Indian Journal of Entomology 84(2): 421-422 (2022) DoI No.: 10.55446/IJE.2021.277

# SEASONAL INCIDENCE AND MANAGEMENT OF HARAR BORER *DICHOCROCIS* SP.

**Sumit Kumar*, Vijay Bharti, Virender Kumar Rana and Ajay Sharma[1]**

Department of Entomology, College of Horticulture and Forestry, Neri,
Hamirpur 177001, Himachal Pradesh, India
[1]Department of Entomology, Dr Y S Parmar University of Horticulture and Forestry,
Nauni, Solan 173230, Himachal Pradesh, India
*Email: sumitbhangalia@gmail.com (corresponding author)

**ABSTRACT**

**A study on the seasonal incidence and management of harar borer *Dichocrocis* sp. was carried out at the College of Horticulture and Forestry, Neri, Hamirpur, Himachal Pradesh in 2018-19. Incidence started during the last week of May with two peaks, first peak was in the last week of July (77%) and the second peak (72%) was in the last week of September. The four insecticides viz. chlorantraniliprole 18.5 w/w, cyantraniliprole 10.26OD, fenvalerate 20EC, monocrotophos 36%EC and the biopesticide agniastra prepared using cow urine, reduced the infestation to <43%. Chlorantraniliprole 18.5 w/w @ 0.005% was the best reducing the infestation to 7.77% followed by cyantraniliprole 10.26OD @0.01% (9.99%) and fenvalerate 20EC @0.012% (14.43%).**

**Key words:** *Dichocrocis* spp., harar borer, chlorantraniliprole, cyantraniliprole, agniastra, cow urine, seasonal incidence, peaks, control

Harar (*Terminalia chebula*) is a deciduous tree with its fruits having medicinal properties (Bag et al. 2013), forms an important constituent of 'Triphala' (a medicinal digestive stew) used in Ayurveda to treat various problems like flatulence, constipation etc. (Suryaprakash et al., 2012). Chander and Chauhan (2014) reported beetle infestation on its fruits in Haryana and adjoining parts of Himachal Pradesh; and Das et al. (2016) reported a scarab beetle from Assam. In the low hill areas of Himachal Pradesh, the fruits are bored by a caterpillar, moving from one fruit to another and damaging numerous fruits. Sharma et al. (2018) observed that fruits of *T. chebula* are heavily infested by an insect, with frass coming out. Damage up to 82.5% is known due to a borer *Dichocrocis* spp. (Lepidoptera: Crambidae) in some parts of Himachal Pradesh. There is dearth of information on its life history, and this study explores its seasonal incidence and control with field experiments conducted at the experimental farm of College of Horticulture and Forestry, Neri, Hamirpur during 2018-19.

## MATERIALS AND METHODS

To evaluate the seasonal incidence four unsprayed trees having uniform vigour and age were selected, and ten fruits from each tree covering all directions were collected at fortnightly intervals, thus with a sample of 40 fruits each. The damage symptoms like hole or excreta or frass were considered and the data pooled and converted to %. To evaluate the efficacy of control, four insecticides viz. chlorantraniliprole 18.5 w/w, cyantraniliprole 10.26OD, fenvalerate 20EC and monocrotophos 36%EC, along with biopesticide agniastra were tried. Agniastra was prepared using the following constituents viz cow urine: 20 l, grounded garlic: ½ kg, grounded green chillies ½ kg and neem leaves 5 kg. All the ingredients were mixed in a container and boiled 4 to 5 times and allowed to cool down for 48 hr, and then mixture was filtered using muslin cloth and stored in a container. It was applied @ 2.5 l/ 100 l of water (Acharya, 2017). The experiment was laid out in a randomized block design with three replications; and in control, foliar application of water only was given. Three sprays at 21 days intervals were given and the data on % infestation was pooled to perform statistical analysis.

## RESULTS AND DISCUSSION

Seasonal incidence of *Dichocrocis* sp., on the basis of the fruits damaged revealed that the pest was spread from last week of May to last week of November when the fruits were harvested. Naik et al. (2010) had reported the activity of *Dichocrocis punctiferalis* on castor from July to November. The data depicted in Fig. 1, revealed two peaks, first in July and second in September. Kang et al. (2002) observed three distinct

Table 1. Efficacy of insecticide/biopesticide against *Dichocrocis* spp. on harar

| Treatments | Conc. (%) | Incidence after each spray 1st | 2nd | 3rd | Mean |
|---|---|---|---|---|---|
| Chlorantraniliprole SC45 | 0.005 | 4.44 (10.97) | 8.88 (17.10) | 7.77 (15.98) | 7.40 (14.68) |
| Cyantranliprole OD10.26 | 0.01 | 5.55 (12.59) | 9.99 (18.30) | 9.99 (18.30) | 8.51 (16.39) |
| Fenvaleate EC20 | 0.012 | 11.10 (19.15) | 15.55 (23.12) | 14.43 (22.26) | 13.69 (21.51) |
| Monocrotophos EC36 | 0.108 | 14.44 (22.12) | 24.44 (29.49) | 24.43 (29.54) | 21.10 (27.05) |
| Agniastra | 2.5 | 27.77 (31.75) | 41.10 (39.81) | 42.21 (40.48) | 37.02 (37.34) |
| Control | - | 38.88 (38.49) | 67.77 (55.84) | 71.10 (57.54) | 59.25 (50.62) |
| Mean | - | 17.03 (22.51) | 27.95 (30.61) | 28.32 (30.68) | |

Figures in parentheses angular transformed values

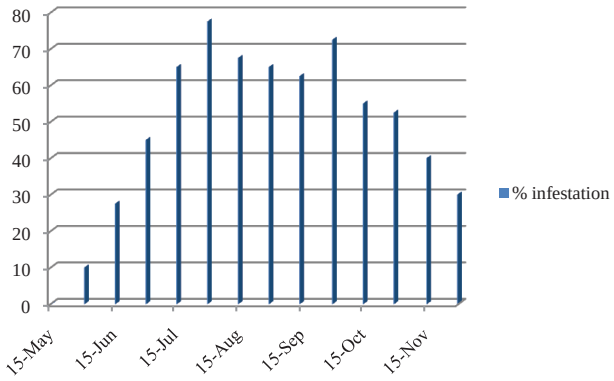


Fig. 1. Seasonal incidence of *Dichocrocis* sp. on harar

peaks during mid to late June, mid to late August, and in late September. Incidence ranged from 10% during the last week of May, which increased to 77.5% during last week of July, and the second peak was in the last week of September. Thus, incidence was severe between July and September, resulting in heavy losses. Sharma et al. (2018) also reported the maximum damage in the third week of July (ranging from 22.5 to 82.5%).

Table 1 reveals the efficacy of insecticides-chlorantraniliprole 45%SC (0.005%), and cyantraniliprole 10.26OD (0.01%) were the most effective (reducing the incidence to 7.40 and 8.51%, respectively). With fenvalerate and monocrotophos, the damage was 13.69 and 21.10%, respectively, while in agniastra it was 37.02% after three applications. The adults emerging from the infested fruits collected from the trees sprayed with agniastra were deformed. Pawar et al. (2016) evaluated insecticides against brinjal shoot and fruit borer *Leucinodes orbonalis*, and observed chlorantraniliprole as superior; and Mandal et al. (2011) observed chlorantraniliprole 20%SC at 40 g a.i./ ha as the best; and cyantraniliprole 10%OD @ 90 and 105 g a.i./ha were highly effective against *Helicoverpa armigera* (Mandal, 2012).

## REFERENCES

Acharya D. 2017. Zero budget prakritik krishi. Pushpak Press Pvt. Ltd., New Delhi. 20 pp.

Bag A, Bhattacharya S K, Chattopadhayay R R. 2013. The development of *Terminalia chebula* (Combertaceae) in clinical research. Asian Pacific Journal of Tropical Biomedicines 3(3): 244-252.

Chander S, Chauhan S K. 2014. Current status of management of *Terminalia chebula* in Shivalik Hills. Journal of Krishi Vigyan 3(1): 45-49.

Das M, Bhattacharyya B, Pujari D, Handique G. 2016. Faunal composition of scarab beetle and their hosts in Assam. Arthropod diversity and conversation in the tropics and subtropics. pp. 335-344.

Mandal S, Singh N J, Konar A. 2011.Efficacy of synthetic and botanical insecticide against whitefly (*Bemisia tabaci*) and shoot and fruit borer (*Leucinodes orbonalis*) on brinjal (*Solanum melongena* L.). Journal of Crop Weed 6(1): 49-51

Mandal S K. 2012. Bio-efficacy of cyazypyr 10% OD, a new anthranilic diamide insecticide against the insect pests of tomato and its impact on natural enemies and crop health. Acta Phytopathologica et Entomologica Hungarica 47(2): 233-249.

Pawar S A, Bhalekar M N, Datkhile R V, Bachkar C B. 2016. Bioefficacy of insecticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guen.). Bioinfolet 13: 273- 275.

Sharma A, Rana V K, Kumar S. 2018. New record of harar (*Terminalia chebula*) fruit borer *Dichocrocis* spp. (Lepidoptera: Crambidae). Indian Journal of Entomology 80(4): 1703-1704.

Suryaparkash D V, Sreesatya N, Avanigadda R, Vangalapati M. 2012. Pharmalogical review on *Terminalia chebula.* International Journal of Research in Pharmaceutical and Biomedical Sciences 3(2): 679-683.

Kang C H, Lee K C, Park C G, Lee D.W, 2002. Seasonal occurrence pattern of peach pyralid moth, *Dichocrocis punctiferalis* in Fuyu persimmon orchards and fruit damage at harvesting time. Korean Journal of Applied Entomology 41: 107-112.

Naik M I, Ajith M A, Manjunath M, Naik C M. 2010. Insect Environment 16(3): 126.

(Manuscript Received: November, 2020; Revised: January, 2021;
Accepted: January, 2021; Online Published: July, 2021)
Online published (Preview) in www.entosocindia.org Ref. No. e20316

Indian Journal of Entomology 84(2): 423-425 (2022) DoI No.: 10.55446/IJE.2021.276

# EFFICACY OF PHOSMET AGAINST WOOLLY APPLE APHID *ERIOSOMA LANIGERUM* (HAUSMANN)

JOGINDER SINGH* AND SANGITA SHARMA[1]

Dr Y S Parmar University of Horticulture and Forestry Horticulture Research Station, Seobagh, Kullu 175138, Himachal Pradesh, India
[1]Regional Horticultural Research and Training Station, Mashobra, Shimla 171007, Himachal Pradesh, India
*Email: drjsverma@yahoo.com (corresponding author)

**ABSTRACT**

**The efficacy of phosmet was evaluated against the aerial form of the woolly apple aphid *Eriosoma lanigerum* (Hausmann) during October- November 2017 and 2019 in apple orchards at Manali district Kullu of Himachal Pradesh. All the doses of phosmet were effective in suppression of the aphid up to 21 days of the spray. Chlorpyriphos (0.05%) was found statistically superior (0.06 aphid colonies/ twig) followed by phosmet @ 0.075%, 0.05% and 0.025% (0.36, 0.40 and 0.54 aphid colonies/ twig, respectively) during 2017. Similar trend was observed during 2019 but chlorpyriphos was found statistically at par with phosmet @ 0.05% and 0.075%. All the concentrations proved safe to the apple plants as there were no phytotoxic symptoms.**

**Key words:** Apple, *Eriosoma lanigerum*, phosmet, chlorpyriphos, Dursban, efficacy, dose, aphid colonies/ twig, phytotoxicity, Himachal Pradesh

Apple is the most important cash crop of Himachal Pradesh accounting for about 90% of the total horticultural produce, and it is infested by a number of insect pests. Among them, woolly apple aphid *Eriosoma lanigerum* (Hausmann) is a serious pest infesting both aerial as well subterranean plant parts, and affecting the plant vigor and yield. In some apple growing areas of Himachal Pradesh, especially Kullu valley and middle valley areas of Kinnaur district, the aerial populations are managed successfully by its endoparasitoid *Aphelinus mali* (Haldemann) introduced in the mid- thirties (Rawat and Pawar, 1987). However, in other apple growing areas like Shimla, Mandi, lower and upper valley areas of Kullu, Kinnaur and Spiti valley, this insect pest appears in epidemic form and needs regular insecticidal applications. A large number of options are recommended (Thakur and Dogra, 1980; Thakur and Gupta, 1988). Later, some neonicotinoids, with different mode of action had been found effective against sucking pests (Angelini and Lazzarini, 1997; Lacombe, 1999; Nakano et al., 1999). Some insecticides have been banned or could not be recommended according to the current Control Insecticides Board (CIB), India guidelines. With malathion and chlorpyriphos, registered against aphids on apple is proposed to be banned, there is a need to evaluate new ones. The present study evaluates the efficacy of phosmet, a new molecule against *E. lanigerum*.

## MATERIALS AND METHODS

Field experiments were carried out in apple orchard at farmer's field at village Brua in Manali area during 2017 and 2019. The trials were laid in randomized block design on 10-15 years old trees of variety 'Royal Delicious'. Three concentrations of phosmet (@ 0.025, 0.05 and 0.075% along with standard chlorpyriphos (@ 0.05 %) were evaluated as foliar application at post-harvest stage i.e. October- November. Two more concentrations viz., 0.1 and 0.15% were observed only for phytotoxic symptoms. There were five treatments including an untreated control, each treatment replicated four times with single tree as a replication. Spray was done with a high-volume sprayer in October @ 10 l of spray fluid/ tree. The pretreatment counts on the number of woolly apple aphid colonies on ten randomly selected twigs were observed in each treatment one day before the spray, while post- treatment counts were made after 3, 7, 14 and 21 days of the spray. These data were analyzed statistically after subjecting to $\sqrt{n+1}$ transformation. The plants were also observed for phytotoxic symptoms, if any.

## RESULTS AND DISCUSSION

Data on the number of woolly apple aphid colonies/ twig during 2017 and 2019 presented in Table 1 reveal that all the treatments are effective against the aphid.

Table 1. Efficacy of phosmet 50WP against woolly apple aphid (2017, 2019)

| Treatments | 2017 | | | | | 2019 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of woolly apple aphid colonies/ twig | | | | | | | | | |
| | Pre count | 3 DAT | 7 DAT | 14 DAT | 21 DAT | Pre count | 3 DAT | 7 DAT | 14 DAT | 21 DAT |
| Phosmet @ 0.025% | 12.06 | 3.10 | 2.74 | 2.10 | 0.54 | 6.32 | 3.22 | 1.58 | 1.54 | 1.18 |
| | (3.61) | (2.01)$^{b}$ | (1.93)$^{c}$ | (1.76)$^{c}$ | (1.24)$^{b}$ | (2.70) | (2.05)$^{b}$ | (1.59)$^{b}$ | (1.59)$^{b}$ | (1.46)$^{b}$ |
| Phosmet @ 0.05% | 10.42 | 1.96 | 1.32 | 1.04 | 0.40 | 7.06 | 2.88 | 0.98 | 1.10 | 0.42 |
| | (3.37) | (1.72)$^{a}$ | (1.52)$^{b}$ | (1.43)$^{b}$ | (1.18)$^{b}$ | (2.83) | (1.96)$^{b}$ | (1.40)$^{b}$ | (1.43)$^{ab}$ | (1.19)$^{ab}$ |
| Phosmet @ 0.075% | 11.02 | 2.36 | 1.22 | 1.14 | 0.36 | 7.38 | 2.74 | 1.20 | 1.18 | 0.82 |
| | (3.46) | (1.82)$^{ab}$ | (1.49)$^{b}$ | (1.46)$^{b}$ | (1.17)$^{b}$ | (2.88) | (1.93)$^{b}$ | (1.48)$^{b}$ | (1.47)$^{ab}$ | (1.34)$^{ab}$ |
| Dursban @ 0.05% | 10.68 | 2.22 | 0.30 | 0.08 | 0.06 | 7.28 | 1.10 | 0.10 | 0.30 | 0.10 |
| | (3.41) | (1.78)$^{ab}$ | (1.14)$^{a}$ | (1.04)$^{a}$ | (1.03)$^{a}$ | (2.87) | (1.45)$^{a}$ | (1.05)$^{a}$ | (1.14)$^{a}$ | (1.05)$^{a}$ |
| Control | 10.56 | 10.74 | 12.04 | 12.82 | 11.04 | 5.40 | 5.70 | 6.28 | 6.72 | 7.20 |
| (water spray only) | (3.40) | (3.43)$^{c}$ | (3.61)$^{d}$ | (3.71)$^{d}$ | (3.47)$^{c}$ | (2.52) | (2.57)$^{c}$ | (2.68)$^{c}$ | (2.73)$^{c}$ | (2.82)$^{c}$ |
| CD (p = 0.05) | NS | 0.27 | 0.20 | 0.16 | 0.06 | NS | 0.25 | 0.30 | 0.40 | 0.37 |

Figures in parentheses √ (n+1) transformed values; Each replication consisted of 10 twigs; Means followed by common letters do not differ significantly; DAT = Days after treatment

During 2017, after three days after spray (DAS) aphid colonies/ twig ranged from 1.96 to 3.10 in the treated plants compared to 10.74 in the untreated control. Phosmet @ 0.05% recorded significantly less aphid colonies/ twig (1.96) followed by chlorpyriphos @ 0.05 % (2.22), phosmet @ 0.075 % (2.36) which were at par with each other. Similarly, during 2019, aphid colonies/ twig ranged from 1.10 to 3.22 in treated plants. Chlorpyriphos showed significantly less aphid colonies (1.10) as compared to phosmet @ 0.075, 0.05 and 0.025%. Similar trends were observed after 7 DAS, during 2017 and 2019, with chlorpyriphos (0.05%) exhibiting significantly higher toxicity to aphid as compared to phosmet; however, phosmet (0.05 and 0.075%) was statistically at par. During 2017, aphid colonies/ twig in chlorpyriphos treated plant was 0.30 whereas it was 1.22 and 1.32 in phosmet (0.075 and 0.05%) treated plants, respectively. In 2019, chlorpyriphos resulted in 0.10 aphid colonies while it was 1.20 and 0.98 in phosmet @ 0.075 and 0.05%, respectively; only least control was obtained with phosmet @ 0.025% (1.46 aphid colonies/twig). On 14 DAS, all treatments continued their efficacy, and chlorpyriphos proved highly effective followed by phosmet @ 0.05%. During 2017, similar trends were observed even after 21 DAS; however, chlorpyriphos was found to be statistically at par with phosmet @ 0.05 and 0.075% after 14 and 21 DAS during 2019.

Chlorpyriphos 0.05 % was found to be the most effective insecticide (0.06 average number of colonies/ twig during 2017) and it was followed by phosmet @ 0.075% and 0.05%. All the treatments were found safe with no phytotoxic symptoms. Pree (1979) found that phosmet provided good control of Oriental fruit moth and was least toxic to the parasite, *Macrocentrus ancylivorus* (Rohwer) amongst azinophosmethyl and permethrin. Bradley et al. (1997) placed phosmet in 'no or little toxicity' (<10 %) category while evaluating effect 31 pesticides on *Aphelinus mali*, a parasitoid of woolly apple aphid. The results of the present study corroborate earlier results on chlorpyriphos as highly effective (Thakur and Gupta, 1998; Khajuria et al., 2010). Singh and Bhardwaj (2018) reported higher toxicity of chlorpyriphos and thiamethoxam against aerial form of woolly apple aphid. Keeping in view the over /and longtime use of chlorpyriphos, its toxicity to the parasitoids/ predators and in case of restrictions on its further use in agriculture in the coming time, phosmet @ 0.05% may provide an alternate and comparatively safer molecule for the suppression of woolly apple aphid.

## REFERENCES

Angilini R, Lazzarini L. 1997. Confidore 200SL: a new systemic insecticide with a wide spectrum of activity. Informatore Agrario Suoplemento 53(11): 30-31.

Bradley S J, Murrell V C, Shaw P W, Walker J T S. 1997. Effect of orchard pesticides on *Aphelinus mali*, the woolly apple aphid parasitoid. Proceedings. Fiftieth N Z plant protection conference, 1997. pp. 218-222.

Khajuria D R, Gupta D, Sharma J P. 2010. Bio- efficacy of insecticides against aerial form of the woolly apple aphid, *Eriosoma lanigerum* (Hausmann) and their safety to the parasitoid, *Aphelinus mali* (Haldemann). Pest Management and Economic Zoology 18(1/2): 225-228.

Lacombe J P. 1999. Efficacy of acetamiprid on aphids in fruit trees. Proceedings. Fifth international conference on pests in agriculture, part 2, Mantpellier, 1999. pp. 295-302.

Nakano O, Leite C A, Florim A C P.1999. Chemical control of citrus

psyllid, *Diaphorina citri* (Hemiptera: Psyllidae). Laranja 20(2): 319-328.

Pree D J. 1979. Toxicity of phosmet, azinophosmethyl and permethrin to the oriental fruit moth and its parasite, *Macrocentrus ancylivorus* (Rohwer). Environmental Entomology 8(5): 969-972.

Prigle K L. 1998. The use of imidacloprid as a soil treatment for the control of *Eriosoma lanigerum* (Hausemann) (Hemiptera: Aphididae). Journal of South African Society of Horticultural Science 8(2): 55-56.

Singh J, Bhardwaj S. 2018. Field efficacy of new insecticides against apple woolly aphid *Eriosoma lanigerum* (Hausmann). Indian Journal of Entomology 80(2): 355-357.

Rawat U S, Pawar A D. 1987. Biological control of woolly aphid, *Eriosoma lanigerum* Haus. in H P and J & K. Journal of Advanced Zoology 8: 42-45.

Thakur J R, Dogra G S. 1980. Woolly apple aphid, *Eriosoma lanigerum* research in India. Tropical Pest management 26: 8-12.

Thakur J R, Gupta P R. 1998. Management of the woolly apple aphid, *Eriosoma lanigerum* (Hausmann) (Homoptera: Aphididae) in apple orchard ecosystem. Pest Management and Economic Zoology 6(2): 93-100.

(Manuscript Received: November, 2020; Revised: January, 2021;
Accepted: January, 2021; Online Published: July, 2021)
Online published (Preview) in www.entosocindia.org Ref. No. e20315