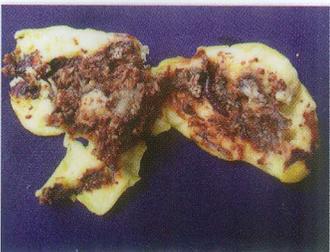
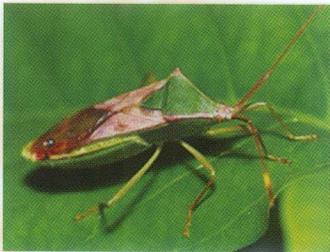


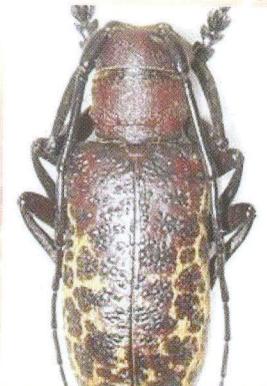
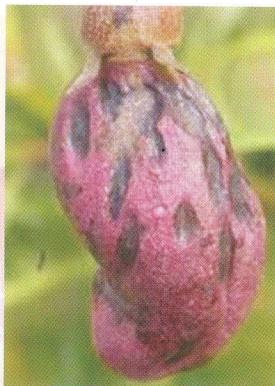
All India Coordinated Research Project on Cashew

# Minor Pests of Cashew in Konkan Region



**Regional Fruit Research Station, Vengurle-416 516**  
(Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli)





Technical bulletin

**All India Coordinated Research Project on Cashewnut**  
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**Published By**

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## PREFACE

Cashew is reported to be infested by large number of insect pests. Among them, tea mosquito bug and cashew stem and root borer are two important pests that cause severe yield loss all over the country. Apart from these, several minor insect pests also affect cashew in different regions which may also need management efforts, if severe infestations are there. Moreover, for management strategy the knowledge on minor pests, their ecology, host range and damage intensity is essential.

Over the years, considerable research has been carried out in the field of cashew pests and their management. I am happy that researchers of Regional Fruit Research Station, Vengurle have made efforts to compile the information on minor insect pests of cashew in Konkan region of Maharashtra. I hope this publication will serve as a reference for farmers, researchers and development agencies in Konkan region.

**(P.L. SAROJ)**  
Director





## INTRODUCTION

Cashew (*Anacardium occidentale* L.) belongs to family Anacardiaceae, considered to be native of the North Eastern parts of South America (Brazil) and now found in many tropical areas. The English name of cashew is derived from the Portuguese name *caju* which in turn came from the tupi-Indian word cashew bears fruit in abundance and at the base of fruit hangs a nut having kidney shape was introduced to West and East Africa, and India by Portuguese travelers during 15<sup>th</sup> and 16<sup>th</sup> centuries, with a purpose for checking soil erosion, as it has good network of roots. It is now grown in coastal areas of East Africa, India, Mozambique, Uganda, Nigeria, Tanzania, Kenya, Vietnam and Brazil.

Now, cashew occupies the status of an important commercial crop. It was only during 1950's that cashew gained commercial importance with the beginning of export of cashew kernels to European countries. Today, the major cashew growing States in India are Maharashtra, Goa, Karnataka, Kerala, Andhra Pradesh, Odisha, West Bengal, Chhattisgarh, Gujarat and North Eastern states. Cashew is called by different vernacular names in India. In Kerala it is known as *Parangi Andi* meaning a foreign or Portuguese nut. In Tamil it is known as *Mundiri* indicating the position and shape of the nut. In Odiya it is known as *Lanka Beeja* indicating that cashew reached Odisha by Sea from Sri Lanka. The Bengalis know cashew as *Hijili badam* and Assamese refer to the nut as *Caju Badam*, in Karnataka it is called *godambi*.

The present area, production and productivity of cashew in India during 2001-02 to 2013-14 is presented in Table 1.

Table 1: Area, Production and Productivity of cashew nut in India

Year	Area In 000 ha	Production IN 000' MT	ProductivityIN MT(ha)
2001-02	740	460	0.6
2002-03	740	460	0.6
2003-04	780	535	0.6
2004-05	820	544	0.7
2005-06	843	579	0.7
2006-07	854	62	0.7
2007-08	868	665	0.7
2008-09	893	695	0.8
2009-10	923	613	0.8
2010-11	953	675	0.7
2011-12	979	725	0.7
2012-13	992	753	0.8
2013-14	1011	753	0.7

(Source: All India 2013-14 (Final Estimates), Department of Agriculture & Cooperation Indian Horticulture Data base 2014 pp.No.206).



Cashew is grown on variety of soils such as laterite, loamy and sandy soils. It requires 20 to 30°C temperature for its cultivation. Cashew is a sun loving tree and requires minimum 50 cm rainfall per annum but can stand extremes of rainfall from 30 cm to 400 cm experienced in the East and West coasts of India.

### Influence of climatic factors on cashew

- ❖ Dry spell during flowering and fruit setting ensures better harvest.
- ❖ Cloudy weather during flowering enhances scorching of flowering might be due to association of tea mosquito bug infestation.
- ❖ Heavy rain during flowering and fruit set damages production.
- ❖ High temperature of 39-42°C during the marble stage causes fruit drop
- ❖ Cashew performs better when the period of drought is shorter.

The improved varieties of cashew recommended for commercial cultivation in India are as presented in Table 2.

**Table 2:** Improved varieties of cashew recommended for different states of India are as follows

Sr. No.	States	Recommended varieties of cashew
1.	Karnataka	Selection-2, Ullal-1, Ullal-2, Ullal-3, UN-50, VRI-1, Vengurla-1*,Vengurla-4*
2.	Kerala	Madakkathara-1, Madakkathara-2, K-22-1, Dhana, Priyanka, Damodar (H-1600)
3.	Maharashtra and Goa	Vengurla-1, Vengurla-4, Vengurla-6, Vengurla-7, Vengurla-8
4.	Tamil Nadu	VRI-1, VRI-2,VRI-3
5.	Andhra Pradesh	BPP-4, BPP-6, BPP-8, VRI-2
6.	Odisha	VRI-2, Bhubaneshwar-1
7.	West Bengal	Jhargram-1, Jhargram-2
8.	Madhya Pradesh	No.40, Vengurla-4

\*Recommended to North Karnataka

Normally, spacing adopted for cashew is 7m x 7m or 8m x 8m. However, spacing from 4m x 4m up to 10m x10m is adopted in different cashew growing tracts depending upon soil condition, variety, irrigation etc.



## Constraints in cashew production

- ❖ Most of the plantations are of seedling origin and cashew cultivation was mainly carried out as an afforestation and conservation programme for waste lands rather than for economic venture.
- ❖ Plantations are maintained under highly neglected conditions with poor soil fertility
- ❖ Lack of management of insect pests.
- ❖ Lack of application of recommended dose of fertilizers and chemicals.

Besides this, poor insect pest knowledge is the most important constraint in cashew cultivation. In order to enhance the cashew production, the knowledge of cashew pests and their management is most important. When insect population reaches a critical level, they become serious pests causing heavy damage.

### General aspects of pests:

A pest may be any insect, an animal, plant or pathogen which causes damage or annoyance to man and his animal. The pest may be serious, moderate or minor, depending up on its capacity to cause destruction of crop and inflict economic losses. The pest may destroy host individuals belonging to single species, various species of a family or several species of a group of families and are called as monophagous, oligophagous or polyphagous pest, respectively. Insect pests are grouped into two groups i.e., harmful insects and beneficial insects. A large number of insect are harmless and besides forming an integral part of various eco-systems, they are the most fascinating natural pollinators and perhaps some are weed destroyers. Similarly, various species are entomophagous parasites and predators and they play an important role in maintaining food chain and energy flow in eco-system and thus have a propounding effect on the natural balance. About 15 per cent of total insect species are adapted to parasitic mode of life.

The pests causing damage to the agricultural crops, domestic animals and public health are broadly classified into agricultural, veterinary and medical pests, respectively. Similarly, some insects are evolved as the store grain pests, house hold pests and forest pests.



## There are several reasons for the origin of pest

- a) Change from monoculture to mix culture causes polyphagous nature among the pests.
- b) Intensification of agriculture or change from discontinuous cropping to continuous cropping invites increased pest intensity.
- c) Creation of new soil inviting exotic pests in the cropping area
- d) Destruction of wild plants and forests in the adjacent areas affecting adversely the rainfall density, humidity and temperature of cropping area.
- e) Induction of new plantation bringing new pests from one area to another.
- f) Repeated cropping throughout the year maintains pest generation throughout year.
- g) Removal of geographical barriers like hills, water bodies, barren lands, grass land etc. helping in spreading of the pests in large area.
- h) Loss of predatory animals and birds causing loss of natural checking on pest population
- i) Use of nitrogenous fertilizers providing microclimate more favourable to the pests
- j) Cultivation of high yielding varieties which are sometimes more susceptible to the pests.

The pest may be serious, moderate or minor depending up on its capacity to increase in number and degree of destruction of a crop and economic loss.

- ✓ **Major Pest:** Insects which cause a loss of 10 per cent or more of yield are called major pests.
- ✓ **Minor pests:** Insects which normally cause a loss ranging from 5 to 10 per cent are called minor pests.

## Insect pests of cashew in India:

Cashew is one of the most important cash crops in India. The productivity of cashew is influenced by many biotic and abiotic factors, out of which insect pests are one of the major constraints.

Cashew is attacked by around 180 species of insect and non-insect pests in India resulting in substantial yield loss (Sundararaju, 1993). Godse *et al.* (2004) reported over 58 species of insects and pests on cashew crop in



the Konkan region of Maharashtra. Considering the extent of damage and yield losses due to pest infestation, cashew pests are grouped as major and minor pests.

The severity of pest changes, as location wise as some pest may be major in one state, whereas the same pest can be minor in other state. However, mostly cashew stem and root borer, cashew tea mosquito bug and cashew thrips are major pests of cashew. Cashew leaf miner, leaf and blossom webber, shoot tip caterpillar, leaf beetle, leaf folder, leaf weevil, aphid are the minor pests of cashew.

### **Classification of pests of cashew:**

Pests of cashew can be widely grouped into surface feeders and internal feeders. Surface feeders can be further divided into chewing and sucking insects. While internal feeders can either be borers or miners. Examples for each category is given below.

#### **1) Surface feeders :**

- ❖ Chewers: Two species of lepidopterans, *Metanastria hyrtaca* Cram (Lasiocampidae ) and *Lymantria ampla* walker (Lymantriidae ) which occur sporadically are the significant defoliators of cashew.
- ❖ Suckers: Tea Mosquito Bug, mealy bug, thrips etc. suck the sap from plants and cause damage.

#### **2) Internal feeders :**

- ❖ Borers : Apple and nut borer, cashew stem and root borer etc are the internal borers of cashew. They bore and plug the hole with frass and excreta.
- ❖ Miners : Larvae of few species of lepidoptera mine the leaves and cause damage.

e.g. *Acrocercops syngramma* M



## Pest calendar for cashew:

Insect pest	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>TMB</b>												
<b>CSRB</b>												
<b>LM</b>												
<b>ABN</b>												
<b>MB</b>												
<b>LBW</b>												
<b>LEC</b>												
<b>THR</b>												

**ABN:** Apple and nut borer

**CSRB:** Cashew stem and root borer

**LBW:** Leaf and blossom webber

**MB:** Monolepta beetle

**LEC:** Leaf eating caterpillar

**TMB:** Tea mosquito bug

**THR:** Thrips

**MB:** Mealy bug

**LM:** Leaf miner

Due to climate fluctuation during last two decades, the minor pests of cashew becoming major. Therefore, it is necessary to study life cycle, nature of damage and control measures. This compilation includes detailed study of minor pests of cashew and their control measures.



## 1. Cashew leaf miner (*Acrocercops syngamma*)

**Family:** Gracillariidae; **Order:** Lepidoptera

*A. Syngamma* is a serious pest of cashew in all cashew-growing locations in India, and is one of the most important lepidopterans. Leaf miners damage crop during post-harvest and post-monsoon flushes in India. Damage is most severe in nursery seedlings and young plantations. The insect attacks 2-80 per cent of the young leaves. In serious cases, it causes 75 to 80 per cent loss of leaf area. As many as 11 larvae were found feeding on a single leaf. The damage caused by larval feeding reduces the plant's photosynthetic capacity. When several larvae attack a single leaf, it dries out and falls. This might lead to a serious loss in production. In India, the insect is a minor pest of mango in Bihar, West Bengal, Maharashtra, Karnataka and Tamil Nadu. Occasionally, the moth damages the leaves of *Syzygium cumini*. Information regarding host plant, life cycle, nature of damage and control measures are as follows.



### Host Plants

*Anacardium occidentale* (Cashew nut), *Mangifera indica* (Mango), *Syzygium cumini* (Black Plum) etc.

### Life cycle

- ❖ The adult is a silver grey moth.
- ❖ Adult female lays eggs on tender leaves.
- ❖ Egg period is 2-3 days.
- ❖ The freshly hatched caterpillars are pale white and turn to reddish brown when fully grown.
- ❖ Larval period ranged between 10 to 15 days
- ❖ Pupation takes place mostly in soil and in some cases in the leaf folds in a thin membranous cocoon.
- ❖ Pupal period ranged between 7-9 days.
- ❖ The life cycle of this pest is 20 to 25 days.



## Nature of Damage

- ❖ The larvae hatching from eggs are mining the young leaves.
- ❖ The larvae feed on the leaf tissue.
- ❖ The tortuous markings on leaves appear due to feeding.
- ❖ The epidermal cuticle swells up in the mined areas where several mined portion merge and then appear as whitish, blistered patches on the leaf surface.
- ❖ On old leaves the damage is seen as large holes.
- ❖ Drying and crumbling of mined portions of the leaf surface will finally occur.

## Control measures

- ❖ Removal and destruction of affected leaves in cashew is recommended to prevent the pest infestation from spreading.
- ❖ No resistant/tolerant varieties are reported.
- ❖ Chemical insecticide Monocrotophos 36 per cent @ 1.5ml/lit of water on new vegetative flush is recommended. In cloudy weather add sticker to get better result.

## 2. Leaf and blossom webber ( *Lamida moncusalis* )

**Family:**Pyralidae; **Order:**Lepidoptera

Two species of leaf and shoot webbing caterpillar *Lamida moncusalis* and *Orthage exvinacea* have been recorded as pests on cashew. This is one of the most important pests of cashew in East Coast tract, particularly in the coastal district of Andhra Pradesh and gradually spreading in the cashew plantations of Tamil Nadu and Odisha.



## Host Plant

*Mangifera indica* (Mango)

## Life cycle

- ❖ The adult is a silver grey moth.
- ❖ Adult female laid eggs singly or in small group of six on leaves during night.
- ❖ Egg period is 5-6 days
- ❖ Freshly laid eggs are yellowish green in color.
- ❖ Larval period ranged between 9 to 14 days
- ❖ Pupation takes place in cocoon leaf webs in soil.
- ❖ Pupal period ranged between 9-14 days.
- ❖ The life cycle of this pest is 37 days.

## Nature of Damage

- ❖ The caterpillar webs the tender shoots and inflorescence together to remain inside and feed on them.
- ❖ Drying of apical webbed shoots
- ❖ The galleries of silken webs are seen
- ❖ Reinforced with castings and scraps of plant parts are indications of presence of caterpillar inside the webbed portion.
- ❖ The incidence is found to be severe mostly on young trees.

## Control Measures

- ❖ Removal and destruction of affected leaves.
- ❖ Digging over the ground at the foot of the cashew tree in order to destroy the cocoons or to bury them.
- ❖ Two parasitoid species belonging to *Braconidae* and *Elasmidae* were found to parasitize up to 10-50 percent.
- ❖ The spray schedule recommended for TMB viz., Monocrotophos, Profenophos and Lambda cyhalothrin is found effective for the management of this pest.



### 3. Mealy bugs (*Ferrisia virgata*)

**Family:** Pseudococcidae; **Order:** Hemiptera

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 *Phenacoccus solenopsis*. The sucking action of this pest leads to foliar yellowing.



#### Host plant

Cassava, Citrus plants, Cocoa, Coconut, Coffee, Mango, Millet, Papaya, Passion fruit, Pineapple, Sugarcane and Yam.

#### Life cycle

- ❖ Mealy bug eggs are very small and are laid under a white, loose woolly wax, which remains attached to the abdomen of the females.
- ❖ A female may lay between 50 to 100 eggs.
- ❖ Nymphs are flat, very small, oval and yellow
- ❖ Older nymphs of some species are covered with fluffy, white wax.
- ❖ Older female nymphs resemble the adults. Older male nymphs secrete a tiny, fluffy cocoon.
- ❖ Upon hatching, young mealy bugs are known as crawlers
- ❖ Nymphal period lasts for 26-45 days.
- ❖ Adult lives for 15-20 days.
- ❖ The total life period is 45-65 days.

#### Nature of Damage

- ❖ Mealy bugs damage plants by sucking sap from tender leaves, petioles and fruit.



- ❖ Severely infested leaves turn yellow and gradually dry.
- ❖ Severe attack can result in shedding of leaves and inflorescences, reduced fruit setting and shedding of young fruits.
- ❖ The foliage and fruit may become covered with sticky honeydew, which serves as a medium for the growth of sooty moulds.
- ❖ Honeydew, sooty mould and waxy deposits may cover leaves reducing photosynthetic efficiency and may lead to leaf drop.
- ❖ Contamination of fruit with honeydew and sooty mould reduces its market value.

### Control Measures

- ❖ Early detection of mealy bugs is necessary for effective control. Check plants for crawlers; pay special attention to the new growth (tender tissues), the undersides of leaves and around leaf joints.
- ❖ Removing mealy bugs by rubbing or picking mealy bugs from affected plants. This is practicable when infestation is low.
- ❖ Pruning and destroying affected parts. This is particularly useful at the initial stage of infestation.
- ❖ Removing and destroying heavily infested shoots or panicles.
- ❖ Mealy bugs are attacked by numerous natural enemies, which usually keep them under control. Most common natural enemies include parasitic wasps, ladybird beetles, hover flies and lacewings.
- ❖ By applying a barrier around the stems or trunks of the trees.
- ❖ Keeping flowering plants at the border of the crops or as companion plant within the crops may help to attract natural enemies
- ❖ Spray of dichlorvas 76 WSC 0.2 per cent (@ 2.5ml / lit) or methyl parathion 50 EC 0.05per cent (@ 1ml/lit) or dimethoate 30 EC 0.05per cent (@ 1.75ml/lit) in combination with fish oil resin soap @ 20 g per liter of water reduces bug incidence effectively.
- ❖ 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

#### 4. Apple and nut borer (*Nephopteryx* sp.)

**Family:** Pyralidae; **Order:** Lepidoptera

Two species of apple and nut borer recorded in India *Thylacoptila paurosema* and another *Nephopteryx* sp. *Thylacoptila paurosema* species



cause 10 per cent losses in serious

cases. The *Nephopteryx* sp. is also responsible for heavy crop losses up to 20-60 per cent. The caterpillar which bores into tender apple and nut causes shriveling and immature fall of nut.



#### Host plant

Sapota

#### Life cycle

- ❖ The adult is medium sized moth with dark forewing and pale hind wings.
- ❖ A female may lay between 10 to 20 eggs near the attachment of apple and nut.
- ❖ Eggs period ranges between 5-7 days.
- ❖ There are five larval instars.
- ❖ Larval period ranged between 15 to 19 days
- ❖ Pupation takes place inside nut or apple.
- ❖ Pupal period ranged between 6 to 10 days.
- ❖ The life cycle of this pest ranges between 25 to 37 days.

#### Nature of Damage

- ❖ The caterpillars on hatching from eggs enter in to either nut or apple.
- ❖ 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 attack the fruits at all the stages

### Control Measures

- ❖ Total removal and destruction of dead and dried inflorescence during the pre flowering season is an effective cultural method for controlling pest population.
- ❖ Spraying of dichlorvos @ 1ml/litre of water during the off-season
- ❖ Spraying of Lambda cyhalothrin @ 0.6ml/litre of water when infestation observed.

### 5. Aphid (*Aphis gossypii*)

**Family:** Aphididae; **Order:** Hemiptera

Highly polyphagous and transmits several plant diseases in other crops. Both nymphs and adults suck plants sap from tender shoots, leaves, panicles, tender apples and nuts.



#### Host plants

Potato, cotton, cabbage, cauliflower, mustard and other solanaceous and cruciferous crops.

#### Life Cycle

- ❖ Aphids are small (1 - 3 mm), soft-bodied insects that vary in color (green, pink, yellow, grey or black).
- ❖ Two cornicles (siphunculus) or “exhaust pipes” extend from the hind end of most aphids



- ❖ Most commonly seen in spring and autumn, aphids can be winged or wingless and are usually slow-moving.
- ❖ Nymphs: 1-1.5 mm long, resemble adults but are smaller and always wingless.
- ❖ Adults: About 2 mm in length and ash grey in colour.
- ❖ Reproduces through parthenogenetic vivipary however, during severe winter, sexual reproduction also occurs.
- ❖ There are 4 nymphal instars.
- ❖ The nymphs mature in 10-15 days.
- ❖ A single female can produce 40-45 young ones.
- ❖ Total life cycle is completed in 10-45 days

### Nature of Damage

- ❖ Suck cell sap from tender leaves/shoots.
- ❖ Excrete honeydew which attracts sooty mould and interferes with photosynthesis.

### Control Measures

- ❖ Infested shoots should be destroyed immediately after harvest to prevent excessive dispersal.
- ❖ Many of the natural enemies viz., ladybirds, syrphid flies, braconid wasps are known to be effective against aphids.
- ❖ Ants are commonly found associated with aphids to collect honeydew, and may even hinder predation of aphids by other insects.
- ❖ Spray schedule for TMB is found effective for control of aphids also.

### 6. Shoot tip caterpillar (*Hypatima haligramma*)

**Family:** Gelechiidae; **Order:** Lepidoptera

The tiny yellowish or greenish brown caterpillar of the moth *Hypatima haligramma* M. damages the shoot tips. It occasionally bores through the tender shoot tip to a depth of about 20-25



mm causing stunted growth and drying up of growing shoot tips up to 26 per cent.

### **Host plant**

Mango

### **Life cycle**

- ❖ The moth is small, dark brown in color having yellowish wings.
- ❖ Pupation takes place inside the unopened leaves or in small bore holes made on the apical shoot tip or floral branches.
- ❖ Pupal period is 7-8 days.
- ❖ The pupa is yellowish red.

### **Nature of damage**

- ❖ The caterpillar causes considerable damage to tender shoots at the emergence of new vegetative flush
- ❖ Caterpillar borers in to terminal shoot tip and tunnels to a length of about 2 cm feeding on internal tissue and filling the tunnel with frass.
- ❖ It borers in to flower buds and eats up the content.
- ❖ Due to injury the growing shoots becomes stunted and some time dries up and withers.
- ❖ This pest damages tender leaves mostly in bud stage.
- ❖ Generally 3-4 caterpillars are observed in single shoot.
- ❖ The gum exudation sets in on floral branches and assumes a silky appearance, which eventually dries up.
- ❖ The emerging leaves are folded and caterpillar remains inside and feed on them.

### **Control measures**

- ❖ Remove and destroy the infected portion of the tree.
- ❖ A spray of 25 per cent quinalphos 2 ml/lit of water or Monocrotophos 1.5ml / lit or carbaryl 1gm/lit of water was found to be effective for the management.



## 7. Leaf beetles and weevils (*Monolepta longitarsus*)

**Family:** Chrysomelidae; **Order:** Coleoptera

The chrysomelid beetle, *Monolepta longitarsus* is an important regular pest in the West coast. It is red beetle and appears in large numbers. The Leaf beetle causes heavy damage to young plant and nursery seedlings during the south-west monsoon (June–August) destroying tender leaves and tender shoots. The beetle scraps the green matter of leaves from the lower surface there by skeletoning the leaves which ultimately dry up. They also scrap the tender portion of stem, feed on green matter and ultimately the terminal portion completely dries up. When nursery seedling is attacked, the entire seedling dries up.

In addition to *M. longitarsus*, *Myloccerus* sp. other species of weevils cause heavy damage to leaves of seedlings and young plants. This pest is controlled by the spray of monocrotophos @1.5ml/lit of water.



## 8. The cashew weevil (*Mecocorynus loripes*)

**Family:** Curculionidae; **Order:** Coleoptera

This is usually a minor pest of cashew but neglected orchards are liable to be under severe attacks. The cashew weevil is a large weevil, about 20 mm long, and of a knobbed appearance. It is dark grey-brown in colour. The female weevil lay eggs singly in small holes in the bark of the trunk or branches. The larvae are legless grubs, whitish in colour with a brown head. Fully-grown larvae pupate in a chamber about 2 cm below the bark.



## Nature of Damage

The larvae bore through the bark and moves downwards tunneling under the bark while feeding on the sapwood of tree. Brown-black gummy frass is seen on the trunk and main branches, at intervals it makes frass ejection holes to the exterior. Heavily infested tree becomes ringed by damaged sap wood and eventually die. When the larvae become fully grown they constrict the bark. The tunnel from the chamber to the exterior is stuffed with wood fragments before pupation

## Control measures

- ❖ The leaves of the infested trees become yellowish and drop and the infested tree finally dies. This might be due to their feeding activities which probably damage the vascular tissues, arrest the sap flow and weaken the stem thereby resulting in yellowing and shedding of leaves and drying of the trees.
- ❖ Very severely infested tree should be destroyed.
- ❖ All stages of the weevils should be collected and destroyed.
- ❖ The tree should be felled and de barked to expose all the larval galleries.
- ❖ Lightly infested tree can be treated by killing all evident adults, cutting of bark to expose the larvae and pupal galleries' and then removing and killing the larvae and pupae.
- ❖ This treatment should be repeated for further six months if required

## 9. Defoliating caterpillars (*Metanastria hyrtaca*)

**Family:** Lasiocampidae; **Order:** Lepidoptera

This is also a sporadic pest attacking isolated cashew trees. The moth lays eggs in clusters on lower surface of leaves. The eggs hatch in nine days. The larval period lasts 33 days for male and 35 days for females. There are five instars and the duration of different instars also varied for male and female. The pupal period



lasts about 12 days. The early instar caterpillars are gregarious feeders on tender foliage and full grown caterpillar feeds voraciously on mature leaves as well .They congregate on the trunk during day time and are active only during night. The pest appears in June – July with emergence of new flushes in cashew and continues upto December.

### **10. Coconut bug (*Pseudotheraptus wayi*)**

**Family:** Coreidae; **Order:** Hemiptera

Adult bugs are reddish brown in colour and 12 to 14 mm long. Nymphs are reddish brown to green brown in colour and have long antennae. Feeding causes necrotic bruise-like depressions; a hard lump develops, which can be easily removed when the fruit is peeled. The bug sucks on the developing fruits causing pockmarks. The kernels are also affected showing spots, which lower their market value.

Conserve natural enemies like weaver ants which nest on cashew trees, deter and feed on coconut bugs.



### **11. Red-banded thrips (*Selenothrips rubrocinctus*)**

**Family:** Thripidae ; **Order:** Thysanoptera

Adults of the red banded thrips are dark brown or blackish. Nymphs are pale yellow with a broad transverse red band on the dorsal side of the abdomen. Thrips attack older leaves, flowers and shoots. Attacked leaves drop off leaving bare shoots with few young leaves at the tip. Infestation of flowers causes poor fruit formation. Locally limited infestations may cause considerable damage.



## 12. Cashew stem girdler (*Paranaleptes reticulata*)

**Family:** Cerambycidae; **Order:** Coleoptera

Adults are long horn beetles, with body length of 25-35 mm and antennae longer than the body. The head and the thorax are dark brown; Elytra are orange with large black blotches giving them a reticulate appearance. Adult beetles girdle branches from 3-8 mm in diameter leaving a V-section cut; only a narrow, central pillar round the pith zone is left, which eventually breaks off. Female beetles lay elongated eggs in transverse slits made in the bark of the girdled branch at points above the girdle.



Larvae are yellow in colour and reach a length of 45 mm when fully grown. They mine in dead wood of the girdled branches. Pupation takes place in the dead wood. The lifecycle takes one year. Once a year (in November or December) all girdled branches should be collected and burnt. Only the dead or dying part of the branch above the girdle needs to be collected.

## 13. Bark-eating caterpillar (*Indarbela tetraonis*) Moore

**Family:** Metarbedelidae; **Order:** Lepidoptera

It is a polyphagous pest reported on citrus, mango, guava, jaman, loquat, mulberry, pomegranate, ber, litchi, cashew and aonla. Older trees and the trees in orchards that are not well maintained are more prone to these pests. Peak activity period is September-October



### Life cycle

- ❖ Eggs are laid under loose bark or in cracks and crevices in clusters of 15-25 from April to June.
- ❖ They hatch in 8-11 days.
- ❖ Larval duration is of 9-10 months.
- ❖ Pupal period is 3 to 4 weeks.
- ❖ Total life cycle lasts 4-5 months in south India and more than a year in north India.
- ❖ One generation per year.



## Nature of damage

Larvae make holes/zig-zag tunneling on the stems and branches. The newly hatched larvae feed on the barks which cover up with the dark ribbon like silken web made of wood chips and excretory pellets. Holes on the trunk, wood dust and fecal matter hanging in the form of a web around the affected portion. Severe damage can result in the death of attacked stem. Blackish larva can be observed underneath the fresh webbing.

## Management

- ❖ Orchard should be kept clean and overcrowding of trees should be avoided
- ❖ Remove the webbing and inject kerosene oil into the holes during September-October and again in January-February.
- ❖ The webs around the affected portion should be cleaned.
- ❖ Cotton swab soaked in petrol or kerosene should be inserted in the holes and sealed with mud.
- ❖ Alternate sprays with Carbaryl @ 2.5 g/litre of water or Quinalphos @ 2 ml/litre of water or Methomyl @ 3.5 g/litre or Fenvalerate @0.05 % is effective in controlling the pest.

### 14. Leaf webber (*Orthaga exvinacea* (Hampson))

**Family:** Pyralidae; **Order:** Lepidoptera

The adult moth do not directly cause any economic damage to the host plant. The larvae are voracious leaf eaters that web together the cluster of leaves in to a colony. A heavily infested tree shows many clusters of webbed and dried leaves, presenting it a conspicuous burnt up appearance.

Pest remains active in mango orchard from June to December and completes different overlapping generations during this period. Mechanical removal in early part of the season, spot treatment



with Imidacloprid (0.02 per cent) and application of insect growth regulator Diflubenzuron are found effective and most feasible for the management of this leaf webber.



### Host plant

Mango, terminalia

### 15. Coreid bug (*Pseudotheraptus devastans*)

**Family:**Coreidae; **Order:**Hemiptera

The characteristic damage by *P. devastans* on the growing tips of a wide range of tree species causes wilting and browning of the leaves. Infested shoots may become deformed, resulting in a flat-topped, stunted, multi-branched form. The damage is most noticeable in younger trees, but the tips of older plants are also attacked.



Under severe damage, most of the tree shoots wilt and dieback .Severe shoot damage, and fruit and stem deformation has been reported on cassava. The population of *P. devastans* around the necrotic areas plays an important role in the dissemination of Cassava Anthracnose Disease (CAD), caused by the fungus *Colletotrichum gloeosporioides* sp. *manihotis*.

### Host plant

Coconut, Cassava, Avocado and Cocoa.

### Control Measures

- ❖ The weaver ants are efficient predators of this pest.
- ❖ Synthetic pyrethroids such as cypermethrin and alpha-cypermethrin (Dominex®), that have been used to control other hemipteran bugs such as the Tasmanian eucalyptus leaf beetle (*Chrysophtharta bimaculata*) on eucalypts, could be recommended.



## 16. Nut crinkler (*Paradasynus sp.*)

**Family:** Coreidae; **Order:** Hemiptera

The bugs suck the sap from tender nuts causing them to shrivel and dry up. The adult female lays eggs on leaf surface in groups of up to 52, equally spaced and arranged in regular rows of five or six. The incubation period is 8-11 days and nymphal period comprising five instars is completed in 21-36 days with an average of 27 days.



## 17. Hairy Caterpillar (*Amsacta albistriga*)

**Family:** Noctuidae; **Order:** Lepidoptera

Highly polyphagous and feeds on almost all green vegetation. Major hosts include groundnut, cashew, castor, cucurbits, pigeonpea, other pulses, millets, *Calotropis gigantea*, etc.



## 18. Leaf-twisting weevil/Leafknot weevil (*Apoderustranquebaricus* Fabricius)

**Family:** Curculionidae; **Order:** Coleoptera

The adult beetle twists the leaves into knots for the early stages of the insect

### Host plant

Mango, Jamun, country Almond (*Terminalia catappa*) etc.



## 19. *Cricula silkmoth* (*Cricula trifenestrata* (Helfer))

**Family:** Saturniidae; **Order:** Lepidoptera

### Host plants

Cashew, Tea, Mango, Pepper,  
*Cinnamomum* sp., *Prunus* sp.  
*Acrocarpus fraxinifolius*.  
*Canarium commune*, *Persea  
bombycina*, *Semecarpus* and  
*anacardium* sp



## 20. Leaf roller (*Dudua aprobola* (Meyrick))

**Family:** Tortricidae; **Order:** Lepidoptera

This caterpillar is translucent yellowish green in colour except for the first two pairs of legs which are black. It lives in a silk shelter in a curled leaf or flower of a food plant. The caterpillar grows to a length of about 2 cm. It feeds on the flowers and leaves of a variety of agricultural crops and garden plants.



### Host plant

Mango, Groundnut, Tamarind,  
Lantana, Litchi, Rose, *Albizia procera*,  
*Cinnamomum* sp., *Lagerstroemia speciosa*,  
*Polyalthia longifolia*, *Shorea robusta*, etc.

## 21. Red cotton bug / cotton stainer (*Dysdercus koenigii* Fabricius)

**Family:** Pyrrhocoridae; **Order:** Hemiptera

Nymphs and adults suck the sap gregariously from immature seeds which do not ripe and



remain light weight.

**Host plant:**

Cotton, Bhendi etc.

**22. Bagworm** (*Eumeta variegata* (Snellen))

**Family:** Psychidae; **Order:** Lepidoptera



Widely distributed in the Indo-Australian region. It can cause damage in plants of citrus and tea. it is polyphagous.



**23. Common baron** (*Euthalia aconthea* (Cramer))

**Family:** Nymphalidae; **Order:** Lepidoptera

Larvae are found along the midribs of the leaves and are camouflaged.



**Host plant:** Mango and Rose.

**24. Defoliating Looper** (*Achaea* sp.)

**Family:** Lepidoptera; **Order:** Noctuidae

*A. catocaloides* is a migratory pest, endemic to West Africa. It is an important defoliator of crops such as cocoa, coffee, citrus, plantain and mango. In addition to damaging crops, drinking water sources may become contaminated by the faeces of this pest. Swarms of *A. catocaloides* can affect crops, water and buildings. A recent infestation in Liberia resulted in coffee, cocoa and plantain crops being devoured and more than 20,000 people evacuating their homes.



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