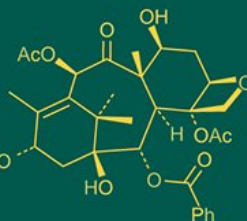
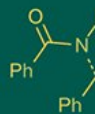


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Parasitic efficacy of egg parasitoid *Trichogrammatoidea bactrae* for management of Pink bollworm *Pectinophora gossypiella* (Saunders) in Bt Cotton

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Abstract

Krishi Vigyan Kendra, Selsura, District Wardha conducted front line demonstrations were conducted at Jambhuldhara village of Arvi tahsil and Dighi and Bopapur village of Deoli tahsil in Wardha district of Maharashtra state India on 13 farmers field during *khari* 2023-24, 2024-25 and 2025-26. Demonstration plot consist Six releases of *Trichogrammatoidea bactrae* @ 1 lakh eggs/ hectare at an interval of 10 days, starting from 55 days of crop germination for management of Pink bollworm, *Pectinophora gossypiella* (Saunders) in Bt Cotton and it was compared with farmer practice plot. The results revealed that Six releases of *Trichogrammatoidea bactrae* @ 1 lakh eggs/ hectare at an interval of 10 days, starting from 55 days of crop germination was found significantly most effective with lowest incidence of pink bollworm damage i.e. 7.63 per cent locule damage in demonstration plots as compared to farmer practice plots with i.e. 12.15 per cent locule damage. Highest yield of 15.13 q/ha was obtained from demonstration plots as compared to farmer practice plots (13.34 q/ha). Similarly, higher B:C ratio of 1 : 2.36 was recorded from demonstration plots as compared to farmer practice plots (1 : 2.05).

Keywords: Cotton, Pink bollworm, *Trichogrammatoidea bactrae*, egg parasitoid

Introduction

Cotton (*Gossypium hirsutum* L.) is the most important commercial crop and India got 1st place in the world in cotton acreage with 114.47 lakh hectares area under cotton cultivation i.e. around 37% of world area of 306.09 lakh hectares. Approximately 67% of Indian's cotton is produced on rain-fed areas and 33% on irrigated lands. In terms of productivity, India is on 40th rank with yield of 437 kg/ha during 2024-25. (Anonymous, 2025)^[1]

Chemical insecticides have been commonly used to control the pests. However, indiscriminate use of insecticides has led to many ecological backlashes like environmental pollution, resistance to pesticides and pest resurgence besides lethal effect to non-target organisms and health hazards to users.

Pink bollworm, *Pectinophora gossypiella* (Saunders), is one of the most damaging insect pests of cotton, with a wide range that causes significant losses in cotton production across India (Dhurua and Gujar 2011; Naik *et al.*, 2018)^[3, 11]. The infestation on Bt cotton was reported to cause 55% locule damage and a 35-90% reduction in seed cotton yield (Naik *et al.*, 2014)^[10]. However, pink bollworm resistance on Bt cotton was reported from Gujarat (2015) and southern states in 2016 onwards (Kranti 2016)^[5].

Trichogrammatoidea bactrae Nagaraja is an egg parasitoid widely distributed in the oriental region of the world, adapted to terrestrial humid habitat and known to attack various insect pest of cotton, sugarcane, fruits and vegetables (Nagaraja, 1978)^[9].

Material and Method

Front line demonstrations (FLD's) on field potential of egg parasitoid *trichogrammatoidea bactrae* for management of pink bollworm, *pectinophora gossypiella* (saunders) in Bt cotton were conducted by Krishi Vigyan Kendra, Wardha.

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The field demonstrations were carried out in randomized block design (RBD) in the farmers' fields of village Jambhuldhara village of Arvi tahsil and Dighi and Bopapur village of Deoli tahsil in Wardha district of Maharashtra state India on 13 farmers field 5.4 ha area under rainfed farming situation during *kharif* 2023-24, 2024-25 and 2025-26. *Trichogramma* was reared in laboratory at KVK, Wardha and prepared trichocards at 27 °C ± 2 °C temperature and 65-85 per cent relative humidity was maintained and were used for FLD's (Morison, 1970) [8]. Demonstration plot consist Six releases of *Trichogrammatoidea bactrae* @ 1 lakh eggs/ hectare at an interval of 10 days, starting from 55 days of crop germination for management of Pink bollworm, *Pectinophora gossypiella* (Saunders) in Bt Cotton and it was compared with farmer practice plot i.e. three spray, 1st spray of Acephate 75 SP 20 gm/10 L of water at 40 DAS, 2nd spray of Fipronil 5% SC 30 ml/10 L of water at 60 DAS, Profenophos 40% + Cypermethrine 4% @ 25-30 ml/10 L of water at 90 DAS. Agronomic practices to raise the crop were followed conventionally by the farmers as per the recommendations of package of practices of Dr.PDKV, Akola including the plant protection measures to manage the

sucking pests and except for bollworms, mainly pink bollworm.

Observations recorded

The observations on number of larvae per 20 bolls was counted, per cent green boll damage and per cent locule damage in open boll in each treatment were recorded and calculated for each treatment by the following formula:

Per cent Green boll damage (%)	=	No. of damage green boll Total No. of green bolls	x	100
Per cent Locule damage (%)	=	No. of damage green boll Total No. of green bolls	x	100

Observations on yield were recorded after harvesting of each treatment. The economic-parameters (gross return, net return and C: B ratio) were worked out on the basis of prevailing market prices of inputs and Minimum Support Prices of outputs.

Results and Discussion

Table 1: Evaluation of egg parasitoid, *Tr. bactrae* for management of pink bollworm in cotton

Tr. No.	Treatment	No. of PBW larvae/20 bolls	Green Boll Damage (%)	Locule Damage (%)	Yield (q/ha)	B:C ratio
T ₁	Acephate 75 SP @ 20 gm ml/10 L - at 40 DAS (1st Spray) Fipronil 5% SC @ 30 ml /10 L - at 60 DAS (2nd Spray) Profenophos 40% + Cypermethrine 4% @25-30 ml/10 L - at 90 DAS (3rd Spray)	5.04 (1.73)	20.74 (4.59)	12.15 (3.55)	13.34 (3.72)	2.05
T ₂	Six releases of <i>Tr. bactrae</i> @ 1 lakh eggs/ hectare at an interval of 10 days, starting from 55 days of crop germination.	3.02 (1.31)	13.50 (2.14)	7.63 (2.84)	15.13 (3.94)	2.36
	'f' test	Sig.	Sig.	Sig.	Sig.	
	SE (±M)	0.02	0.06	0.05	0.06	
	CD at 5%	0.08	0.17	0.16	0.17	
	CV (%)	5.89	6.04	6.01	5.18	

The mean larval incidence in demonstrated plots was 3.02 larvae/ 20 green bolls and was significantly lower than farmer practice plots (5.04 larvae/ 20 green bolls). The green boll damage was also significantly found minimum in demonstrated plots with *Tr. bactrae* (13.50 %) as compared to the farmer practice plots (20.74%) (Table.1). The per cent locule damage was significantly lower in the insecticidal demonstrated plots (7.63 %) when compare to farmer practice plots (12.15 %). EI Hafez and Nanda (2000) [4] indicated that the *Trichogrammatoidea bactrae* parasitism on Pink bollworm eggs was varied from 16.67-100 (Mean 66.67) percent at different release distances. Malik (2001) [6] reported up to 18 per cent parasitisation of pink bollworm

eggs by *Tr. bactrae* through release of adults @ 1,44,000/ha in pima cotton. The results are in close proximity with earlier reports (Malik, 2001; Mohamed *et al.*, 2016) [6, 7], which revealed that the early-season release would permit parasitoids to attack pink bollworm eggs on the cotton plant surface such as flower bracts, young bolls and may reduce the need for disruptive pesticides in the first half of the season. Dhandapani *et al.* (1992) [2] revealed that three releases of biocontrol agents., *T. chilonis* and *Brinckochrysa sceletes* on 90, 105 and 120 days after sowing could effectively check the population of *Heliothis armigera* and *Bemisia tabaci* which was equal to that of insecticides.

Table 2: Economics of the FLD

	Farmers Practice	Technology Assessed
Yield kg/ ha	13.34	15.13
GMR Rs/ha	102011	115699
NMR Rs/ ha	52319	66837
B:C Ratio	2.05	2.36
Cost of cultivation Rs/ha	49692	48862
Increase in Yield (%)		13.42

Selling rate of Cotton - Rs.7647/ql

Highest yield of 15.13 q/ha was obtained from demonstration plots as compared to farmer practice plots (13.34 q/ha). Similarly, higher B:C ratio of 1: 2.36 was

recorded from demonstration plots as compared to farmer practice plots (1: 2.05). Yield of cotton increased by 13.42 % in demonstration plots than farmer practice plots.

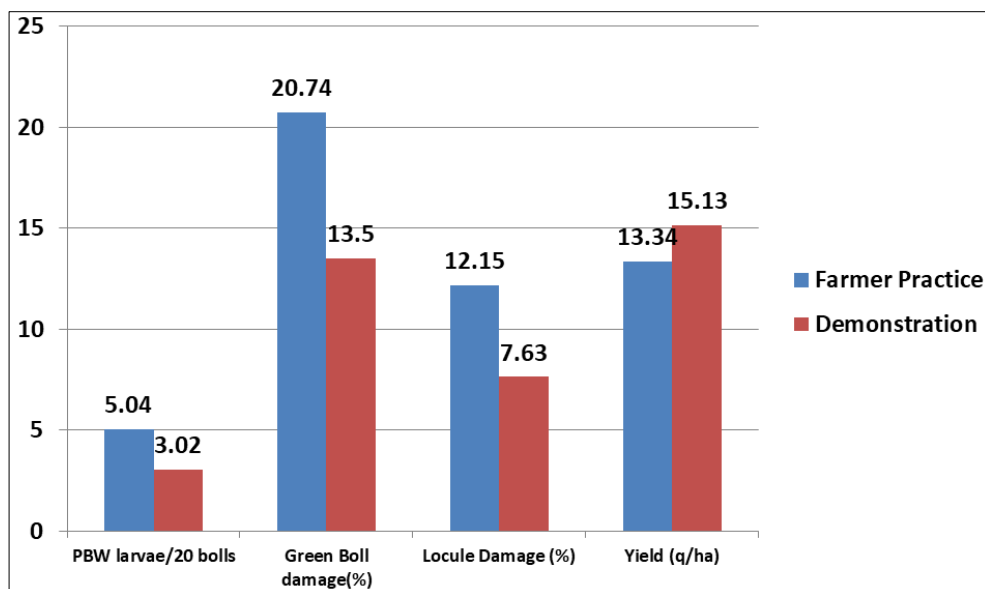


Fig 1: Graphical data on Infestation of PBW and Yield in Cotton

Conclusion

Six releases of *Trichogrammatoidea bactrae* @ 1 lakh eggs/hectare at an interval of 10 days, starting from 55 days of crop germination was found effective for management of Pink bollworm in Bt Cotton and getting higher seed yield of cotton crop and higher monetary return.

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