MANAGEMENT OF THE COCOA MIRIDS

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Introduction

Cocoa production could be maximised through improved pest management. The cocoa mirid is a serious pest of cocoa, which can cause considerable loss of cocoa yield. Formulation of a sound insect pest control programme for the cocoa mirids will not only reduce the pest population but also the amount of insecticides used. Detailed ecophysiological studies will be very useful in understanding the extent of damage caused by the pest as well as help in improving management strategy for the pest. Farmers have adopted chemical control because it is effective, but this method could pose other problems. one of the major causes of using chemicals is the development of resistance in the insects against insecticides. It has been observed that some of the cocoa mirids have developed resistance as insecticide spraying in these areas has been shown to be ineffective. Therefore, the following studies were conducted: (1). Detailed ecophysiological studies; and (2) development of insecticide resistance in the cocoa mirids.

Materials and Methods

(a) Ecophysiological studies: Two different ecophysiological studies were conducted i.e. feeding and oviposition behaviour study and the effect of the mirid damage on the photosynthesis of the cocoa shoots. (i). A choice experiment was conducted in the field to study the feeding and oviposition preference. In order to link numbers of feeding lesions and eggs to cherelle and pod sizes and to their ages, length/surface area relationships were determined using coefficient relationship. (ii). Field studies were also done to determine the relationships between position of the mirids feeding lesions and egg laying sites. Field experiments were also conducted to determine the effects of the mirids damage on cocoa shoots and their effects on the photosynthesis rate. Cocoa shoots were chosen and exposed to the mirids. Observations were conducted on the damaged cocoa shoots and also on the flushing cycle of the shoots at seven-day intervals. Photosynthesis rates for each category of damage on the cocoa shoots were determined. (b). Insecticide resistance: Various degree of tolerance of the cocoa mirids against insecticides had been detected. Therefore experiments were conducted to screen different populations in Serdang, Sungai Tekam and Kelang against a selection of insecticides (gamma HCH, cypermethrin and deltamethrin). The bioassay methods for the detecting resistance in the cocoa mirids were those developed in this laboratory (Muhamad and Dzolkhifli, 1996a; 1996b).

Results and Discussion

The feeding and oviposition behaviour study (Muhamad and Wong, 1999) showed that mirids preferred small cocoa pods (about 4 to 8 cm long) than bigger pods (8 to 16 cm long) as there were more feeding lesions per unit area of surface on the former. It was also observed that very few feeding lesions and eggs were found on the smallest pods (less than 4 cm long). This suggests that females choose to oviposit on relatively old cherelles and young pods because its nymphs may benefits by feeding during the nutritious growing phase of pod development. Results also showed that females preferred to lay in or close to feeding lesions. Adult males did not make feeding lesions where an egg was laid earlier. Laboratory experiment also showed that females of the mirids always feed before laying their eggs and they did not lay any eggs when their stylets were removed. Perhaps oviposition in or close to feeding lesions helps to minimise feeding injury, since the insect mostly feed away from previous lesions. The effects of mirid damage on cocoa shoots (Muhamad et al. 1998) showed that severe damage was observed at the petioles, main leaf line and leaf line. The mirid attack could be classified according to the number of feeding lesions formed on the shoots into: low, medium and heavy damaged shoots. The photosynthesis rate for each category of damage on the cocoa shoots showed that the mirid damage significantly reduced photosynthesis rate of the shoots. While the flushing cycle continued in the low damaged shoots, it was delayed in the medium damaged shoots. Highly damaged shoots were wilted. The susceptibilities of the cocoa mirid from Serdang to gamma HCH, cypermethrin and deltamethrin were evaluated in this laboratory (Muhamad and Dzolkhifli, 1997). The LT50 of the Serdang Population for gamma HCH determined in the years 1982, 1985 and 1992 had increased, which would indicate the imminent resistance in the mirids. The resistance status of different populations in the Sungai Tekam areas indicated a greater tolerance in some of the populations against gamma HCH and cypermethrin. However, the mirids from these areas were still susceptible to deltamethrin. The high degree of tolerance exhibited by the mirids to gamma HCH and cypermethrin indicate a possible development of resistance.

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