

STORED PRODUCT PESTS OF PLANTATION CROPS AND THEIR MANAGEMENT

A.S. Sukumaran

INTRODUCTION

Excess moisture, mould, insects and rodents are known to be responsible for damage and loss to stored products of plantation crops and also for the deterioration in quality of stored material.

COPRA

At various stages of production, distribution and utilization, heavy quantitative losses occur due to insects, rodents, fungi and other micro organisms. The important insect pests recorded in copra are *Cadra cautella* walk, *Necrobia rufipes* De Geer, *Oryzaephilus surinamensis* Linn, *Abasverus advena* weltl., *Hypothenemus hampei* DeGeer, *Lasioderma serricornis* Fab., *Carpophilus diminiatus* Fabricius, *Tribolium castaneum* Herbst and *Dermestes ater* De Geer.

1. Almond moth (*Cadra cautella* Walks) (Lepidoptera:Phycitidae)

The caterpillar of this moth is a serious pest of products such as cocoa beans, cotton seed, nuts and copra and dried fruits. In Copra, it is injurious when the product has not been properly dried and suitably stored. Well prepared copra is too hard for the caterpillar to attack. The adult moth lays eggs on the inner surface of copra, the emerging larvae make a silken mat on the inner surface of the cup and remain within. Remaining inside the silken mat, the larvae feed by scarping the copra from the surface.

2. Ham beetle (*Necrobia rufipes* De Geer) (Coleoptera: Cleridae)

This beetle occurs in the wet season in many countries of South-East Asia and the Pacific and is popularly known as "the copra bug". In addition to copra, it feeds and breeds on salted meat, dried fish, prawns, bones, skins, cocoa beans and nutmeg. It is a serious pest of mouldy copra of poor quality where as the larval mortality is high when they feed on properly prepared copra. Both the adults and grubs cause damage. The larvae make ramifying tunnels inside copra and feed from within whereas the adults remain on the surface of the copra and eat inwards from the cut edges.

3. Saw Toothed Grain beetle (*Oryzaephilus surinamensis* Linn.) (Coleoptera: Silvanidae)

This is a serious pest of poor quality copra but does not seriously infect well-dried copra. The adults bore through the cut end of the copra pieces. They make extensive galleries between the kernel and testa and lay eggs there. The emerging larvae feed within the galleries and cause damage. The existence of galleries within the copra cannot be indicated externally by holes or frass. The presence of the pest can be detected only when the pieces are broken up.

4. Foreign Grain Beetle (*Abasverus advena* weltl.) (Coleoptera: Silvanidae)

This is a small reddish brown oval beetle with smooth elytra and clubbed antennae. The adults bore into the copra in

between the dried endosperm and testa and the damage is caused by adults and larvae in the same manner as *O. surinamensis*. It does not feed on good quality copra but only on copra on which the mould *Penicillium* is growing.

5. Coffee Berry Borer (*Hypothenemus hampei* De Geer) (Coleoptera: Anthribidae)

This greyish beetle has small dark patches on the elytra and prothorax. Adults bore into the copra through the innerside and their entry holes could be prominently seen. The beetles make galleries within the copra and lay eggs there. The larvae also feed on copra within the galleries and cause severe damage.

6. Cigarette beetle (*Lasioderma serricorne* Fab.) (Coleoptera: Anobiidae)

This is a light brown round beetle with thorax and head bent downward which gives a humped appearance to this insect. The adults bore into the pieces of copra through the testa and the entry holes can be seen prominently on the surface. The beetle feed by making galleries and lay eggs there. Emerging larvae feed on copra within the galleries and the life cycle is completed inside the copra.

7. Short winged beetle (*Carpophilus diminiatus* fab.) (Coleoptera: Nitidvlidae)

This is a dark brown flattened beetle with short elytra which cover two or three abdominal segments. In the tropics, it feeds on copra, cocoa beans, ginger, nutmeg, palm kernels etc. It is seldom found on copra of good quality.

8. Red grain beetle (*Tribolium castaneum* Herbst) (Coleoptera : Tenebrionidae)

This is a very well-known pest of stored

products. Though regarded primarily as a pest of cereal products, including flour and bran, it is also destructive to oil seeds and copra. Like all the other insects that damage copra, it shows a marked preference for poor quality material with an abundance of the mould *Pencillium*.

ARECANUT

The husked arecanut known as chali is stored in godowns, sometimes even upto one year in gunny bags before marketing. Insect damages by feeding on the inner central core and due to this holes appear on the surface of the nuts. More than 21 species of insects and mites are recorded infesting stored arecanut in the country. The insect damage is maximum during the rainy months when the humidity is high and minimum during winter and summer months. The moisture content of the stored arecanut varied from 8% to 28.3%. The tender arecanut chips show maximum resistance to infestation by insects. The important insect pests recorded are:

1. Arecanut beetle (*Cocotrypes carpophagus* Horn) (Coleoptera: Scolytidae)

This is the most important storage pest of arecanut. The damage is maximum even upto 100% during November. The Damage is mainly caused by adult beetles which bore into the nuts and feed on the inner contents. The infested nuts show holes of 0.6-1.0 mm in diameter.

2. Coffee bean weevil (*Araecerus fasciculatus* D.) (Coleoptera: Anthribidae)

Both adults and grubs have been reported to damage stored arecanut. Infested nuts show holes 1.5-2.5 mm in diameter. Unhusked nuts with intact perianth are not infested by this insect even after one year of storage.

3. Cigarette beetle (*Lasioderma serricorne* F.) (Coleoptera: Anobiidae)

This is a widely distributed storage pest infesting stored arecanuts throughout the year. Both the adult and grubs damage the nuts and make them as powder.

4. Rice moth (*Corcyra cephalonica* stainton) (Lepidoptera: Galleriidae)

The caterpillars of this moth construct galleries of silk and frass over stored nuts, remain within and feed on them.

CASHEW:

Processed cashew kernels during storage are damaged by some insect pests. About 20 species of beetles, five species of caterpillars and mites are reported to be infesting cashew nut kernels in storage. Among these, many species contaminate the kernels with their presence and excreta. The important storage pests are:

1. The Ham beetle (*Necrobia rufipes* De Geer) (Coleoptera: Cleridae)

The adult beetles are about 5 mm long and greenish blue. The larvae are 4 mm in length, slender and tapering towards the head, purplish in colour with short hairs on the body. In addition to cashew kernel they feed on fish, hides and copra.

2. The cadella (*Tenebroides mauritanicus* Linn.) (Coleoptera: Ostomidae)

The adults are dark brown to black in colour and about 12 mm in length. The larvae are white in colour with black head and measure about 15 mm in length when fully grown. Two prominent black horns are present on the terminal abdominal segment. Grubs and adults feed on all sorts of stored products particularly dried fruits.

3. Saw toothed grain beetle (*Oryzaephilus surinamensis* Linn.) (Coleoptera : Silvanidae)

The adults are flat bodied, dark brown in colour measuring about 2 mm in length. They resemble the head-louse because of the presence of 6 tooth-like projections on each side of the thorax. The larvae are whitish, elongate and about 3 mm in length. The head is brown and the abdomen tapers towards the tip. The insects feed on variety of food materials like grains, dried fruits, seeds and nuts.

4. Red grain beetle (*Tribolium castaneum* Herbst) (Coleoptera: Tenebrionidae)

The adults are actively moving insects with flat, elongate, reddish brown body. They are about 3 mm in length and their antenna terminates in a club. The larvae are brownish-white flattened and measure about 4 mm in length. *T. Castaneum* is mainly a pest of milled and processed articles and it attacks oilcakes, dried fruits, nuts etc.

5. Fig moth (*Cadra cautella* walker) (Lepidoptera: Pycitidae)

The adult moths have a wing expansion of about 2-5 cm, greyish in colour with transverse stripes on fore wings. The larvae are about 1.5 cm long and spin webs among food particles. This insect is a serious pest of harvested figs and attacks dried fruits such as dates, almonds, walnuts, tamarind etc.

6. Indian meal moth (*Plodia interpunctella* Hubner) (Lepidoptera: Phycitidae)

The adults have a wing expansion of about 1.8 cm. The base of the forewings is greyish-white and the distal portion is reddish-brown. The larvae are about 1.5 cm in length, whitish with pinkish tinges. The

larvae feed on whole grains, milled products and fruits.

7. Rice moth (*Corcyra cephalonica* stainton) (Lepidoptera: Pyralidae)

The moths are dull-coloured with pale greyish-brown markings on the wings. The wings when expanded is about 1.8 cm. The larvae are dirty-white with yellowish head and measure about 1.5 cm in length. They live inside webs made of silk and broken grains.

COCOA

Cocoa beans are damaged in godowns by several insect pests. The important pests are: 1. *Cadra cautella* walks (Lepidoptera: Phycitidae) 2. *Necrobis rufipes* De Geer (Coleoptera : Cleridae) 3. *Abasverus advena* waltl (Coleoptera : Silvanidae) 4. *Carpophilus diminiatus* Fab (Coleoptera: Nitidulidae)

SPICES

Several species of insect pests damage different spices in godowns and cause severe economic losses. The important pests are:

1. *Necrobis rufipes* De Geer (Coleoptera: Cleridae)

Damages Nutmeg

2. *Oryzaephilus surinamensis* Linn. (Coleoptera: Tenebrionidae)

This insect is primarily a pest of oilseeds, spices and dried fruits.

3. *Abasverus advena* Waltl. (Coleoptera : Silvanidae)

Damages ginger and nutmeg.

4. *Carpophilus diminiatus* Fab. (Coleoptera: Nitidulidae)

Damages ginger and nutmeg

5. *Aspidiotus hartii* Green (Hemiptera: Diaspididae)

It is an important pest of ginger and turmeric both in the field and during storage.

Management: Management of stored product pests of plantation crops involves both preventive and curative measures.

Preventive measures:

1. Cleaning of godowns / store rooms

Clean the floor, corner and roof of the godown. The dust and debris (containing egg, pupae, dead larvae and adult stages of insect) collected should be burnt.

2. Plastering of cracks and crevices in the store rooms

The cracks and crevices developed in the store house walls may harbour storage pests, hence they should be plastered before storing

3. Cleaning and drying of the stored products

The materials to be stored should be cleaned and dried in the sun to reduce the moisture content, failing which will lead to development of mould giving rise to disagreeable odour and color. This mould also attracts the pest developing on copra. The partial decomposition and increased acidity of the mouldy copra coupled with insect infestation further deteriorate their value through their moulted skin and excreta. Hence uniform drying of the copra is necessary to reduce the moisture content to or below the specified level.

4. Cleaning and disinfecting the storage structures

Gunny bags previously used for storing

other commodities should be steamed to ensure disinfection.

5. Provide dunnage

The storage bags or bins can be piled over the dunnage made by bamboo poles, mats or wooden crates to make them damp proof.

6. Proper stacking of storage structures

The storage bags should be piled up neatly and systematically. Proper space should be left between the piles and walls to increase the ventilation and to facilitate periodical inspection and cleaning.

7. Provide plinth structures around the store house to prevent the entry of rodents.

8. The ventilators should be covered with wire mesh to prevent the entry of avians and reptiles.

Curative measures:

1. Periodical inspection of the stocks and if any insects noticed they should be removed and the stock should be sundried and cleaned.
2. Spraying malathion 25% dispersable powder @450 g in 5 l of water per 100 m² at monthly intervals to disinfect the storage sheds and to ensure the insect population maintained at harmless level.
3. Fumigation: Use of aluminium phosphide tablets @1 tablet / tonne with an exposure period of six hours to control the major pests. The tablets are placed between the sacks and the entire sacks covered with rubber sheets and plastered with mud along the edges to make it air tight. Methyl bromide is used at 2.5-3 kg/100 cu.m. The exposure period is 48 hrs.

Ethylene di bromide (EDB) has been developed in the form of tablets under the trade name mini fume by CFTRI, Mysore and it can be used @ one tablet per quintal. However fumigation should be done with care for those commodities with higher oil content. If they are fumigated, longer waiting period should be allowed before using. The fumigated store should be kept opened for sufficient time before entering in.

REFERENCES

Jacob SA (1980). Biology and bionomics of ginger and turmeric scale, *Aspidiotus hartii* Grean - Proceedings of the National Seminar on Ginger and Turmeric, April 1980. pp. 131-132.

Nair MRGK (1980). Pests of Ginger and Trumeric - Proceedings of National Seminar on Ginger and Turmeric. pp. 101-103.

Nalinakumari T et al. (1992). Occurance and nature of damage caused by pests of stored copra in Kerala. *Indian Coconut J.* 23: 7-9.

Radhakrishnan Nair CP and Mariamma Daniel (1982). Pests causing major crop loss - storage pests. *The Arecanut Palm.* pp. 174-177.

Rai PS (1984). Hand book on cashew pests. pp. 76-80.

Russell DC (1969). Agricultural seminars Bulletin no. 6, Cashewnut processing. pp. 67-69.

Vasantharaj David B and Kumaraswamy (1975). Elements of Economic Entomology. pp. 163-167.