

# Biological Control of *Helopeltis* spp. in Mature Cocoa by the Black Ant (*Dolichoderus bituberculatus*) and the Cocoa Mealybug (*Planococcus lilacinus*)

MORAY K. GRAHAM

*Peilton Moniaive, Thornhill DG3 4HE, Dumfries, Scotland, U.K.*

Major damage to cocoa in Indonesia is caused by *Helopeltis* spp. to the cherelles and pods. This sap sucking insect causes the cherelles and pods to dry up, drop off or succumb to secondary fungal infection through the mirid puncture wounds (*Figure 1*). There are at least two species of *Helopeltis* responsible, one with a red and black abdomen (*H. theobromae*) the other with a green abdomen (*H. clavifer*). Natural control of the pest depends on the season. Adult populations of *Helopeltis* are markedly reduced in very dry weather. The most efficient deterrent to *Helopeltis* is the black ant, *Dolichoderus bituberculatus* which can be induced to colonise cocoa pods in association with a mealybug, *Planococcus lilacinus*. In the absence of this association, the only practical control is by insecticides.

The symbiotic relationship of the black ant and the mealybug has been studied by a number of entomologists in Indonesia, notably Karlshoven (1950) and recently Rahman Syed (1988). Karlshoven (1950) pointed out that the ant and the mealybug are omnipresent in Java and Sumatra. The mealybug is found on a number of fruit trees and the lower storey jungle growth. The black ant present in East Kali-

mantan may have been introduced from Java or Sumatra.

Mealybug thrives on damp conditions and feeds on plant sap. Favoured sites are young fan shoots and the base of young cocoa pods. In periods of prolonged drought the mealybug died out completely except near water sources. PT Lonsum Bah Lias Research Station has studied the commercial application of the ant and mealybug symbiosis which has been successfully replicated at Lonsum cocoa estates in Sumatra Utara and at a number of PTP estates, particularly at Kebun Marikei and Marindal not far from Medan.

The black worker ants (4–5 mm) tend their nesting queens and farm the mealybugs within 10–15 m of their nesting sites. Ants are more numerous when their nests are adjacent to pods or shoots. The worker ants are especially active round the mealybug colonies. The rather slow moving orange coloured *Helopeltis* instar nymphs do not tolerate the ants at all (*Figure 2*). The adult *Helopeltis* will alight on pods but are driven off by the aggressive ants before they have time to puncture the pod surface. In situations where the ant and mealybug are well established clean cocoa pods



Figure 1. Pods damaged by *Helopeltis* sp. later killed by secondary fungal infection.



Figure 3. *Dolichoderus bituberculatus* colony exposed inside a coconut frond leaflets on the ground.

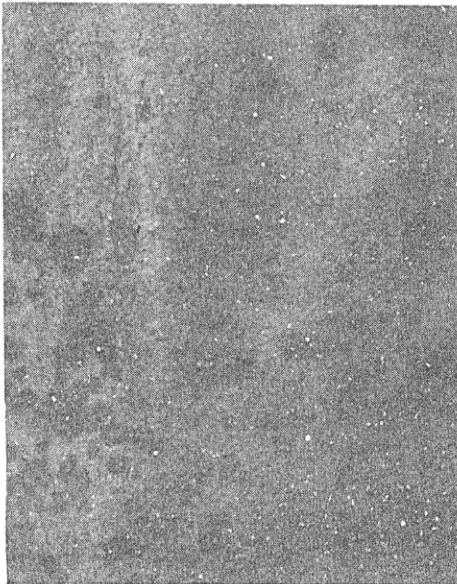


Figure 2. *Helopeltis* nymph (second instar) on lightly affected pod.

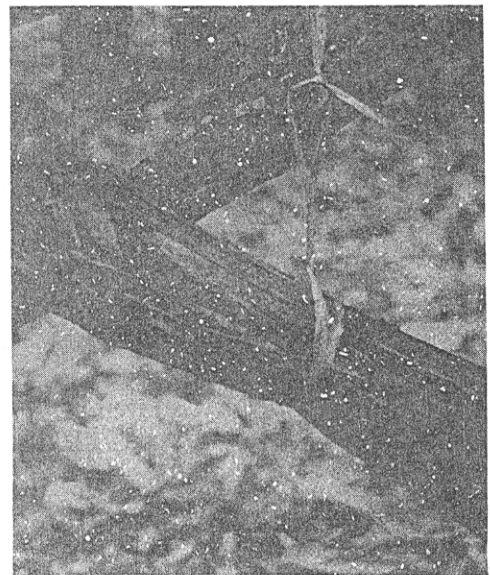


Figure 4. Rolled coconut leaflets suspended or left in cocoa tree fork/jorquette. The leaflets last longer if suspended.

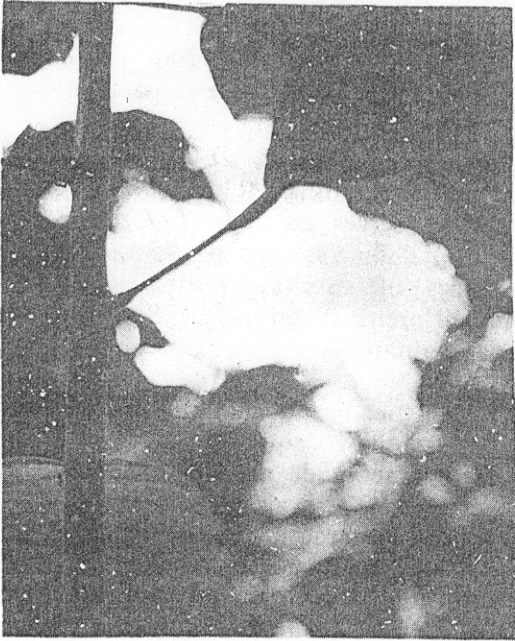


Figure 5. Mealybug and ant association on young fan branch.



Figure 7. Cocoa pod with newly established colony of mealybug and ants.



Figure 6. Fragment of newly opened cocoa pod placed on 10 cm length cocoa pod to start new mealybug colony.



Figure 8. Cocoa pods heavily covered by mealybugs and ants.

are generally seen with very few puncture wounds.

The ants do not cause discomfort to the workers — unlike the large red “kerangas” ants common over most of Kalimantan.

The breeding sites of black ants is in or around fallen, dried coconut fronds, preferably those which are shaded or partially covered by weeds (Figure 3). Rolled up inside surfaces of coconut leaflets are especially favoured. Temporary nests are made in rolled up coconut leaflets or cocoa leaves hung from cocoa branches of fruiting trees (Figure 4). Cocoa leaves dry out more quickly than coconut leaflets. Leaf bundles last at least six months, hung from cocoa branches, and are important to maintain a high ant population during the vulnerable period before the peak crop during the wet season.

New colonies of mealybugs are readily established by placing fragments of pods (preferably > 10 cm length) harvested and broken in the field — with mealybugs adhering — onto new pods (Figure 5, 6, 7, & 8).

Breeding colonies of the black ant may be moved the same way in their rolled-up coconut fronds, which remain viable for six to nine months depending on the weather. Propagation of the ants is more difficult where there are

no coconuts, though a variety of different nesting mediums ranging from cardboard to polythene film are accepted in dry or wet weather respectively.

The black ant, *D. bituberculatus*, is not the only insect whose aggressive display serves to deter *Helopeltis* spp. from damaging cocoa pods. Other species of ants are partially effective in different locations of Sumatra and Kalimantan.

In the event that the black ant fails to give adequate control of *Helopeltis*, insecticide application at two to three week intervals during peak infestation may be required. Systemic insecticides are not recommended. Synthetic pyrethroids are preferred. Cypermethrin is cost-effective at 0.03–0.06 kg per ha followed by alphamethrin. Only if these insecticides are not available, deltamethrin may be considered. Deltamethrin is the most powerful pyrethroid commercially available in Indonesia and is also the most costly. Pesticide application method depends on the season.

#### REFERENCES

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