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Research Note

Role of trap crops in increasing parasitisation efficiency of *Trichogramma chilonis* Ishii in cotton

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ABSTRACT: **The role of trap crops on the parasitisation efficiency of *Trichogramma chilonis* was studied at farmer's field at village Khuban (Distt. Ferozepur). Maize, sorghum, pearl millet and marigold were tested as trap crops. One row of trap crop was grown after every 20 rows of cotton crop along with pure crop of cotton. The egg parasitoid was released 13 times during July to September at weekly interval @ 1, 50,000 per hectare. Need based applications of comparatively safe insecticides were also made. The highest mean parasitization (10.48%) was observed when sorghum was used as trap crop and it was significantly higher than all other treatment. The parasitisation when marigold was used as trap crop was also higher (8.08%) than pure cotton. The mean incidence among green bolls was lowest (2.74 %) when sorghum was used as trap crop and it was significantly lower than other treatments except when marigold (3.52 %) and pearl-millet (3.8 %). The seed cotton yield in pure cotton was lowest (13 q/ha) which was on par with maize (13.1 q/ha) but these were significantly lower than other treatments. The yield was significantly highest (14.8 q/ ha) when sorghum was used as trap crop.**

KEY WORDS: Bollworms complex, cotton, parasitization, trap crop, *Trichogramma chilonis*

The bollworms, *Helicoverpa armigera* (Hübner), *Earias* spp. and *Pectinophora gossypiella* (Saunders) are serious pests of cotton in the Punjab. Brar *et al.* (2003) reported that releases of *Trichogramma chilonis* Ishii when integrated with insecticides proved effective for the control of cotton bollworms. Jadhav *et al.* (2000) found that cotton crop grown neighbouring to sorghum had significantly higher level of egg parasitism by *T. chilonis* than in a monocrop. The present study was undertaken to study the role of trap crop like maize, sorghum, marigold and pearl millet in enhancing the parasitisation efficiency of *T. chilonis* and in turn control of cotton bollworms.

The experiment was conducted at farmer's field at village Khuban (Distt. Ferozepur) during 2002. Maize, sorghum, pearl millet and marigold were compared with pure cotton. One row of trap crop was sown after every 20 rows of cotton. The trap crops were sown after one month of sowing of cotton. The plot size was 400 sq. m. The experiment was conducted in a randomized block design with three replications. Thirteen releases of *Trichogramma chilonis* were made from July, 1 to

September 23 at weekly interval @ 1, 50,000 per hectare. Eight applications of comparatively safe insecticides *viz.*, Quinalphos 25EC @2 l/ha, Endosulfan 35EC @ 2.5 l/ha, Deltamethrin 2.8EC @400ml/ha and Acephate 75SP @2 kg/ha (Singh, 2000) were also given. However, trap crops were kept unsprayed. The parasitoid was released 3-4 days after spraying.

The incidence of the bollworms during July to October was recorded among the intact fruiting bodies and green bolls from five plants in each plot at weekly interval. The yield of seed-cotton was recorded on whole plot basis. Minimum 25 eggs of *Helicoverpa armigera* were collected at weekly interval from each plot to find out egg parasitisation. The data were analyzed statistically after necessary transformation.

Parasitisation

The data presented in Table 1 revealed that parasitisation of *H. armigera* eggs was significantly different only on August 27, September 10 and October 1. However, the mean parasitization varied significantly among different treatments. The highest mean parasitization (10.48%) was recorded when sorghum was used as trap crop. The lowest mean parasitization (6.52 %) was recorded in pure cotton, which was on par with pearl-millet (6.68 %) and maize (6.78%).

Bollworm incidence

Mean bollworm incidence among intact fruiting bodies did not vary significantly. The bollworm incidence among green bolls did not differ significantly on all dates of observation except September 17 but mean incidence showed significant differences (Table 2). The mean incidence was lowest (2.74 %) when sorghum was used as trap crop and it was significantly lower than other treatments except when marigold (3.52%) and pearl-millet (3.80%) were grown as trap crops. The highest incidence (4.86 %) was recorded when maize was used as trap crop and it was on par with pure cotton (4.76 %) and pearl-millet (3.80 %). The incidence in pure cotton (4.76 %) was on par with all treatments except when sorghum was used as trap crop.

Yield

The seed cotton yield in pure cotton was lowest (13 q/ha) which was on par with maize (13.1 q/ha) but both these were significantly lower than other treatments (Table 2). The yield was significantly highest (14.8 q/ha) when sorghum was used as trap crop. The seed cotton yield when marigold (14 q/ha) and pearl-millet (13.9) were used as trap crops was on par with each other.

Earlier, Robinson *et al.* (1972) observed increased populations of coccinellid, chrysopid, nabid and spider predators on cotton grown adjacent to sorghum than grown alone. Jadhav *et al.* (2000) reported that sorghum hybrid (CSH1) as a neighboring crop to cotton hybrids (MECH1, MECH2 and RCH2) increased the egg parasitism in *H. armigera* by *T. chilonis* than in a monocrop. Maize intercropped with cotton in Tanzania (Pearson, 1958), sorghum with pigeonpea in India reduced the attack of *Helicoverpa* spp. on the later crops (Romeis *et al.*, 1999). On the contrary intercropped maize failed to protect cotton from *H. zea* in USA (Henry and Adkisson, 1985; Pimental *et al.*, 1977). Sorghum as trap crop increased parasitisation, reduced the incidence of bollworms and increased the seed cotton yield significantly in the present studies. The egg laying by *H. armigera* was higher on sorghum than other trap crops. Thus the parasitisation on sorghum was higher. The higher parasitisation in cotton was due to shifting of *T. chilonis* from sorghum to cotton. The higher level (up to 70%) of egg parasitism of *H. armigera* eggs by *T. chilonis* on compact sorghum panicles has been reported by Jadhav *et al.* (2000). An estimated population buildup of *T. chilonis* over 1.25 million/ ha on sorghum has been reported by Duffield (1994).

Table 1. Effect of trap crop on parasitization of *H. armigera* eggs by *T. chilonis* in cotton at village Khuban (Distt Ferozepur) during 2002

Trap crop	Per cent parasitisation of *H. armigera* eggs										
	*6/8	*13/8	*20/8	27/8*	3/9	10/9	17/9	24/9	1/10	8/10	Mean
Maize	5.80 (14.47)	2.40 (9.13)	0.00 (4.05)	7.80 (16.65)	6.40 (14.54)	2.00 (6.55)	8.40 (16.78)	12.80 (20.88)	16.80 (24.09)	5.40 (13.41)	6.78 (15.08)
Pearl -millet	2.80 (9.69)	4.80 (13.16)	2.40 (9.13)	0.00 (4.05)	8.90 (17.13)	4.70 (12.47)	8.80 (17.06)	10.80 (19.05)	14.80 (22.57)	8.80 (17.18)	6.68 (14.96)
Sorghum	2.00 (8.46)	2.80 (9.69)	4.80 (13.25)	14.80 (22.99)	10.80 (18.86)	18.80 (25.67)	12.20 (20.40)	19.80 (26.14)	10.80 (19.15)	8.00 (16.33)	0.48 (18.86)
Marigold	5.60 (14.21)	7.20 (16.02)	2.80 (9.66)	8.90 (17.67)	10.50 (18.68)	6.80 (15.09)	10.50 (18.84)	12.60 (20.74)	6.80 (15.05)	9.10 (17.43)	8.08 (16.50)
Pure cotton	4.80 (13.25)	2.60 (10.06)	3.80 (10.95)	2.70 (9.54)	5.60 (13.65)	4.80 (12.60)	12.80 (20.85)	14.60 (22.43)	6.40 (14.61)	7.10 (15.27)	6.52 (14.78)
CD (p=0.05)	(NS)	(NS)	(NS)	(4.76)	(NS)	(5.58)	(NS)	(NS)	(3.91)	(NS)	(1.70)

● Figures in the parentheses are arcsine percentage + 0.5

Table 2. Effect of trap crop on green boll infestation by cotton bollworms in cotton at village Khuban (Distt Ferozepur) during 2002

Trap crop	Per cent green bolls infestation by bollworms					Yield(q/ha)
	10/9	17/9	24/9	8/10	Mean	
Maize	3.23 (10.35)	3.06 (9.90)	7.96 (16.17)	5.20 (12.98)	4.86 (12.69)	13.10
Pearl -millet	3.34 (10.51)	1.17 (5.52)	4.22(11.78)	6.48(14.73)	3.80(11.24)	13.90
Sorghum	1.80 (7.50)	1.06 (5.82)	4.02(11.54)	4.09(11.67)	2.74(9.52)	14.80
Marigold	2.62 (9.00)	1.64 (7.35)	4.99(12.55)	4.82(12.61)	3.52(10.74)	14.00
Pure cotton	3.51 (10.78)	3.68 (11.05)	6.46(14.71)	5.40(13.92)	4.76(12.59)	13.00
CD(P=0.05)	(NS)	(3.86)	(NS)	(NS)	(1.88)	0.25

Figures in the parentheses are arcsine percentage.

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