

RESEARCH ARTICLE

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Effect of Parasitoid (*Epiricania melanoleuca*) on Sugarcane Leafhopper Population under Field Conditions

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ABSTRACT

Epiricania melanoleuca is an important parasitoid of sugarcane leafhopper in tropical condition of sugarcane plantation. This parasitoid was first appeared (0.23 cocoons/leaf) in second fortnight of September when nymphs and adults population was 7.47 and 0.83 per leaf of sugarcane were observed. Parasitoid population gradually increase and reached their peak at first fortnight of October as 16.60 nymphs and 1.03 adults were noticed with 0mm rainfall, 32.40°C and 21.87°C temperatures, 84.50% relative humidity 0.94km/hour wind velocity and 8.61hours/day as bright sunshine hours. The present study was performed to evaluate effect of this parasitoid on major sugarcane pest. This study may be helpful for farmers to avoid pesticide application and awareness about biological control with yield enhancement.

Key words: Parasitoid, sugarcane leafhopper, population, predator-prey relations

INTRODUCTION

Sugarcane is a thick, tall, perennial grass which tillers, at the base, to produce a stem of 3-4m height. It is cultivated in the tropical and subtropical regions of the world, primarily for its ability to store a high concentration of sucrose within the internodes of the stem. Sugarcane leaf-hopper, *Pyrilla perpusilla* Wlk. (Lophopidae: Homoptera), commonly known as Pyrilla, has recently become an endemic pest and is posing a great threat to the sugar industry in India. *Pyrilla perpusilla* is a serious pest of the sugarcane and both nymphs and adults, feed on it as well as on other secondary host plants, by sucking the cell-sap, that extensively affects its production (Kumar and Yadav, 2006). The pest remains active throughout the year with 3-4 numbers of generations with optimum activity from July to September and survives on wheat, barley and oat etc. during winter (Shah and Saleem, 2002).

Pyrilla perpusilla is being attacked by twelve species of natural enemies in India. Natural enemies viz. *Tetratichus pyrillae* (Crawford), *Oenocyrtus* spp. *Lastrodrymus* spp. and *Metarhizium* spp. playing an important role in the regulation of pest population which can be exploited to the maximum possible extent in the management of Pyrilla (Dhaliwal and Baina 1983; Verma and Singh 1987). Ecto-parasitoid *Epiricania melanolenca* (Lepidoptus, Epipyropidea) was recorded in India as the most important adult and nymphal parasitoid of *P. perpusilla*. One of the most important characters of *E. melanoleuca* is ability to exploit all the biotypes of *P. perpusilla* in different climatic regions. The female moth of *E. melanoleuca* laid 400-800 eggs. Its larvae feed through the *P. perpusilla* cuticle and suck its body fluids (Common, 1990). Short life cycle, higher rate of reproduction and tremendous searching ability for their host increase its effectiveness as a useful bio-control agent (Chaudhary and Sharma, 1990; Seneviratue and Kumarsinghe, 2002).

METHODS AND MATERIALS

In the experiment, sixty sugarcane leaves were selected randomly throughout active season of sugarcane leafhopper infestation. Parasitized nymphs and adults of *Pyrilla*

perpusilla were differentiated by presence of white cottony cushion on back and on pleural abdominal region respectively. Then percentage parasitism by *Epiricania melanoleuca* on sugarcane leafhopper was carried out as described by Mishkat and Khalid (2007) as –

$$\text{percent parasitization (\%)} = \frac{\text{No. of Parasitized nymphs \& Adult}}{\text{Total No. of nymphs \& adult} \times 100}$$

RESULTS AND OBSERVATIONS

Parasitization of *P. Perpusilla* by the *Epiricania melanoleuca* (Fletcher) under Field Conditions: Nymphal and adult parasitization of sugarcane leafhopper by *Epiricania melanoleuca* revealed that this parasitoid was active during second fortnight of September to first fortnight of January. Observation on percent parasitization was calculated on the basis of presence of white cottony cushion on back and on pleural abdominal region of nymphs and adults of *P. perpusilla* in 60 sugarcane leaves randomly selected throughout active season of sugarcane leafhopper infestation at 15 days interval. The ectoparasitoid was first appeared (0.23 cocoons/leaf) in second fortnight of September when nymphs and adults population was 7.47 and 0.83 per leaf of sugarcane were observed. Parasitoid population gradually increase and reached their peak at first fortnight of October as 16.60 nymphs and 1.03 adults were noticed with 0mm rainfall, 32.40°C and 21.87°C temperatures, 84.50% relative humidity 0.94km/hour wind velocity and 8.61hours/day as bright sunshine hours (Table 1).

Table 1: Nymphal and Adult parasitization by *Epiricania melanoleuca* (Fletcher) on Sugarcane leafhopper under field conditions during 2014-2015

Time	Population of <i>Pyrilla perpusilla</i>		<i>E. melanoleuca</i> Cocoon/ Leaf Population	Percentage Parasitization	
	Average Nymph/ Leaf	Average Adult/ Leaf		Nymph of Pyrilla	Adult of Pyrilla
Sept 30	7.47	0.83	0.23	0.00	0.00
Oct 15	16.60	1.03	1.87	2.11	28.93
Oct 30	7.67	1.00	0.40	32.60	11.67
Nov 15	6.07	0.37	0.33	16.53	31.67
Nov 30	3.13	1.03	0.20	24.77	20.00
Dec 15	3.53	0.47	0.50	35.21	2.33
Dec 30	1.87	0.67	0.27	18.99	16.67
Jan 15	1.10	0.33	0.17	18.21	10.00

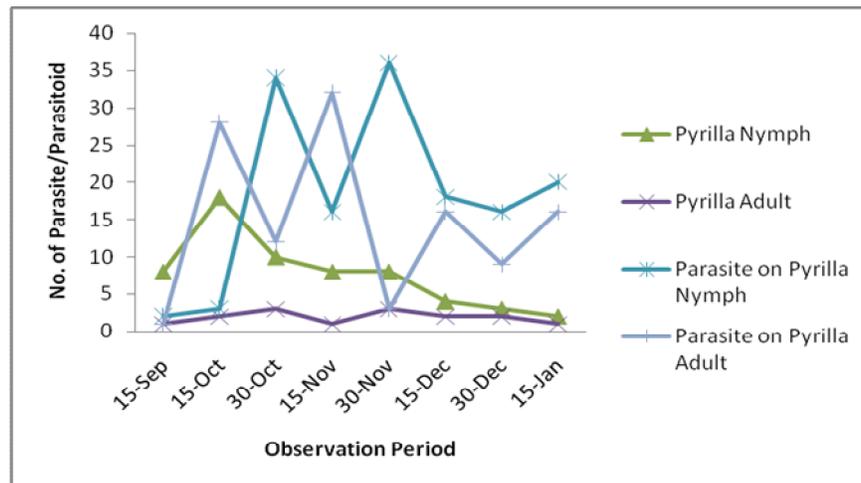


Fig.1: Nymphal and Adult parasitization by *Epiricania melanoleuca* on Sugarcane Leafhopper during study period.

Thereafter the nymph and adult population gradually reaching 1.10 nymphs and 0.33 adults/leaf and parasitoid population as 0.17 cocoons/leaf during first fortnight of January. The nymphs, adults and parasitoid population ranged from 1.10 to 16.60, 0.33 to .03 and 0.17 to 1.87 numbers/ leaf during second fortnight of September to first fortnight of January respectively.

Parasitoid nymphs and adults were first appeared in first fortnight of October. The nymphal parasitization of *P. Perpusilla* by *E. melanoleuca* ranged from 2.11-35.21 percent and maximum 35.21% was noticed with 0mm rainfall, 30.43°C and 14.30°C temperatures, 69.07% relative humidity, 15.9km/h wind velocity and 8.15hours/day as bright sunshine hours prevailed at first fortnight of December respectively. However, the adult of *P. perpusilla* parasitized by *E. melanoleuca* ranged from 2.33-31.67% with highest 31.67% prevailed at the first fortnight of November (Fig. 1).

At the appearance of the *E. melanoleuca* no parasitization was observed on second fortnight of September. The parasitization was first observed in first fortnight of October with 31.04% increased as 48.2% in November and then gradually decreased in the first fortnight of January with 28.21% respectively.

DISCUSSIONS

During the course of study it was observed that parasitoid suppress the *Pyrilla* population as potential bio-control agent. The population of Ectoparasitoid *E. melanoleuca* was first appeared in second fortnight of September in sugarcane crop and gradually increased in October and November than goes fall down in December to January at Gopalganj region. Variation in results in regard of *E. melanoleuca* potentially may be attributed to different in area. Chaudhary, *et al.*, (1987) reported that *Epiricania melanoleuca* play important role in the suppression of *P. perpusilla* population. The heavy parasitism of nymphs and adults as 12.5 to 24.6% was noticed. Prasad *et al.* (1988) concluded that *E. melanoleuca* effectively suppressed the pyrilla population during July. Joshi and Sharma (1992) investigated the ectoparasitoid as a biological control agent on sugarcane crop. The peak parasitism has observed in October as 47.9% which further decline in December.

The findings about *E. melanoleuca* infestation are in agreement with Chhilar and Madan (1992) reported this parasitoid bio-control agent on sugarcane. Rana, *et al.*, (2002) concluded its peak population during August. The percent parasitization was ranged from 4.16 to 64.74%. Pawar, *et al.*, (2002) reported effectiveness of *E. melanoleuca* on *P. perpusilla*. The sugarcane pyrilla initially appeared in June-July. Mishkat and Khalid (2007) found that the peaks of *P. perpusilla* population during November whereas *E. melanoleuca* peak during September. Whereas more or less similar findings were found by Rajak (2007) who explained that *E. melanoleuca* successfully controls the sugarcane leafhopper. Gangawar, *et al.*, (2008) studied the bio-suppression of *Pyrilla perpusilla* by *E. melanoleuca*. Kumar, *et al.*, (2008) observed maximum number of eggmass, nymph and adult per leaf of pyrilla as 6.67, 22.67 and 18.00 on 30th July, 30th and 15th August respectively. The maximum population of egg pupa and adult/leaf of *E. melanoleuca* were 8.00, 27.33 and 18.67 on 30th September, 30th October and 15th November respectively. More similarly, Pandey, *et al.*, (2008) recorded pyrilla and its parasitoid population and concluded maximum population of pyrilla as 89.50 per leaf during June due to maximum temperature low humidity and slow multiplication of parasitoid. The pyrilla population has decreased in the month of July due to fast multiplication of parasitoid.

REFERENCES

1. Chaudhary J.P., Kaushik S.K., Singh R. and Mrig K.K. (1987): Role of natural enemies in the suppression of sugarcane leaf hopper *Pyrilla perpusilla* Walker. *FAO Plant Protection Bulletin*, 35: 15-19.
2. Chaudhary R.N. and Sharma V.K. (1990): A note on *Pyrilla perpusilla* Walker on maize. *Indian Journal of Plant Protection*, 18: 113-114.
3. Chhillar B.S. and Madan Y.P. (1992): Biological Control of Sugarcane Leafhopper, *Pyrilla Perpusilla* Walker, *Indian Sugar*, 42(9): 691-694.
4. Common I.F.B. (1990): *Moths of Australia*. McGraw-Hill Book Company, London, 535 pp.

5. Dhaliwal Z.S. and Bains S.S. (1983): A laboratory technique for rearing sugarcane leaf hopper *Pyrilla perpusilla* (Walker). Uttar Pradesh Journal of Zoology. 3: 164-165.
6. Gangwar S.K., Srivastava D.C., Tewari R.K., Singh M.R. and Rajak D.C. (2008): Management of *Pyrilla perpusilla* Walker in Sugarcane with Ecto-Parasitoid *Epiricania melanoleuca* Fletcher during Epidemics in Sub-tropical India, Sugar Tech., 10(2): 162-165.
7. Joshi R.K. and Sharma S.K. (1992): Seasonal parasitization and carryover of *Epiricania melanoleuca* Fletcher, an ectoparasite of *Pyrilla perpusilla* Walker under arid conditions. Annals of Arid Zone. 31: 33-35.
8. Kumar S., Khan M.A. and Sharma K. (2008): The Sugarcane lophoid Planthopper *Pyrilla perpusilla* (Homoptera Lophopidae): A Review of Its Biology, Pest Status and Control: Bul Entomol Res., 86: 485-9498.
9. Mishkat U. and Khalid M. (2007): Population Dynamics of Sugarcane Planthopper *Pyrilla perpusilla* Walker (Lophopidea: Homoptera) and Its nat.
10. Pandey G., Pandey M.N., Mishra V.K., Singh S., Singh D.N. and Singh S.B. (2008): Studies on the Effect of Eco-friendly Bio-agent *E. melanoleuca* for the Control of Sugarcane *Pyrilla* in Eastern UP, Indian Agricultural Research Article, 23(2): 91-95.
11. Pawar A.D. (1987): Biological control of sugarcane pests in India. Plant Protection Bulletin, 39: 1-6.
12. Prasad J., Singh R. and Pawar A.D. (1988): Augmentation of *Epiricania melanoleuca* for the Control of *Pyrilla perpusilla* in Western UP, Plant Protection Bulletin, Ind., 40(1): 29-31.
13. Rajak D.C. (2007): Colonization and Re-distribution of *E. melanoleuca* Fletcher against *Pyrilla perpusilla* Walker, Ann. Plant. Protec. Sg., 15: 83-86.
14. Rana Z.A., Mahmood M.M. and Hashmi A.A. (2002): Population Dynamics of *Pyrilla* and Its Parase *E. melanoleuca* Fletcher at Faislabad, Pakistan, Journal of Agricultural Research, 17(3): 267-272.
15. Seneviratne JAUT and Kumar Singhe N.C. (2002): Biological Control of the Sugarcane Planthopper by the Moth *Epiricania Melanoleuca* (Fletcher) in Sri Lanka, Sugar Tech., 4(2): 26-32.
16. Varma A. and Singh K. (1987): *Metarhizium anisopliae* (Metschikoff) Sorokin in the Managmeent of *Pyrilla perpusilla* Walker, The Sugarcane Leafhopper, Entomologist News Letter (No. 18), pp. 12.