

Nut pests of coconut

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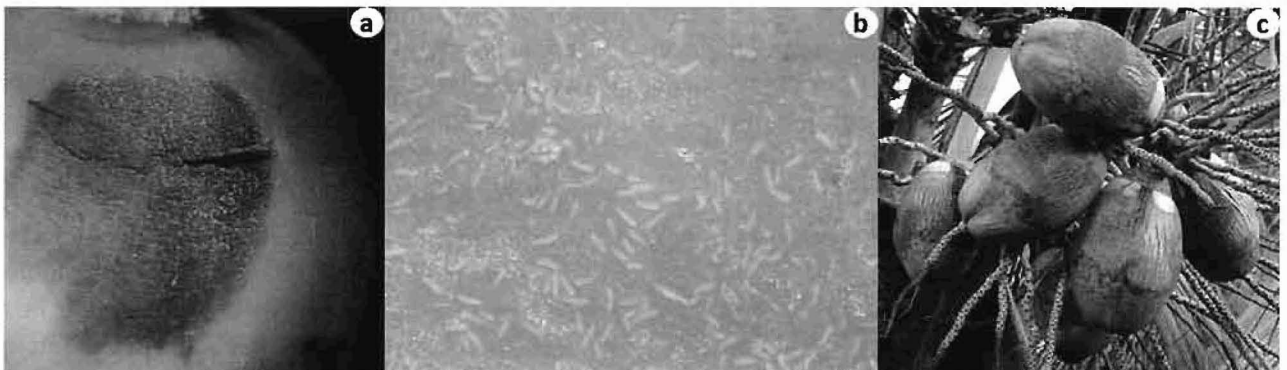
The coconut palm (*Cocos nucifera* Linn.), also known as the "Kalpavriksha," is a multi purpose and multi-utility plantation crop delivering enormous ecosystem services in tropical climates especially along the coastlines. With a tall, slender trunk topped by a canopy of fronds, the coconut palm, which is widely distributed throughout coastal areas worldwide, thrives in sandy soils and tropical climates. The coconut fruit itself is well-known for its rich, creamy meat that is utilized in snacks and cuisines, as well as its nutrient-rich water, which is cooling and re-hydrating. The leaves of the palm are also used to weave baskets and thatch roofs. With its resilience to coastal conditions and ability to thrive in diverse environments, the coconut palm plays a crucial role in local economies and cultures, making it a symbol of tropical abundance, sustainability and serve as a source of food for pollinators.

Coconuts, revered for their versatility and nutritional value, faces significant threats from various pests that target the mature nuts or buttons. These pests not only jeopardize coconut production but also impact the livelihoods of millions worldwide. Understanding the feeding nature and weak links of these pests, implementing effective management strategies is crucial for safeguarding coconut yields and sustaining agricultural sector

and food system. The pests that target the nuts are coconut eriophyid mite (*Aceria guerreronis* Keifer), coreid bug (*Paradasynus rostratus* Distant), nut-borer (*Cyclodesomma* Van der Hoeven), rodents (*Rattus rattus wroughtoni* Hinton) etc. Occasionally, porcupine (*Hystrixindica*), monkey (*Macacaradiata*), palm civet (*Paradoxurus* sp.), wood pecker (*Dinopium* sp.), palm squirrels, *Funambulus palmarum*, robber crab (*Birguslatro*) etc. also attacks the nuts in certain endemic region. Some of the minor/ secondary pests like termites [*Odontotermesobesus* (Rambur)], coconut scale (*Aspidio tus destructor*), mealy bugs and lesser coconut weevil [*Diocalandra frumenti* (Fabricius)] attack the nuts as well.

Coconut eriophyid mite: *Aceria guerreronis* Keifer (Acarina: Eriophyidae)

Among various species of eriophyid mites, coconut eriophyid mite, *Aceria guerreronis* is one of the most destructive invasive pests on coconut which causes a yield loss up to 25% in terms of copra yield. In India, coconut eriophyid mite was first reported by Sathiamma et al. (1998) from Amballur Panchayath in Ernakulam District. *Aceria guerreronis* is a creamy white, vermiform organism with two pairs of legs. It is microscopic, measuring 200–250 µm in length and 36–52 µm in breadth. Mites attain sexual maturity within a week and start laying eggs.



a) Eriophyid mite on button b) Eriophyid mite under microscope c) Symptom of mite damage

An adult mite lays about 100–150 eggs. The eggs hatch into protonymphs, deutonymphs and finally to adults. The total life cycle is completed in 7–10 days.

Even though, the infestation occurs throughout the year, the population peaks during summer as it prefers hot weather. The mites congregate underneath the perianth of button and tender nuts and causes damage by sucking the sap. The symptoms of infestation are manifested one month after the colonisation of mites, especially after pollination. The initial symptom appears as elongated white streaks near the perianth region of young buttons. It later develops into white triangular patches pointing towards the distal end and cause immature nut fall. On unshed buttons, the patches cover more area and become brown in colour to form warts and longitudinal fissures on it. In severe infestation, cracks and gummosis on husk can be seen, which leads to malformation of nuts and reduction in size.

Biopesticides are recommended for the management of mites. There are many natural enemies viz., predators and pathogens present in its natural habitat. It is essential to conserve the natural enemies to regulate the pest population in an eco-friendly manner. Neem-based spraying of biopesticides like neem oil–garlic– soap emulsion at 2% concentration or azadirachtin 10,000 ppm at 0.004% concentration or root feeding with azadirachtin 50,000 ppm (@ 7.5ml) or azadirachtin 10,000 ppm (10 ml) mixed with equal volume of water is recommended for mite management. The potential acaropathogenic fungus, *Hirsutella thompsonii* (@ 20 g / l/ palm containing 1.6 x 10⁸ cfu per gram) was found to be a promising natural enemy of coconut eriophyid mite. Low-cost methodology for the mass culturing of the fungus in coconut water was developed at ICAR-CPCRI. Kalpa Haritha, a tall selection of coconut from ICAR-CPCRI has recorded comparatively lesser mite infestation



Symptoms of coreid bug attack at different stages of nut development

in field condition. Proper palm health management including soil-test based nutrient application coupled with conservation of the predatory fauna in the ecosystem is essential to regulate the coconut mite population in nature.

Coreid bug: *Paradasynus rostratus* Dist. (Hemiptera: Coreidae)

Paradasynus rostratus is emerging as a serious pest on coconut. The bug causes heavy crop loss up to 60% by shedding of developing buttons and immature nuts. The first collection of coreid bug from India was made from Kerala (Krishnapuram, Alappuzha District) by Chandy Kurian in 1959. Subsequently a detailed survey was carried out throughout Kerala and the infestation was noted from Marthandam (Tamil Nadu) up to Kannur (Kerala) in the West Coast of India. The pest was also recorded from Thirthahalli in Karnataka. The pest has been observed to infest developing fruits of tamarind, guava, rubber, mango, tapioca, cocoa, passion fruit etc.

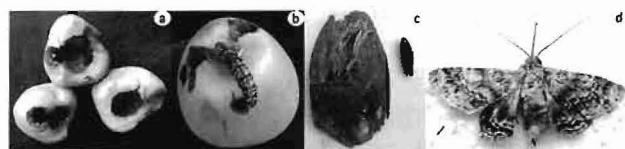
There are five nymphal instars for the pest and the total life period is 82–97 days. The egg period was recorded as 8 to 10 days and the nymphal stage comprised of five instars with duration of 4–5, 5–7, 4–6, 4–6 and 8–10 days, respectively on coconut. Adults survive for 49–53 days and total life period was reported to be 82–97 days. The nymphs and the adults feed on tender coconuts causing immature nut fall or malformation of nuts. The bugs feed by inserting its stylets through the perianth. It injects toxic saliva that cause necrosis of the affected area, which later appears as sunken spots on it, causing button fall and if retained, the attacked nuts show feeding punctures as eye like spots (spindle-shaped) which develop into necrotic lesions with furrows or crinkles and gummosis. Barren bunches with shrivelled buttons are one of the common symptoms in endemic tracts. The bugs attack coconut during monsoon and post monsoon season when the humidity is high.

A reduviid predator *Endochus inornatus* Stal. was reported feeding on the nymphs. They also found that the pest incidence was low on the collateral host plants colonized with red ant (*Oecophylla* sp.). Among the various botanicals and new generation molecules

evaluated against coreid bug in coconut, palms-treated neem oil (0.5%) and *Chlorantraniliprole* (0.018%) recorded the highest reduction of 74%. Identification and field level application of potential egg parasitoids are underway at ICAR-CPCRI.

Nut borer: *Cyclodesomma Van der Hoev* (*Lepidoptera: Noctuidae*)

Nut borer is a sporadic pest which causes damage on buttons during summer period specifically on dwarfs and hybrids. The caterpillars feed on developing nuts by boring holes on the meristematic tissues surrounding the tepal. They bore deeply into young nuts feeding most of the inner contents and cause premature nut shedding. The larvae are voracious feeders which cause severe damage in a short period of time. The caterpillars have been recorded feeding on other palm species also. They make hairy cocoons in the crown region. The adult moths have ochre green tinged wings with bilayered ring spots near the apical margin.



Nut borer a) damage symptoms b) Larva c) pupa d) adult

To reduce the pest incidence, excessive application of nitrogenous fertilizer should be avoided. Need based intervention should be advocated if the damage is quite high in a locality. Spraying of *Lambda cyhalothrin* 5 EC @ 1 ml per litre or *Chlorantraniliprole* 18.5 SC @ 0.3 ml per litre are found effective for the management of the pest.

Rat: *Rattus rattus wroughtoni* Hinton

Rattus rattus wroughtoni lives on the crown of palm, whereas, *Mus booduga* is confined to the ground. Rats are one of the most important pests in island ecosystems like Lakshadweep and Bay islands where the closer spacing of the palm favours their movement and multiplication. The crop loss due to rat damage is estimated to be 30–40% in several parts of India. Rats cause damage by gnawing the soft portion of tender nut near the stalk end, the damage symptom visible as holes of 5 cm diameter.



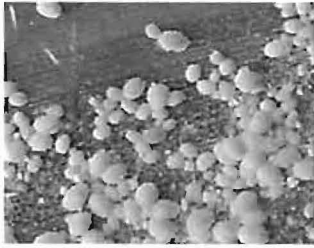
a) Symptom of rat damage b) Tin Banding around palm

Rats consume the inner contents of the nut and the nuts remain on the bunch for 2–6 days. Fallen nuts with holes are seen in palm basin. Rats generally prefer 3–6 months old nuts. Apart from tender nuts, they may also damage leaf stalk, unopened spathe, female flowers, mature nuts and nuts stored in godowns. The rats prefer palms with sweet nut water and pulp. Gangabondam was reported as highly preferred by *R. r. wroughtoni* followed by Laccadive Orange Dwarf, Laccadive Green Dwarf and Laccadive Yellow Dwarf. The rat damage is more in island because of unscientific close planting, inadequate crown cleaning and absence of natural enemies like snakes or owls. The bandicoot rats cause serious damage to seedlings as they feed on the haustorium of germinating nuts and sometimes feed on developing stem of the seedlings causing drying up of spindle leaf or collapse of the seedling.

Other mammalian pests of coconut include, flying fox, robber crabs, monkeys, pigs, porcupine etc. Use of different types of traps is one of the most effective methods in reducing the rat population. Poison baits, fumigation of rat burrows, physical barriers, chemical substances and encouragement of natural enemies are recommended for the management of rats. Field sanitation by removal of fallen nuts, timely weeding and regular cleaning of palm crown is crucial for rat management. Padding on palm trunk with one meter polythene sheet or tin interfere on the rat movement. Painting snake images on palms is an indigenous technical knowledge



Snake drawing on trunk to avoid rats



Dysmicoccus finitimus on spadix



Dysmicoccus cocotis on spadix and rachilla



Termite damage on seedling



Diocalandra frumenti

followed in Tamil Nadu. Placement of single dose anti coagulant rodenticides is also effective and economic. Placing of 10 g bromadiolone cakes two times @ 12 days interval on the crown of one tree out of every five trees is recommended for reducing rat population. ICAR-CPCRI has developed a rod for the placement of such rodenticides on crown of palm for Lakshadweep Islands.

Mealy bugs

The mealy bugs occur in small colonies at the base of spear leaf, spadix, inflorescence and perianth of tender nuts. Several species of mealy bugs are reported in India from coconut palm such as *Palmi cultorpalmarum*, *Pseudococcus cryptus* and *Dysmicoccus sp.* which are commonly found on spear leaf and palm leaflets. Mealy bugs suck the sap from young seedlings, spindle leaves, spathes and



Dysmicoccus cocotis on spadix and rachilla

floral parts perianth of immature nuts in coconut. As a result, the tender unopened fronds remain stunted, deformed and suppressed and in severe cases immature nut fall occurs. Mealy bugs associated with inflorescence (spadix, spathe and rachis) and immature nuts

are *Dysmicoccus cocotis* and *Dysmicoccus finitimus* reported from Kerala, India

Scale insect: *Aspidiotus destructor* (Signoret)

Even though, scale insects are considered to be minor pests of coconuts in India, they are assuming the status of major pests due to the close planting,

poor management practices and scanty rainfall. Scale insects occur more in summer. Scale insects feed on leaves and nuts of coconut palms. A persistent crust of scales grows over flower spikes, immature nuts and the undersides of leaves in cases of severe infestation. The upper surface of infested coconut fronds has yellow regions formed by several yellow spots, each of which indicates the location of the coconut scale on the underside.

Termites (*Odontotermes spp.*) and some of the secondary pests like lesser coconut weevil (*Diocalandra frumenti* (Fabricius)) also attack the nuts. Termites generally attack seedlings in the nursery especially in the laterite areas preferring the husk of seed nuts, either through the base of the seednut or at the collar region. Wilting of the central shoot is usually the first visible symptom of attack leading to death of the seedlings. Wooden wastes, coconut petiole wastes and un-germinated seed nuts have to be removed and destroyed in advance prior to taking up of sowing of seed nuts. River sand is preferred as rooting media for innate selection of superior seedlings as well as reducing menace by termites. Soil application of chlorpyrifos dust @ 3.8 g / nursery bed (7.5 m²) or fipronil granules @ 2.3 g / nursery bed before sowing of seed nuts is also recommended.

Pests pose significant challenges to coconut cultivation worldwide, impacting both yield and quality of the fruit. Timely identification, effective pest management strategies, including integrated pest management (IPM) techniques, are crucial to mitigate these threats and ensure sustainable coconut production. Protecting coconut palms from nut pests is essential for ensuring sustainable coconut production and supporting the livelihoods of millions of coconut farmers. ■