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Insect Pests of Cashew and their Management

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CONTENTS

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14

S. No.	Particulars	Page No.
1	Introduction	1
2	Cashew stem and root borer	2
3	Tea mosquito bug	7
4	Apple and nut borer	11
5	Thrips	12
6	Mealy bug	13
7	Leaf miner	15
8	Leaf and blossom Webber	16

Insect Pests of Cashew and their Management

Introduction

Cashew (Anacardium occidentale L., Anacardiaceae) is a very important foreign exchange earning crop of India. It was originally introduced into India from Brazil by Portuguese travellers during sixteenth century mainly for checking soil erosion on the coast. Initially, it was considered as a suitable crop for soil conservation, afforestation and also wasteland development but gradually gained commercial importance. Cashew is now widely grown in tropical climates and it has very well adapted to the Indian conditions. The estimated area under cashew in India is 8.55 lakh hectares and the production is around 5.73 lakh tons. The national average productivity is 815 kg per hectare. Now India is the largest producer, processor, consumer and exporter of cashew in the world. In India, it is mainly cultivated in Maharashtra, Goa, Karnataka and Kerala along the West coast and Tamil Nadu, Pondicherry, Andhra Pradesh, Orissa and West Bengal along the East coast. It is also grown to a limited extent in non traditional areas such as Bastar region of Chhattisgarh and Kolar region of Karnataka. At present Maharashtra is ranking first in area, production and productivity in the country. India is exporting annually about 1.20 lakh tons of cashew kernels and the cashew industry has the potential to play a leading role in social and financial uplift of rural poor. In Goa, Cashew nut is cultivated around 55000 ha with annual production of 23138 tonnes. Average yield is 415 kg / ha (2011).

Pest infestation is a major constraint in cashew production. It is attacked by a number of insect pests during different stages of its growth and development. More than fifty species of insects are known to be infesting cashew in India in different degrees of intensity. However, when the extent of damage is taken into account only four are considered to be major pests. They are stem and root borer, tea mosquito bug, leaf miner, Apple and nut borer. The other minor pest includes thrips, leaf and bloosm webber and mealy bug. Tea mosquito attacks tender shoots and flower panicles and if the infestation is severe it causes yield reduction up to 30-40 per cent. Cashew growers seldom use insecticides for controlling this pest. Stem and root borer is found to attack both adult and young cashew trees at the collar region. It causes damage to the extent of 40 per cent in neglected plantations. The severely attacked trees die within a period of two years causing substantial tree loss. Most of the cashew growers do not pay due care to cashew plantations as they are not aware of the advantages of adopting recommended package of practices. Due to lack of knowledge about these pests the growers come to know of the infestation only after the crop is lost or tree is dead. Hence, the production potential in most of the cases is not fully realised due to non-adoption of plant protection measures against these pests. The technical bulletin contains brief descriptions of the nature and extent of damage to the crop, the life history of the pest, and possible management aspects of the major insect pests on cashew.

Stem and root borer *Plocaederus ferrugineus* (Cerambycidae: Coleoptera)

The cashew stem and root borer, *Plocaederus ferrugineus L* is the most serious pest of cashew as its damage results in death of trees. It is an internal tissue borer and infestation was up to 40% in different periods and severely attacked trees die within a period of two years causing substantial tree loss. The infestation by the pest is more severe in neglected plantations. Two other species of stem borers *viz., P. obesus* Gahan and *Batocera rufomaculata* also infests cashew trees. The *Plocaederus* spp. are encountered as primary pests.

Symptoms of damage

- Stem borer infection could be easily identified by the presence of small bore holes at the collar region.
- Extrusion of frass (like coarse dust powder) through the holes at the collar region.
- Oozing of gum at the base of cashew tree trunk.
- The grubs that hatch out bore into the bark and feed on the sub-epidermal and vascular tissues.
- Extensive tunneling in the stem and root region and the tissues are tunnelled in irregular fashion.
- As a result of damage the supply of water and nutrients is arrested by which the leaves turn yellow and are shed and finally leads to the death of the tree.
- Affected trees also tilt on one side due to loss of anchorage, if the injury is severe on anchoring roots.

Biology

- The borer has one generation per year. The adult is a medium sized (25-40 mm long), reddish-brown long horned beetle. The female beetle lays 60-90 eggs.
- They prefer to lay eggs on old trees (> 4 5 years old) that have rough bark with more cracks, on trees either damaged by stem borers in the previous season or by physical actions like heavy pruning.
- The eggs are laid into the live tissues in the crevices of the loose bark in the trunk or exposed portion of the roots above the soil.
- The eggs are whitish, ovoid in shape measuring about 3 mm in length (looks like rice grain). The egg period varies from 4-7 days.
- The eggs hatch out as tiny grubs, which bore into the fresh tissues of the bark.
- The grubs feed inside the tissues for 4-7 months. The grown up grubs are off-white in colour measuring about 7-10 cm in length.

Tea mosquito bug: Helopeltis antonii Sign. (Miridae: Heteroptera)

The tea mosquito bug, is another important and most serious pest of cashew in India, and causes more economic loss to the crop. It is estimated that this pest alone cause 20 - 60 per cent yield loss. It causes more than 30% economic loss by inflorescence blight and immature nut fall. Other two species viz., *H. theivora* and *H. bradyi* also infests cashew trees.

Symptoms of damage

- Both nymphs and adults of this mirid bug suck sap from the tender flushes, young shoots, inflorescence, panicles, growing young nuts and apples.
- Occurrence of dark brown patches on green tender stem of young shoots and inflorescence rachis.
- Feeding on tender leaves causes crinkling and curling. Affected shoots show long black lesions.
- The immature nuts infested by this pest develop characteristic eruptive spots and finally shrivel and fall off.
- Heavily infested trees show scorched appearance, leading to the death of shoots and growing tips.
- Severely affected branches may lead to the secondary infection by fungus (Botrydiplodia theobromae) causing die back disease.
- Each nymph/adult during its life time damages at least three tender shoots/ panicles.

Biology

- The adult bug is reddish-brown, about 6-8 mm long with a black head, red thorax, black and white abdomen.
- Female bug lays eggs on the tender tissues of new shoots, and soft tissues of inflorescence branches.
- Eggs are reniform and creamy white. The presence of chorionic threads projecting outside the tissues is indicative of the presence of eggs inside.
- Single female bug lays, on an average, 50 eggs. The incubation period of the egg is on an average 5-7 days.
- The adult usually feeds during early hours (6-10 am) and makes about 150 feeding punctures per day.

- The eggs normally hatch out as nymphs. Young nymphs feed on tender leaves which later become necrotic. The nymphs are wingless and smaller, but otherwise resemble the adults. The young nymphs are orange coloured and ant-like with long legs.
- A nymphal period is of 10-15 days with 5 instars. The female bug lives for about 7 days, while the longevity of male is 9-10 days. The life-cycle is completed in 25-32 days.
- During the monsoon period they can be seen damaging the young plants.

Alternate hosts

• Neem, guava, cocoa, mahogany, cinchona, cotton, apples, grapes, drumstick, black pepper and jamun.

Seasonal incidence

- The condition becomes quite congenial for the multiplication and feeding by the nymphs and adults, when the cashew trees are in their most active growth phase (December onwards).
- Trees with the new flush and tender inflorescence are highly attractive to the nymphs and adults.
- The pest population reaches its peak, during the month of February–March. These periods the trees are in the full blossom stage.
- Young trees are getting affected more, because of the availability of succulent growth throughout the year.



Damage symptoms



TMB damage on tender shoots



TMB damage on tender shoots and panicles





Adult and nymph inflicting damage



Adult tea mosquito bug

Management

- Remove the volunteer (self-sown) neem plants in and around cashew plantations.
- Proper monitoring of the pest situation is very important.
- Three spray schedules should be followed
- 1st Spray: Monocrotophos 1.5 ml/ litre of water (0.05%) or Lamda cyhalothrin at 0.003% during new flushing stage (November- December).
- 2nd Spray: Carbaryl 50% WP at 2g/ litre of water (0.1%) or Chlorpyriphos (0.05%) at flowering stage (Dec- January).
- 3rd Spray: Repeat the first spray at the initial fruiting stage (Feb-March)
- Spray well in advance before the insect inflicts damage to the crop. Thorough foliar coverage is a must.
- The same insecticide should not be repeated in the second round. Avoid indiscriminate use of synthetic pyrethroids as it causes flare-up of sucking pests.
- The sprayings should be done before 9 am or after 4 pm in order to save nontarget pollinators.
- The eggs of the mosquito bug are naturally parasitized by *Telenoums* sp. and *Erythmelus* helopeltidis. Spiders such as *Oxyopes schireta*, *Phildippus patch* and *Hiyllus* spp. are efficient predators and feed on nymphs and adult mosquito bug.
- Red ants *Oecophylla smaragdina* should be encouraged in cashew plantations as it will repel the tea mosquito bug.
- During the out-break situation, the management programme should be launched on large scale community basis.

Apple and Nut borer: Thylocoptila panrosema (Pyralidae: Lepidoptera)

• It causes 10% yield loss during years of severe infestation in certain cashew growing areas.

Symptoms of damage

- The caterpillars attack the fruits at all the stages and cause shrivelling and premature fall of nuts.
- In the early stages, the young larvae move to the joints of nut and apple scrape the epidermis and then bore into them. In later stages, they bore into tender apples and nuts and feed on them.
- The borer affected nuts do not develop, become shrivelled and dried up resulting in pre mature fall of nuts and apples.
- The borers tunnel near the junction of apples and nuts, and the entry holes are plugged with excreta.
- Only a single caterpillar is generally seen either in the apple or nut, but there are reports of up to five larvae occurring in apples and three in nuts.
- The caterpillars bore through the apple from one end to the other

Biology

- The adult is a medium sized moth with dark fore-wings and pale dark hind wings.
- There are 5 larval instars lasting 15- 33 days.
- The fully grown larvae drop to the ground and pupate in earthen cocoons. The pupal period lasts about 8-10 days.

Management

- Removal and destruction of dead and dried inflorescence.
- Spray carbaryl 50 WP 0.1% (@ 2g / lit) at the time of fruit setting.
- Total removal and destruction of dead and dried inflorescence during the preflowering season is an effective cultural method for controlling pest population.
- Spraying of dichlorvos @ 2ml /litre of water during the off-season.

Thrips: flower thrips, Rhynchothrips raoensis; Foliage thrips, Selenothrips rubrocinctus (Thripidae:Thysanoptera)

Symptoms of damage

- Adults and nymphs are seen in colonies on the lower surface of leaves and suck the sap from leaves, inflorescence and apples and nuts.
- As a result of their rasping and sucking activity the leaves become pale brown, scab on floral branches, apples and nuts, forms corky layers on the affected parts.
- In severe cases there will be shedding of leaves and stunting of growth of trees.



Thrips infested apples and nuts

Biology

- They are minute, slender, fragile, soft bodied, fast moving insects and adults have fringed wings.
- The eggs are inserted singly in the epidermis of the leaf. The nymphs emerge in about 10 days.
- The nymphs of red-banded thrips S. rubrocinctus can be distinguished by their greenish yellow colour and red bands across the first and last abdominal segments.

Management

• Spraying of Monocrotophos 36 WSC 0.05% (@ 1.5 ml / lit).

Mealy bug: Ferrisia virgata (Pseudococcidae: Heteroptera)

• The mealy bug, *Ferrisia virgata* is a serious pest of cashew in all cashew growing areas. Three other species of mealy bugs infesting cashew includes *Planococcus lilacinus*, *Planococcus citri* and *Phenococcus solenopsis*.

Symptoms of damage

- The nymphs and adults of mealy bugs suck large amount of sap from the tender plant parts results in withering of growing shoots, inflorescence and developing fruits.
- It can be seen on the lower surfaces of tender leaves, twigs, inflorescence panicles and fruit peduncles.
- Besides causing direct damage, the bugs excrete copious amount of honey dew on which sooty mould develops which impairs normal photosynthetic activity.
- Heavy nut yield loss observed under severe out break conditions.

Biology

- They are soft bodied, and covered with milky white coating on the body.
- They have reproductive potential of laying 100-300 eggs in masses covered with cottony white mealy filaments.
- The eggs are amber in colour and within a day they hatch into crawlers. Nymphal period lasts for 26-45 days. Adult lives for 15-20 days. The total life period is 45-65 days.

Management

- Continuous monitoring and early detection of infestation are essential to manage this pest.
- The cashew plantation and neighbouring areas should be free from weeds and alternate hosts.
- The infested portion of the plant parts like leaves, inflorescence and twigs with mealy bug colonies should be pruned and destroyed.
- Fallen leaves under the tree canopy should be collected and burnt to avoid further spread of the pest.
- Spray of dichlorvas 76 WSC 0.2% (@ 2.5ml / lit) or methyl parathion 50 EC 0.05% (@ 1ml / lit) or dimethoate 30 EC 0.05% (@ 1.75ml / lit) in combination with fish oil resin soap @ 20 g per litre of water reduces bug incidence effectively.

Damage symptoms



Mealy bug on leaves



Feeding on inflorescence



Feeding on fruit peduncle

- Spraying should be done in such a way as to cover the entire lower surface of leaves, twigs and branches where the crawler stages are found in large numbers.
- Avoid spraying of same insecticides in repeatedly.
- Predators are very effective in controlling the mealy bug. Encourage the predators like *Chrysoperla carnea, Menochilus sexmaculatus, Coccinella septumpunctata*, and *Scymnus coccivora* in and around the cashew plantations.

Leaf miner: Acrocercops syngramma (Gracillariidae: Lepidoptera)

Infestation by this pest is common in the post- monsoon flushes and young plantations.

Symptoms of damage

- The larvae after hatching from the eggs, start mining the epidermal layer on the upper surface of the tender cashew leaves.
- As a result of feeding, the affected areas form blistered patches of greyish white in colour.
- As the infested leaves mature the damage is manifested as big holes.

Nursery seedlings



Damage Symptom of leaf mener

plantations are more prone to the infestation of this pest than the older ones.

young

Biology

• The adult is a silver grey moth which lays eggs on tender leaves.

and

- Freshly hatched larvae are pale white in colour and fully grown caterpillars are reddish brown in colour.
- The caterpillars make their own way out of the mined areas and fall to the ground for pupation.
- The total larval period ranged between 10 to 15 days.
- Pupation takes place mostly in the soil and in some cases in the leaf-folds in a thin membranous cocoon.
- The life cycle of this pest is 20 to 25 days.

Management

• Spray Monocrotophos 36 WSC 0.05% (@ 1.5ml / lit) during the month of October-November at new flush emergence stage.

Leaf and blossom webber: Lamida moncusalis (Pyraustidae: Lepidotera)

Symptoms of damage

- Presence of web on the terminal portions of new shoots and blossom is the initial symptoms of infestation.
- The caterpillars are remaining inside web and feed on them.
- The incidence is found severe mostly on young trees.

Biology

- The eggs are laid singly or in small groups of 3-5 on the leaves. Freshly laid eggs are yellowish green in colour.
- The caterpillar is dark green in colour with yellow longitudinal bands and pinkish dorsal lines. There are five larval instars.
- Pupation takes place in cocoons in the leaf webs or in the soil.
- The life cycle is completed in 37 days.



Damage symptom of Leaf and blossom webber

Management

• Spray of chlorpyriphos 20 EC 0.05% (@ 2.5 ml / lit) at flushing period will effectively control this pest.

Awareness campaigns on the management of cashew stem and root borer

We have organised awareness campaign on the management of cashew stem and root borer during 10th to 12th January, 2012 in Batim, Shelap, and Barcem area of Goa. On field management of cashew stem and root borer with chemical pesticide chlorpyrifos has been demonstrated with active involvement of farming community. In this campaign, we have explained the life cycle, symptoms, feeding activity, pest identification, hygienic, extraction of grubs, prophylactic and curative management aspects of this hidden pest.

Awareness campaigns on the management of cashew stem and root borer



Removal grubs from the infected trees



Treating the infected tree



Awareness campaign

A) Contact details

- 1) Director, ICAR Research Complex for Goa, Ela, Old Goa 403 401.
- 2) Director, Directorate of Cashew Research, Puttun 575 202, Dakshin Kannada, Karnataka.
- Director, National Bureau of Agriculture, important insects, Bengaluru, Post Box No 2491, H.A. Farm Post, Bellary Road, Bangalore 560 024, Karnataka.

B) Other Publications of ICAR on Cashew

- 1) Techniques and Practices for cashew production.
- 2) Improved package of practices for cashew production in Goa.
- 3) Goa-1 : A Cashew Variety for Goa.
- 4) Soil and Water Conservation Measures for Sustainable Production of Cashew.



Completely damaged cashew plants by tea mosquito bug