
TRIAL OF INSECTICIDES AND A FUMIGANT AGAINST FOREST SEED PESTS

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Abstract

In a laboratory trial against *Hypsipyla robusta*, a fruit borer of *Cedrela toona*, DDVP 50% EC killed 100% larvae each in 0.05 and 0.03% doses and 83% larvae in 0.01% dose while Laser 25% EC gave 80, 43 and 33% kill of larvae, respectively in 0.05, 0.03 and 0.01% doses. Malathion showed poor results with 36.6 and 26.6% mortality of larvae in 0.05 and 0.03% doses, respectively.

In another trial (a fumigant) caused 100% mortality of adults of stored seed pests, *Caryedon serratus* and *Tribolium castaneum*, in the doses of 50, 100, 150 and 200 mg per 0.043 m³ volume. No toxic effect of phostoxin was found on the seed germination of *Pinus roxburghii*, *Dalbergia sissoo*, *Acacia modesta* and *A. tortilis* in the above doses.

Introduction

Hypsipyla robusta and *Caryedon serratus* were recorded as major seed pests of *Cedrela toona* and *Acacia tortilis* respectively at Peshawar during 1992-93. The former attacked fruits and seeds on the standing trees while the latter damaged seeds in the stores. Chaudhry (1966) found larvae of *H. robusta* boring into the shoots of *Cedrela toona* in Changa Manga, Pakistan. Beeson (1941) reported *H. robusta* as a serious pest of fruit and seeds of *Cedrela toona* and *Carapa moluccensis* and shoot borer of *Cedrela* and *Swietenia* from Indo-Malayan Region and described its 5 generations, 1st being the flower generation 2nd the fruit generation and 3rd, 4th and 5th the shoot generations. Rao and Bennett (1969) found *H. robusta* attacking *Cedrela toona* in

Uttar Pradesh, Himachal Pradesh and the Punjab, *Chichrassia* sp. in West Bengal and *Swietenia macrophylla* in Kerala in India. Akanbi (1973) recorded *H. robusta* as major insect borer of Mahogany in Nigeria.

Caryedon serratus was found infesting stored fruits and seeds of *Tamarindus indica* at Ajmer, Rajasthan, Gujrat, Mdhya Pradesh, Maharashtra, Uttar Pradesh and Maysore and pods of *Acacia farnesiana* and *A. arabica* on the trees at Udaipur and Rajasthan in India (Mital and Khanna, 1968).

Tribolium castaneum, a major pest of stored grain, was found infesting slightly stored seeds of *Ceratonia siliqua* at Peshawar. Gill et al (1975) recorded damage of this pest in stored walnut (*Juglans regia*) at Haryana, Punjab, Delhi and Uttar Pradesh in India.

The present studies present control trials with insecticides against *H. robusta* and a fumigant against *C. serratus* and *T. castaneum* and effect of the fumigant on the seed germination of 4 tree species.

Method and Material

Trials were carried out in the laboratory at the Pakistan Forest Institute, Peshawar during 1993 at room temperature ranging from 25 to 30°C. Larvae of *H. robusta* collected on *Cedrela toona* while adults of *C. serratus* and *T. castaneum* reared in the laboratory on their respective hosts. For insecticidal trial fresh panicles of immature fruits

of *Cedrela toona* were collected from the field and sprayed evenly with an air compressed hand atomizer using Malathion 57%EC, DDVP 50%EC and Laser 25%EC in 0.01, 0.03 and 0.05% doses. On drying the panicles of fruits were taken in glass chimneys in 3 replications. 30 full grown larvae were released on the fruits in each chimney and covered with muslin cloth. Observations on mortality of larvae were taken daily.

For fumigation trial phostoxin tablets were used in the recommended doses of 33, 66, 99 and 132 gm per 28.3 m³ with an exposure time of 72 hours. The available airtight containers of 0.43 m³ volume were taken and 4 doses of phostoxin were calculated on the basis of the recommended doses as 50, 100, 150 and 200mg/0.043 m³. Seeds of *Acacia tortilis* (host of *C.serratus*) and *Gleditsia triacanthos* (host of *T.castaneum*) each 1/2 kg was taken separately in the containers in 3 replications. 30 beetles each of *C.serratus* and *T.castaneum* were released on their

respective host seeds in the containers. Bits of phostoxin tablet were added to the containers in the above doses and covered with airtight lids. Observations were recorded after 72 hours.

To see the effect of phostoxin on the seed germination of *Pinus roxburghii*, *Dalbergia sissoo*, *Acacia modesta* and *Acacia tortilis* samples of seeds each weighing 100 gm were taken in the same containers in 2 replications. Bits of phostoxin tablet in 50, 100, 150 and 200 mg doses were added to each container and covered with airtight lids. On the expiry of the exposure period of 72 hours all the samples were taken out and used for the germination test in the seed laboratory.

The data in each case were statistically analysed in the computer laboratory.

Results and discussion

Results are described as follows:

Table 1. Efficacy of Insecticides against toon fruit borer, *Hysipyla robusta*.

Dose %	Mortality of larvae		
	Released	Dead	%
DDVP 50%EC			
0.00	30	3	10.0
0.01	30	25	83.0
0.03	30	30	100.0
0.05	30	30	100.0
Laser 25%EC			
0.00	30	3	10.0
0.01	30	10	33.0
0.03	30	13	43.0
0.05	30	24	80.0

<u>Malathion 57%EC</u>			
0.00	30	2	6.6
0.01	30	0	0.0
0.03	30	8	26.6
0.05	30	11	36.6

<u>ANOVA</u>				
<u>SV</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>FV</u>
Rep.	2	1.500	0.750	0.69
Treat.	2	188.167	94.083	86.87**
Error(a)	4	4.333	1.083	
Maj. Lots	8	194.000		
Doses	3	199.417	66.472	28.37
TXD	6	69.166	11.528	4.92
Error (b)	18	42.167	2.343	
Total:	35	504.750		

** = highly significant

The table reveals that DDVP proved the most effective insecticide against the pest as it caused 100% mortality of larvae each in 0.03 and 0.5% doses. Laser gave as high as 80% kill of larvae in the highest dose of 0.05% with medium effect in lower doses while Malathion showed poor results in all the doses against the pest.

ANOVA shows that the insecticides, doses and interaction between insecticides and doses are highly significant.

The LSD test revealed the highest effect by DDVP medium by Laser and poor by Malathion. Similarly 0.05% dose in each treatment was found highly effective and control dose the poorest one in the LSD test.

Table 2. Efficacy Phostoxin against *C.serratus* and *T.castaneum*

Dose mg/0.043 m ³	Mortality of beetles		
	released	dead	%
<i>C.serratus</i>			
0	30	5	17
50	30	30	100
100	30	30	100
100	30	30	100
200	30	30	100
<i>T.castaneum</i>			
0	30	3	10
50	30	30	100
100	30	30	100
150	30	30	100
200	30	30	100

Phostoxin, releasing phosphine gas, showed highly significant results against the pests as 100% mortality both of the pests occurred in all the doses with 17% natural mortality of *C.serratus* and 10% of *T.castaneum*.

The effect of phostoxin on the germination of seeds of 4 tree species was investigated in the above doses as under:

Table 3. Effect of Phostoxin on the germination of seeds

Tree Species	% germination in the doses (mg/0.043 m ³)				
	0	50	100	150	200
<i>Pinus roxburghii</i>	88	88	94	86	92
<i>Dalbergia sissoo</i>	72	78	64	70	70
<i>Acacia modesta</i>	48	56	44	50	56
<i>Acacia tortilis</i>	14	6	14	18	16

ANOVA						
SV	SQ	DF	MS	F	SF	
Main effects	7.000	5	1.400	1.647	0.325	
Rep.	1.600	1	1.600	1.882	0.242	
Dose	5.400	4	1.350	1.882	0.332	
Explained	7.000	5	1.400	1.647	0.325	
Residual	3.400	4	0.850			
Total	10.400	9	1.156			
<i>Dalbergia sissoo</i>						
Main effect	43.100	5	8.620	1.112	0.472	
Rep.	22.500	1	22.500	2.903	0.164	
Dose	20.600	4	5.150	0.665	0.649	
Explained	43.100	5	8.620	1.112	0.472	
Residual	31.000	4	7.750			
Total	74.100	9	8.233			
<i>Acacia modesta</i>						
Main effects	25.400	5	5.080	0.163	0.964	
Rep.	10.000	1	10.000	0.320	0.602	
Dose	15.400	4	3.850	0.123	0.967	
Explained	25.400	5	5.080	0.163	0.900	
Residual	125.000	4	31.250			
Total	150.400	9	10.011			
<i>Acacia tortilis</i>						
Main effects	10.800	5	2.160	0.554	0.735	
Rep.	0.400	1	0.400	0.103	0.765	
Dose	10.400	4	2.600	0.667	0.648	
Explained	10.800	5	2.160	0.554	0.735	
Residual	15.600	4	3.900			
Total	26.400	9	0.933			

The data show that there is no significant difference in germination of treated and untreated of each tree species.

ANOVA confirms the non-toxic effect of phostoxin in all the doses on the seed germination of each tree species. Hence phostoxin can safely be used @ 50 to 200 mg per 0.043 m³ or 1 to 5 gm per 1 m³ value.

Conclusion

The attack of *Hypsipylla robusta* on fruits of *Cedrela toona* can be prevented by spraying DDVP 50%EC on the immature fruits in 0.03 or 0.05% dose. *Caryedon serratus* and *Tribolium castaneum* can be controlled with phostoxin in a dose of 1 to 5 gm per 1 m³. Seeds of *P. roxburghii*, *D. sissoo*, *a. modesta* and *A. tortilis* can be fumigated with phostoxin in a dose of 1-5 gm per 1 m³ for the control of seed borers and for sanitation purpose without affecting seed viability.

Acknowledgement

The author expresses his gratitudes to Mr. Afzal Cheema, Forest Mensuration Officer, Pakistan Forest Institute for statistical analysis of the data.

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