HOST AND DISTRIBUTION RECORDS OF *HELOPELTIS CLAVIFER* (WALKER) (HETEROPTERA : MIRIDAE) IN PAPUA NEW GUINEA

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ABSTRACT

A total of 25 plant species, representing 15 families are recorded as hosts of the mirid Helopeltis clavifer *(Walker) in Papua New Guinea. Seventeen of these are new records.*

The host plant feeding damage and distribution of H. clavifer *is also outlined.*

Although the insect is at present a serious pest of only two crops (cocoa and tea) in certain areas of this country, it is possible that as agricultural development continues, it may develop into a pest of other crops grown here.

INTRODUCTION

Members of the genus *Helopeltis* (Heteroptera: Miridae) are widely distributed throughout the old world tropics, and are responsible for serious damage to at least 30 species of agriculturally important tropical plants. For example, *H. chinchona* Mann, distributed in Indonesia and South East Asia, has been recorded from more than 60 different host plants (Lever 1949) while Miller (1941) listed a total of 38 host plants of *H. antonii* Sign. and *H. theivora* Waterhouse.

Cocoa (*Theobroma cacao* L., Fam. Sterculiaceae) is attacked by various *Helopeltis* species wherever it is grown in the old world. *H. clavifer* (Walker) is one of the most important cocoa pests on the mainland of Papua New Guinea (Smith 1973), in Irian Jaya, Indonesia (Simon Thomas 1962) and in Sabah, Malaysia (Conway 1971), but little has been published on alternate host plants of this pest. Simon Thomas (1962) listed *Ipomoea batatas* (L.) Lam. (Fam. Convolvulaceae) (sweet potato) and *Leucaena leucocephala* (Lam.) de Wit (as *L. glauca*) (Fam. Fabaceae) as hosts of *H. clavifer* in Irian Jaya, while in Sabah, *Psidium guajava* L. (Fam. Myrtaceae) (guava) and *Anacardium occidentale* L. (Fam. Anacardiaceae) (cashew nut) are known to be attacked (Conway 1971). In Papua New Guinea, the mirid has been reported to damage *Flemingia strobilifera* (L.) R.Br. (Fam. Fabaceae) (Anon. 1971), and Szent-Ivany (in press) has recorded six other host plants, namely *Camellia sinensis* (L.) O. Kuntze (Fam. Theaceae) (tea), *Centrosema pubescens* Benth. (Fam. Fabaceae), *Ipomoea hederifolia* L. and *I. batatas* (Fam. Convolvulaceae), *Mimosa invisa* var. *inermis* Adelb. (Fam. Mimosaceae) and *Pueraria phaseoloides* Benth. (Fam. Fabaceae).

This paper records additions to the existing information on alternate hosts of *H. clavifer* in Papua New Guinea. Host plant families are arranged following Hutchinson (1973).

PLANT DAMAGE

Plant feeding mirids, to which group *H. clavifer* belongs, have mouthparts capable of piercing deeply into plant tissue and sucking out the cell contents. Goodchild (1952) studied the digestive

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system of *H. bergrothi* Reut., and proposed that host plant damage was caused mainly by the chemical affects of an injected toxic saliva, rather than the mechanical effects of feeding.

The typical feeding damage caused by *H. clavifer* is a necrotic area of cell tissue called a lesion. While the insect is still feeding, a water soaked area develops around the point of entry of the mouthparts, and the area becomes well defined within one hour, rapidly becoming dark brown to black due to death of plant cells caused by the toxic saliva. Lesions are particularly obvious on green stems and shoots where they are elongate in shape, but on fruits the lesions are generally circular. Feeding damage to flush shoots and soft leaves (where secondary veins are generally attacked) causes malformation and curling of the shoot and leaf, or in severe cases, death of the terminal bud and shoot. If terminal shoot growth is affected, secondary and occasionally tertiary lateral shoot proliferation occurs, thus creating a deformed and stunted plant.

When very young fruits are attacked, they frequently shrivel and die, while older fruits may be reduced in size, malformed, pitted or scabbed, due to *H. clavifer* feeding action.

NEW HOST RECORDS

Acalypha caturus Bl. (Fam. Euphorbiaceae). Adults and nymphs observed feeding on young flush tissue of this secondary regrowth tree. Garaina, Morobe Province.

Anacardium occidentale (Fam. Anacardiaceae) (cashew nut). Adults and nymphs were observed to attack flush growth of five year old trees, causing the death of some growing points and subsequent ramification below the damaged tissues. Developing fruits were malformed and showed sunken feeding scars, while flower shoots were often severely damaged. Eggs were found embedded in the leaf petioles. Attack to the growing points of young seedlings has also been reported (Hartley 1974). Popondetta Agricultural College (P.A.C.), Popondetta, Northern Province.

Annona reticulata L. (Fam. Annonaceae). Adults noted feeding on developing fruits. Garaina, Morobe Province.

Annona squamosa L. (Fam. Annonaceae) (custard apple). Nymphal stages were observed to cause moderate damage to soft flush growth and very young fruits. P.A.C., Popondetta, Northern Province.

Bixa orellana L. (Fam. Bixaceae) (annatto dye). Adults and nymphs were reported to feed on veins of flush leaves, particularly those shaded from the sun, causing the death of adjacent tissue and leaf crinkling. Bubia Agriculture Research Centre and Wau, Morobe Province.

Cassia fistula L. (Fam. Caesalpiniaceae) (Indian laburnum). Adults and nymphs were seen feeding on flush growth and causing minor damage. P.A.C., Popondetta, Northern Province.

Eucalyptus deglupta Bl. (Fam. Myrtaceae) (kamerere). Adults and nymphs were observed attacking flush growth and causing moderate damage and ramification. Lejo Experiment Station, North Sangara, Northern Province.

Flemingia sp. prob. *congesta* Roxb. (Fam. Fabaceae). Adults and nymphs were observed feeding on flush tissue, and eggs were found embedded in leaf petioles of plants used as temporary shade for young cocoa trees. Lejo Experiment Station, North Sangara, Northern Province.

Gliricidia sepium (Jacq.) Stewd. (Fam. Fabaceae). A single adult was observed feeding on flush tissue of a cocoa shade tree. P.A.C., Popondetta, Northern Province.

Ixora chinensis Lamk. (Fam. Rubiaceae). Adults were seen feeding on soft flush growth and flower shoots,

causing distortion. Eggs were found embedded in soft flush tissue. P.A.C., Popondetta, Northern Province.

Leucaena leucocephala (Fam. Fabaceae). On several occasions, adults were observed feeding on flush growth of cocoa shade trees. P.A.C., Popondetta, Northern Province.

Mangifera indica L. (Fam. Anacardiaceae) (mango). Distortion of shoot growth and proliferation of young shoots resulted from the feeding of adults and nymphs. Damage was occasionally severe. Popondetta, Northern Province.

Mangifera sp. (Fam. Anacardiaceae) ('bush' mango). Adults and nymphs were observed feeding on flush growth of a small tree and caused minor damage. Sangara, Northern Province.

Passiflora edulis Sims (Fam. Passifloraceae) (passion fruit). Adults and nymphs were reported to feed on flush tissue of a vine, causing minor damage only. Wau, Morobe Province.

Polyscias sp. poss. *fruticosa* (L.) Harms. (Fam. Araliaceae). Moderate damage was caused when nymphs and adults fed on flush growth. Eggs were found embedded in flush tissue. This shrub, which grows to a height of 2 — 3m is much used as a hedge and border plant around Northern Province villages. Popondetta, Northern Province.

Persea americana Mill. (Fam. Lauraceae) (avocado). Adults and nymphs were observed to attack soft flush growth and flower shoots, causing distortion and death of tissue. P.A.C., Popondetta, Northern Province.

Psidium guajava (Fam. Myrtaceae) (guava). Adults and nymphs were seen to attack soft flush tissue, causing moderate to severe damage and proliferation of side shoots. Insect feeding attack also caused scabbing on developing fruits. Eggs were found embedded in ripening fruits. P.A.C., Popondetta, Northern Province.

The immature stages of *H. clavifer* are soft-bodied, delicate insects which are liable to desiccation (Smith 1973) and consequently are very rarely found away from a host plant. Since immature stages were found, it is very probable that the mirid would breed on all of these newly reported host plants, with the exception of *G. sepium* and *L. leucocephala*. Feeding on these two species of cocoa shade trees was probably incidental.

DISTRIBUTION WITHIN PAPUA NEW GUINEA

Szent-Ivany (in press) has reported that the distribution of *H. clavifer* within Papua New Guinea was the Central, Northern, Morobe, Eastern Highlands and New Ireland Provinces, and ranged from sea level to approximately 1,670m (5,500 ft.). Recently, *H. clavifer* has been recorded on cocoa in the Madang and Milne Bay Provinces, and since the insect is found in several localities along the North Coast of Irian Jaya, it is likely that its distribution ranges into the Sepik, Gulf, Western and some of the Island Provinces of Papua New Guinea.

In October 1978, adult and nymphal specimens of *H. clavifer* were collected from an as yet unidentified plant growing in the lower story of primary forest in the Burit area of the Baining Mountains, East New Britain Province (elevation about 450m). This is only the second record from the island region of Papua New Guinea, the first being from cocoa pods at Matakan Plantation, Namatanai District, New Ireland Province during March 1965.

It is possible that other infestations of *H. clavifer* have not yet been recorded because they may occur on flush tissue of tall trees in virgin forest. In Indonesia, Leefmans (1920) has reported that *Helopeltis* infestations of this type may only occasionally descend from the forest canopy, and are therefore rarely observed.

DISCUSSION

These records increase the number of plant species on which *H. clavifer* has been recorded in Papua New Guinea by 17, and bring the total number of hosts to 25 species, representing 15 plant families. At present, the mirid is a serious pest of only two cash crops, cocoa and tea, but extensive damage can result to many other plant species due to the toxic effects of feeding.

In other countries, species of *Helopeltis* may attack a wide range of fruit and nut crops (e.g. apple, grapes, rambutan), spices (chillies, cinnamon, pepper), fibre and beverage crops (coffee, cotton, kapok), shade trees (*Albizia, Sesbania, Tephrosia*) timber trees (camphor, *Eucalyptus*, mahogany) and ornamentals (*Gardenia, Begonia, Fuchsia*). Some of these species are already growing in this country, and some others may be considered as cash crops in the future. It could therefore be expected that *H. clavifer* will become a major pest of other crops in Papua New Guinea as agricultural development continues.

ACKNOWLEDGEMENTS

I am grateful to Dr W.C. Gagné of the Wau Ecological Institute for permission to publish the *P. edulis* host record, and to Dr J.J.H. Szent-Ivany and my colleagues in the Department of Primary Industry for their comments on the manuscript. I am also indebted to Mr E.E. Henty, Senior Botanist, Division of Botany in the Office of Forests at Lae who identified the botanical specimens.

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(Accepted for publication, September 1977 revised October 1978)