



# Eco Friendly Management of Arecanut Root Grub ( *Leucopholis lepidophora* Blanchard) in Hilly Tracts of Uttar Kannada, Karnataka

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## ABSTRACT

Amongst the several factors attributed for lower productivity of Arecanut, damage by root grubs is substantially important in Malnad belt of Uttar Kannada district. The root grubs cause damage to the arecanut tree by directly feeding on roots resulting in symptoms like yellowing of leaves, stem tapering at the crown region, reduced inter-node length, nut fall and ultimately leads to reduced vigour, yield and death of plant. To manage this insect, usually insecticides are recommended but farmers of this district are reluctant to use chemical pesticides due to the deleterious effects on soil health, fauna and flora. Indigenous technical knowledge followed by the farmers were documented in 15 villages of three taluks viz., Sirsi, Siddapur and Yellapur and based on scientific validation, an on farm trial was conducted to evaluate the feasibility and economic viability of aqueous extract of soap nut and neem oil 5 % mixture and entomopathogenic fungi, *Metarhizium anisopliae* 2 X 10<sup>8</sup> conidia /g @ 20 g per palm tree against root grubs in arecanut during 2009-12 at farmers' fields. The results revealed that the recommended practice i.e. drenching with chlorpyrifos 20 EC @ 10 ml/l of water ( 3-4l of solution per palm tree) recorded highest grub mortality of 86.83 per cent as against 64.88 per cent in aqueous extract of soap nut and neem oil 5 % mixture treated palms. Appearance of new healthy green frond and improvement in the growth of the palms are the visual indicators. Neem oil and soap nut extract was the best alternative to chemical insecticides, locally available and is ecofriendly.

**Key Words :** Arecanut, Root grub, Neem oil, Soap nut, Eco-friendly.

## INTRODUCTION

Arecanut (*Areca catechu* L. ) cultivation in the valley forms the main feature of the Uttar Kannada district, Karnataka and cultivated in an area of 17,912 ha with a production of 43,864Mt. The district has a rich heritage of floral and faunal diversity. Arecanut crop is attacked by an array of insect and non insect pests. Amongst them, the root infesting scarabaeid white grub, *Leucopholis lepidophora* Blanch ( Scarabaeidae : Coleoptera) is a major pest and is widely distributed in Western ghats area of Karnataka( Veeresh *et al*, 1982).

The root grubs cause damage to arecanut tree by directly feeding on roots resulting in symptoms like yellowing of leaves, stem tapering at the crown region, reduced inter-node length, nut fall and ultimately leads to reduced vigour, yield and death of

plant (Nair and Daniel, 1982). The probable reasons for root grub menace in Uttar Kannada district are conversion of paddy fields into arecanut gardens without proper drainage, difficulty in collection of emerging adults during July to August, unaware about the application of plant protection chemicals and lack of community approach in managing rootgrubs. Present management practices include synthetic insecticides as major component but the farmers in Uttar Kannada district are reluctant to use chemical pesticides to soil due to its deleterious effects on soil flora and fauna apart from soil pollution. Farming community of this region is well known for practicing indigenous farming technology for the management of insect pest and diseases. Hence, an on farm trial was planned to study the feasibility and economic viability

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of Indigenous technical knowledge (ITK) and entomopathogenic fungi against this insect pest in farmers fields of Uttar Kannada district.

### MATERIALS AND METHODS

Uttar Kannada district (13055' to 15032' N and 7406' to 7507' E) is situated in the North West part of Karnataka adjoining the state of Goa. The documentation of Indigenous Technology Knowledge (ITK) of farmers in Uttar kannada district for management of insect pests of arecanut was carried out through questionnaire method in Sirsi, Yellapur and Siddapur taluks of Uttar Kannada district. An OFT was planned based on the scientific validation of most effective ITK i.e. performance of soap nut and neem oil aqueous extract @5 % and the entomopathogenic fungi, *Metarrihizium anisopliae* (Metsch.) for three consecutive years 2009-12 in already infested arecanut garden of 15 to 18 years old at Vaddinakoppa village of Sirsi Taluk. The trials were conducted in five farmers' fields with four treatments. Twenty palms were maintained for each treatment. Before the experiment, the population of grubs in palm basins was ascertained by random sampling. The treatments were imposed in the month of September. The *M. anisopliae* with  $2 \times 10^8$  conidia /g was applied @ 20 g per palm at

the root zone of arecanut along with 2 kg farm yard manure (FYM). The plant extract was prepared afresh before imposition of treatment. To prepare 5 % of aqueous extract, 500 g of dry soapnut fruits were soaked in 2.5l of water for 72 hr. Later the fruits were squeezed thoroughly to get profuse frothing. The solution was filtered and mixed with 500 ml of neem oil and volume made up to 10 liters. Ready solution of 3 liters was applied to the soil in root zone of areca nut tree by drenching around the tree trunk.

In case of recommended practice, chlorpyriphos 20 EC@ 10 ml of insecticide formulation in one liter of water was prepared and such three liters of solution was drenched to the soil around the tree. In farmers practice, chlorpyriphos solution was applied at varying concentration twice in a year. Observations on larval mortality was recorded at 60 days after treatment (DAT) imposition by digging the soil at the base of tree and counting the grubs.

### RESULTS AND DISCUSSION

The results (Table 1) revealed that recommended practice, Chlorpyriphos 20 EC at the rate of 10 ml per liter proved to be highly effective treatment with 86.83 per cent mortality of grubs at 60 days after treatment. Though the average grub mortality

**Table 1. Efficacy of plant extracts and bio pesticide in the management of arecanut root grub ( 2009 to 2012).**

Treatment	Per cent Larval mortality at 60 Days after treatment (DAT)			
	2009-10	2010-11	2011-12	Mean
T1 : Farmers practice, Untimely soil application of insecticides	40.6	54.82	45.65	47.02
T2 : Recommended practice, Drenching of soil with chlorpyriphos 20 EC @ 10 ml/l of water	83.85	91.65	85.00	86.83
T3 : Alternate practice, Drenching of soil with mixture of neem oil and soap nut aqueous extract 5%	60.15	72.00	62.50	64.88
T4 : Alternate practice, Application of <i>M. anisopliae</i> with $2 \times 10^8$ conidia /g @ 20 g per palm + 2 kg FYM	36.52	32.85	56.5	41.96

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was around 64.88 per cent in treatment drenching of soil with mixture of neem oil and soap nut aqueous extract 5 %, but found effective against farmers practice ( 47.02 % larval mortality) and application of *M. anisopliae* (41.96 % larval mortality) .

These results of neem oil and soap nut extract were in line with the work of Rakesha *et al* (2011) who reported 59.26 per cent larval mortality of areca root grubs under laboratory conditions. Prabhu *et al* ( 2011) also recorded 53.55 per cent root grub mortality under large scale trails in farmers fields at Sirsi taluk, Uttar Kannada district. The results of chlorpyrifos corroborate with the reports of Channakeshavamurthy *et al* (2010) and Subaharan *et al* ( 2001) . Since the yield levels of arecanut can not be compared with the larval mortality, but, the appearance of new healthy green frond and improvement in growth of the palms could be the visual indicators.

The reduced mortality of grub in farmers practice may be due to wrong time of application of insecticides and the dosage. Considering the emergence pattern of adults and oviposition, it was observed that application of plant protection measures after the monsoon i.e., during September and October would yield desirable results in case of areca nut root grub. This helps in toxic principles to reach the target site without being lost by way of leaching, runoff due to heavy monsoon showers.

### CONCLUSION

Along with plant protection measures, proper management of drainage is also very important. Many entomopathogens *viz.*, *Metarrhizium* are also

effective against this insect pest. Still there is a need to demonstrate the integrated management package to areca growers to combat this deadly insect pest on community approach. In this context, mixture of soap nut and neem oil could be one of the best alternative against chemicals and for organic areca growers.

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