

# Pests and diseases of JACKFRUIT in India and their control

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JACKFRUIT, *Artocarpus heterophyllus* LAM. is native of India and is also grown in Bangladesh, Burma, Srilanka, Malaysia, Indonesia, Philippines, Brazil, etc. In India, the estimated area under this fruit is 26.000 hectares. Of this about 8.500 hectares are in Assam State, 6.200 hectares in Tripura, 4.500 hectares in Bihar and 2.200 hectares in Kerla. In spite of so much area jackfruit is seldom grown in regular plantations or orchards. It is mostly in back yards and compounds or as in South India, along the western coast, it is in mixed plantation of arecanut and coconut. The trees flourish in humid climate specially on hill slopes and are sensitive to cold, frost or drought. As such these trees are grown from sea level to about 1.500 metres elevation in the south and at the foothills of the Himalayas in the north (HAYES, 1966).

Like any other crop jackfruit trees too sustain some loss due to ravages of insect pests and diseases. The insect pests of major importance in India, include, shoot borer, bark borers, bud weevil, spittle bugs and mealy bugs while those of minor importance are, leaf-webbers, scale insects, aphids, longicorn beetles, thrips, whiteflies, etc. (appendix I). Among the diseases, mention may be made of pink disease, fruit rot bud, blossom or flower rot and leaf spots.

## SHOOT BORER, *Diaphania caesalis* (WALKER)

FLETCHER (1914) reported *Glyphodes caesalis* WALKER (1859) as a pest of jackfruit in Karnataka and Maharashtra States. Subsequently, the species was transferred to genus *Margaronia*, then to *Palpita* and finally WANG (1963) placed it under *Diaphania*. CHOWDHURY and MAJID (1954) recorded it as a major pest in Assam state. Besides, it is also found in Bihar, Uttar Pradesh, Andhra Pradesh and Tamil Nadu states of India. ALAM

*et al* (1964) recorded this borer as a minor pest of jackfruit in Bangladesh.

The pest is active from May to October. Eggs are laid on tender shoots and buds. On hatching the caterpillars bore into tender shoots, flowering buds and developing fruits and tunnel through the same. As a result of tunnelling the shoots wilt, buds dry and drop down while the fruits start rotting. Pupation takes place inside the tunnels.

The caterpillars have yellowish head and prothorax and reddish brown body with numerous black flattened horny warts each bearing one short bristle like hair. Pupae are reddish brown. Adults are whitish brown moths with greyish elliptical patterns on wings. Wing expanse 34-36 mm.

As the pest feeds on internal tissues, removing the affected portions and covering the fruits with alkathine bags gives adequate protection (MADHAVA RAO, 1975). In the initial stage of attack, destroy affected shoots buds and fruits and spray with 0.03 % endosulfan or 0.1 % carbaryl. ALAM (1962) recommended spraying with 0.03 % phosphamidon or 0.2 % BHC or DDT.

## BARK BORERS

*Inderbela* (ARBELA), *tetraonis* (MOORE), *Batocera* (CERAMBYX), *rufomaculata* (DE GEER), *B. rubus* (LINNAEUS), *Glenia belli* G. *Epepeotes luscus* FABRICIUS, *Sthenias grisator* FRABRICIUS, *Apriona germari* HOPE and *Platypus indicus* STIERLN have been recorded boring into the trunk, main stems and branches of jackfruit trees in India. Of these, first two are comparatively more destructive and widely distributed all over India. Most of these are polyphagous having a wide range of host plants. Their attack is more pronounced in those trees where the surroundings are not kept clean or the trees are not well looked after.

*I. tetraonis* has been recorded damaging ber (*Zizyphus* spp.), citrus, falsa (*Grewia asiatica*), guava, jackfruit, jamun

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(*Syzygium cuminii*), litchi, mango, etc. Eggs are laid in batches under loose bark of the trees. On hatching, the young larvae nibble the trunk or main stem for couple of days and then bore inside the same, making a short tunnel downwards. The excreta and fine chewed wooden particles are thrown out which are seen conspicuously lying over the holes on trunks and main branches in webby mass. Caterpillars are dirty brown in colour while the moths are light grey with brown and black dots on forewings. Egg and pupal periods occupy 8-10 and 15-25 days respectively and the caterpillars live for 10-11 months - thus having only one generation in a year.

*B. rufomaculata* is widely distributed in oriental region and besides jackfruit, it also attacks apple, fig, mango, mulberry, etc. The female lays about 200 eggs, placed one by one in incisions cut in the bark with her mandibles. On hatching the grubs tunnel into the main stem or trunk and feed on meristem and then penetrate deeper inside; the excavations made in the early stage of infestation are extensive, irregular and deep in sapwood. In case of severe infestation translocation of cell sap is interrupted, affecting adversely the growth and fruiting capacity of the trees; often the bark may also split open exposing the inner tunnels. Adult beetles are nocturnal in habit and feed by gnawing the bark of living twigs. Eggs are brownish white in colour, cylindrical in shape (6 × 2 mm) with narrowly rounded ends. Full grown grubs are 75-85 mm long and yellowish ivory in colour. Pupae are yellowish - brown to dark brown and measure 53 × 20 mm. Pupal chamber is 50-75 mm cavity in which the full fed grub rest during winter and pupate in March. Adult beetles are stout, dark brownish grey with yellowish grey spots on elytra; prothorax has 2 large kidney shaped ornage spots and a pair of short thick spine like projections. On an average these are 50-55 mm long; females being longer than males. Egg, grub, pupal and adult stages occupy 1-2, 12-20, 2-6 and 9-14 weeks respectively.

*E. luscus* has been reported as a minor pest of jackfruit and mango (NAIR, 1975). BEESON (1941) reported this pest from India on various forest trees including *Ficus* spp. The adult beetles are 17 to 27 mm long, reddish brown with vague grey markings and two black shoulder spots on elytra. It has three generations a year; shortest life cycle being 2 1/2 to 3 months and prolonged one 8-10 months. Females live for over 4 months and lay as many as 1,400 eggs (BEESON, 1941).

*S. grisator* are commonly known as girdler beetles as these girdle the stems, often killing the same. Its main host is grapevine (BUTANI, 1974). SANJEEVA RAJ (1959) studied its bionomics and observed egg period to last for 8 days and grub for 7 months, with only one generation a year.

*A. germari* is a main of forest trees (BEESON, 1941). Adult beetles are about 50 mm long, yellowish grey with elytral sutures and margins bluish grey. These appear during March to October and feed on bark of living shoots; the affected shoots are girdled and later die away.

*P. indicus* is also a main pest of forest trees (BEESON, 1941) that has been reported as minor pest of jackfruit trees (NAIR, 1975). These are very small beetles (3.5 to 4.0 mm long) and have a very peculiar habit of boring into the bark or wood. The main and branch tunnels curve sinuously through the soft wood in a horizontal plane and the pupal chambers are offset vertically on both sides, spaced slightly apart.

To control these borers, clean the affected portion of trunk or main stem and insert into the holes swab of cotton wool soaked in a good fumigant like, chloroform, carbon bisulphide, petrol, etc. PATEL *et al* (1964) found even kerosene oil to be effective whereas SRIVASTAVA (1964) suggested using a mixture of ethyl glycol and kerosene (3 : 1). Soon after inserting the fumigant, seal the holes with mud. Such of the holes as may reopen, need be retreated. For minor pests, specially *S. grisator* and *A. germari* hand collection and mechanical destruction of the beetles is also helpful.

#### BUD WEEVIL, *Ochyromera artocarpi* MARSHALL

This is an specific pest of jackfruit, found all over India and has been recorded as a major pest from Assam and western coast of Karnataka state. The small whitish grubs bore into tender buds and fruits, as a result the affected buds and fruits fall down prematurely. Adults are greyish brown weevils found feeding on leaves.

NAIR (1975) also reported two more cuculionid weevils, namely, *Onychocnemis careyae* MARSHALL and *Teluropus ballardi* MARSHALL feeding on the leaves.

To control, CHOWDHURY and MAJID (1954) suggested destruction of affected shoots, infested buds and fallen buds and fruits coupled with mechanical collection and killing of grubs and adults. Chemical control suggested for shoot borer will be effective against these weevils as well.

#### SPITTLE BUGS

*Cosmoscarta relata* Distant is a serious pest of jackfruit trees, specially in south India (BEESON, 1941). These appear in swarms and feed on young shoots and leaves - the affected leaves often get curled. The nymphs are wingless, dark purple with yellowish head, pronotum and legs. These are found living inside common mass of froth generally on stalks and young shoots and ripening fruits. The frothy mass consists of the fluid voided from the anus and mucilaginous secretion from the epidermal glands. After the last moult the nymphs leave this frothy mass and become

adults. Adults are large sized (about 15 mm long) bugs with reddish head and pronotum and forewings with reddish markings on the tagmina. The bugs are very active and difficult to catch.

NAIR (1975) also reported two more spittle bugs, namely, *Clovia lineaticollis* MARSHALL and *Ptyelus* species from South India particularly Kerala state. These bugs are smaller than *C. relata*. Adults of *C. lineaticollis* are about 9 mm long, chestnut brown with yellowish stripes while those of *Ptyelus* species are 10-12 mm long and greyish in colour.

To control these bugs, collect the masses of froth and destroy mechanically the young nymphs therein.

### MEALY BUGS

*Nipaecoccus viridis* (NEWSTEAD) (= *N. vastator* MACKELL, *Pseudococcus corymbatus* GREEN) is a polyphagous pest recorded also on ber (*Zizyphus* spp.), citrus, fig, grapes, guava, mango, mulberry, tamarind, etc. It is found all over India. Peak period of activity is around November when clusters of these mealy bugs may be found on leaves and tender shoots of jackfruit trees, sucking the cell sap. Eggs are roundish cylindrical flattened at both ends, chestnut brown in colour and fully covered with fine cretaceous material forming the ovisac. Nymphs are deep chocolate in colour, having their dorsum covered thinly with a whitish mealy material. Adult females are dark castaneous covered completely with sticky cretaceous white ovisac. If removed from this ovisac, the females are seen covered with whitish mealy substance. Eggs are laid in ovisacs and the females die soon after egg-laying. Egg period is 7-10 days while nymphal development takes about 15 and 20 days in case of males and females respectively.

*Ferrisia (Ferrisiana) virgata* (COCKERELL) commonly known as white tailed mealy bug, is also polyphagous, having a vast range of host plants (ALI, 1962; NAYAR *et al.*, 1976); the fruit crops include, cashew nut, citrus, coconut, custard apple, guava and jackfruit. The mealy bug is pantropical in distribution (CIE map No. A-219) and is found all over India (ALI, 1968). It feeds on leaves and tender shoots and during dry weather it moves down and inhabit the roots. A prolonged period of drought may result in a severe outbreak of this pest. The peak period of activity is August to November, when the affected parts turn yellow wither and ultimately die away. Adult female, a distinctive mealy bug, is apterous, 4.0 to 4.5 mm long with a pair of conspicuous longitudinal sub-median dark stripes, long glossy wax threads all round and two long prominent waxy filaments at the posterior end. Reproduction is both sexual as well as parthenogenetical. A female lays 200 to 400 eggs. These hatch in 3-4 hours. Male and female nymphs take 31-57 and 26-47 days respectively. Longevity of males is 1-3 days and that of females 36-53 days (NAYAR

*et al.*, 1976); entire life cycle occupy 3 1/2 to 8 weeks.

To control these mealybugs, spraying may be done with 0.05% dichlorvos (DDVP), fenitrothion or carbophenothion. This spraying will also check the infestation of scale insects.

### LEAF WEBBERS

Leaf webbers or leaf eating caterpillars are sporadic pests usually of minor importance. The species commonly found damaging jackfruit trees in India, include, *Perina nuda* FABRICIUS and *Diaphania bivittalis* (GUEENE). The caterpillars, roll, fold or web together the leaves and feed within. Both the species are polyphagous.

*P. nuda*, besides jackfruit, has also been recorded on fig and mango trees. Its eggs are light pink when freshly laid, turning red and later brick red. These are 0.7 mm long, cylindrically round tapering towards the end attached to leaf. Eggs are laid in clusters or rows, on leaves. A single female lays 50-400 eggs. Full grown caterpillars are 22-25 mm long, having short erect tufts of dusky grey to brownish hairs. Pupae are hairy and brightly coloured (brownish green) dorsally and pale yellowish ventrally. Male and female pupae are respectively 16 and 18 mm long. There exists extreme sexual dimorphism in the moths. Male is smaller than female and its forewings are half ochreous (near the base) and half transparent while those of females are dull ochreous white. Wing expanse of males and females is 33-36 and 38-42 mm respectively. According to CHERIAN and ISRAEL (1939) egg, larval and pupal periods are 4-6, 16-20 and 5-9 days respectively; adult longevity is 3-11 days and the total life cycle occupies 27-39 days.

MUTHUKRISHNAN *et al.* (1958) reported *D. bivittalis* causing considerable damage to foliage in Tamil Nadu. Caterpillars are olive brown with conspicuous white markings, about 30 mm long when full grown. These pupate within the leaf folds in thin white silken cocoons. Pupae are red and 20-24 mm long. Moths have head, thorax and abdomen chestnut brown above and white beneath and forewings also chestnut brown having two semihyaline white blotches with a small black spot between the two; hindwings hyaline with a broad chestnut marginal band having a black line at its inner edge. Males have a black anal tuft. The eggs hatch in 5-6 days, the larvae pupate after 14-16 days and the pupae become adults in 8-10 days (NAGARAJA RAO and SUBRAMANIAM, 1958).

To control these pests, hand picking and mechanical destruction of caterpillars in the initial stage of attack is suggested. In case of severe infestation, which is rather rare in case of jackfruit trees, dust 5-10% BHC or 4-5% carbaryl. Spraying with 0.1% BHC + 0.1% DDT or 0.1% carbaryl is also effective in checking the pest population.

### CASTOR CAPSULE BORER

*Dichocrocis punctiferalis* (GUENEE)

A major pest of castor that is often found feeding on fruits of citrus, ginger, guava, jackfruit, mango, mulberry, peach, pear, plum, pomegranate, tamarind, etc. It is a minor pest of jackfruits. Besides Indian sub-continent, the pest has been reported from Japan, Indonesia, Malaysia and Australasia. Reddish brown caterpillars bore inside the buds and young fruits and feed on pulp within; the bored holes are plugged with excreta. In case of severe infestation, excreta fall on the ground below and can be seen there in small heaps. Eggs are pink coloured, oval shaped, about 0.5 mm in diameter and have rough surface. Full grown caterpillars are 25-35 mm long, dark pinkish brown with spiny warts all over the abdomen. Moths are brownish yellow with number of black dots on all the wings. Egg, larval and pupal periods occupy 6-7, 12-16 and 7-10 days respectively. The pest completes its life-cycle in 4-5 weeks during summer and a little longer during winter.

To control, destroy the affected buds and fruits and spray as suggested for leaf webbers above.

### SCALE INSECTS

These include, fluted scale, *Icerya (Crossotoma) aegyptiaca* (DOUGLAS); mango giant bugs, *Drosicha (Monophlebus) stebbingi* (GREEN) and *D. mangiferae* (GREEN); armored or hard scales, *Hemiberlesia (Aspidiotus) lataniae* (SIGNORET), *Parlaspis (Webstriella) papillosa* (GREEN) and *Pinnapis (Chionaspis) aspidistrae* (SIGNORET) as also soft scales, *Ceroplastes rubens* MASKELL, *Chloropulvinaria (Pulvinaria) psidii* (MASKELL) and *Coccus (Lecanium) actuessimum* (GREEN). Except *P. papillosa* the rest are all polyphagous and *C. rubens* is of regular occurrence on jackfruit trees.

*C. rubens* commonly known as pink waxy scale is a major pest of *Citrus* spp., often found on fig, jackfruit, mango, pear, etc. HILL (1975) also mentions coffee and tea as its alternative host plants. The pest has limited distribution (CIE map No. A-118) and has been reported so far from East Africa, India, Sri Lanka, parts of China, Japan, Malaysia, Philippines, Solomon Isles, East Australia, Pacific Islands, Newzealand and Hawaii. This is not a major pest of jackfruit but being widely spread all over India, it is often found on good many jackfruit trees also. Colonies of these scales may be seen covering the shoots and fruit stalks and sucking the cell sap therefrom. These scales also excrete copious amount of honeydew which keeps dripping on leaves and fruits, attracting ants as also favouring the development of sooty mould. Adult females (males are rare) are convex in shape covered with a pink waxy shell (3-4 mm long) often with white vertical stripes. Life history is not known in detail - there is only one generation in a year.

Control measures are seldom warranted against scale insects on jackfruit trees. If and when need be, spray with 0.05% dichlorvos, fenitrothion or carbophenothion. Spraying with 0.05% diazinon, dimethoate or phosphamidon is also effective.

*D. mangiferae* and *D. stebbingi* have been often confused together. RAHMAN and LATIF (1943) and LATIF (1949) considered these to be synonymous, but ALI (1968) pointed out these to be distinct species. Apparently, both the species look alike and have same symptoms of damage and habits etc. The gravid females come down the trees and enter into the soil. The ovisacs are found in the soil 50-150 mm deep. On hatching nymphs climb up the trees and suck sap from succulent and tender leaves and twigs. There is only one generation a year.

Regular ploughing around the trees during summer and monsoon months exposes and destroys the eggs; soil application with 5% aldrin, chlordane or heptachlor dust 300-500 gm per trees, just before the winter sets in, checks the nymphal population and alkathine banding suggested by SRIVASTAVA and BUTANI (1972) will be effective in preventing the nymphs from climbing up the tree trunks. In case of severe infestation, spray 0.04% diazinon or monocrotophos which is quite effective in killing the young nymphs.

### APHIDS

Jackfruit aphid, *Greenidea artocarpi* (WESTWOOD) and black citrus aphid, *Toxoptera aurantii* (FONSCOLMBE) have been recorded feeding on jackfruit trees. While no other host of *G. artocarpi* is known, *T. aurantii* has been reported damaging citrus, litchi, cacao, coffee, tea, etc., *Citrus* spp. being the main host all over the world (CIE map No. A-131). Clusters of young and adults may be seen on tender shoots and leaves, sucking the cell sap and giving out honeydew. Due to this the entire tree is devitalized and the affected parts get distorted and covered with sooty mould. A dry spell of weather followed by rains results in severe infestation of aphids. DAVID (1956) reported *G. artocarpi* on during January-February to September-October. *G. artocarpi* is pale green while young ones of *T. aurantii* are dark brown and the adults shiny black. Cronicles of the former are long and hairy while those of the later are neither that long nor hairy. Reproduction is usually parthenogenetical and that's how the population always rises very rapidly.

To control these aphids, spray with 0.03% dimethoate, phosphamidon or monocrotophos. Normally couple of sprayings are quite sufficient to keep the pest under check.

### THRIP

*Pseudodendrothrips (Dendrothrips) dwivarna* (RAMAKRISHNA and MARGABANDHU, 1931). This is a bico-

lorous typically monophagous species infesting tender leaves of jackfruit (ANANTHAKRISHNAN, 1971). It is confined to Peninsular India and has been recorded from Karnataka, Kerala and Tamil Nadu states. Each affected leaf may have 15-20 adults and numerous eggs and nymphs (ANANTHAKRISHNAN, 1955). Concentrated feeding of nymphs and adults produces number of whitish spots/patches on leaves and the affected leaves ultimately fade and die away.

Eggs are elongated oval, slightly curved, measuring on an average  $210\mu \times 84\mu$ . Freshly hatched nymphs are minute (less than 0.5 mm) and pale yellow in colour. Full grown nymphs are 0.6-0.7 mm long, light orange yellow with dark grey antennae and pale grey legs. Adults are small (females 0.9-1.1 mm, males 0.6-0.7 mm), head and thorax reddish brown and abdomen yellow with heavily fringed wings. Females are always more in number; sex ration being 5 : 1 females : males.

To control thrips, spray 0.03% dimethoate, phosphamidon or monocrotophos.

#### OTHER MINOR PESTS

Whiteflies, *Aleurotrachelus caerulescens* SINGH and *Pealis schimae* TAKAHASHI have been recorded occasionally; their nymphs sucking sap from the leaves. Nymphs and adults of *Otinotus oneratus* WALKER have been recorded from Orissa state, feeding on foliage. NAIR (1975) reported lace-wing bug, *Stephanitis charieis* D. & M. infesting the leaves. Oriental fruit fly, *Dacus dorsalis* (HENDEL) lays its eggs on ripe fruits and on hatching the grubs feed inside the pulp (PRUTHI, 1969). FLETCHER (1917) recorded the flies, *Ptecticus rufus* and *P. australis* from rotten fruits lying on the ground. *Camptomyia artocarpi* NAYAR and *Rubsaamenia artocarpi* NAYAR, the saprophagous gall midges have also been recorded from decaying fruits (NAYAR *et al.*, 1976). None of these pests warrant any control as these are of rare occurrence and minor importance in case of jackfruit trees.

#### RED ANTS

*Oecophylla (Formica) smaragdina* (FABRICIUS)

These have been reported from various countries extending from Australia to Africa. The ants web and stitch together a few leaves usually at the top of the branches and build their nests in citrus, jackfruit, jamun, litchi, mango trees etc. The nests though not air tight are certainly water proof and the outer leaves also remain green since these are not detached from the stems. The ants being carnivorous are considered beneficial as they prey upon some flies, hoppers, moths, caterpillars, beetles, etc. These ants are active all the year round, though their activity slackens during monsoon months and get a flip on sunny days. These ants do not cause any direct injury or loss to the tree but indirectly substantial damage is caused by protecting scale insects and aphids from being preyed upon by

their parasites and predators and also carry the nymphs of aphids, mealybugs and scale insects from tree to tree, thus spreading the infestation of these harmful pests. Besides, being very ferocious, these ants are a nuisance to the persons who climb the trees and often get bitten by these ants. Eggs are whitish in colour and oval in shape. Larvae are white when freshly hatched and about 1.2 to 1.4 mm long while full grown ones are 9-11 mm long. Pupae too are pure white in colour while the adults are light orange red; the workers being about 10 mm long. DAVID (1961) has studied their bionomics. Egg, larval and pupal durations occupy 4-8, 10-17 and 5-7 days respectively.

To control these ants, it is recommended that their nests be removed and destroyed mechanically or the same should be sprayed to run off point with 0.1% BHC (BUTANI and TAHILIANI, 1974).

#### DISEASES

Fruit rot/bud or blossom rot caused by *Rhizopus artocarpi* is one of the serious diseases found all over India, wherever jackfruit is grown. The young buds and flowers, rot and drop down; wet rot appears on young fruits which later becomes dry and desiccated and finally the affected fruits also drop down pre-maturely. According to CHOWDHURY (1949) in Assam state 15-32% fruits are damaged by this disease. A temperature of 26-28 °C is most favourable for rapid growth of this fungus. Spraying with Bordeaux mixture triweekly during January to March (three sprayings) affords some relief (HAYES, 1966). Fortnightly spraying with aureofungin-solv. 40 ppm is also effective.

Pink disease caused by *Pellicularina salmonicolor* is another major malady of jackfruit trees in India. Young woody branches lose their leaves; start drying from top downwards and a pinkish colour coating develops on the bark. To control this disease, cut out affected parts, in case of main branches and trunk, scrap the affected portions and apply crude carbolic acid swab. Spraying tridemorph (Calixin-E.C.) a systemic fungicide also helps in checking this disease.

Leaf spot diseases are very common and one or the other is always found wherever jackfruits are grown. These are caused by *Colletotrichum lagenarium*, *Phosmopsis artocarpina*, *Septoria artocarpi*, etc. As a result speck like dots to large spreading spots (10-30 mm in diameter) appear on leaf lamina and/or petioles. These are usually brown to brownish red in colour. There may be 10-15 spots on a badly affected leaf and subsequently such leaves fall off. Prune badly affected foliage and branches and destroy the same. Fortnightly spraying with 0.2 to 0.3% copper fungicide (Dithane M-45, Zineb) is also effective in combating this disease.

VEVAI (1971) also reported grey blight (*Pestalotia elasticola*), charcoal rot (*Ustilana zonata*), collar rot (*Rosselina arcuata*) and rust (*Uredo artocarpi*). These diseases have been reported causing damage to jackfruit trees, but not in India.

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## APPENDIX I

## Insects recorded on Jackfruit trees in India

## HEMIPTERA

- Aleurodidae  
*Aleurotrachelus caeruleus* Singh  
*Pealius schimae* Takahashi
- Aphididae  
*Greenidia artocarp* (Westwood)  
*Toxoptera aurantii* (Westwood)
- Cercopidae  
*Cosmoscarta relata* Distant  
*Clovia lineaticollis* M  
*Ptyelus* species
- Margarodidae  
*Drosicha stebbingi* (Green)  
*D. mangiferae* (Green)  
*Icerya aegyptiaca* (Douglas)
- Pseudococcidae  
*Ferrisia virgata* (Cockerell)  
*Nipaeococcus viridis* (Newstead)
- Diaspididae  
*Hemiberlesia lataniae* (Signoret)  
*Parlaspis papillosa* (Green)  
*Pinnaspis aspidistrae* (Signoret)  
*Semelaspidus artocarp* (Green)
- Coccidae  
*Ceroplastes rubens* Maskell  
*Chloropulvinaria psidii* (Maskell)  
*Coccus acutissimus* (Green)
- Tingidae  
*Stephanitis charieis* D. & M.
- Membracidae  
*Otinotus oneratus* Walker
- THYSANOPTERA
- Thripidae  
*Pseudodendrothrips dwivarna* (Ramakrishna & Margabandhu)

## LEPIDOPTERA

- Metarbelidae  
*Inderbela tetraonis* (Moore)
- Pyraustidae  
*Diaphania caesalis* (Walker)  
*D. bivitalis* (Guenee)  
*Dichrocrosia punctiferalis* Green
- Lymantriidae  
*Perina nuda* Fabricius

## DIPTERA

- Cecidomyiidae  
*Camptomyia artocarp* Nayar  
*Rubsaamenia artocarp* Nayar
- Therevidae  
*Ptecticus rufus*  
*P. australis*
- Trypetidae  
*Dacus dorsalis* (Hendel)

## HYMENOPTERA

- Formicidae  
*Oecophylla smaragdina* (Fabricius)

## COLEOPTERA

- Cerambycidae  
*Batocera rubus* (Linnaeus)  
*B. rufomaculata* De Geer  
*Glenia belli* G  
*Epepeotes luscus* Fabricius  
*Sthenias grisator* Fabricius
- Lamiidae  
*Apriona germari* Hope
- Curculionidae  
*Ochyromera artocarp* Marshall  
*Onychocnemis careyae* Marshall  
*Teluropus ballardi* Marshall
- Scolytidae  
*Platypus indicus* Stierln

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