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*Scientific Monograph No. 16*

*The Imperial Council of Agricultural Research*

**OUR KNOWLEDGE OF THE INSECT AND MITE PESTS  
OF CITRUS IN INDIA AND THEIR CONTROL**

BY

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PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI  
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, CALCUTTA  
1945

Price Rs. 2-2 or 3s. 6d.

citrus in India with a view to the utilisation in the biological control of these pests.

#### *Dialeurodes citrifolii* (Morg.)

Morgen, *Spec. Bull. La. agric. exp. Sta.*, p. 70 (1893) (*Aleurodes citrifolii*)

*Distribution.* India, Florida and New Zealand.

In India it has so far been reported to occur in the following localities: the Punjab, Assam and United Provinces and Central Provinces.

This species is reported to be more common in the northern parts of Florida than in the south and is usually associated with other species of white-flies [Quayle, 1938]. It is popularly called Cloudy-winged white-fly and is often confused with the citrus whitefly.

*Food plants.* This species attacks all varieties of citrus in addition to several other plants like yam, *Ficus* spp. (in Florida) and tomatoes (in New Zealand) [Webb, 1914].

It is often a sporadic major pest but usually the damage is not very severe.

*Life-history.* The eggs are black with reticulations and usually laid on the tender parts of the shoot. The rate of development of this is somewhat slower than that of citrus whitefly by about a fortnight.

*Natural enemies.* The entomophagous fungus *Aschersonia citrina* (popularly called Yellow fungus) is known to attack this species.

*Control.* The most satisfactory methods of controlling this species consists in applying the spray treatment mentioned under the citrus white-fly.

#### *Dialeurodes elongata* Dozier

Dozier, *J. agric. Res.*, 36: 1001 (1928)

This species was described by Dozier from specimens found damaging citrus leaves at Lyallpur (Punjab) in 1906. It is effectively controlled by the application of fish-oil-resin-soap and kerosene oil emulsion sprays mentioned under citrus white-fly.

#### APHIDOIDEA

#### *Dorsalis pomi* (de Geer)

*Distribution.* This is well-known as the Green apple aphid in several countries like Africa, Australia, New Zealand, Tasmania, South America, West Indies and India. The original home of this species is supposed to have been in the holarctic region but has now been introduced into most other places.

*Food plants.* Citrus is one of the important food plants of this aphid. The damage done is, however, small. The other plants which it attacks are: apple, pear, *Crataegus*, *Mespilus*, *Chenomeles*, *Sorbus* spp., *Cydonia*, etc.

The aphids are mainly found on the leaves and tender branches of citrus. As a result of the attack the leaves become badly curled but not etiolated. Sometimes tender citrus fruits are also attacked, causing premature falling of the unripe fruits. In very severe cases of attack on shoot or leaf, the

ripening of the fruit is either slowed down or entirely prevented. In most cases the quality of the fruit is affected.

*Life-history.* Eggs are laid during winter on the growing shoot in enormous numbers. They are capable of withstanding the effects of severe colds. There is no alternation of plants in the different races of this aphid. Both the sexes are wingless.

*Control.* One of the effective ways of controlling this aphid is considered to be the application of winter-sprays on the eggs, before the citrus buds have opened. In very bad cases of attack cutting and burning of the twigs on which eggs are found is the only useful method. Further information about control of aphids on citrus is given under the next species.

#### *Dorsalis tavaresi* (Del Guercio)

*Distribution.* This species of aphid is widely distributed in India, South Africa and South-eastern Asia.

*Food plants.* The Black citrus aphid, as this species is popularly called, is an important, sporadic major pest of citrus in several parts of India and other places given above. It has not so far been found breeding on any other plant. The infestation takes place mainly on the leaves which, as a result, become very badly curled and deformed. Infested branches get stunted. The damage is usually most severe at the time of flowering in spring. Sometimes heavy damage is also caused during July-September.

*Life-history.* Not known.

*Control.* Spraying in winter reduces the damage in the following summer. Sprays against this species usually consist of lime-sulphur (1:100) with 8 oz. of 40 per cent nicotine sulphate and 8 oz. of 'Capex' spreader (in 100 gallons) were found to be the most suitable and effective in checking this aphid [Hall, 1930].

#### *Myzus persicae* (Sulzer)

*Distribution.* The Green peach aphid, as this species is popularly called, is a cosmopolitan species.

*Food plants.* It is known to be injurious to a very large number of wild and cultivated plants including citrus. The damage to citrus is usually insignificant, though occasionally the aphid is very destructive.

#### *Toxoptera aurantii* (Boyer de Fons.)

*Distribution.* This aphid is known to occur in the United States of America and India. In the latter

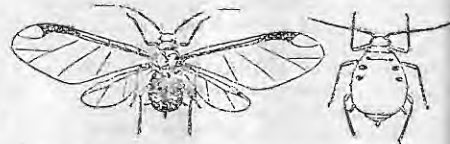


FIG. 7. *Toxoptera aurantii* (Boyer de Fons.) adult winged and wingless forms of the female

country it has been recorded from Bombay and Bihar only.

*Food plants.* The citrus aphid is an important major pest of citrus in India, Florida and California. It is not known to attack any other plant.

*Life-history.* Not known.

*Natural enemies.* According to Börner and Schilder [1932], Coccinellid and Syrphid predators and Chalcidoid and Braconid parasites take a very heavy toll of this aphid in several countries.

*Control.* Aphids on citrus are controlled in the United States by the application of sprays. Miller [1929] reported, for instance, that the Florida green citrus aphid is effectively controlled by application of derris extracts (1:800 and 1:1000), which kill off between 95 and 99 per cent of the aphids in 36 to 48 hours. Better results were obtained by him with nicotine-sulphate-soap spray (nicotine sulphate 1:800, soap  $\frac{1}{2}$  per cent). Nicotine sulphate-lime dusting ( $7\frac{1}{2}$ :100) was also found quite satisfactory against the aphids. Pyrethrum extracts (1:800) with 1 per cent soap solution caused equally high mortality of the aphid. According to the same worker, very poor results only were obtained by spraying lime-sulphur and fish-oil-resin-soap sprays. Fletcher [1917], however, recommended the application of fish-oil-soap sprays for this aphid in India. It is thus very desirable that detailed investigations should be made on the effectiveness of the various methods enumerated above in addition to testing the usefulness of numerous other insecticidal substances like *Tephrosia*. The control of aphids on citrus has indeed engaged the attention of workers only very little in this country.

#### PSYLLIDAE

#### *Diaphorina citri* Kuwayama

Kuwayama, *Trans. Sapporo Nat. Hist. Soc.* 2: 160 (1907)

*Distribution.* India, Burma, Malaya, Ceylon, China, Formosa, Japan, Tainon, Philippines and Java.

The Citrus psylla, as this species is commonly called, is very widely distributed throughout India.

*Food plants.* The citrus psylla attacks all species and varieties of citrus in addition to several other plants of the natural order Rutaceae, like *Murraya kænigi*, *Cordia cordata* and *C. cordifolia*. Hoffmann [1936] reported that it was found attacking *Clausenia lansium* in Kwantung Province in China.

The actual damage is caused by the nymphs. They move about actively on the plant and suck the sap from the tender parts on which they are often crowded together. The early stage nymphs usually feed on the sap from the buds, later on moving to the leaves and tender branches. As they suck the sap, they secrete a dewy fluid from their annal ends, sometimes in such enormous quantities that a tree appears entirely white. This secretion encourages the growth of a black sooty mould on the leaves. The symptoms of attack by the nymphs of the citrus psylla consists in the malformation of leaves which are badly curled, look sickly and fall off prematurely.

The tree suffers complete defoliation in extreme cases. Apart from the effects of defoliation and loss of sap, the nymphs also inject into the plant tissue some toxic substance at the time of sucking the sap. The effect of this toxic fluid is supposed to be the cause of the fruits being undersized, poor in juice and being insipid in taste. This also has the effect of causing the branches not directly attacked becoming prematurely dry.

The psylla is so very destructive in several parts of India that the citrus industry is often completely ruined. Husain and Nath [1927], and Pruthi and Batra [1938], for instance, believe the citrus psylla to be the most destructive of all insect pests of citrus in the Punjab and the North-West Frontier Province. According to the first two authors, the income of a citrus-grower in the Punjab was once reduced to one-tenth of his usual after a very severe attack by the psylla. It is perhaps not so destructive in other countries where it is so far known to occur.

*Life-history.* A detailed account of the life-history of the citrus psylla, including a description of the various immature stages, was published by Husain and Nath [1927]. Copulation usually takes place soon after emergence of the adults. Pre-oviposition period is thus very short and generally never exceeds 24 hours. If tender citrus branches are available, oviposition commences almost immediately after emergence.

The eggs are laid inside half-folded leaves of the buds, in leaf axils or other similar suitable places on the tender parts. Occasionally eggs are also laid on leaves and branches. They are anchored in the usual way by means of minute stalks thrust into the epidermis and the eggs thus fixed firmly and erect. A single female often lays as many as 800 eggs over a period of two months. Husain and Nath [1927] reported that the egg-laying is most active at Lyallpur during the months of March, April and May. The lowest number of eggs laid by one female was found to be 525 and the largest number 807. Pruthi and Batra [1938] found that egg-laying takes place most actively in the North-West Frontier Province during the months of March and April only. The incubation period of the eggs lasts from about 4-6 days in summer to 22 days in winter. The actual process of hatching occupies about twenty minutes.

The nymphs moult four times, there being five instars. Each instar lasts on the average for 3 days in summer and 5 days in winter; the first instar is usually a little more prolonged in winter and sometimes may extend to about 10-12 days. The total life-cycle is completed in about 15-47 days according to the season. The maximum duration of life of the adult is often 190 days. There are often as many as eight or nine generations in the year. No true hibernation has yet been observed in this species.

*Natural enemies.* The following Coccinellids are commonly predaceous on the citrus psylla in different parts of India: *Coccinella septempunctata*, *C. repanda*, *Chilocorus scutellata*, *Chilocorus nigrita* and *Brumus suturalis*. The larvae of a species of

*Chrysopa* also feed on the nymphs in large numbers. According to Husain and Nath [1927], nine different species of Chalcidoidea are parasitic on the nymphs in the Punjab. *Tetrastichus radiatus* Waterston, the only species mentioned by name, occurs practically all over India and is an important parasite of the citrus psylla. This parasite often destroys over 95 per cent of the psyllid nymphs. An account of the life-history of the parasite was published by Husain and Nath [1923].

**Control.** Psyllids on citrus are usually controlled in several parts of the United States of America by removal of the alternative food plants. At the beginning of the outbreak, if not too severe, 'on nursery or other young trees, pinching off infested shoots is of value'. Van der Merwe [1923] and Quayle [1938] consider spraying to be not profitable, because it does not kill the adults which are capable of flying away. Spraying is on the contrary effective against nymphs, if applied early enough.

In India, spraying of a contact poison at a time when the parasites are not very active, is considered effective against the citrus psylla. Tobacco decoction and resin compound, when sprayed on citrus, is reported to have successfully killed off the nymphs in the Punjab. Crude oil emulsion, though nearly as effective as the above, is considered to be somewhat costlier. Cultural methods calculated to increase the vigour of the plants are also extremely useful in warding off the damage.

#### PENTATOMIDAE

##### *Antestia cruciata* (Fabr.)

Fabricius, *Ent. Syst.*, p. 714 (1775) (*Cimex cruciatus*)

**Distribution.** This species is widely distributed all over India, especially in South India, Ceylon, Assam, Burma and Malaya.

**Food plants.** This is a well-known pest of coffee in India and Ceylon. The bugs attack coffee berries and suck the juices. Occasionally they suck the sap from the tender branches of citrus also in several parts of South India [Ramakrishna, 1932].

##### *Cappea taprebanica* (Dall.)

Dallas, *List of the specimens of Hemiptera Ins. coll. Br. Mus.* 1 : 244 (1851) (*Pentatoma taprebanica*)

**Distribution.** India, Ceylon, Java and Sumatra. In India it is widely distributed and has been reported from North Khasi Hills, Malabar, Conoor, Shevroys and Bababudin Hills.

**Food plant.** Orange, on which it is a minor pest, is the only food plants so far known to be attacked by this bug. The nymphs and adults are often found very much crowded on the bark of trunk.

**Life-history.** Not known.

**Control.** There is no definite record of any successful method of controlling this bug on citrus. Brushing off with the help of a broom and killing the bugs by immersing in a pan of kerosinated water

appears to be the most convenient way of dealing with the pest in citrus orchards.

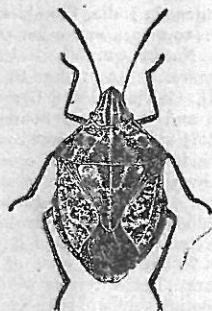


FIG. 8. *Cappea taprebanica* (Dall.)

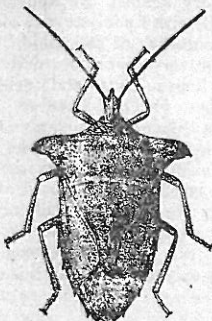


FIG. 9. *Rhynchosoris humeralis* (Thunb.)

##### *Chrysochoris grandis* (Thunb.)

Thunberg, *Nov. Ins. Sp. descr.*, 2 : 31 (1783) (*Cimex grandis*)

**Distribution.** India, China and Japan. In India it is so far known only from Assam and Burma.

**Food plants.** The nymphs and adults of this pentatomid bug are sporadic minor pests of citrus in Burma and Assam. In addition, it is also reported to attack the oil palm, *Aleurites cordata*, in Japan [Takahashi, 1918].

**Life-history.** Not known in detail. There appear to be two generations in the year. Adults hibernate during winter and lay eggs in July on the lower surface of leaves. The nymphs at first suck the sap from the leaves but later on attack the buds also. The second generation nymphs attack the fruits and cause very heavy damage by their premature fall.

**Control.** As suggested for the foregoing species.

##### *Nezara viridula* (Linnæus)

Linnæus, *Syst. Nat.*, 1 : 444 (1758) (*Cimex viridula*)

**Distribution.** India, Ceylon, Burma, Australia, Europe, America, Africa and other places.

It is very common throughout India.

**Food plants.** The chief food plants of the Pumpkin bug, as this species is popularly called, are cowpeas, cucurbits, coriander, *Hibiscus sabdariffa*, cotton, cacao, potato, tomato, tobacco, maize, rice, wheat, etc. When any of these are grown near citrus orchards, the bugs attack the citrus plants, especially the unripe fruits. The spots on the fruits attacked by them turn brownish or even black and the fruits taste bitter. The injury is both direct through loss of sap and indirect through bacterial and fungal attack following that of the bugs. Some toxic substance is also believed to be injected along with the saliva at the time of the bug sucking the juice of the fruits. It is altogether a sporadic major pest in some parts of India.

**Life-history.** Eggs are laid in masses of about 40 each on the lower surface of the leaves of the food plants. Oviposition usually takes place between February and April. The incubation period of the eggs varies between 4.5 and 7 days according to season. The nymphal stage lasts for about a month, during which period five moults take place. There are generally four or five extremely over-lapping generations in the year. The nymphs and adults of the later generations alone are generally destructive to citrus plants in India. The bugs decrease in numbers during the heat of the summer months, but again increase with the onset of rains.

**Natural enemies.** The adult bugs are heavily parasitised by *Sarcophaga sternodontis* and *Trichopoda pennipes*. The adults of the pentatomid bug, *Euthyrhynchus floridanus*, are reported to suck the blood of this pentatomid and thus kill a good number of in some parts of America. *Habrolepis submetallica* How. is an important parasite of the eggs of the pumpkin bug in America. In India, *Telenomus* sp. and *Microphanurus* sp. parasitise the eggs in considerable numbers. According to Silvestri [1938], the Reduviid *Sicanus collaris* is an important predator on this bug in Indo-Malaysia.

**Control.** Removing the alternative food plant from the neighbourhood of citrus plants is one of the effective ways of preventing attack. Cowpeas and such other cover crops grown in citrus orchards should not be allowed to become too mature, when the bugs leave them for the citrus plants. In India, *Gynandropsis pentaphylla*, a common weed, often growing profusely in all areas, attracts the bugs in large numbers; care should be taken to eradicate this weed from the neighbourhood of citrus plants.

The most satisfactory method of dealing with an attack of citrus by the bugs appears to be that of brushing them off into pans of kerosinated water. In very bad cases, when valuable nursery stocks are threatened, spraying with nicotine-sulphate-soap compound will be found extremely beneficial.

##### *Rhynchosoris humeralis* (Thunberg)

Thunberg, *Nov. Ins. Spec. Descr.*, 2 : 40 (1783) (*Cimex humeralis*)

**Distribution.** This species occurs mainly in India, Burma and China; it is also reported to be found in

Siam. In India, it is, so far as is known at present, confined to the east, namely to parts of Assam, Buxar Duars, Kumaon and other places in the eastern Himalayas.

**Food plant.** This pentatomid bug is a very important major pest of oranges in Assam, Siam and China. Enormous numbers of nymphs and adult bugs crowd together and suck the juice from the developing fruits, and thus bring about their premature fall. Half-ripe fruits appear to be specially relished by the bugs. The damage is sometimes so great that hardly a single fruit ripens properly, if it does not prematurely fall. The place where the bugs apply their proboscis for sucking turns out to be a seat of bacterial and fungal infection which often rapidly spreads even down to the fruit stalk and later still to the entire branch.

**Life-history.** Eggs are usually laid between May and September, in two or three batches of 14 to 15 eggs each batch, on the upper surface of the leaves. They hatch in about a week's time. The early stage nymphs crowd together but later on scatter about on the plants. The nymphs reach maturity after feeding for a month. Winter is usually passed in the adult stage. The number of generations in the year is not definitely known in India; only one generation was observed in China [Luh Nien-tsin, 1936].

**Natural enemies.** Hoffmann [1928] recorded that mantids destroy large number of adults and nymphs of this bug. The eggs are also parasitised by unidentified species of Hymenoptera.

**Control.** This pentatomid bug is reported to be successfully controlled in China [Luh Nien-tsin, 1936] by the use of hand-nets and by the utilization of egg parasites. Shaking the bugs or brushing them off into kerosinated water will also be satisfactory against them. In very severe cases of attack on valuable and rare varieties, spraying with tobacco decoction is the most suitable method of saving the fruits. In Assam, according to Gupta [1920], a very interesting treatment against the attack of citrus by these bugs consists in dipping sticks in the milky latex juice of the jak tree and touching the bugs with these. The bugs are said to be readily killed off as a result of this treatment.

##### *Vitellus orientalis* Distant

Distant, *Trans. ent. Soc.*, p. 172 (1900)

**Distribution.** This bug occurs in South India.

**Food plants.** According to Ramakrishna [1920], this bug punctures the fruits of orange. The effect of puncturing appears to hasten rotting and also attraction for fungi.

#### COREIDAE

##### *Leptoglossus membranaceus* (Fabr.)

Fabricius, *Spec.*, 2 : 351 (1781) (*Cimex membranaceus*)

**Distribution.** This bug is widely distributed in tropical and South Africa, Seychelles Islands, Ceylon, South India, Assam, Andaman and Nicobar

damage is often very heavy, the skin of the attacked fruit becoming cracked, or turning grayish or silvery.

*Life-history.* Not known.

*Natural enemies.* A number of predaceous insects cause considerable mortality to this and other citrus thrips in India and abroad. Coccinellids are perhaps the most important of these predators. A few Chalcidoid parasites are also known.

*Control.* Thrips on citrus are easily controlled by spraying citrus trees with nicotine sulphate and soap compound. Pyrethrum sprays are reported to be relatively more effective than nicotine sprays [Quayle, 1938]. Lime-sulphur spray is recorded as a satisfactory method of control for thrips attacking citrus in California, Rhodesia and South Africa [Hall, 1930]. Dusting of sulphur has also been reported to be quite satisfactory in several localities [Hall, 1930; McGregor, 1929]. One pound of sulphur is usually considered sufficient for an average-sized tree and the dust is generally applied about March. In April or May next another application, about three-fourths of a pound, completely controls the thrips. The lime-sulphur spray for citrus thrips should consist of a strength of about 1½–2 per cent, with or without the addition of about ¼ lb. of calcium caseinate to 100 gallons of the spray. In Rhodesia the lime-sulphur spray is generally used at 1 per cent strength.

*Remarks.* Several other species of thrips are quite common on citrus all over India but practically nothing is known about the extent of damage, their habits and life-history. *Thrips nilgiriensis* Ramakr., *Th. pandu* Ramakr. and *Th. subnudula* Karny are some of the thrips which are minor pests of oranges in several parts of South India. In California another species, viz. *Scirtothrips citri* (Moulton) is considered to be the most destructive of all thrips to citrus. It scars lemons, limes and oranges very badly and nearly 80 per cent of the fruits are thus spoiled. *S. aurantii* (Faure) is another species reported as destructive to oranges in South Africa where it attacks the young fruits and foliage. *Hercotrips fasciatus* (Perg.) is one of the other thrips attacking citrus in California.

#### HYMENOPTERA

The Hymenoptera are not among the major pests of citrus in any part of the world. One or two species may be considered to be sporadically minor pests in some parts of India. They are for instance *Vespa orientalis* Linn., *Polistes hebraeus* (Fabr.) and the ant *Oecophylla smaragdina*. The former two species are often attracted to the punctures made by fruit-piercing moths on oranges and suck the sweet juices. *O. smaragdina* sometimes constructs its nests in the leaves of citrus and fiercely attacks anyone approaching the trees.

#### ACARINA

##### *Paratetranychus citri* McGregor

McGregor, *Ann. ent. Soc. Amer.*, 9 : 284 (1916)

*Distribution.* This mite is widely distributed in the United States of America, especially in Florida

and California. It is also known to occur in Ceylon and several parts of South India. According to Rutherford [1914], it is a very destructive pest of citrus in Ceylon.

*Food plants.* These mites attack the leaves, tender fruits and green bark of limes, lemons, oranges, grape-fruit and pomelo. As a result of the attack the parts do not develop properly and fall off prematurely. In extreme cases of attack complete defoliation of citrus bushes often results. The fruits are usually very undersized.

*Life-history.* The female lays about 50 eggs which incubate for about a week in summer and for



FIG. 22. *Paratetranychus citri* McGregor

four weeks in winter. Soon after hatching, the first instar larva has only three pairs of legs and moults three or four days later. The protonymphal stage lasts for another three or four days; this stage has four pairs of legs. The deutonymphal stage likewise lasts for another four or five days, at the end of which period the third and the last moulting gives rise to the adult mite. The adult mite lives for about five days or more. Pre-oviposition period extends to about two days.

There are usually several overlapping generations in the early spring and breeding continues right up to the onset of the winter cold. The mites are, however, most abundant in March-April. The damage is usually most severe about this time.

*Natural enemies.* A large number of natural enemies of mites are known in India: Chrysopids, Thrips, Coccinellids, Itonidids (gall-midges), and Hymenopterous parasites destroy very large numbers of mites. *Arthrocnodax* sp., *Chrysopa* sp. and *Hemerobius* sp. have so far been observed to be predaceous on this and other species of mites in India.

*Control.* Mites attacking citrus plants are generally very easily controlled by applications of sulphur dust. Sometimes lime-sulphur sprays are also used with very fairly satisfactory results. It is, however, reported that in California the application of lime-sulphur spray has not always met with complete success. Sprays containing some of the heavier types of mineral oils, generally used against scale insects, were found very useful against mites also. This on the contrary brought about very bad scorching of the trees on account of the season

when mites are mostly active. Therefore, other methods such as application of dinitro-ortho-cyclohexylphenol as dusts came into use with great success [Boyce and Prendergast, 1936]. It is reported that as a result of the application of this dust even an appreciable percentage of the eggs of mites were killed off. On account of their peculiar tracheal system, fumigation with cyanogen does not usually have any satisfactory effect on mites.

*Remarks.* Mites are among the most destructive of the citrus pests in several parts of the world. Dozens of species are known to attack various varieties of citrus. *Phyllocoptes oleivorus* (Ashm.), for instance, is reported to be the most destructive of all mites attacking citrus in the United States of America. It is said to be native of Asia and though there is no definite record of it from India so far, it is very likely to be found attacking citrus in this country also. In the United States alone it is reported to destroy over 75 per cent of fruits.

There are several species of *Paratetranychus* attacking citrus in India: many of these have yet to be specifically identified. The life-history and habits of all have also to be studied. *P. bioculatus* Wood-Mason is one of these species which attacks, in addition to citrus, tea, coffee, tomato, etc. in Ceylon, Assam, Java and several other localities. Misra recorded his species on several important crops like jute, cotton, castor, apple, mulberry, indigo, etc. Of the other species of mites known to attack citrus in India the most important are: *Tetranychus sexmaculatus* Riley, *Tetranychus (Epi-tetranychus) altheae* Hanst. (= *T. telarius* partim), *T. (E.) latus* C. & F., *Tenuipalpus obovatus* Donn, *Tarsonemus transulescens* Green and *Tetranychus hindustanicus* Hirst [Cherian, 1933].

The attack by *Tetranychus sexmaculatus* differs from that of all the other species of mites in that the feeding of this mite is confined to definite areas on the underside of the leaves along the mid-rib or some of the larger veins. A characteristic depression of the leaf is formed, in which colonies of mites are found. This depression is pale yellow and is usually covered with webbing. On the other side of the leaf a raised, pustule-like swelling is easily seen.

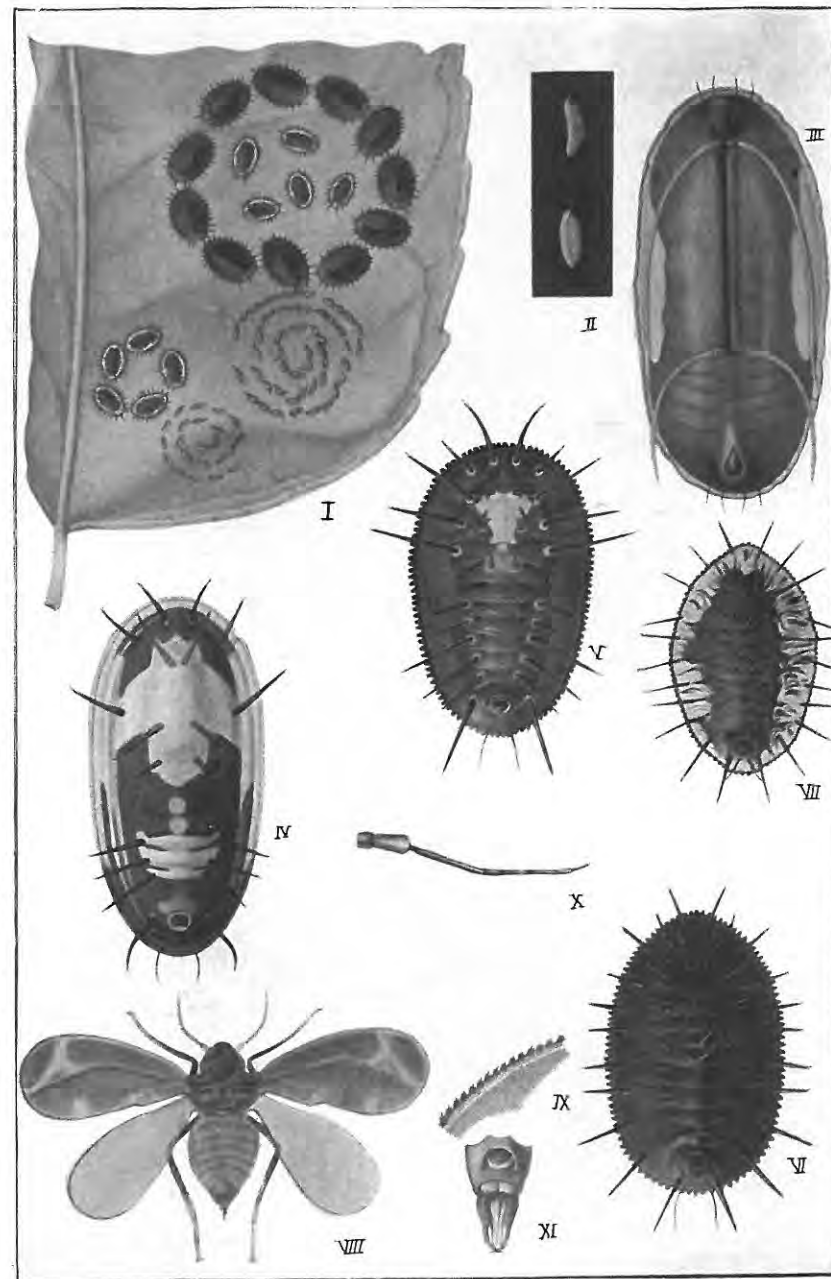
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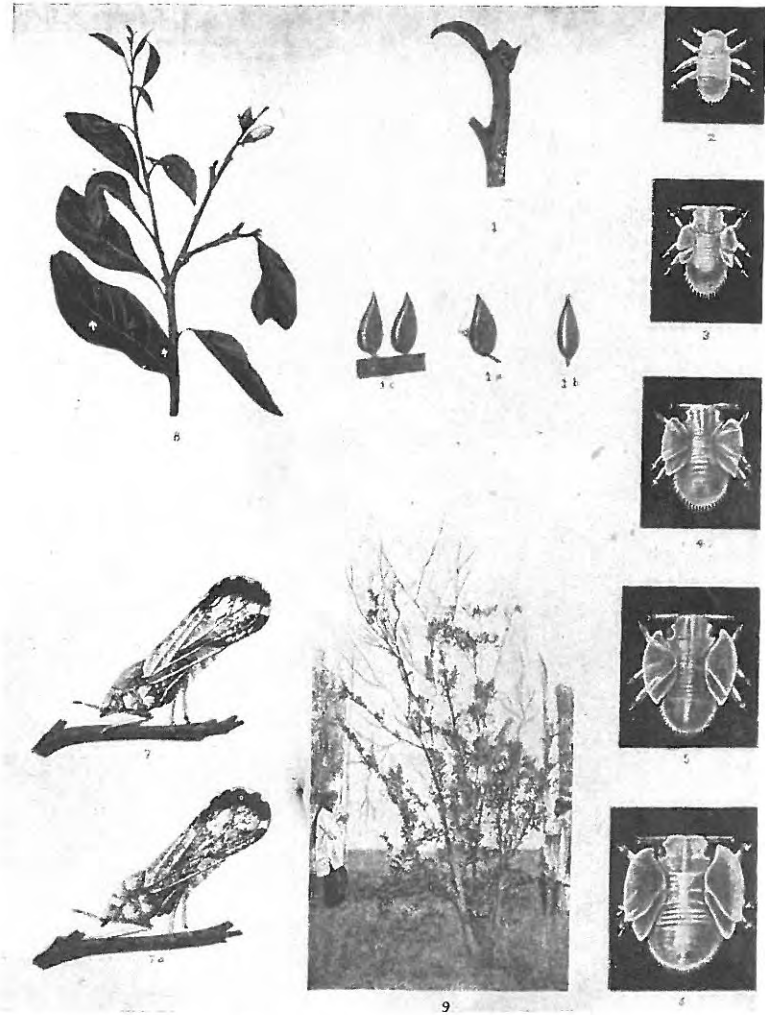
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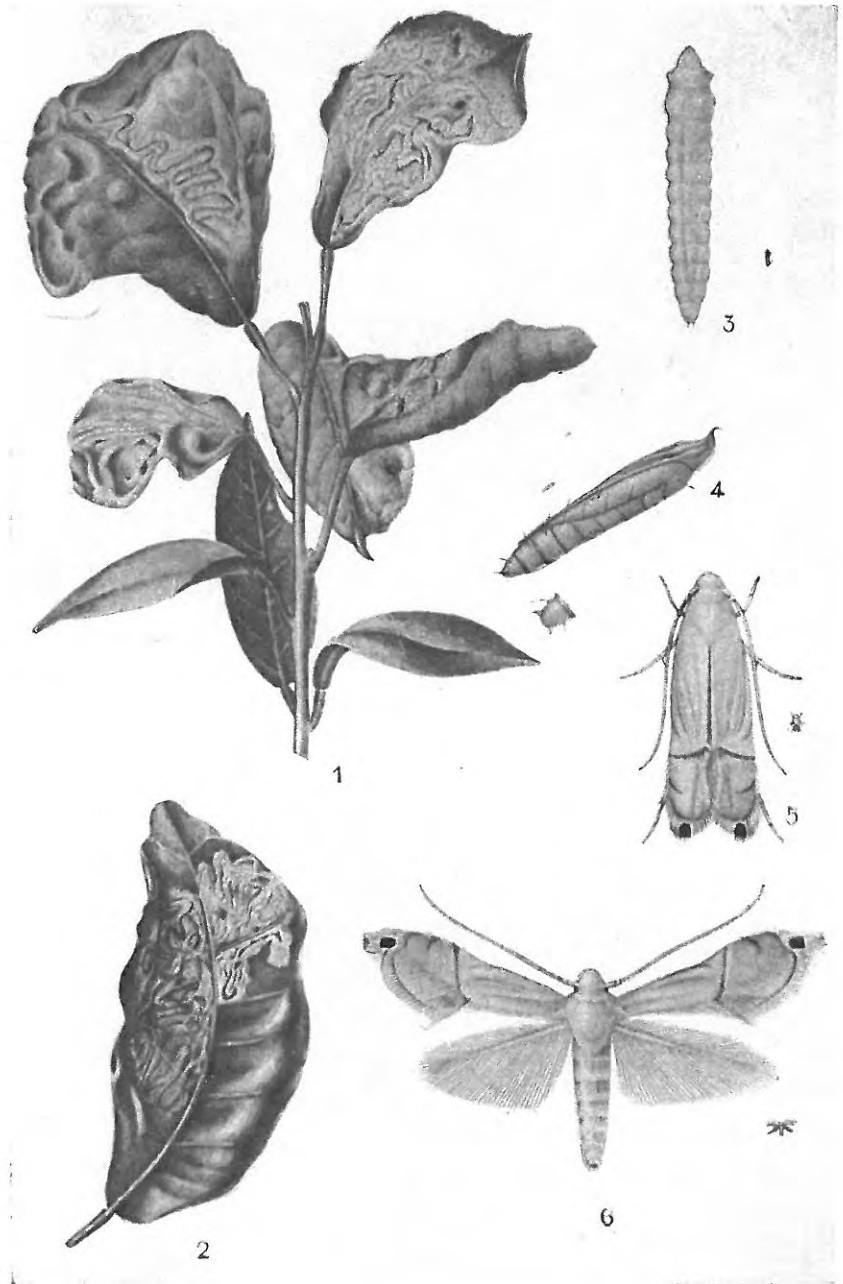


*Aleurocanthus spiniferus* (Quaint.)

I. Eggs on a portion of leaf; II. Single egg magnified ( $\times 33$ ); III-VI. Nymphs; VII. Male puparium magnified ( $\times 40$ ); VIII. Female with wings expanded magnified ( $\times 54$ ); IX. Portion of margin of forewing of female, much enlarged; X. Antenna, female, much enlarged; XI. Genitalia male magnified ( $\times 20$ )



*Diaphorina citri* (Citrus Psylla)



*Phyllocnistis citrella* (Staint.)