CONTROL OF BARK-EATING CATERPILLAR OF MOLUCCANA KOROI *(PARASERIANTHES FALCATARIA)*

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ABSTRACT

The bark-eating caterpillar, *Indarbela quadrinotata* Walker (Metarbelidae : Lepidoptera) is an important pest of moluccana koroi *(Paraserianthes falcataria)* in Bangladesh. Various methods to control the pest were tested in a 4-year old moluccana plantation at Satgaon Tea Estate, Moulvibazar. Though all the methods proved effective in controlling the pest over the untreated control, spraying the bark with 0.1% dieldrin or malathion, injection of 5 ml of 0.1% dichlorvos into each larval hole or plugging the larval hole with cotton soaked with kerosene were found superior. The possibility of applying various methods to prevent, control or minimize the pest attack in large scale plantations was discussed.

সারসংক্ষেপ

বাংলাদেশে মোলাকানা কড়ই এর বাকলভোজী পোকা এক গুরুত্বপূর্ণ ক্ষতিকর পোকা। মৌলভী বাজারের অন্তর্গত সাতগাঁ চা বাগানের চার বছর বয়স্ক আক্রান্ত মোলাকানা কড়ই বাগানে এ পোকা দমনের বিভিন্ন পদ্ধতির কার্যকারিতা পরীক্ষা করা হয়। যদিও পরীক্ষিত সকল পদ্ধতিই পোকা দমনের জন্য কার্যকরী তবুও ০·১% ডাইএলড্রিন অথবা ম্যালাথিয়ন বাকলে ছিটানো, অথবা ০·১% ডাইক্লোরভসের ৫ মিঃ লিঃ ঔষধ পোকার প্রতি গর্তে প্রয়োগ অথবা পোকার গর্তের মুখ কেরোসিন সিক্ত তুলা দ্বারা বন্ধ করে দেয়া অপেক্ষাকৃত বেশী কার্যকরী বলে প্রতীয়মান হয়েছে। বিস্তীর্ণ বনাঞ্চলে পোকা দমনের এ সকল পদ্ধতি প্রয়োগের সম্ভাব্যতা আলোচনা করা হয়েছে।

INTRODUCTION

Paraserianthes falcataria (L.) Neilson, locally known as moluccana koroi, is one of the fastest growing leguminous trees in the world (Anon. 1979). The species is native to south east Asian region. It was first brought to Bangladesh in the sixty's by tea planters for use as shade tree in tea gardens. Later the Forest Department, after initial test, started its plantations in Sylhet Forest Division and about 2,900 ha plantations were raised within 1982 in this Division (Sterringa 1989).

For the last couple of years a severe attack by the bark-eating caterpillar, *Indarbela quadrinotata* Walker (Metarbelidae : Lepidoptera) was observed in the plantations. A research project was, therefore, undertaken at the Bangladesh Forest Research Institute (BFRI), Chittagong to study the biology and ecology of the pest, and to develop suitable pest management technique. The first part of the study was already reported (Baksha 1991), and the second part is now incorporated herein.

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MATERIALS AND METHODS

During 1985-88, four sets of experiment for the control of the pest were conducted in a 4-year old *P. falcataria* plantation at Satgaon Tea Estate, Moulvibazar, where heavy pest incidence was observed (Baksha 1991). The sets of experiment were as follows :

i) The larval holes were sealed with cotton soaked with kerosene and covered with adhesive tape,

ii) The matted frass of the larva was rubbed off and the feeding site was dressed with coal tar,

iii) 5 ml each of kerosene, 0.1% dichlorvos, 0.1% dieldrin, 0.1% malathion and 0.1% diazinon was poured into larval retreat hole with disposable syringe after removing the frass and larval webs and

iv) The bark was sprayed with dichlorvos, dieldrin, malathion and diazinon, each at 0.1% concentration. Motorized knapsack power sprayer was used to spray the insecticides.

Ten active larval holes were used for each treatment including the untreated control. The experiments were replicated thrice using a randomised block design. Observations on mortality at 24, 48 and 72 hours after the treatment were recorded by counting the active larval holes. A larva was considered living if fresh excretal pellets or webbing appeared around the hole after removing the frass at each observation. The data were transformed, wherever necessary, to arc sin values, and analysed statistically. The means were separated by Duncan's New Multiple Range Test (Little and Hills 1972).

RESULTS AND DISCUSSION

The larva leads a concealed life in the retreat hole or under the cover of webs when feeding on the bark. Obviously it is hard to control the pest by traditional spraying. However, all the treatments applied in view to control the bark-eating caterpillar reduced infestation significantly over the untreated control.

In case of sealing the larval holes by cotton soaked with kerosene and sealed with adhesive tape, the larval mortality was 86.7% after 72 hours of application of the treatment, which might be due to fumigant action of kerosene or oxygen depletion of the larva inside the tunnel. Statistically similar mortality (70.0%) was found in the treatment where the matted frass was rubbed off and dressed the area with coal tar (Table 1). The aim was to entrap the larva inside the tunnel and kill it by starvation as the larva has a peculiar habit of feeding the same portion of the bark that was left after feeding in the night before. This technique was an approach to manage the pest by utilizing the feeding behaviour of the larva. However, the first method gave the faster kill than the second.

In the injection technique, all the insecticides and kerosene oil gave almost complete control 72 hours after single application. Dichlorvos and malathion gave the highest kill (100.0%) followed by dieldrin (96.7%) and diazinon (90.0%). Kerosene oil (80.0%) also proved effective in controlling the larvae. However, dichlorvos gave the quickest kill (Table 2).

In the bark spraying experiment, dieldrin was the best insecticide in controlling the pest giving 86.7% mortality of the larvae 72 hours after spraying (Table 3). This result was statistically similar to those of malathion (80.0%), diazinon (70.0%) and dichlorvos (66.7%).

Table 1. Efficacy of two methods of non-insecticidal control of *I. quadrinotata* larvae infesting *P. falcataria*

Treatment	Mean % mortality after *		
	24 hours	48 hours	72 hours
1. Plugging the larval holes by cotton soaked with kerosene oil and sealed with adhesive tape	70.0 a (57.0)	80.0 a (63.9)	86.7 a (68.9)
2. Rubbing off the matted frass of the larva from the bark and dressing the area with coal tar	56.7 a (48.9)	60.0 a (50.9)	70.0 a (56.8)
3. Control (untreated)	0.0 b (0.9)	0.0 b (0.9)	0.0 b (0.9)
$LSD_{0.01}$	(15.1)	(14.7)	(10.3)
CV (%)	(11.3)	(10.2)	(6.5)

* Means followed by same letter in a column do not differ significantly. Figures in parentheses are arc sin values.

Table 2. Effect of injecting chemicals into the larval holes on the population of *I. quadrinotata* larvae infesting *P. falcataria*

Treatment	Mean % mortality after *		
	24 hours	48 hours	72 hours
Dieldrin 20 EC	76.7 a (61.2)	86.7 b (68.9)	96.7 ab (83.5)
Malathion 57 EC	80.0 a (63.9)	83.3 bc (66.7)	100.0 a (89.5)
Diazinon 60 E	60.0 b (50.9)	70.0 cd (56.8)	90.0 bc (71.6)
Dichlorvos 100 EC	90.0 a (74.8)	100.0 a (89.5)	100.0 a (89.5)
Kerosene oil	50.0 b (45.0)	60.0 d (50.9)	80.0 c (63.9)
Control	0.0 c (0.5)	0.0 c (0.5)	3.3 d (6.5)
$LSD_{0.01}$	(7.8)	(11.2)	(15.8)
CV (%)	(13.9)	(7.8)	(9.1)

* Means followed by same letter(s) in a column do not differ significantly. Figures in parentheses are arc sin values.

Table 3. Effect of spraying insecticides around the bark of *P. falcataria* on the larval population of *I. quadrinotata*

Treatment	Mean % mortality after *		
	24 hours	48 hours	72 hours
Dieldrin 20 EC	53.3 a (46.9)	66.7 a (54.8)	86.7 a (68.9)
Malathion 57 EC	56.7 a (48.9)	63.3 a (52.8)	80.0 a (63.4)
Diazinon 60 E	53.3 a (46.9)	60.0 a (50.9)	70.0 a (57.0)
Dichlorvos 100 EC	50.0 a (45.0)	60.0 a (50.9)	66.7 a (54.8)
Control	0.0 b (0.5)	3.3 b (6.5)	3.3 b (6.5)
$LSD_{0.01}$	(12.7)	(14.7)	(15.6)
CV (%)	(12.3)	(12.4)	(11.3)

* Means followed by same letter in a column do not differ significantly at 1% level of probability. Figures in parentheses are arc sin values.

Earlier, several methods such as piercing the larvae inside their shelter tunnel with a hooked wire, injection of fumigants like carbon disulphide, EDCT, petrol and naphthalene into the tunnel to control *I. quadrinotata* were generally recommended (Beeson 1941, Mathur 1960, Sandhu *et al.* 1978). A number of insecticides and chemicals were also found effective in controlling the pest, but in view of economy, availability, facility in handling and effectiveness the injection of kerosene or petrol in the larval holes was recommended (Srivastava 1972).

The present investigation suggests that spraying the bark with 0.1% dieldrin or malathion or injection of 5 ml of 0.1% dichlorvos into the larval holes or plugging the larval holes by cotton soaked with kerosene oil and sealed with adhesive tape may be practised. Though the control treatments applied individually to each larval hole gave satisfactory control of the pest they are very much labour intensive and thus seems to be uneconomic and impractical to apply in large plantations. However, they can be useful to protect few high value trees such as fruit trees, seed orchards, ornamental trees, etc. Secondly, the methods are feasible only when the trees are not high enough to reach by hand. Similar is the case with the spraying operations. The affected bark of high-reach trees cannot be sprayed with traditional equipments and will require pedal or power sprayer.

Baksha (1991) reported that the healthy growing stands were less affected. Extensive outbreaks may, therefore, be considered as the indication of unhealthy growing stocks resulting in the production of excessive quantities of dead branches such as may be caused by draught, hailstorm, congestion, poor sites, etc.

Many workers (Baksha 1991, Beeson 1941, Butani 1977, Browne 1968, Verma and Khurana 1974, Verma *et al.* 1976) gave lists of alternative host plants of *I. quadrinotata*. If the plantation of *P. falcataria* is raised with species known to act as alternative host of the pest, it is most likely that there will be greater pest incidence. As tea is known to be a favourite host plant of the pest, the raising of *P. falcataria* plantations in or near tea gardens may be discouraged.

As the junction of dead branches and the trunk are mostly the sites where the larva bores a shelter tunnel, the pruning of branches may be avoided. If done or the branches damaged by storm or other natural calamities, the cut end may be dressed with coal tar or paint to prevent the pest attack as well as secondary fungal invasion.

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