash and wine was standardized under a National Horticulture Board sponsored project.

A low cost storage technique was evolved for tomatoes using equilibrated saw dust as packing medium. The research and development team of KHDP has succeeded in the development of improved varieties of different vegetable crops viz. Haritha and Neelima in brinjal, Saubhagya in oriental pickling melon, Vijayanthi and VS 13-2 in yard long bean. A high yielding cucumber line AAUC - 2 with light green attractive fruits, utilised for Kerala State has been identified at AICVIP, Vellanikkara. Two turmeric varieties, Kanthi and Sobha with high yield and high curcumin content were released from the Dept. of Plantation Crops and Spices, College of Horticulture.

RAPD assay has been developed and primers identified for genetic finger printing in black pepper. Clonal fidelity and genetic stability of tissue culture derived black pepper plants have been confirmed through molecular markers. A type II PR protein has been identified to be associated with the resistance mechanism of black pepper for phytophthora foot rot disease. Somaclonal variants developed in black pepper expressed better tolerance to the foot rot disease. PCR assay has been developed for confirmation of phytoplasmal etiology of root wilt disease in coconut. A nitrogen fixing bacterium (both endo and epiphytic) has been isolated for the first time in black pepper.

- KSHS News letter