



# Participatory Community Approaches in Area-Wide Management of Red Palm Weevil



Pictorial Hand Book for Coconut Farmers



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# Pictorial Hand Book for Coconut Farmers

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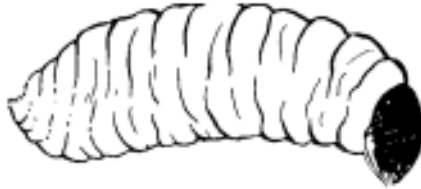
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# Committed and sustained involvement of coconut farmer crucial in management of red palm weevil

- ❖ Red palm weevil is an internal tissue borer and fatal enemy of coconut.
- ❖ Rampant nature of lateral spread if not intervened timely.
- ❖ Sustained surveillance of plot at least once in a week for early symptom diagnosis.



## Know the pest



Scientific name: *Rhynchophorus ferrugineus* (Olivier)

- All stages of the pest (egg, grub, pupa, and adult beetle) confined within coconut palm.
- Injuries in palm, orient weevils for egg laying.
- Active feeding by grubs kills the palm, if unchecked.
- Around 17 palm species are invaded including coconut, oil palm, date palm, arecanut *etc.*, by the pest.

## Observe the symptoms of red palm weevil infestation



Timely diagnosis could save the palm, but farmers usually recognize the infestation only after toppling of the crown.

At that stage, the palm could not be recovered.

- ◆ Crown-topped palms should be completely destroyed and removed for destroying the life stages of pest within the palm.
- ◆ The main source of inoculum for spread of the pest is through the retention of the infested palms in the field.

### Symptoms of red palm weevil infestation



- Feeding of grubs in the leaf axil would result in oozing out of brownish fluid, with foul smell.
- The grub inside the palm trunk will mascerate and consume only the fluid. Meanwhile regurgitation of microbes from its gut enhances the rotting process. The result is observed as the oozing out of fluid along the trunk.
- Keenly observe the presence of bore holes as well as chewed fibrous material/ frass / pupal cases/ oozing of fluid *etc.*

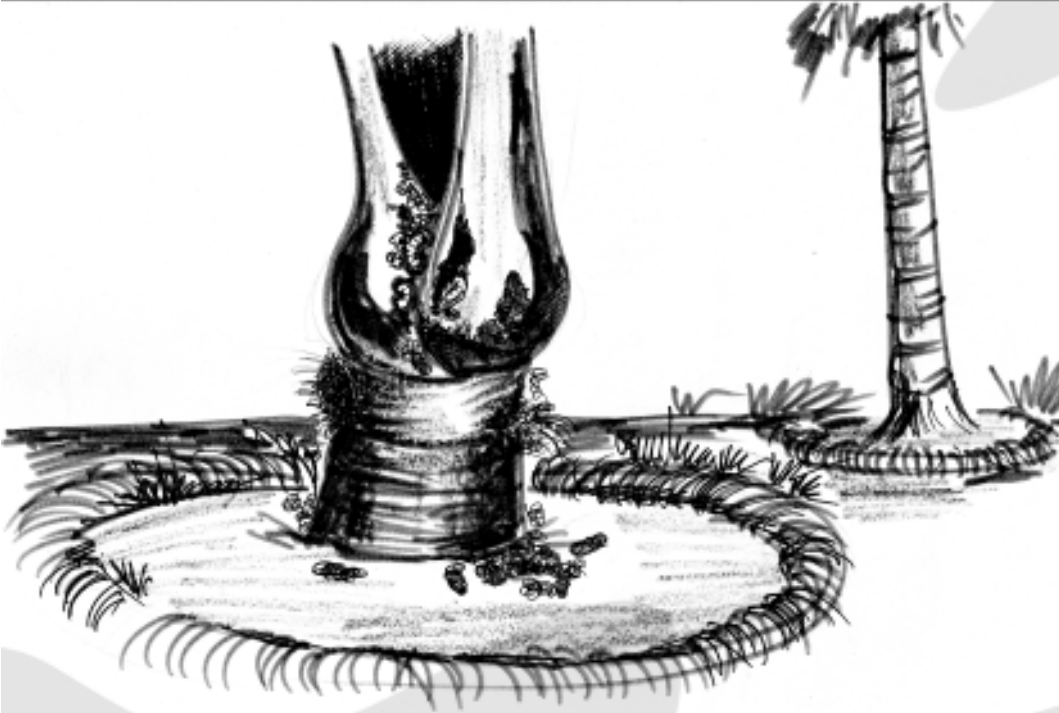
### Symptoms of red palm weevil infestation



- ✦ Bole entry of the pest occurs under two conditions: shallow planting and injuries in the bole region due to intercultural operations (tiller or tractor ploughing).
- ✦ The symptoms are very difficult to diagnose, but farmers may also scrutinize for bole entry symptoms.
- ✦ Fertilizer application, mulching *etc.*, may be done a little away from the main trunk.



### Symptoms of red palm weevil infestation



- ✧ Red palm weevil infests the palm through the leaf axils. The farmers have to observe for presence of bore hole symptoms, presence of pest/ life stages, chewed up material, frass or excreta. In such palms, one should also observe the leaf axils as well as crown for any symptoms or a slight tilting of the upper crown and reduced turgidity of the spear leaf.
- ✧ In the palm basins, frass or any chewed up fibre or pupal cases also may be noted.

### Symptoms of red palm weevil infestation



- Another visible symptom is splitting of the fresh petiole in red palm weevil affected areas. Those palm also may be observed for any other symptoms of red palm weevil (hidden) and curative & phyto-sanitary measures may be adopted at the earliest.

### Symptoms of red palm weevil infestation



- Gnawing sound of grub could be heard when ear is placed on the trunk.
- Sound resembles that of crushing sugar cane for juice extraction.
- Any intervention will reduce the gnawing sound made by the grubs.

## Preventive Measures...



- ↪ Injuries on palm release volatiles, which attracts the weevil for egg laying. Never cause any injuries to palms.
- ↪ Cut coconut leaves leaving 1.2m of petiole.
- ↪ Close planting of palms also induces volatiles for weevil attraction.
- ↪ Never cut the trunk for climbing or place any tools on palm trunk to injure the palm.

## Preventive Measures...



- Burning the infested palms will not kill immature stages of the pest. Farmers should take care to split open the killed palms and destroy all the life stages and the palm debris to avoid release of odor.
- The infested palms should also be treated with kerosene 200 ml to kill the pest.
- This activity may be given due consideration, since it could reduce the pest population as well as could positively impact the sustainable reduction of the palm loss due to red palm weevil attack.

## Preventive Measures...



- ◆ It was noted in fields that even very young coconut palms killed by the pest left unattended in the plots. Even any family member could remove all the fronds and spilt open the pest infested portions to destroy the pest stages.
- ◆ This action could ensure saving of other coconut palms in farmers coconut plot.

## Preventive Measures...



- ✓ Palms completely destroyed by red palm weevil must be cut open & ensure destruction of pest life stages, to reduce spread of damage.
- ✓ In case of unavailability of laborers, the family members could cut down all fronds and pour 200ml kerosene into the trunk & leaf axils to destroy pest stages.

## Community management process



- ◆ Individual level technology adoption may not result in effective suppression of red palm weevil. Participatory community approaches and need-based interventions, result in effective management which requires low cost and time, compared to usually followed methods.
- ◆ Coconut plant protection and surveillance groups (CPPSG) could be initiated with 3-5 members including women self help groups (SHG) in each ward of a panchayath as conveniently manageable geographical area.
- ◆ They should be given on and off field level skill capacitating in survey, documentation, identification of coconut pests and diseases/deficiency symptoms, management practices and practical plant protection aspects.



## Community management process



- ❖ CPPSG need to visit all coconut plots of an area & record number of palms, age, incidence of pests and diseases management practices adopted, number of red palmweevil infested palms (age-wise), mode of infestation & destruction.
- ❖ Educate the farm family members regarding the pest, importance of surveillance for observing symptoms and management techniques.
- ❖ Farmers can link with Department of Agriculture, CPPSG/CPS/Research Institutes (ICAR-CPCRI) & website for advisories & support services.

## Community management process



- ◆ Red palm weevil infests palms of all ages, but predominantly seen in palm aged between 5-15 years.
- ◆ Coconut communities can integrate technologies with use of sprayers with long lances, aluminum ladders *etc.*, for timely management of red palm weevil affected palm & saving them.
- ◆ The necessary precaution and protective measures are to be adhered while handling pesticides.

## Community management process



- ◆ Early diagnosis is the key for saving a palm affected by red palm weevil.
- ◆ Curative measures: After thoroughly cleaning the infested area of the palm, apply 1ml imidacloprid (0.02%) or 5ml spinosad(0.013%) or 2.5ml indoxacarb (0.04%) in 1 litre of water.
- ◆ Repeat the application after 2-3 weeks observing and diagnosing symptoms.

## Community management process



- Rhinoceros beetle is the most common pest of coconut and its infestation could pave way for red palm weevil attack. Hence management of rhinoceros beetle through “area wide community extension approach” in biomanagement mode is to be integrated.
- Rhinoceros beetle infestation symptoms could be seen as typical ‘V’ shaped geometrical cuts in opened fronds. It attacks seedlings, non-bearing and bearing palms.

## Community management process



- ✓ Palm trunks left in farmers' fields, either red palm weevil destroyed or cut down, act as breeding ground for rhinoceros beetles.
- ✓ Infested palms should be destroyed or treated with *Metarhizium anisopliae* fungus in decaying or degrading coconut trunk of palms.

## Community management process



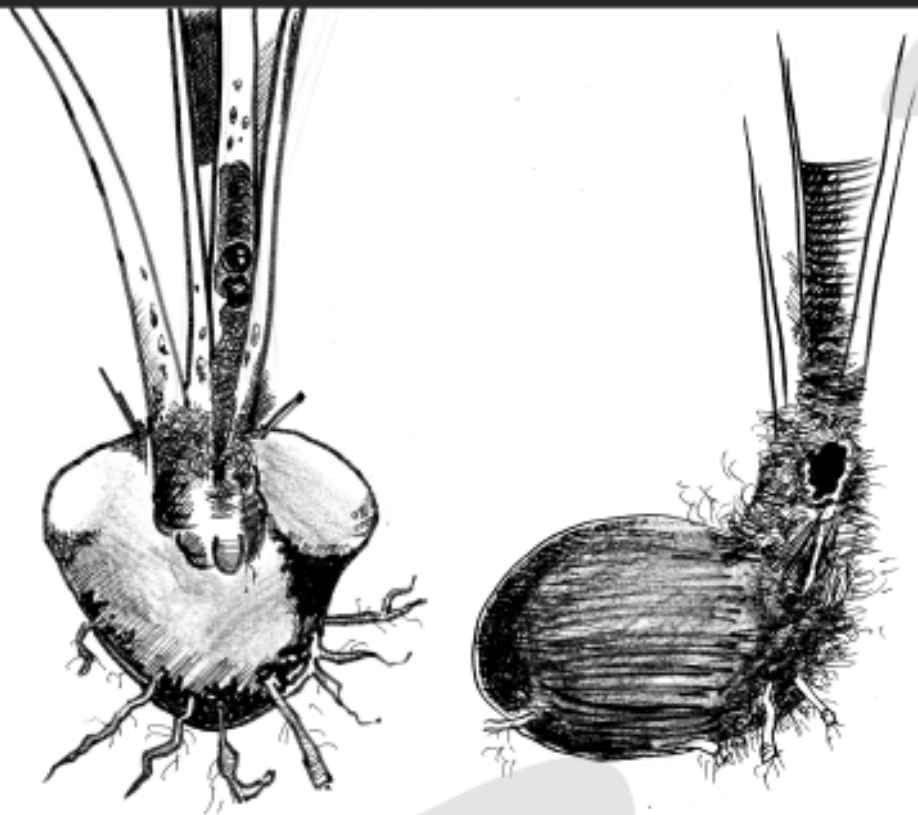
- ◆ Breeding sites of rhinoceros beetles, such as FYM pits, compost pits, decayed organic debris, coir pith heaps *etc.*, can be treated with *M. anisopliae* fungus. About 100g of fungal culture in one litre of water is to be sprinkled over the heap and also pour into 3-4 holes made with poles in the heaps.
- ◆ The fungus would infect the grub within 7-10 days. Adult beetles are infected in due course of time, thus, resulting in its reduction.

## Community management process



- As prophylactic measure, filling around the spindle and 2-3 leaf axils below it with three naphthalene balls (12 g) covering with sand or 250 g powdered neem/marotti cake mixed with equal quantity of sand or placing 3-5g chlorantriniliprole granules in perforated sachets in leaf axils is recommended.
- Prophylactic leaf axil treatment is recommended during January, May & September every year.

## Community management process



- ◆ Coconut seedlings in nurseries are also damaged by rhinoceros beetle. The spindle leaf of seedlings could be seen dried up and will come out if pulled. Base of the spindle leaf is damaged by rhinoceros beetle. The growing portion will get recovered subsequently.



## Community management process



- Palms which show trunk entry of red palm weevils could be detected with the presence of hole and oozing of reddish/brownish fluid. The hole below the top most one may be closed and pesticide solution applied using an applicator/funnel as shown above. Recommended pesticides are imidacloprid (1ml) or spinosad (5ml) or indoxacarb (2.5ml) in one litre of water.

## Community management process



- Stem bleeding is a fungal disease of coconut palms augmented by poor management practices and ill drained conditions. Symptoms of brown ooze from minute growth cracks seen on the base of the trunk
- For managing the disease apply paste of talc based formulation of *Trichoderma* at the affected portions in the trunk along with application of 5 kg neem cake mixed with 100g *Trichoderma* formulation in the basins.
- Avoid trash burning in coconut basins.

## Community management process



- ◆ Dwarf varieties of coconut are found to be more prone to red palm weevil infestation. Hence, farmers cultivating dwarf coconut palms should take extra vigilance and adopt recommended precautionary, prophylactic and curative measures against red palm weevil.

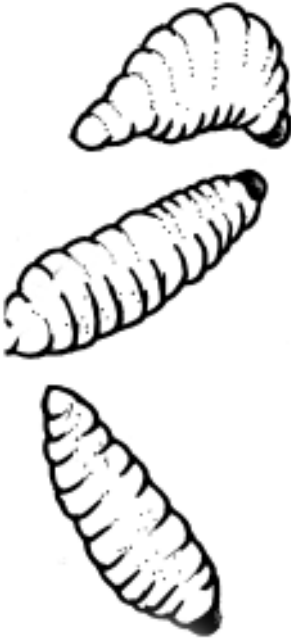
## Community management process



From the area - wide participatory community approach for red palm weevil management it could be understood that:

- ◆ Proper spacing should be adopted while planting (7.5x 7.5 m - 70 palms per acre, 172 palms /ha). Closer spacing augments incidence of red palm weevil.
- ◆ Proper depth of planting (pit size-1-1.2m<sup>3</sup>) has to be adopted.
- ◆ Avoid over shading.
- ◆ Sanitation measures in coconut plots could facilitate red palm weevil management in economic and environment friendly manner.
- ◆ Retaining the red palm weevil affected palms in plots will lead to rapid spread and palm loss.
- ◆ Curative measures are to be repeated, if needed.
- ◆ Periodic surveillance, regular and systematic care of the palm, crop health management including balanced nutrient management maintains proper palm health.

## Know the difference



**Red palm weevil**



**Rhinoceros beetle**

- Rhinoceros beetle & red palm weevils are the two important pests of coconut causing yield & palm loss.
- The larvae of rhinoceros beetle has 6 legs and grub of red palm weevil has no legs (apodous ).
- All the life stages of red palm weevil such as egg, grub, pupae and weevil are seen inside the infested palm.
- Rhinoceros beetle lays eggs in decaying organic debris/ FYM/coir pith and adults are the damaging stage. Adult beetle chew the tender spindle portion and suck the juice, whereas, grubs of red palm weevil are the destructive life stage.

## Know the difference



- Farmers at times assume rhinoceros beetle attack on spindle as red palm weevil infested symptom. When the rhinoceros beetle bores the spindle base, sometimes the spindle topples down. The difference of both the symptoms may be keenly observed.
- Though growth of the palms are affected, rhinoceros beetle attack is not fatal.

### Know the difference



- ◆ In advance stage of red palm weevil infestation, the entire crown of infested palm topples down.
- ◆ Such palms are beyond the stage of recovery.
- ◆ Infested palms are to be cut open and all the life stages of red palm weevil destroyed to check the multiplication and spread of the fatal pest.

## Know the difference



- ◆ The symptoms of red palm weevil and bud rot affected palms are difficult to distinguish in advanced stages. Hence, the differences may be keenly noted.
- ◆ Red palm weevil infestation could be seen in crown, trunk and leaf axils. The eggs/ grubs/pupae /adults could be seen in the affected palms along with bore holes or frass/excreta of the pest.
- ◆ Bud rot is a fungal disease affecting the growing bud region, hence, the fronds will be seen withered and gradually falls down. Spindle will come out on pulling and the remaining leaves turn pale yellow.
- ◆ Typical fungal rotting induced foul smell emanates from severe bud rot affected palms.



### Know the difference



- ◆ Leaf rot and bud rot diseases are the two major diseases of coconut. The wide spread occurrence of the diseases also attracts red palm weevil to the palms.
- ◆ Leaf rot occurs in the spindle leaf of palms reducing the photosynthetic area and gradually leading to reduction of health and yield.
- ◆ Bud rot is a fatal fungal disease, affecting the growing point of palm emanating foul odour.
- ◆ For the management of leaf rot disease, adopt phytosanitation along with removal and destruction of affected portion and application of hexaconazole 2 ml in 300 ml water or talc based formulation of *Pseudomonas fluorescens* 50 g/500 ml of water to spindle leaf and top most axils.
- ◆ For managing bud rot disease, after removal and destruction of affected portion, apply 10% Bordeaux paste and spray 1% Bordeaux mixture to the nearby palms as a prophylactic measure.

### Impact of participatory community approaches in area-wide management of red palm weevil



Area wide participatory community approach for red palm weevil management was implemented in Bharanikkavu Gramapanchayath during 2014-2015.

- ❖ GPS plotting of red palm weevil infested palms was done in the GIS map of the panchayath.
- ❖ Participation and involvement of peoples' representatives, coconut farmers organizations, Dept. of Agriculture /Animal Husbandry, Women SHGs, coconut farmers were the highlight of the facilitation process.

#### **Innovative components of the programme**

- ❖ Coconut plant protection surveillance groups (CPPSG), Integrated coconut field clinic (ICFC), Area wide process model for red palm weevil management and integration of techniques, technologies and social resources.
- ❖ 30-89 % reduction in red palm weevil could be obtained in 21 wards of the panchayath with an average of 55.83 %. Moreover reduction in duration of technology dissemination, cost of technology management and improvement in knowledge and skill of coconut farming community could be obtained.

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## Area-wide participatory community approach for red palm weevil management

Location	:	Bharanikkavu Gramapanchayath
Area	:	2000 ha
Survey documentation	:	7068 households
Palm profile record	:	174733 palms
Integrated coconut field clinics organized	:	18
Training programmes for stakeholders	:	43
Coconut plant protection and surveillance groups	:	12
Field visits	:	232
SMS sent	:	128
Publications/mass media programmes	:	11
Interactive workshop	:	1
Video on community management of red palm weevil	:	1



# Red Palm Weevil: Area-wide Participatory Community Management Model



**Observation ! Caution ! Participation ! Action!**



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