

Strategies to protect coconut palm from rhinoceros beetle attack during monsoon

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Removal of beetle using hook

Coconut, *Cocos nucifera* (L.) is popularly known as “Tree of life” or “Kalpavriksha” because of the innumerable benefits it offers to mankind. The crop faces challenges from various biotic and abiotic factors at different phases of its growth and development. Among the biotic stresses, borers are the major constraint limiting the palm plantation productivity worldwide up to 30 %. The Coconut rhinoceros beetle (CRB), *Oryctes rhinoceros* Linn. (Coleoptera: Scarabaeidae) is one of the major borer palm pest which is endemic to all the coconut growing regions. Besides coconut, it also infests oil palm, date palm, areca palm, toddy palm and occasionally feeds on sugarcane, agave, pineapple, banana and taro.

Damage Symptoms

The robust adult black beetles damage the palms by boring into unopened spear leaves, spathes and inflorescences in contrast to the grubs which feed only on decaying organic matter. As the beetles bore deeper into the palm, the chewed fibers are seen extruding from the entry holes. The damaged fronds show characteristic V- or wedge-shaped cuts as they unfold, reducing the photosynthetic area. Seedlings and juveniles are highly susceptible to beetle attack than the grown up palms. Twisting of the spear leaves, stunted growth and improper establishment were observed in the CRB damaged seedlings and such damaged seedlings gets often disposed by farmers in huge numbers. Besides the damage injury by CRB, the bore holes made by this beetle serve as entry points for lethal pests and pathogens like red palm weevil and bud rot fungi, respectively.

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Leaf damage by rhinoceros beetle



Perforated insecticide sachet

Bio – ecology

Although pest occurs throughout the year, peak adult emergence is noticed during June to September months. Adults of *O. rhinoceros* is a large stout black beetle, 35 – 50 mm long and 14 – 21 mm breadth, possess a characteristic cephalic horn which is longer in males. The pygidium is densely clothed with reddish brown hairs on the ventral surface in the females whereas males are devoid of pygidial hairs. Adults are nocturnal active fliers (active at night) and remain hidden during most of the daytime either in the feeding site or in the breeding sites. Adult live for about 3 – 6 months and average fecundity per female is 108 eggs. Freshly laid eggs are white in colour and globular in shape with incubation period of 8 - 12 days. Larvae are creamy white in colour, C - shaped with well developed brown head capsule, mandibles and thoracic legs. Larval period ranges from 82 to 207 days with three developmental instars followed by pupal period for 20 to 29 days. Larva feeds on the dead wood, dead palm logs and dead standing coconut palms which are killed by pest /disease/ lightning and decaying organic materials like cow dung heaps, compost pits and sawdust heaps are their major breeding sites. Environmental factors like temperature of 27 - 29°C with relative humidity of 85 – 95 % are highly suitable for the faster pest multiplication.

Integrated Pest Management

Oryctes rhinoceros is persistently active and reproductive throughout the year, its detection is often difficult due to its nocturnal activity and cryptic nature of residence within the palms. According to the popular saying, prevention is better than cure,

our Integrated pest management (IPM) strategies for rhinoceros beetle emphasizes on phyto – sanitary, preventive methods than the curative methods and it should be deployed on a community basis to bring effective results.

► Phyto – sanitary method

Maintenance of farm hygiene and sanitation within and the surrounding coconut plantations forms the first line of pest defense. Since *O. rhinoceros* profusely breed on the organic matter, potential breeding sites like dead palms and decaying coconut logs from the coconut gardens must be cleared off. Compost heaps, cow dung pits and vermi-composting tanks have to be covered with mosquito / nylon nets and turned out frequently for collection of grubs.

► Prophylactic / preventive method:

- Placing of 250 g powdered oil cakes (neem/ marotti/ pongamia) mixed with sand (1:1) in the top three leaf axils of the palm thrice a year during May, September and December is recommended as prophylactic measure.
- Placing of 3 - 4 naphthalene balls in the leaf axils at the base of the spindle leaf covered with sand ensures protection for 45 - 60 days.
- Placement of two perforated sachets containing chlorantraniliprole (3 g) or fipronil (3 g) in the leaf axils at the base of spindle leaf during monsoon season was found effective. During dry period, 100 ml of water may be poured over the sachet after placement to release the molecule.
- Placement of botanical cakes made out of extracts from *Clerodendron infortunatum* Linn. and *Chromolaena odorata* Linn. on the topmost leaf axils

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Shri.Saradindu Das, Chief Coconut Development Officer of Coconut Development Board repatriated to parent department on 1st July 2021. He was serving as Chief Coconut Development Officer of Coconut Development Board since 11th November 2016 on deputation. He has been holding the post of Director of Horticulture Department, Government of Tripura prior to his deputation basis at Coconut Development Board. Shri. Saradindu Das is a postgraduate in Agriculture from Bidhan Chandra Krishi Vishwa Vidyalaya, West Bengal. Shri.Das started his official career in Coconut Development Board as Technical Assistant at State Centre Kolkata in 1985. Subsequently he joined as superintendent in Agriculture Department, Tripura in 1988 and later on served as Deputy Director and Joint Director in Agriculture Department, Government of Tripura.



and or smearing the spindle and adjoining petioles with botanical paste/oils @ 10 gm developed by CPCRI protects juvenile palms from rhinoceros beetle attack.

► **Mechanical method**

Periodic observation on the palm crown for any damage symptoms and removal of the beetles using metallic hook during the peak attack period (June-September) can be followed (Fig. 5). As a prophylactic



Fig 6 : Wrapping crown portion with nylon net



Fig 7: PVC trap for rhinoceros beetle

measure, loosely wrapping of unopened spear leaf with adjacent leaf base with locally available fish net/ nylon nets can be followed to avoid CRB damage in crown region. This technique is very effective in trapping adult beetles by entangling them in the nylon net mesh (Fig. 6).

► **Biological control**

CRB can be effectively managed by utilizing two microbial agents viz., green muscardine fungi (*Metarhizium anisopliae*) and *Oryctes rhinoceros nudivirus* (OrNV). These organisms are host specific, ecologically safe and they can be integrated with other management strategies.

- Application of green muscardine fungus (*Metarhizium anisopliae*) @ 5×10^{11} m⁻³ to the breeding sites is effective in killing all the stages of the CRB larvae.
- Field release of OrNV infected CRB adults @ 10-15 number/hectare is also effective.

► **Pheromone traps**

Installing specially designed PVC trap containing rhino lure or *Oryctalure* @ 1 trap per hectare are effective in trapping beetles in high numbers. The trapped adult beetles should be periodically collected and killed. However the traps are to be placed away from the seedlings and young palms. ■