

Field Performance of *Trichogramma chilonis* Ishii against Sugarcane Stem borer

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ABSTRACT

An experiment was conducted against sugarcane stem borer, *Chilo tumidicostalis* Hampson to test the efficacy of exotic egg parasitoid *Trichogramma chilonis* Ishii in 1999- 2000 cropping season in growers plot, at Ishurdi and Thakurgaon. The experiment was comprised of three treatments requiring 0.5 ha of land and the treatments were *Trichogramma* Released (TR) technology where only *Trichogramma* release was made @ 50,000/ha/wk, Complete Package (CP) technology where all the available recommended technologies including release of *Trichogramma* @ 50,000/ha/wk were adopted and Untreated-Check (CK) where no control measure was adopted. Results revealed that *Trichogramma* released technology showed 41.03% and 38.13 % efficacy and complete package technology showed 39.17% and 48.44 % efficacy at Ishurdi and Thakurgaon sites respectively. It was observed that efficacy achieved from *Trichogramma* released technology and complete package technology was almost identical in reducing the pest infestation over check. Yield record showed that treated plots produced higher tonnage at both Ishurdi and Thakurgaon. It was observed that CP technology showed 87.11 and 99.69% yield increase as against 70.71 and 35.93% in TR technology over check at Ishurdi and Thakurgaon respectively.

Key words : Sugarcane stem borer, Field performance, *Trichogramma*.

INTRODUCTION

Sugarcane stem borer, *Chilo tumidicostalis* Hampson is the most destructive pest of sugarcane throughout the cane growing areas of Bangladesh. Karim and Islam (1977) observed its severity in 1973 -74 cropping season who reported total crop failure (100%) in 517 acres of sugarcane in Setabgonj Sugar Mills Zone. Khanna *et al.* (1957) observed 8.2 to 12.6 % yield loss due to the stem borer infestation. The activities of the pest started in May /June and continued till harvesting of canes. Gupta and Avasthy (1960) reported as high as 25-70% and 12-60% losses in cane yield due to primary and secondary infestations in different varieties respectively along with 0.5 - 3.5 unit losses of sugar recovery in West Bengal.

Information on chemical control of sugarcane stem borer is still lacking in Bangladesh. Several experiments were carried out against stem borer in the pest prone areas observed that only Padan 4G was found effective (Anon., 1993 and 1998) but it could not be used by the farmers. Mechanical control of infested stem with larvae inside is the only suitable recommended control technique for stem borer but the farmers are reluctant to adopt because it destroys semi-mature or mature canes from the field. Other

problem is likely to be mentioned that when stem borer attack begins in June/July it often rains that abstains farmers to go to the field for such type of operation. Occasional rains with high temperature and high humidity sometimes with little stagnant water help multiplication of stem borer in the field. In such a condition biological control of stem borer with *Trichogramma chilonis* might be the alternative option. Biological control is widely used throughout the world for the control of borers. Several authors reported that sugarcane stem borer is effectively controlled by using *Trichogramma chilonis* (Alba and Estioko, 1981; Shenhmar and Brar, 1996; Khanzada and Ahmad, 1997; Anon., 1997; Mishra *et al.*, 1997; Pandey and Sing, 1997 and Alam *et al.*, 1999).

MATERIALS AND METHODS

A. Laboratory activities :

i) Rearing of *Corcyra* :

Rice meal moth, *Corcyra cephalonica* is the alternative host of *Trichogramma chilonis*. *Corcyra* was reared on half broken wheat in wooden trays (100 cm x 30 cm x 12 cm) placed in wooden racks in larvae rearing room and then transferred to moth emergence room. Emerged out moths rest in walls/ roof. The moths were then collected through test tube (15 x 1.5 cm) poured in glass boyaaams (Jar) for mating and oviposition. The glass jar contained a piece of rolled wire net and the lid of the jar was specially prepared with wire net for easy aeration. *Corcyra* eggs were collected from the glass jar (upside down) by brushing. The eggs were collected everyday. Some eggs were used for strip preparation ie. for rearing *Trichogramma* and some eggs were used for recycling *Corcyra* and the whole process is continued. Laboratory temperature at 28°C- 30°C and Relative humidity at 60%-75 % were maintained for rearing the alternate host of egg parasitoid.

ii) Rearing of *Trichogramma* :

Corcyra eggs were used as host for rearing *Trichogramma* in the laboratory. For the purpose white paper pieces (strip) measuring 10 cm x 1 cm having *Corcyra* eggs were inserted into the test tube containing parasitoids (mother strip) for parasitization of the newly introduced strip (daughter strip). Three -fourth of the strip was smeared with gum acacia. The gum was specially prepared with distilled water to a medium light sticky material. Freshly collected *Corcyra* eggs were placed over the gum evenly through the nylon net from a plastic/glass vial. The strip accommodates about 1500 - 2000 *Corcyra* eggs which produces (approximately) 2500 parasites due to poly-embryony of the species. Prepared strips need fanning for 5 minutes for drying. The daughter strip was again inserted into the test tube (20 cm x 2.5 cm) containing parasitoids inside for 6 hours or more. After parasitization is complete, the daughter strips were taken out and kept individually in a fresh test tube plugged with cotton/tissue paper. Pupa of *Trichogramma* containing test tube can be stored in a refrigerator at a temperature below 5-7 °C to make a stock for future use as required. Preservation can be done for a period of 20-25 days. Thus the whole process was repeated for rearing of *Trichogramma* in the laboratory.

B. Field activities :

The experiment was conducted at two locations in growers' plots. One at Bangladesh Sugarcane Research Institute (Ishurdi) site and other one at Regional Sugarcane Research Station (Thakurgaon) site. At each site, the experimental plot was 1.5 ha which was divided into three sub-plots measuring 0.5 ha having 5 metre gap among plots. The experiment was set up with the moderately stem borer susceptible variety Isd 16. It was planted in November (Ishurdi) and December (Thakurgaon) through conventional sett placement in the trenches. Row to row distance was maintained 1m. Source of seed were certified seed plots of Thakurgaon and North Bengal sugar mills farm. Fertilizer application was carried out according to the Agro-Ecological Zones (AEZ). Other normal cultural practices like weeding, mulching and irrigation were done as and when necessary.

At both locations, of the three sub-plots, one was treated as *Trichogramma* Released (TR) technology plot where only the parasitoid *Trichogramma* was released @ 50,000/ha/ week, the other plot was considered as Complete Package (CP) technology plot where all the recommended technologies were followed and third one was Check Plot (CK) where no control measure was adopted. As such the treatments were as follows :

T₁ = Release of *Trichogramma* @ 50,000/ ha / week from May to September

T₂ = All the recommended technologies (cultural + mechanical + release of *Trichogramma* @ 50,000/ha/wk + application of chemical) were followed for the control of stem borer.

T₃ = Untreated (Check)

Though application of chemical was scheduled in the treatment (T₂) yet it could not be applied due to non availability. Mechanical control of primary infested canes were removed as per schedule of treatment. Fifty samples were randomly collected from each plot to record pest infestation covering 20-square meter area. Stem borer infestation generally reaches its peak from July to October. Data were collected in the month of August through October and analyzed through 't' test for August and September in Thakurgaon and Ishurdi respectively and LSD for others. Yield of cane was also recorded at harvest.

RESULTS AND DISCUSSION

Result presented in the Table 1 indicates that both the *Trichogramma* (TR) technology and Complete package (CP) technology showed similar response in controlling stem borer infestation in the month of August, September and October at BSRI site which were statistically significant. The percent effectiveness of TR technology in August, September and October were 57.90, 38.28 and 27.82% and that of CP technology were 24.06, 47.06 and 36.41% respectively against stem borer infestation over check. The mean efficacy percentage of TR technology was 43.33 and that of CP technology was 35.34 indicating the superiority of TR technology compared to CP technology.

Similar results were obtained at RSRS, Thakurgaon site (Table 2). From the result it is inflicted that TR technology reached the efficacy of 36.30, 49.81 and 28.84% in reducing the infestation in August, September and October respectively. CP technology

showed 60.10, 47.08 and 38.15% efficacy in controlling stem borer infestation in August, September and October respectively over check. At Thakurgaon site CP technology performed better than TR technology showing the mean efficacy percentage of 48.44 in CP and 38.31 in TR technology.

From table 3 it was observed that both CP technology and TR released technology produced satisfactory yield over check plot yet CP technology produced higher tonnage which produced 87.11% and 99.69% yield increase over check at BSRI and RSRS, Thakurgaon site respectively.

Alam *et al.* (1999) released *T. chilonis* at different rates and found that *T. chilonis* released @ 0.4 million and 0.6 million/ha controlled stem borer satisfactorily. The results of field releases of *T. chilonis* at 50,000/ha at 7 days interval from July to November for two crop seasons indicated significant reduction in the infestation of *Chilo saccharifagus indicus* Kapur compared to 10 and 15 days interval and check (Tiwari *et al.*, 1996). The result of the present findings is in conformity with the findings of Tiwari *et al.* (1996).

The results indicated that *Trichogramma* had positive role in reducing the stem borer infestation to a desirable level but the cost of production of *Trichogramma* appeared high compared to other countries. From the present study it was observed that application of *Trichogramma* @ 50,000/ha/wk costs Tk.577.00 (excluding the cost of electricity and labour) whereas in India it costs only Rs. 85.00 including the cost of electricity (Solayappan, 1999).

From the present findings it was observed that control of target pest like stem borer was found effective through mass releasing of *Trichogramma* either sole or in combined application method that might be recommended for commercial adoption in the pest prone areas. However, further study may be conducted to minimize the cost of production of *Trichogramma*.

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Table 1. Level of Stem borer infestation as influenced by different treatments at Ishurdi, 1999- 2000.

Treatments	August		September		October	
	%SB infestation (Mean of 50 samples)	% Efficiency	%SB infestation (Mean of 50 samples)	% Efficiency	%SB infestation (Mean of 50 samples)	% Efficiency
TR	04.82	57.90	31.21	38.28	45.33	27.82
CP	07.55	34.06	25.91	47.06	39.94	36.41
CK	11.45	-	48.95	-	62.81	-
LSD(5%)	1.847				0.07288	

TR = *Trichogramma* Release technology ; CP = Complete Package technology
CK = Check Plot

Table 2. Level of Stem borer infestation as influenced by different treatments at Thakurgaon, 1999- 2000.

Treatments	August		September		October	
	%SB infestation (Mean of 50 samples)	% Efficiency	%SB infestation (Mean of 50 samples)	% Efficiency	%SB infestation (Mean of 50 samples)	% Efficiency
TR	17.53	36.30	29.23	49.81	48.21	28.84
CP	10.98	60.10	30.82	47.08	42.50	38.15
CK	27.62	-	58.24	-	68.72	-
LSD(5%)			2.825		0.08659	

TR = *Trichogramma* Release technology ; CP = Complete Package technology

CK = Check Plot

Table 3. Cane yield as influenced by different treatments 1999- 2000.

Treatments	Yield (t/ha)		Yield increase over control (%)	
	Location			
	Ishurdi	Thakurgaon	Ishurdi	Thakurgaon
Check	57.44	59.36	-	-
CP technology	107.48	118.54	87.11	99.69
TR technology	98.06	80.24	70.71	35.93

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