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Narayanaswamy H
 Arecanut Research
 Centre, ZAHRS, University of
 Agricultural and Horticultural
 Sciences Shivamogga,
 Karnataka, India

Raju J
 Plant Quarantine Station,
 DPPQS, Mangalore, Karnataka,
 India

Jayalakshmi K
 ZAHRS, University of
 Agricultural and Horticultural
 Sciences, Shivamogga,
 Karnataka, India

Syed Sannaulla
 ZAHRS, University of
 Agricultural and Horticultural
 Sciences, Shivamogga,
 Karnataka, India

Shesragiri KS
 ZAHRS, University of
 Agricultural and Horticultural
 Sciences, Shivamogga,
 Karnataka, India

Dinesh Kumar M
 ZAHRS, University of
 Agricultural and Horticultural
 Sciences, Shivamogga,
 Karnataka, India

Correspondence
Narayanaswamy H
 Arecanut Research
 Centre, ZAHRS, University of
 Agricultural and Horticultural
 Sciences Shivamogga,
 Karnataka, India

Integrated management of basal stem rot disease of arecanut

Narayanaswamy H, Raju J, Jayalakshmi K, Syed Sannaulla, Shesragiri KS and Dinesh Kumar M

Abstract

Basal stem rot is one of the important diseases of arecanut accounting to severe yield loss in southern India. The disease in Karnataka is reported to be caused by *G. lucidum*. The disease if unattended, is becoming a major threat to arecanut production in Andhra Pradesh, Karnataka and Tamil Nadu states. Management of the disease is possible with continuous monitoring and implementing biocontrol based integrated management approaches. Among the six treatments tried, application of Tridemorph as root feeding at 2ml per 100ml water during January, April and September along with application of both Neem cake @ 2kg per palm and *Trichoderma harzianum* at 100g per palm performed better in controlling the disease. Both Neem cake and *Trichoderma harzianum* was applied during onset of monsoon. By applying the above treatment palms recovered by giving higher number of healthy leaves (9.45 per palm) and reduced drooped leaves (3.5 per palm). This was closely followed by pure chemical treatments of either Tridemorph or Hexaconazole as root feeding.

Keywords: management, basal stem rot, arecanut, *G. lucidum*

Introduction

Basal stem rot of Arecanut incited by *Ganoderma lucidum* (leys) karst has the history of more than 100 years. Basal stem rot disease of arecanut is one of the major reasons for reduced yields of arecanut in southern states. The disease is reported to be caused by *Ganoderma lucidum* (Ley.) Karst. *G. applanatum* (Pers.) Pat. And *G. boninense* in Indian subcontinent. It is also known as Anabe roga in Kannada Language. The occurrence of the disease is reported from Kerala, Assam, West Bengal and Karnataka. Its occurrence and distribution in major arecanut growing states revealed that the disease is not confined to any soil type, however is more prevalent in lighter soils. High degree of variation was observed between the pathogen isolates through morphological, cultural and molecular studies. The survey during 2009-10 for the incidence of this disease indicated that the losses of palms have been ranged from 5-12% in maiden areas of Shimoga, Davanagere, Chitradurga and Chickmangalore districts. This disease is more severe in hard black loamy acid soils containing higher iron and low calcium (Lalithakumari 1969) [1] Palms in the age group of 5-15 years are more susceptible. The fungus is soil borne and infects the root. When the trees are weak due to physiological imbalance, the fungus becomes more virulent and spreads upwards, killing the entire root system. Affected palms show the symptoms of yellowing and drooping of leaves, bleeding of brown liquid from cracks at basal portion of stem. In advanced stages of the disease the fungus produces Mushroom like fruiting bodies or sporophores, along the sides of the basal trunk. Rotting of roots and internal tissue of basal portion of stem proceeds leading to death of palm. Even though early disease escapes detection, the disease is found manageable with continuous monitoring and bio control based integrated disease management measures. Earlier recommendation to manage this disease include chiefly by chemicals like Bordeaux mixture, Captan, Carbendazim and Calixin etc. (Sampath Kumar and Nambiar, 1996) [6] These chemicals by and large found effective but not sustainable. Hence, this study was undertaken with an objective of formulating efficient integrated strategy for sustainable management on basal stem rot disease of Arecanut.

Materials and Methods

An experiment was laid out in four different locations namely Hosahalli and Hasudi village in Shimoga district, Tarikere and Hunasathatta in Chikmangalore district. These gardens showed

the disease incidence during 2009 to an extent of 10-15%. Five treatments were imposed from January 2010 and onwards for two years. Treatments included use of Calixin hexaconazole as fungicides, Calixin with neemcake and *Trichoderma harzianum*. For each palm 2kg of neemcake and 100g of *Trichoderma* were applied. Five affected trees were chosen for each treatment and observations were recorded for average number of healthy leaves per palm and number of leaves drooped per palm.

Results and Discussion

Wide range of fungicides such as sulphur, thiram, benomyl, plantavax, vitavax (Sulladmath and Hiremath, 1978) [7] mercurials copperoxy-chloride (Nair and Rao, 1965) [2] and cycloheximide (Lalithakumari, 1969) [1] were reported as effective against *Ganoderma lucidum* (Leys). All the treatments were found effective in reducing the disease severity (Table 1). However, between two chemicals the performance of Calixin was found better than Hexaconazole when integrated with other practices. Among the treatments tried, application of Calixin as root feeding @ 2ml per 100ml water during January, April and September along with application of both Neem cake @ 2kg per palm and *Trichoderma harzianum* @ /00g per palm performed better in controlling the disease. Both Neem cake and *Trichoderma harzianum* was applied during onset of monsoon. By applying the above treatment palms recovered by giving higher number of healthy leaves (9.45 per palm) and reduced drooped leaves (3.5 per palm). This was closely followed by pure chemical treatments of either Calixin or Hexaconazole as root feeding. Sampath Kumar and Saraswathy (1994) [6] observed that the

effectiveness of chemical fungicide was enhanced in conjunction with applying FYM @ 15-20 kg /palm or green leaf 15-20 kg/palm or Neemcake@ 2.5kg/palm. Due to bio control activity of *Trichoderma harzianum* and release of nimbicidin and nimbicidine from applied Neemcake helped to suppress the pathogen. The pathogen that still survives in system might be controlled due to activity of systemic fungicide. Thus, plants were devoid of pathogen and showed healthy symptoms.

Rajappan and Vaithilingam (2009) [4] reported integrated disease management system (IMS) consisting of cultural (basin irrigation, application of the recommended fertilizer rates, application of 50 kg farmyard manure/plant, basin management with 50 g sun hemp and in situ incorporation, and intercropping with banana in 2 rows within 2 rows of coconut), biological (application of *Trichoderma viride* and *Pseudomonas fluorescens* at 200 g plant each) and chemical (application of tridemorph or hexaconazole at 200 ml/100 ml of water at quarterly intervals) control systems were effective against basal stem rot disease.

Palanna *et al.* (2009) [3] found that the disease spread was less (70.31% reduction over control) with root feeding of Hexaconazole (1%) at quarterly intervals along with soil application of 5 kg neem cake and 50 g of *Trichoderma harzianum* per palm at half yearly interval. Root feeding of tridemorph (2%) along with application of 5 kg neem cake/palm/year and root feeding of hexaconazole (1%) combined with application of 5 kg neem cake/palm/year also reported less disease spread (64.02 and 56.93% reduction over control, respectively).

Table 1: Effect of Integrated Management Schedules on Basal Stem Rot of Arecanut.

Sl No.	Treatments	Av. No of Leaves/ Palm	No. of leaves Dropped/ Palm	No. of Infested palms
T1	Tridemorph (Calixin) @ 2 ml/100 ml water root feeding (January, April, September)	9.25	4.0	3
T2	Tridemorph (Calixin) (@ 2%) drenching 5 lit/palm (January, April, September)	7.90	3.5	4
T3	Hexaconazole @ 2 ml/100ml water root feeding, 3 times, (January, April, September)	9.65	3.5	4
T4	Hexaconazole @ 2ml/lit (Slit/palm (January, April, September)	8.15	5.5	5
T5	T1+Neemcake 2kg + <i>Trichoderma harzianum</i> (100g/palm)	9.45	3.5	2
T6	Untreated check	7.25	6.5	6

Note: Recommended manures and Fertilizers were applied and were common to all. Treatments.

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