A LABORATORY REARING METHOD FOR THE CACAO MIRID *HELOPELTIS CLAVIFER* WALKER (HEMIPTERA:MIRIDAE)

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ABSTRACT

A method is described for continuous rearing and handling of large numbers of adults and nymphs of Helopeltis clavifer *Walk. Adults are caged with small cacao pods held in vials of water. Feeding and oviposition occur in the pods. Newly emerged nymphs are transferred to similar freshly prepared pods, which are changed daily thereafter. Under these conditions, the egg and nymphal stages last seven to eight days and* 11 *to* 12 *days respectively, which are very similar to their durations as recorded in the field.*

INTRODUCTION

THE cacao mirid *Helopeltis clavifer* Walker was first recorded on cacao (*Theobroma cacao* L.) in the Central District of Papua New Guinea during 1954 (Dun 1954) and it is now one of the most important pests of the crop, especially in the Northern, Morobe and Central Districts of Papua New Guinea. It has also been recorded on cacao in Sabah, Malaysia (Conway 1964).

In the field, eggs are inserted beneath the epicarp of cacao pods, beneath the epidermis of pod peduncles, and very occasionally beneath the epidermis of recently hardened vegetative shoots. Only a pair of fine terminal egg filaments protrudes from the surface of the plant tissue. Following an incubation period of seven to eight days, the nymphs hatch and begin feeding almost immediately on cacao pods. The insect passes through five nymphal instars, each requiring two days, except for the final instar which requires three days. Two to three days after moulting to the adult form, mating occurs and after a further two days, oviposition commences. Adults may live for up to four weeks and lay over 100 eggs, but normally lay between 60 and 80. The majority of eggs are laid within a week of mating.

Research into the bionomics, ecology and control of *H. clavifer* was initiated at Popondetta during 1969. To obtain a continuous supply of adults and nymphs for experimental work, it became necessary to rear the insect under laboratory conditions. Although most other cacao mirids are difficult to breed and maintain in the laboratory (Entwistle 1972), this species, being a pod feeder can be reared successfully using the method desribed in this paper.

METHOD

Field collected (and later, laboratory reared) adults were caged in hurricane lamp glasses (Colman 'Pyrex', 12.5 cm diam., 13.0 cm long) covered at one end with insect screening (Sarlon shade, No. 60081) to allow for air circulation. Approximately ten males and ten females were placed in each cage, and these readily fed on and laid eggs into a small cacao pod (up to 10 cm in length). The pods were kept as fresh as possible by placing the stems in 2 x 1 inch vials of water. Each day, a fresh pod was offered, and the old pod, still in its vial was removed from the cage. The vial, labelled with oviposition date and the number of eggs laid in the associated pod, was then placed adjacent to the cage to await egg hatching.

Temperature and humidity conditions in the breeding room closely followed those outside, with an average diurnal temperature range of from 25 to 32° C and a relative humidity range of from 55 to 90 per cent.

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Six days after oviposition, a fresh pod was placed touching the dried pod containing the eggs. This enabled newly hatched nymphs to move onto the fresh pod to feed. Unless the recently hatched nymphs fed soon after hatching, they rapidly died from desiccation. Since over 80 per cent of the eggs hatched between 0500 and 0800 hours, pods were inspected once daily at 0800 hours, and those newly emerged nymphs remaining on the old pod, were transferred to the fresh one by means of a fine camel hair brush. Eight days after oviposition, all viable eggs had hatched and the old pods were discarded. As egg incubation period was relatively short (seven to eight days), all eggs hatched before the pod became covered with fungal growth.

Unless prevented, early instar nymphs tend to wander from the pods and die from desiccation. To overcome this, the vials containing pods were placed for the first three days in a 9 cm petri dish, the lip of which had been coated with vaseline to prevent the nymphs moving from the dish. An additional access to the pod was provided by a green cacao shoot which was angled from the side of the petri dish to the top of the pod. One pod, if changed daily, was sufficient to support the feeding of 40 to 50 first or second instar nymphs or about 15 to 20 fifth instar nymphs or adults.

Both field collected and laboratory reared adults readily mated and oviposited while in the cages, but fecundity at 10 to 15 eggs per female was low. Much higher fecundity was obtained when a second method, incorporating field oviposition, was adopted. This entailed the use of cylindrical cages, 25 cm long and 10 cm in diameter, constructed of insect screening (Sarlon cloth), to confine field collected adults to cacao pods still attached to a tree. After six days of oviposition in the field, the pods were removed from the trees and placed in the breeding room where the newly hatched nymphs were collected and transferred to fresh pods as previously described. In these field cages, each female deposited 30 to 50 eggs into a pod.

Approximately 80 per cent of the eggs laid were viable, and 70 per cent of all nymphs attained the adult stage in the breeding room. No difference in either viability or incubation time was observed between laboratory-laid eggs and the field-laid eggs. Up to four successive generations of *H. clavifer* have been raised using laboratory ovipositing females, but for large scale nymphal or adult rearing, the field oviposition method is more efficient.

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