As Tingid sucks the juice of leaves,
Virus rods (?) behind it leaves;
A dual role as vector-pest
On palms enacts the insect-guest,

Fronds receiving probes below
Show outside them scars yellow;
Flaccid leaves are signs of 'wilt'
The lace-bugs take to newer belt.

THE LACE-WINGED ENEMY OF COCONUT

BY

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Introduction

If numerical abundance is accepted as a criterion for deciding the status of an insect as a pest on any agricultural crop, no insect, other than the leaf-eating caterpillars, slug caterpillars, bag worms etc., which break out sporadically in large numbers in certain localities under favourable environmental conditions, is as great an enemy of coconut as *Stephanitis typicus* Distant. It is commonly known as the "banana-lace-wing-bug" by virtue of its earlier record on that host and lace like wings.

Alternate hosts and distribution

Apart from banana and coconut, the pest has been recorded from the African oil palm, jack tree, cardamom, turmeric, plantain, camphor, custard apple, ginger, manila hemp, pineapple, colocasia, arrow root and languas. About 700 species of insects belong to the group 'Tingidae', which include the lace bugs and are pests on various cultivated plants of agricultural and horticultural importance. *Stephanitis* is widely distributed in the Oriental region and has been recorded from Sri Lanka, Manila, Philippine Islands, Malaya, Canton, Formosa, Java and several places in India. It is present all over Kerala.

Importance of the bug

As pest on coconut, *Stephanitis* is listed as one of minor importance only. Both adults and nymphs

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of the insect suck the juice from their lower surface through punctures effected by the needle-like stylets of the rostrum (Fig. 1 & 2). Feeding marks are seen on the outer side of leaves as yellow spots. They are persistent. The inner leaves retain the feeding marks even when they become the outermost. When there are too many feeding marks close by, produced by a large number of sucking insects, the entire leaf surface presents a contiguous yellow patch. The total effective functional area of photosynthesis is reduced. In the laboratory, an adult bug was observed to have made about 200 feeding probes in 24 hours.

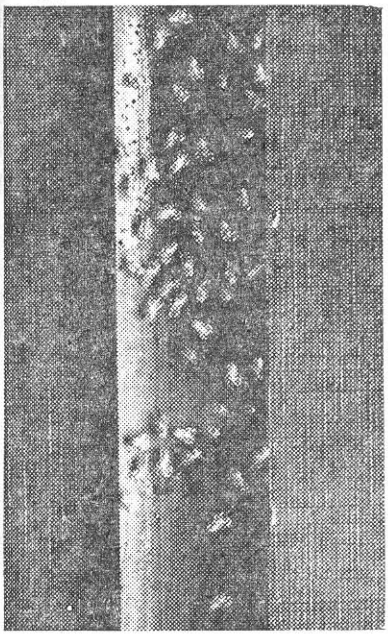

Fig. 1. Adults of lace-bugs feeding on coconut leaflet

Apart from being a pest, the bug is suspected to play an additional role as a carrier of the pathogen, possibly a virus, involved in the root (wilt) disease of coconut now reported to be prevalent over 250 thousand hectares in central and south Kerala, forming more than a third of the total cultivated area in the State and causing an estimated loss of more than Rs 150 million worth nuts a year. The disease is spreading to newer and adjacent areas. Experimental proof is available on *Stephanitis* transmitting the disease when fed on diseased coconut leaves and subsequently liberated to indicator host plants like cowpea as well as coconut seedlings, both under laboratory and field conditions. This, however, needs confirmation. Recent detection of virus particles (?) in association with diseased tissues of host plant, the reported ability of tingid bug to transmit virus disease in plants and the occurrence of a large number of lace bugs in the field on coconut althrough the year enhance the importance of the bug in coconut cultivation.

Life-history and habits

The bug completes its entire life cycle on coconut leaf itself, in about 25 days. Eggs are laid on the under surface of leaflets completely inserted into the leaf tissue, concealed and covered over by a protective cap. The egg takes about 12 days to hatch; the newly merged nymph is small, white and congregational in habit. The colour soon changes to green as it starts feeding on the plant juice. It feeds, grows, moults and passes through five nymphal stages lasting in all 13 days. The main changes during growth relate to increase in size, reorganisation of structural details in respect of segmentation, development of wings, eyes and body spines as well as changes in colouration and habits. The adults live for 3-4 weeks, one female laying on an average, 30 eggs during its life span. In Nature, males occur in greater numbers than the females.

Seasonal abundance

Systematic count of the pest in the field for two years on eighty seedlings has shown that the population of the pest is highest in March, April and May with a peak in April, lowest in December with a rise in September-October and a dip in January, June and July. Abundance of adults and nymphs is of the same pattern, which is governed by meteorological factors, the correlation being direct with temperature and sunshine while rainfall and relative humidity exert a reverse influence.

Distribution of the pest on host plant

The pest presents a very definite pattern of distribution on the leaves of the host plant. It is present in increasing numbers from the outer to the inner leaves. The outer whorls of leaves droop. Fresh infestation by the insects in adjacent

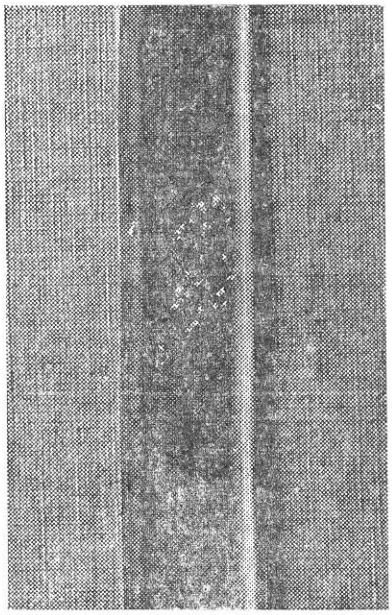

Fig. 2. Nymphs of lace-bugs feeding on coconut feaflet

new hosts either through flight or through wind therefore takes place on inner leaves which stand out more or less erect. Similarly, within the same host plant, adults of subsequent generation abandon the original leaflet on which they bred and probably move inwards in search of more tender leaves. But in the case of leaflets, the middle ones lodge larger number than those at either end of the same leaf. The middle leaflets have larger areas and can afford greater

protection to the fragile insects from wind and other external disturbances.

Natural enemy

Stephanitis has been observed to be preyed upon by nymphs (Fig·3) and adults of a mirid bug (*Stethoconus praefectus* Distant) occurring throughout the year amidst the population of the lace bug. This predator also completes its entire life cycle on the coconut leaf, in about 17 days. Eggs laid on the lower side of the leaflets are partly exposed and hatch in about seven days. The five nymphal instars are passed through in ten days. Females live for more than a month and lay eggs at an average rate of two to three eggs per day per adult. One bug devours more than 60 host nymphs during metamorphosis and one adult feeds on five to six host nymphs per day. Both nymphs and imago of the predator suck the young ones and adults of the lace bug. It would thus appear from the habits that it is an effective agent of biological control.

Insecticidal control

Preliminary laboratory trials indicated that 0·000625 per cent telodrin, 0·001 per cent sevin (carbaryl) 0·0025 per cent nuvan, 0·0125 per cent metasystox 0·05 per cent BHC produced per cent and 0·1 per cent D 92 per cent mortality of adult 24 hr. when sprayed on leaflet which they were established.

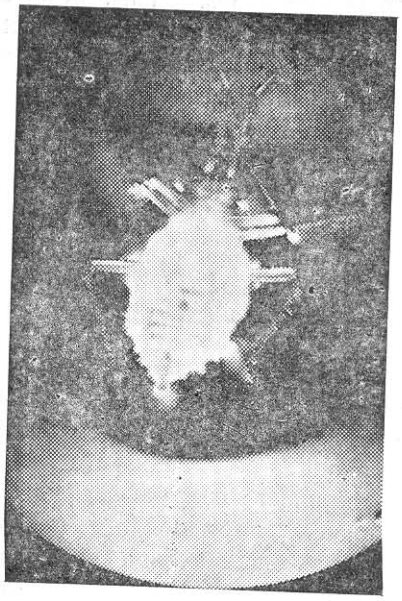

Fig. 3. Nymph of predator on lace-bugs

Conclusion

Although a lot of informa has been gathered on the var aspects of the insect which, of l has assumed greater importa as a possible vector of coconut pathogen than as a minor pest coconut foliage, and has there invited detailed investigations, are still in the dark about its e role as a transmitting agent. P liminary studies have been d on the vector-virus relationsh Elaborate observations both in laboratory and field appear to necessary to establish the mec nism of spread in the field. Th items of study are on the techni programmes of this research s tion.

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