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BORER BEETLE CONTROL ON RUBBER TREES USING INSECTICIDES

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Borer beetle infestation was observed on partially dried bark of standing rubber trees. Swabbing of a mixture of carbaryl (0.5%) + quinalphos (0.25%) on the beetle infested region of the bark three times at an interval of one week was highly effective and resulted in 99 per cent control when observed after two months.

Key words: Borer beetle, *Hevea brasiliensis*, Insecticide, Pest control.

INTRODUCTION

Rubber (*Hevea brasiliensis*) is a less preferred host plant for insect pests. Partial drying of the tree bark is often caused by various maladies such as tapping panel dryness, pink disease, root disease, sun scorch, drought, canker and lightning scorch. Such partially dried rubber trees are attacked by different types of borer beetles. They bore into the wood to make tunnels and lay eggs inside them. The grubs that hatch from the eggs feed on the starch contents of the wood. The beetles, which emerge out also bore holes towards the outside and expel wood powder. The bore holes with ejecting string of wood dust is the symptom of borer beetle infestation. Such holes, considered as live bore holes, may contain various stages of beetles or grubs. Sometimes the adjacent live bark may also be punctured in the process and latex exudes through such holes. Though the borer beetle infestation has been observed on tapping trees for many years, an increasing trend in infestation is observed recently. The infested rubber trees break off during wind causing loss of valuable timber. Petch (1921) described borer beetle attack (*Xyleborus perforans* and *X. parvulus*) on rubber in Ceylon and Malaya. The borer beetle species which are reported to cause damage to rubber trees are mainly members of family Bostrichidae namely *Heterobostrychus aequalis, Synoxylon conigerum* (Tisseverasinghe, 1970), *Dinoderus bifoveolatus* (Norhara, 1981), *Sinoxylon anale* and *Xylothrips flavipes* (Mathew, 1987). *Platipus latifinis, P. solidus* belonging to Platipodidae and *Xyleborus similis* (Mathew, 1987), *X. perforans* belonging to Scolytidae (Jose *et al.* 1989) and *Minthea rugicollis* belonging to Lyctidae (Norhara, 1981) are other reported species of borers.

Control of borer beetle infestation on rubber trees has not been attempted earlier. However, preservation of sawn planks of rubber wood by means of diffusion treatment as well as vacuum pressure impregnation with boron or copper containing preservatives have been attempted to ward off borer beetles (Jose *et al.*, 1995).

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MATERIALS AND METHODS

The live bore holes of the borer beetles were identified by the strings of wood powder expelled from the bore holes and by the head of beetles protruding through the exit holes. The external surface of the infested bark with bore holes and pinholes were slightly scraped off with a knife and the holes counted. Two preliminary trials were carried out to generate basic information on the effect of insecticides and the number and interval of application. The experiments were laid out in CRD with three replications. The details of treatments are given in Tables 1 and 2. The insecticides were diluted with water to the indicated concentrations and applied using a brush. The pre- and post-treatment counts of live boreholes were recorded from five borer beetle infested trees per plot and the percentage control was calculated.

In the first experiment, the insecticides were applied singly twice at an interval of one week. In the second trial, four insecticides were applied singly and two as mixtures in specific doses at an interval of one week (Table 1).

The third experiment (Table 2), repeated twice, had 16 treatments with three replications in CRD. Eight of the treatments were insecticides applied singly at specified concentrations and seven were mixtures of insecticides along with an untreated control. The treatments were applied using a brush over the infested portion of stem three times at an interval of one week. The observation on the borer beetle population was recorded one and two months after the treatment. The data were analysed statistically.

RESULTS AND DISCUSSION

The control of borer beetle was not satisfactory in the preliminary trial in which the insecticides were applied singly at an interval of one week. It ranged only from 21.33 to 38 per cent when observed after two months (Table 1). A higher rate of control of beetles (ranging from 34.33 to 67 per cent) was observed in the second experiment when a higher concentration of insecticides and combination of insecticides were applied twice at an interval of one week. It was, obvious that the combination of Car-

Table 1. **Control of borer beetle infestation on rubber trees**

Treatment	Formulation	Dose (%)	Control (%) after	
			One month	Two months
Carbaryl	50 WP	0.20	38.00	39.33
HCH	50 WP	0.20	35.33	—
Monocrotophos	40 EC	0.05	27.67	—
Chlorpyriphos	20 EC	0.10	28.00	40.33
Malathion	50 EC	0.05	21.33	—
Quinalphos	25 EC	0.05	25.33	47.00
Fenvalarate	20 EC	0.05	—	34.33
Carbaryl + Chlorpyriphos	50 WP + 20 EC	0.20 + 0.20	—	61.67
Carbaryl + Quinalphos	50 WP + 25 EC	0.20 + 0.10	—	67.00
Control (Untreated)	—	—	0.00	0.00
CD (P≤0.05)			5.35	6.01

Table 2. **Control of borer beetle infestation on rubber trees (Pooled data for two years)**

Treatment	Formulation	Dose (%)	Control (%) after	
			One month	Two months
Carbaryl	50 WP	1.00	56.00	65.67
Lindane	6.5WP	0.13	40.00	58.67
Fenvalarate	20 EC	0.33	20.33	32.00
Chlorpyriphos	20 EC	0.40	46.00	57.00
Dichlorvos	80 EC	0.76	41.00	48.67
Monocrotophos	40 EC	0.20	40.33	48.00
Phosphamidon	100 EC	0.20	40.00	46.33
Quinalphos	25 EC	0.50	57.00	64.67
Carbaryl + Chlorpyriphos	50 WP 20 EC	0.50 0.20	85.00	92.67
Carbaryl + Quinalphos	50 WP 25 EC	0.50 0.25	91.67	99.00
Carbaryl + Malathion	50 WP 50 EC	0.50 0.50	81.67	91.00
Carbaryl + Dichlorvos	50 WP 80 EC	0.50 0.20	66.33	74.67
Lindane + Chlorpyriphos	6.5 WP 20 EC	0.065 0.20	74.33	83.00
Lindane + Quinalphos	6.5 WP 25 EC	0.065 0.25	78.67	85.33
lindane + Malathion	6.5 WP 50 EC	0.065 0.50	66.67	74.67
Control (Untreated)	—	—	0.00	0.00
CD (P≤0.05)			4.12	5.03

baryl (0.20%) and quinalphos (0.10%) gave the highest rate (67%) of control (Table 1). Combination of carbaryl 0.20 per cent and chlorpyriphos 0.20 per cent was the next most effective treatment yielding 61.67 per cent control (Table 2). Insecticides applied alone were not that effective.

The results of the third experiment confirmed that application of combination of insecticides was superior to any single one. The pooled data from two years observation indicated that a combination of Carbaryl 0.5% + quinalphos 0.25% was most effective (91.67%) for control of beetles when observed after one month. The control improved to 99 per cent after two months. The next effective treatment was carbaryl (0.5%) + chlorpyriphos (0.20%) which recorded 85.0 and 92.67 per cent respectively when observed after one and two months. Combinations of carbaryl (0.5%) + malathion (0.5%) with either quinalphos (0.25%) or chlorpyriphos (0.20%) also gave satisfactory control up to two months (Table 2).

The combination of Carbaryl (0.50%) + quinalphos (0.25%) and other effective insecticide combinations may have given a quick knock down effect to the borers inside the bore holes. The three applications at an interval of one week ensured proper penetration of insecticides to the interior of the tunnels killing the beetles and grubs effectively. In the early years of rubber cultivation, Petch (1921) suggested that the severely attacked portions of rubber trees have to be cut and the exposed wood should be treated with insecticides for controlling borer beetle attack. Control of the borer beetles *Dinoderus*

minutes (bostrychidae) which attack on mango with diazinon 0.30% (Bat, 2000) and on bamboos with prophylactic spraying of synthetic pyrethroid insecticides (Thakur and Bhandari, 1997) have been reported. *Sinoxylon sudanicum* (Bostrychidae) attack on mango could be reduced by treatment with diazinon and phenthoate (Batt, 2000) and on date palm with deltamethrin, fenitrothion and fenvalerate (Helal and El-sebay, 1994). The attack of shot hole borer, *Xyleborus fornicatus* Eichhoff (Scolytidae) on tea could be suppressed by spraying chlorpyriphos, fenvalarate and quinalphos at the rate of 1.0, 0.50 and 1.0 litre per hectare (Devadas *et al.*, 1989) and on pomegranate with quinalphos 0.50%, carbaryl 1.0% and dichlorvos 1.0% (Mote and Tambe, 1990). The present experiments have proved that the brush on application of insecticide combinations at prescribed concentrations is effective for the control of borer beetles infesting rubber trees.

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