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ABSTRACT

Heliothis armigera caused 99.9% infestation of the fruits of a medicinal plant *Nigela sativa* in the medicinal plant garden at the Pakistan Forest Institute, Peshawar during 1993. It caused complete seed losses in 73% of the infested fruits. In rest of the 27% fruits seed loss rated as heavy (8%), medium (8%) and Light (11%).

Among the insecticides, tested against the pest in the field, Malathion gave 100% control of the pest in all doses followed by Sunmerin killing 100% larvae in 0.03, 0.04 and 0.05% doses. DDVP and Laser each caused 100% mortality of larvae only in 0.04 and 0.05% doses. Natural mortality of larvae ranged from 16 to 25%.

INTRODUCTION

Heliothis armigera (Noctuidae: Lepidoptera) is a general defoliator of agricultural crops, ornamental plants, forest nurseries and some trees. However, it also infests cotton bolls and fruits of other economic plants by boring and devouring their content.

As cotton bollworm it has been reported from Pakistan (Ahmad and Mohsin, 1969), Iran (Moradeshaghi and Poormirza, 1976), India (Rangarajan *et al.*, 1970), Azerbaijan (Budrik, 1970), Uganda (Davies and Kasule, 1964) and Bulgaria (Stoeva, 1968). Tobacco fruits and gram pods are also damaged by the pest in India (Patel and Patel, 1969 and Rai and Sinch, 1976). Its infestation on fruits of *Nigela sativa*, a medicinal plant grown at the Pakistan Forest Institute, is a new record in Pakistan.

In this article damage of *Heliothis armigera* on *Nigela sativa* and its control is given.

METHOD AND MATERIAL

The zig-zag sampling method was used for the assessment of damage. Starting from one corner of the infested field and traversing 5 paces along the edge the first sample point was taken. The second sample point was taken after walking the same number of paces at right angle into the crop. Then again walking parallel to the field boundary in the original direction in order to take the third sample point. Zig-zaging continued and sample points were taken until the opposite field boundary was reached and then a reverse direction was followed.

At each sampling point a stick was thrust into the ground and fruits of 4 plants around the stick were collected in the plastic bags. The fruits were sorted out as infested and

sound in the laboratory. The infested fruits were thoroughly examined and the seed damage was rated as complete (empty pods with a hole), heavy (seeds eaten in 3/4 of a pod), medium (1/2 empty pod) and light (seeds eaten in 1/4th of a pod).

For control trails the field was divided into 80 plots for using 4 insecticides each in 5 doses and 4 replications. In each plot larval count was made on all plants before treatment. Insecticides were sprayed with an air compressed hand sprayer in the given doses. Larval count was made again after 72 hours of the treatment.

RESULTS AND DISCUSSION

1. A total of 894 fruits were collected from 60 sample plants at 15 sampling points. Fruit infestation was recorded as under:

Table 1. Percent fruit infestation caused by *H. armigera*

Samples	No. of fruits		Total
	Infested	Sound	
1	49	0	49
2	54	0	54
3	64	0	65
4	66	0	66
5	55	0	55
6	72	0	72
7	57	0	57
8	43	0	43
9	50	0	50
10	66	0	66
11	42	0	42
12	61	0	61
13	57	0	57
14	67	0	67
15	90	0	90
Total	893	1	894
Percentage	-	-	99.9

The pest caused 99.9% infestation of the mature fruits of *Nigela sativa*. The larvae bored single hole in the fruits and devoured the content of the fruits to various degrees.

Table 2. Extent of seed loss in the infested fruits of *Nigela sativa*

Samples	No. of infested fruits with seed loss				Total
	Complete	Heavy	Medium	Light	
1	40	2	3	4	49
2	36	5	2	11	54
3	41	7	10	7	65
4	43	6	6	11	66
5	44	8	1	2	55
6	67	4	0	1	72
7	30	10	9	8	57
8	29	2	6	6	43
9	40	9	0	1	50
10	50	3	5	8	66
11	34	2	4	2	42
12	52	5	1	3	61
13	48	5	3	1	57
14	55	3	6	3	67
15	55	1	14	30	90
Total	654	72	70	98	894
Percentage	73	8	8	11	100

The table shows that seeds in 73% fruits were eaten completely leaving empty pods while in rest of the 27% fruits seed loss occurred as heavy (8%) medium (8%) and light (11%).

2. Control trials

Efficacy of 4 insecticides against *Heliothis armigera* is given in the following table.

Table 3. Percent mortality of *Heliothis armigera* larvae

Dose (%)	Pre-treatment population	Post-treatment population	% Mortality
MALATHION 57% EC			
0.02	49	0	100
0.03	69	0	100
0.04	118	0	100
0.05	66	0	100
Check	49	37	25
SUNMERIN 5% EC			
0.02	29	1	96.5
0.03	30	0	100
0.04	31	0	100
0.05	20	0	100
Check	32	25	22.0
DDVP 50% EC			
0.02	27	3	88.8
0.03	154	2	98.7
0.04	198	0	100
0.05	222	0	100
Check	109	92	16.0
LASER 25% EC			
0.02	64	8	87.5
0.03	92	2	97.8
0.04	66	0	100
0.05	73	0	100
Check	88	70	21.0

The table reveals that Malathion afforded the best results with 100% mortality of larvae in all the doses followed by sunmerin killing 100% larvae each in 0.03, 0.04 and 0.05% concentration. DDVP and Laser each caused 100% kill of larvae in 0.04 and 0.05% concentration. Natural mortality of larvae ranged from 16 to 25% in the treatments.

It can be concluded from the control trials that Malathion 57%EC or Sunmerin

5%EC can be used from 0.03 to 0.05% doses for the control of *H. armigera* in the field.

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