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FIELD EVALUATION OF SOME NEWER INSECTICIDES AGAINST BARK FEEDING CATERPILLAR *AETHERASTIS CIRCULATA* INFESTING RUBBER

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Effectiveness of five insecticidal dusts (carbaryl, fenvalerate. HCH, methyl parathion and quinalphos) was evaluated against the bark-feeding caterpillar, *Aetherastis circulata* Meyr. feeding on the bark of *Hevea brasiliensis*. All the insecticidal applications were significantly superior to control. Fenvalerate, methyl parathion and quinalphos proved to be more effective in relative performance. The most effective and low toxic fenvalerate is recommended for the control of this pest.

Key words:- *Hevea brasiliensis*, Pest control, *Aetherastis circulata*, Fenvalerate, Methyl parathion, Quinalphos, India.

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INTRODUCTION

In recent years *Aetherastis circulata* Meyr. (Yponomeutidae: Lepidoptera), the bark-feeding caterpillar which was considered to be of minor importance and of sporadic nature, appeared as a severe endemic pest on rubber, especially in Trichur district of the central Kerala region, in addition to their occurrence in the Southern districts of Kerala and Kanyakumari district of Tamil Nadu (Nehru *et al*, 1983; 1987). First reference about this pest was made by Ramakrishna Iyer (1938). It was generally observed that high rainfall had an adverse effect on the incidence of bark feeding caterpillar, and low rainfall or absence of rain always favoured increase of pest population. The pest was found active throughout the year feeding on different alternative host plants such as *Macaranga peltata*, *Michaelia champaca*, *Terminalia catappa*, *Delonix regia*, *Moringa oleiefera* and *Mangifera indica* but was most active on rubber from October to May (Nehru *et al*, 1987). The caterpillars build galleries on the trunk and branches with chewed bark, faeces and silk and live inside. They feed initially on the dead corky bark. The final instar caterpillars feed deeper to pupate and latex oozes out from these points. These points, from where latex oozes, facilitate easy entry of fungal pathogens during rainy season, causing bark diseases like canker and bark rot (Jayarathnam, 1980). Of the two common species of bark feeding caterpillars infesting rubber, *Aetherastis circulata* is more severe and abundant than *Ptochoryctis rosaria*. Severe incidence of *Aetherastis circulata* was continuously recorded even in high rainfall belts of rubber since 1980 due to the occurrence of prolonged drought in consecutive years. Severe incidence

this pest occasionally resulted in extreme stembleeding and consequent loss of branches or even the trunk of rubber trees in localised areas in certain estates in clone PB 235. The pest was observed in the fields in its active stages from March to May. The final instar caterpillars were most abundant during their peak period from April to May. During this period. the number of caterpillars upto a height of 150 cm from the ground varied from 80 to 140 with an average of 92.80, indicating that the best time for application of insecticides will be the month of April. Nehru and Jayarathnam (1984) and Nehru *et al* (1987) worked out the relative toxicity of some insecticides to the larvae of *A. circulata*. As a result of these efforts, a number of insecticides belonging to chlorinated hydrocarbons, organophosphates and carbamates were tested as sprays, fogs and dusts to control this pest. Insecticidal dusts proved to be more suitable, because of cost effectiveness and ease of application, especially in hilly terrains.

Since the beginning of the 1980's relatively hazardous insecticidal dusts like HCH, quinalphos, methyl parathion and carbaryl have been applied for the control of *A. circulata*. Despite the proven efficiency of these insecticides for controlling bark feeding caterpillars, their impact on non-target organisms like human beings and animals has provoked the search for safer insecticides. Consequently in recent years efforts have been intensified to find an alternative, safer, new synthetic pyrethroid to methyl parathion and carbaryl insecticide, which may have the same level of toxicity against *A. circulata*, but at the same time be more environmentally acceptable. In preliminary studies, fenval 0.4 per cent dust has shown considerable promise for *A. circulata* control by virtue of its high toxicity to the pest.

MATERIALS AND METHODS

During 1988, a field trial was laid out in a randomised block design to evaluate the comparative effectiveness of five insecticides as dusts, at Mooply estate (Trichur, Kerala State). Chemical treatments along with a control were replicated three times. The plot size was 1296 m^2 and the spacing provided between two adjacent plots was 12 m. There were 18 plots, each with 144 trees. Fenval (fenvalerate) 0.4 per cent, methyl parathion 2 per cent, quinalphos 1.5 per cent, carbaryl 5 per cent and HCH 10 per cent were the treatments, the dosage being 15 kg ha^{-1}. Only one round of dusting was done. A ground application power duster was used and the machine was carried at every fourth row. Pest population counts were recorded on 20 randomly selected trees from each plot, a day before and seven and fourteen days after application of the insecticides. Counting of caterpillars was done in an area of 1.5 m height from the collar region all around in the trunk. The data on mean percentage of population reduction at seven and fourteen days after the treatments were statistically analysed.

RESULTS AND DISCUSSION

The data on the efficacy of different insecticidal dusts are presented in Table 1. All the insecticidal treatments significantly reduced the caterpillar population compared to the control. Seven days after application of fenval proved to be significantly more effective than all other treatments, followed by methyl parathion. But after fourteen days fenval and methyl parathion were on par and proved to be significantly superior to all other treatments and recorded 100 per cent reduction in caterpillar population. Quinalphos and carbaryl were on par but were significantly superior to HCH in minimising the population of caterpillars, seven

Table 1. **Efficacy of different insecticides against *Aetherastis circulata***

Treatments	Mean percentage population reduction after	
	7 days	14 days
Fenval 0.4% dust	99.14 (84.69)	100.00 (90.00)
Methyl parathion 2% dust	95.75 (78.12)	100.00 (90.00)
Quinalphos 1.5% dust	88.96 (70.99)	96.68 (79.68)
Carbaryl 5% dust	85.77 (68.02)	92.96 (75.38)
HCH 10% dust	75.80 (60.58)	85.36 (67.57)
Control	10.26 (18.67)	6.40 (14.59)
C.D. (P = 0.05)	5.82	5.19

Figures in parentheses are angular transformed values

and fourteen days after application of the insecticides. Since methyl parathion is comparatively more toxic to human beings, fenval, quinalphos or carbaryl can be recommended for the control of this pest. Incidence of the bark-feeding caterpillar on rubber and its control measures were reported by earlier workers (Jayarathnam, 1980; Nehru and Jayarathnam, 1984; Nehru *et al*, 1987). Fenval proved to be most effective against *A. cireulata* infesting rubber at the Rehabilitation Plantations Limited, Punalur recording 98.99 per cent reduction in larval population. The corresponding reduction for quinalphos, carbaryl and HCH was 91.26 per cent, 85.74 per cent and 75.11 per cent respectively (Rubber Research Institute of India, 1989). Dusting of methyl parathion was also found to be very effective, causing 98.52 pr cent reduction in caterpillar population (Nehru and Jayarathnam, 1984). These findings support the results of the present investigation, especially on the comparative effectiveness of insecticides such as fenval, methyl parathion, quinalphos and carbaryl against this pest. It was also observed that even after 30 days from the date of dusting, there was no fresh infestation to rubber on account of the bark-feeding caterpillar in the treated plots.

The results thus indicate that while fenvalerate, methyl parathion, quinalphos and carbaryl were effective in controlling *A. circulata*, it is safer to recommend the one with minimum mammalian toxicity. On this account as well as in view of the tall nature of the tree which grows to 20–24 m high and the increasing incidence of this pest, fenvalerate is more safe for large scale field application.

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