Sugar Tech (2008) 10(2) : 162-165

SHORT COMMUNICATION

# Management of *Pyrilla perpusilla* Walker in sugarcane with ecto-parasitoid *Epiricania melanoleuca* Fletcher during epidemics in sub-tropical India

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Revesied: 12 January, 2008 / Revised: 22 March, 2008 / Accepted: 17 April, 2008

**Abstract** The bio-suppression of sugarcane leaf hopper, *Pyrilla perpusilla* Walker during epidemics in 2007 by its potential nymphal and adult ecto-parasitoid, *Epiricania melanoleuca* Fletcher in command area of three sugar mills of Uttar Pradesh covering an area of approximately 40,000 ha with commendable success could serve as a model for pest management in other areas also. The sugarcane Pyrilla, which initially appeared on wheat, fodder sorghum, barley and grown up sugarcane, later migrated to autumn, spring plant and ratoon during March-April. The over wintering population of nymphs survived to a great extent due to mild winter which favored the fast multiplication of nymphs into adults. These nymphs developed into adults during March and started breeding profusely and caused the havoc. The population of Pyrilla and its parasitoid was assessed during rapid roving survey. The leaves bearing parasitoids were redistributed in sugarcane fields @ 5000 cocoons + 5 lacs eggs/ha or 10000 cocoons/ha in absence of eggs of *Epiricania.* The *E. melanoleuca* played a major role to control the *Pyrilla* population. The insecticidal spraying operation, which was not recommended, resulted in a saving of about Rs.1600/ha besides avoiding environmental pollution. The splendid control of the Pyrilla epidemic has once again proved that conservation of natural enemies and augmentation through field redistribution could be effective components in bio-suppression of *Pyrilla*. Hence, it is inferred that if ecto-parasitoid *Epiricania melanoleuca* cocoon is available in field @1-5/leaf at Pyrilla population level ranging from 20 to 150 nymphs+adults/leaf, the insecticides should not be sprayed at all.

**Keywords** Bio-suppression, *Epiricania melanoleuca,* Management, *Pyrilla perpusilla*, Sugarcane.

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Sugarcane sucking pest, *Pyrilla perpusilla* Walker (Hemiptera: Lophopidae) is the most destructive pest in subtropical India and appears sporadically. Short as well as large scale outbreaks of the sugarcane Pyrilla have been reported in different parts of India from time to time. Pyrilla epidemics have been recorded in Uttar Pradesh in the past in 1934-36, 1937-38, 1947-48, 1951-53, 1968-70,1973-74, 1976-77, 1978-79, 1985-86 and 1999 (Pawar *et al* 2002, Rajak, 2007). The present investigation is a case study of management of sugarcane Pyrilla with outstanding success by its potential nymphal and adult parasitoid, *Epiricania melanoleuca* during 2007 in Uttar Pradesh. In Nepal, Neupane (1976) reported the pest from six districts, while in Pakistan, it has been recorded from most of the districts (Sheikh 1968). In Sri Lanka, the species has been recorded from the Eastern and southern central provinces (Kumarsinghe & Ranasinghe, 1985 and 1988; Kumarasinghe and Wratten, 1996). The egg parasitoids of Pyrilla have been recorded at high level from Andhra Pradesh (Rajak and Varma, 2001). Due to attack of Pyrilla, reduction in sugar recovery in sugar mills was observed to the extent of 0.2-5 units. About 28 – 50 per cent of crop yield has been recorded as loss due to this pest with poor

growth of internodes and difficulties in milling cane from affected plants. The syrup obtained from severely infested canes does not set well during processing of jaggery and reduced by 2.2-4.5 per cent (Gupta, 1948). Saxena (1969) reported that Pyrilla infested canes possess higher invert sugar in mixed juice, heavier scaling in evaporator bodies, greater viscosity of C massecuite, which causes delay in boiling and exhaustion, poor exhaustibility of final molasses and delay in lead curing for removal of molasses even after dilution/ reheating of the massecuites.

The teams from Indian Institute of Sugarcane Research, Lucknow surveyed the sugarcane growing areas in three sugar mills of Uttar Pradesh at fortnightly intervals to monitor the population of Pyrilla and its natural enemies during March to October, 2007. The Pyrilla as well as the parasitoid population counts were recorded from two leaves each at top, middle and lower portion of sugarcane plant. Estimated savings on the cost of insecticidal spraying has been calculated on the basis of expenditure normally met on various parameters like cost of pesticides and labourers, rent of sprayer etc.

Out break of Pyrilla was noticed during March- June, 2007 on sugarcane besides wheat, jowar, maize, berseem. Weeds like *Saccharum* spp., *Sorghum helepense* etc were found harbouring Pyrilla. About 40,000 ha area of sugarcane was infested by Pyrilla in three sugarcane mill zones. The nymphs and adults, sucking the sap from under surface of leaves near midrib, result in yellowish white spots. The leaves were found pale which later on withered away. The hoppers exuded a sweet sticky fluid commonly known as honey dew which promoted quick and luxuriant growth of the fungus *Capnodium* sp., and as a result the leaves get completely covered by the sooty mould. The black coating interferes with the photosynthetic activity of the leaves and crop growth is adversely affected. Due to continuous desapping by hoppers, top leaves in the affected canes dry up and the lateral buds germinate. The younger crop which has been attacked by the Pyrilla ultimately resulted into poor yield and low recovery.

K.M.Sugar Mills Ltd, Faizabad

The rapid roving survey was conducted during April- June, 2007 in sugarcane command areas of K.M.Sugar Mills Ltd., Faizabad. The sugarcane area of about 20,000ha in 35 villages,*viz*., Khirauni, Mohia Kapur Pur, Shahnawaz Pur, Tihura, Karim Nagar, Rampur Sardha, Shantipur, Samaha Kalan, Gundhaur, Mohtisim Pur, Abanpur, Netwari, Leela Pur, Madana, Ram Pur Puwari, Sarai Rashi, Raje Pur, Barwa, Sariyawan, Bhai Pur, Ram Pur Bhagan, Tarun, Bika Pur etc., having prominent varieties, viz, CoS 91269, CoSe 92423, CoS 8436, CoLk 8102, CoS8432 and CoS 95255 were critically examined for the occurrence of *Pyrilla.* It was observed that the egg masses ranged from 2 to 11 and nymphs and adults of Pyrilla varied from 40 to 150/leaf in mature standing crop. Along with Pyrilla, natural enemies of egg masses and different stages of ecto-parasitoid, *Epiricania* were also recorded. The cocoons of *Epiricania* varied from 0 -5/leaf. In the crop planted during autumn, spring and recently initiated ratoon, the population of Pyrilla varied from 20 to 60/ leaf whereas the cocoons of *Epiricania* varied from 0 to 1 /leaf. *Pyrilla* was also found infesting wheat, *Jowar*, maize, berseem etc. Weeds like *Saccharum* spp., *Sorghum helepense* etc. were found harbouring Pyrilla. Later observations on pest and parasitoids recorded during September – October indicated the presence of pyrilla at low ebb but the activity of *Epiricania* was at maximum.

Bajaj Hindustan Ltd, Gola Gokarannath, Lakhimpur Kheri

The sugarcane area of about 17000 ha in villages, viz., Rajora, Jalapur, Baharganj, Maharaj Nagar, Kuwan Pur,, Jhera, Khutur Road etc., having major varieties viz., CoS 92423, CoJ 84, Co S92263, CoSe 92423, CoS 99259, CoS 96275, CoS 97261 and CoS 97264 were surveyed during April- May, 2007 for the infestation of Pyrilla. The sugarcane had infestation of Pyrilla in the range of 1 to 7 egg masses and 1 to 60 nymph+adult per leaf. The parasitized egg mass observed in the range of 0-2 per leaf and cocoons of *Epiricania* varied from 0-2 per leaf. Further observations recoded during Sep-Oct. revealed the negligible population of Pyrilla.

Haidergarh Chini Mill, Barabanki

Survey was conducted during April- May, 2007 in the command area of the mill for the occurrence of insect-pests on sugarcane with particular reference to Pyrilla infestation. Eighteen sugarcane fields were visited covering 11 villages having mainly two varieties viz., CoS 767 and CoS 8432. These fields included 5 fields of plant cane and 13 of ratoon cane. All these fields were having pyrilla infestation. Pyrilla was noticed mainly in adult stage, distinctly more in CoS 8432 than CoS 767. The mean population was recorded upto 10 adults /leaf. The egg masses of Pyrilla were also noticed in most of the fields having 1 egg mass/leaf. The egg parasitization was also noticed. *Epiricania* cocoons were available in most of the fields with a mean of 1 cocoon/10 leaves. Some unharvested sugarcane fields were found heavily infested with Pyrilla but with good population of *Epiricania*. The pyrilla infestation was also visible in adjoining maize fields having egg masses and adult stage of pyrilla along with *Epiricania* cocoons. The Coccinellid predators were also active and abundant.

Strategies recommended for the management of out break of Pyrilla

1. Harvest as early as possible the mature standing canes from the fields. The cane leaves containing viable cocoons

and egg masses of *Epiricania* may be clipped off in 8-10 cm size. These bits of leaves may be stapled on under side of leaves in younger crop having severe infestation of Pyrilla. In heavily infested fields *Epiricania* may be released @10000 cocoons or 5000 cocoons +5 lacs eggs /ha.

2. Remove the egg masses of Pyrilla along with leaf bits and keep them in fine mesh net bags for emergence of parasitoids in Pyrilla infested fields and destroy the nymphs of Pyrilla emerging in bags. In ratoon two lower leaves may be stripped off as these are preferred by Pyrilla for egg laying.
3. Do not burn the trash having the viable cocoons of *Epiricania.* These may be removed and released in Pyrilla infested fields.
4. Release 500 adults of Pyrilla/ha loaded with entomopathogenic fungi, *Metarhizium anisopliae* during monsoon period for spread of disease in *Pyrilla.*
5. Remove dry leaves from August onwards to reduce infestation
6. Do not apply excessive doses of nitrogen as it will help Pyrilla to proliferate.
7. Irrigate the fields to make micro climate of ecosystem more favourable for the fast multiplication of *Epiricania.*
8. Temperature above $40^0$C and relative humidity less than 50 per cent along with westerly wind will drastically reduce the population of *Pyrilla*.
9. Do not spray any pesticide as this may be harmful to *Epiricania* and other beneficial fauna.

*Epiricania melanoleuca* has been extensively used for the bio-control programme against Pyrilla in the recent past (Pawar *et al* 2002, Seneviratne and Kumarsinghe, 2002, Rajak, 2007).In India, Sri Lanka, Pakistan, Bengladesh, *E. melanoleuca* has played major role in the control of the Pyrilla epidemics. It was recorded in India in 1939 (Fletcher, 1939) but its bio-control potential was recognized during 1972 Pyrilla epidemic in eastern Uttar Pradesh and Bihar (Banerjee, 1973). The Pyrilla population was controlled in summer by conserving *E. melanoleuca* (Misra *et al*., 1987). Pawar *et al* in 2002 calculated a net saving of about Rs.17.56 crores from 5,77,901 ha due to avoidance of aerial insecticidal spraying for the control of Pyrilla in sugarcane crop. *Epiricania melanoleuca* proved its merit in situ parasitization due to high multiplication rate, comparatively shorter life cycle, survival under varied agroclimatic conditions, larvae having good searching ability of its host and least effect of insecticides on the immature life stages (Rajak, 2006 and Rajak *et al,* 2007). The introduction of *E. melanoleuca* in new areas where it is not present has been attempted by several workers and in most cases favourable results have been achieved (Pawar and Misra, 1983; Misra *et al*., 1984 and Rajak, 2007).

Response of the recommended management strategy

The concerted efforts made for the control of Pyrilla in sugarcane through conservation and augmentation of natural enemies especially with *Epiricania,* proved that conservation of natural enemies and augmentation through field releases became the cardinal, eco-friendly and most cost effective principle of Pyrilla pest management. The infestation of Pyrilla gradually reduced to trace level from June onwards and thereafter it did not resurge throughout the cropping season.

Estimated savings due to above strategy

Expenditure involved for deployment of technical and other extension personnel was same in both the pesticidal and biocontrol methods. Hence, this expenditure for employing personnel has not been included. The insecticidal spraying operation was not recommended during April - May, 2007 in Uttar Pradesh due to the presence of potential egg, nymphal and adult parasitoids. This has resulted into average savings of Rs.1600/ha besides the social, environmental and ecological benefits.

**Acknowledgement** The authors are grateful to Director, Indian Institute of Sugarcane Research, Lucknow for providing facilities to conduct survey. The authors also extend their sincere thanks to the management authorities and field staff of the K.M.Chini Mill, Faizabad; Bajaj Hindustan Ltd, Lakhimpurkheri and Haidergarh chini Mill for their co-operation during the survey.

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