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Research Note

Bio-efficacy of DOR Bt, a *Bacillus thuringiensis* formulation against rice leaf folder, *Cnaphalocrosis medinalis* (Guenee) in Punjab

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ABSTARCT: **The studies on bio-efficacy of DOR Bt, a *Bacillus thuringiensis* formulation against rice leaf folder, *Cnaphalocrosis medinalis* (Guenee) in Punjab were conducted for three years) during 2005 to 2007. Three dosages of DOR Bt (1.0, 1.5 and 2.0 Kg/ha) were applied on appearance of the pest and were compared with chemical control (monocrotophos 36 SL @1.4 l/ha) and untreated control. After 45 days of transplanting the lowest mean incidence (1.38%) was recorded in higher dose (2.0 kg/ha) of DOR Bt followed by monocrotophos (1.44%)and incidence in these two was significantly lower than all other treatments. After 60 days of transplanting the lowest mean incidence (1.08%) was observed in monocrotophos, which was significantly lower than all other treatments except higher dose (2.0 kg/ha) of DOR Bt (1.11%), which was also significantly lower than all other treatments. The maximum mean yield (61.12 q/ha) was harvested from monocrotophos which was also significantly higher than all other treatments except higher dose (2.0 kg/ha) of DOR Bt (60.75 q/ha). Significantly lower yield was obtained from control plot (53.81%). It can be concluded that DOR Bt @ 2.0 kg/ha was as effective as monocrotophos 36 SL @ 1.4 l/ha in controlling the rice leaf folder and increasing the grain yield of rice.**

KEY WORDS: DOR Bt, rice leaf folder, rice

In Punjab, rice occupied 26.42 lakh hectares with a total production of 101.93 lakh tonnes during 2005-2006 (Anonymous, 2006). Rice is attacked by 385 species of insects causing 31.5 to 86.0 per cent losses in yield (Gunathilagaraj and Kumar, 1997). Out of these, white backed planthopper (WBPH), *Sogatella furcifera* (Horvath), brown planthopper, *Nilaparvata lugens* (Stal.), stem borer, *Scirpophaga incertulas* (Walker) and leaf folder, *Cnaphalocrocis medinalis* (Guenee), have assumed serious form in the country (Dale, 1994, Kushwaha, 1988). Insect pests damage rice crop at different stages of crop growth of which leaf feeding pests are of major importance because of their ability to defoliate or to remove the chlorophyll content of the leaves leading to considerable reduction in yield. Rice leaf folder, *C. medinalis*, considered as a pest of minor importance, has increased in abundance in late 1980's and has become a major pest in many parts of India. Every unit of increase in infestation by *C. medinalis* decreased the yield by 14 and 1.46 per cent during

Table 1. Effect of DOR Bt on incidence of leaf folder and grain yield of rice (var PR116) in Punjab during 2005 - 2007.

Treatments	Percent leaves folded				Yield (q/ha)			
	2005	2006	2007	Mean	2005	2006	2007	Mean
Bt @ 1.0kg/ha	6.31(14.56)	0.56(4.30)	2.68(9.42)	2.93(9.42)	60.00	56.13	56.50	57.02
Bt @ 1.5kg/ha	3.30(10.49)	0.46(3.88)	1.96(8.04)	1.93(7.75)	65.20	57.50	57.90	59.05
Bt @ 2.0kg/ha	3.83(11.27)	0.38(3.52)	1.02(5.78)	1.38(6.33)	66.40	58.92	59.80	60.75
Monocrotophos 36 SL @1.4l/ha	4.17(11.76)	0.47(3.91)	1.00(5.73)	1.44(6.43)	67.10	58.83	60.20	61.12
Untreated Control	7.50(15.88)	2.21(8.55)	4.26(11.87)	4.46(11.98)	52.30	55.36	53.80	53.81
CD (p=0.05)	(0.20)	(0.52)	(0.95)	(1.09)	0.19	0.52	0.98	2.08

Figures in parentheses are arc sine transformations

summer and wet season, respectively (Nanda and Bisoi, 1990). For the control of this pest, chemical spray is the most common practice. Concerns about environment pollution, resistance to pesticides, residues in food and threats to biodiversity emphasize the need for novel strategies for the control of this pest. Biopesticides offer an environmentally acceptable strategy. Keeping these in view, the present studies were undertaken to evaluate the DOR Bt (a formulation of *Bacillus thuringiensis* developed by Directorate of Oilseeds Research, Hyderabad) against rice leaf folder.

The studies on the bioefficacy of DOR Bt against rice leaf folder were conducted for three years in farmers' fields at different locations of Punjab, *viz.*, Kami khera (Distt.Ferozepur), Samrala (Distt.Ludhiana) and Jasso Majara (Distt. Jalandhar) during 2005, 2006 and 2007, respectively. Three dosages of DOR Bt (1.0, 1.5 and 2.0 Kg/ha) were applied on appearance of the pest and compared with chemical control (monocrotophos 36 SL @1.4 l/ha) and untreated control. Three sprays of DOR Bt were given during 2005 (1st, 2nd and 4th weeks of August) and two sprays of DOR Bt were given during 2006 & 2007 (1st and 2nd fortnights of August). In chemical control, two sprays of monocrotophos were given during all the years (1st and 2nd fortnight of August). The plot size was 250 sqm for each treatment and the experiment was conducted in randomized block design with four replications. The data on the percent leaves folded/ damaged was recorded after 45 days of transplanting from 10 randomly selected plants from each replicate. The yield was recorded on whole plot basis.

Incidence of leaf folder: During all the years, the per cent leaves damaged was significantly lower in all the treatments as compared to control (2.21-7.50%) (Table 1). During 2005, the lowest incidence was observed in medium dose of Bt @ 1.5kg/ha (3.30%) which was significantly lower than that in all other treatments. However, during 2006, the lowest incidence was obtained with the highest dose of Bt @ 2.0kg/ha (0.38%) which was on par with medium dose of Bt @ 1.5kg/ha (0.46%) and standard chemical check monocrotophos 36SL (0.47%). During 2007, the lowest incidence (1.00%) was recorded in monocrotophos, which was on par with highest dose (2.00kg/ha) of Bt (1.02%) and incidence in these two was significantly lower than all other treatments.

When the data were pooled, the lowest mean incidence (1.38%) was recorded with the highest dose (2.0 kg/ha) of DOR Bt followed by monocrotophos (1.44%)and incidence in these two was significantly lower than all other treatments.

Grain yield: When the data were pooled over years, the maximum mean yield (61.12 q/ha) was recovered from plots treated with monocrotophos, which was

significantly higher than that in all other treatments except the highest dose (2.0 kg/ha) of DOR Bt (60.75 q/ha). Significantly lower yield was obtained from the control plot (53.81%).

Based on the incidence of leaf folder and yield, it can be concluded that DOR Bt @ 2.0 kg/ha was as effective as monocrotophos 36 SL @ 1.4 l/ha in controlling the rice leaf folder and increasing the grain yield of rice. Hence, Bt formulation can be used in integrated pest management in rice without disturbing the agroecosystem and the quality of the environment. The results are in corroboration with Shahid *et al.* (2003) who also reported that Bt formulation (CAMB) was effective in controlling the rice leaf folder under laboratory and field conditions. Yang Ziwen (2008) also reported that *Bt* is very effective against rice leaf roller, rice leaf tier and rice leaf folder.

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