Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

JEZS Journal of Entomology and Zoology Studies

ISSN 2320-7078
JEZS 2014; 2 (1): 96-98

Received 29-01-2014
Accepted: 07-02-2014

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Management of Apple Tree Borer, *Aeolesthes Holosericea* Fabricius on Apple Trees (*Malus Domestica* Borkh.) In Jammu Province, Jammu and Kashmir State, India

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ABSTRACT

Management of Apple longicorn borer, *Aeolesthes holosericea* Fabricius was attempted using different treatments, viz. Check untreated, Mud plugging, Petrol plugging, Odonil plugging, Para dichloro benzene, Carbaryl, Dichlorvos and Aluminium phosphide to evaluated their bio efficacy against the pest. In all the treatments the borer holes were plugged with mud after treatment while plain mud plastering was done in control. All the treatments were significantly effective against the pest compared to check but Dichlorvos gave best results (100%) in reducing the pest population after 30 days upto 60 days after treatment. The order of efficacy of different treatments was Dichlorvos followed by Carbaryl > Odonil plugging > Aluminium phosphide > Para dichloro benzene > Petrol plugging > Mud plugging.

Keywords: *Aeolesthes holosericea*, longicorn, *Malus domestica*, pest management, chemicals.

1. Introduction

The State of Jammu and Kashmir is endowed to have the richest pilgrim of different varieties of apples. Many of the varieties are found at the same season. Apples are exported from Kashmir not only to other parts of India but also to the different parts of the world [1]. As per last horticulture census 1999-2000, about 55% of the area is covered under apple cultivation in the that accounted for an annual production of 1372.97 thousand metric tonnes of apples during 2009-10 [2].

Apple has attained the distinction of being the most important fruit crop of the North Western Himalayan region of India. Apple crop is vulnerable to various biotic and abiotic factors. Amongst biotic factors tree trunk borer, Aeolesthes holosericea Fabricius highly destructive pest of apple and other temperate fruits. Pest makes horizontal zig zag channels into the trunk and main branches thereby reducing the life of trees and fruit yield. Realizing the importance of pest, detailed study of biology of apple stem borer was taken into consideration to evaluate different treatments to reduce the pest infestation on apple trees in Jammu province.

2. Material and Methods

Experiments for management of stem borer *Aeolesthes holosericea* Fabricius on apple trees was carried out at Bhaderwah Station, in a completely randomized block design during 2009-2010. Live borer holes were determined by plugging all the holes with mud. Holes on the earmarked trees were counted before applying treatments (pre-treatment count) viz. Mud plugging, Petrol plugging, Odonil plugging (1.0g), Para Dichloro Benzene (0.5, 1.0 and 1.5%), Carbaryl (2.05, 3.33 and 5.0%), Dichlorvos (0.5, 1.0 and 1.5%) and Aluminium phosphide (0.5, 1.0 and 1.5%).

All these chemicals were applied in the holes in recommended doses, plugged with cotton and plastered with mud. Plain mud plastering comprised as control. Each treatment was replicated thrice with single tree as a replicate. In case of Petrol plugging (100%), Carbaryl (2.05, 3.33 and 5.0%), Dichlorvos (0.5, 1.0 and 1.5%), cotton plugs after soaking separately in respective treatments and concentrations (50 ml/tree), were inserted deep into the tunnels and the holes were sealed with mud. In case of Para Dichloro Benzene (PDB) and odonil treatment, the required quantities of the materials were placed in the tunnels after cleaning the frass and sealed with mud.

Percent mortality of the pest was worked out [3, 4] on the basis of holes live holes observed one day before treatment and those recorded at 15, 30, 45 and 60 days after treatment (DAT). The data was subjected to statistical analysis after angular transformations to compute the significance of treatments.

3. Results and Discussion

3.1 Comparative efficacy of various treatments against *Aeolesthes holosericea* Fabricius on apple trees (*Malus domestica* Borkh.) during 2009 and 2010

Data on bio efficacy of different treatments against *Aeolesthes holosericea* Fabricius is presented in Table-1. Holes on earmarked trees were counted before applying the treatments. Various treatments viz. Check untreated, Mud plugging, Petrol plugging, Odonil plugging, Para dichloro benzene, Carbaryl, Dichlorvos and Aluminium phosphide were evaluated for their bio efficacy against pest. Results revealed that all the treatments were significantly effective against the pest compared to check.

Data showed that the number of holes per tree ranged from 5.66 to 11.0 and 5.60 to 12.30 during 2009 and 2010 respectively. Data revealed that Dichlorvos at 0.5, 1.0 and 1.5% resulted in 85.03, 100.0 and 100% reduction of live holes at 15 days after treatment during 2009. Odonil (1.0g), Para dichlorobenzene (1.0g), carbaryl (2.05, 3.33 and 5.0%), Dichlorvos (0.5, 1.0 and 1.5%) and aluminium phosphide (1.0 and 1.5%) resulted in 75.0, 77.14, 87.76, 92.93, 100.0, 85.83, 100.0, 100.0, 84.84 and 100% reduction of live holes per tree 15 days after treatment in comparison to mud plaster and petrol plugging (100 %) during 2009. After 60 days of treatment, Dichlorvos 1.0%, 1.5% and aluminium phosphide 1.5% were the most effective (100.0%) in controlling the pest while aluminium phosphide (0.5%) was the least effective (7.40%) in reducing number of live holes per tree during 2009. Amongst the treatments during 2010, Dichlorvos at all the three concentrations (0.5, 1.0 and 1.5%) resulted 100% reduction of live holes per tree 15 days after treatment. Aluminium phosphide (1.5%) and odonil plugging also provided 100% results after 15 days after treatment. Carbaryl 2.05, 3.33 and 5.0% gave 90.49, 84.12 and 96.96% reduction in borer population. Least effective treatment during 2010 was mud plugging that offered only 11.42% control. The order of efficacy of different treatments was Dichlorvos followed by Carbaryl > Odonil plugging > Aluminium phosphide > Para dichloro benzene > Petrol plugging > Mud plugging.

Amongst all the treatments, Dichlorvos gave best results (100%) in reducing the pest population after 30 days upto 60 days after treatment. However carbaryl also offers a good control over pest population at 2.05, 3.33 and 5.0 % concentration resulting in 76.33, 84.03 and 85.9 % during 2009 and 75.65, 75.65 and 90.69% reduction in 2010. Similarly, aluminium phosphide (1.5%) gave 100% results in borer treatment (Table-1). Efficacy of dichlorvos, naphthalene balls and petrol plugging against borers have been reported by various workers [4, 5, 6, 7, 8]. Few authors [9] recommended the use of PDCB which if not used judiciously causes plant injury. In Himachal Pradesh while working on an allied borer authors [10] mentioned the possibility of injection of 0.1 % DDT or BHC in the borer hole with the help of syringe in addition to their recommendation of PDCB. It is recorded that dichlorvos (1.0%) gave 100 % control of the apple stem borer, *Aeolesthes holosericea* Fabr. on apple in Himachal Pradesh [6]. Plugging the holes with mixture of BHC dust and mud (in the ratio of 1:6) or plugging the holes with cotton soaked in petrol after cleaning the frass followed by sealing with mud for management of *Aeolesthes sarta* infesting walnut and other temperate fruits in Kashmir [7]. Fumigation of tunnels with formaldehyde solution or aluminium phosphide tablets also gave good control of the pest [11]. Some authors [8] have recorded that Odonil controlled *Aeolesthes sarta*, to an extent of 80.45- 81.55% within 15 days after treatment on walnut. Some other [4] recorded highest efficacy of aluminium phosphide (78.78%) in controlling *Aeolesthes sarta* on apples in Kashmir followed by carbaryl > dichlorvos > *B. bassiana* > naphthalene balls > odonil > petrol plugging > mud plaster. Alam [5] also found, besides, mechanical destruction of grubs and beetles, fumigation of Para dichlorobenzene, carbon bisulphide and chloroform effective against the pest. Placement of cotton plugs after soaking in dichlorvos (0.2%) and sealing the holes with mud inflicted 61.70 and 61.75% mortality in the pest during1984 and 1985 respectively. Few authors [12, 13] recommended the injection of kerosene oil and para dichloro benzene mixture, carbon tetrachloride, carbon disulphide and para dichloro benzene mixture; chloroform, petrol, naphthalene and carbolic acid mixture; benzene; ethyl acetate; petrol and kerosene oil mixture against another longicorn beetle *Batocera rufomaculata* on mulberry in Jammu and Kashmir.

Table 1: Comparative efficacy of various treatments against *Aeolesthes holosericea* Fabricius on apple trees (*Malus domestica* Borkh.) during 2009 and 2010

Treatment	Dose/ tree	Pre-treatment count		Percent reduction in number of holes per tree (Days After Treatment)								Pooled Mean
				2009 (DAT)				2010 (DAT)				
		2009	2010	15	30	45	60	15	30	45	60	
Check untreated	-	8.33 (16.77)	12.00 (20.26)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00±0.0 (0.00)
Mud plugging	-	7.0 (15.34)	5.66 (13.76)	49.99 (44.42)	34.72 (35.45)	23.60 (28.68)	9.70 (18.05)	38.72 (38.31)	27.30 (31.49)	27.30 (31.49)	11.42 (19.75)	27.84^{ab}±4.7 (31.33)
Petrol plugging	100%	6.6 (14.88)	8.3 (16.74)	55.55 (47.73)	51.38 (45.23)	40.27 (39.05)	40.27 (39.05)	42.59 (40.54)	35.5 (36.15)	31.85 (34.33)	21.1 (26.74)	39.81^{ab} ±3.83 (39.05)
Odonil plugging	1.0g	9.3 (17.75)	6.3 (14.53)	75.0 (59.31)	68.05 (55.08)	63.88 (53.03)	48.88 (44.34)	100 (90.0)	100 (90.0)	89.16 (70.05)	83.61 (65.50)	78.57^{c}±6.3 (62.42)
Para dichloro benzene	0.5g	6.3 (14.53)	10.66 (19.0)	67.59 (55.08)	67.59 (55.08)	58.3 (49.46)	58.3 (49.46)	40.19 (39.05)	40.19 (39.05)	36.49 (36.86)	26.7 (30.66)	59.57^{d} ±2.7 (50.51)

	1.0g	5.66 (13.76)	10.33 (18.74)	77.14 (60.45)	77.14 (60.45)	77.14 (60.45)	65.71 (54.09)	57.87 (49.46)	54.84 (47.73)	51.51 (45.80)	45.15 (42.06)	
	1.5g	7.3 (15.67)	7.0 (15.34)	69.43 (56.09)	69.43 (56.09)	69.43 (56.09)	59.72 (50.35)	71.02 (57.14)	71.02 (57.14)	61.30 (51.26)	56.54 (48.49)	
Carbaryl	2.05%	6.0 (14.17)	11.0 (19.36)	87.76 (68.43)	83.0 (65.50)	83.0 (65.50)	76.33 (60.45)	90.49 (71.80)	90.49 (71.80)	87.92 (68.43)	75.65 (59.31)	87.65 ±1.41 (69.42)
	3.33%	8.3 (16.74)	8.3 (16.74)	92.93 (74.57)	92.93 (74.57)	84.03 (66.34)	84.03 (66.34)	84.12 (66.49)	84.12 (66.49)	84.12 (66.49)	75.65 (60.34)	
	5.0%	11.0 (19.36)	8.3 (16.74)	100.0 (90.0)	100.0 (90.0)	91.5 (71.80)	85.9 (67.81)	96.96 (79.73)	96.96 (79.73)	85.15 (67.22)	90.69 (72.36)	
Dichlorvos	0.5%	9.3 (17.75)	7.6 (16.0)	85.83 (67.81)	85.83 (67.81)	85.83 (67.81)	78.33 (62.25)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	97.32 ±6.4 (80.66)
	1.0%	10.6 (19.0)	10.6 (19.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	
	1.5%	8.6 (17.05)	7.6 (16.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	
Aluminium phosphide	0.5%	8.3 (16.74)	10.33 (18.74)	28.04 (31.33)	24.33 (29.55)	15.87 (23.47)	7.4 (15.78)	32.10 (34.51)	32.10 (34.51)	32.10 (34.51)	15.58 (23.24)	65.52 ^{bcd} ±7.2 (54.04)
	1.0%	8.0 (16.42)	12.3 (20.53)	84.4 (66.73)	84.4 (66.73)	81.38 (64.43)	81.38 (64.43)	88.8 (70.44)	86.66 (68.57)	86.66 (68.57)	86.66 (68.57)	
	1.5%	7.0 (15.34)	11.33 (19.66)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	
C.D. (p=0.05)				**72.18 ±3.7**	**70.34 ±4.0**	**66.34 ±4.39**	**61.94 ±4.8**	**71.34 ±4.4**	**70.06 ±4.7**	**66.95 ±4.62**	**62.1 ±5.4**	

Each figure is a mean of three replications; Figures in parenthesis are angular transformed (arc sine transformed) values;
*Means followed by same superscripts are not significantly different (CD=0.05).

4. Acknowledgement
The authors are thankful to Head, Department of Zoology, for all the necessary help and guidance.

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