



# Assessment of Infestation by *Sesamia inferens* on Wheat Varieties under different Tillage Conditions

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## ABSTRACT

Field trials were conducted at farmers' field (Bahircap, Balupur Barnapara and Pulbanda villages) of Ratua 1 block, Malda, West Bengal, India (25°13'1.51"N latitude and 87°55'29.02"E latitude) during rabi season of 2013-2014 to assess the infestation of pink stem borer and varietal performance of wheat under different tillage condition. Among the eleven varieties, DBW17 (0.75% and 1.06%), DBW39 (1% and 1.94%) and CBW 38 (1.75% and 0.94%) and K307 (2% and 1%) showed better tolerance against stem borer infestation in both conventional and zero tillage condition, respectively. The infestation was comparatively more at maturity under zero tillage condition.

**Key Words:** Pink Stem Borer, Wheat, Varieties, Tillage.

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## INTRODUCTION

Wheat (*Triticum aestivum*) is the second most important cereal crop next to rice according to acreage however it is at third position next to rice and maize according to production. The system of wheat cultivation i.e. zero tillage has the immediate advantage of reduced cost of tillage. The pest scenario of wheat cultivation is also undergoing change with the change in tillage system. Though pink stem borer (*Sesamia inferens* Walker) (Lepidoptera: Noctuidae) originally a pest of rice (Pathak and Khan, 1994), is an established pest of wheat due to adoption of this tillage system of sowing of wheat crop in North-Western plains of India and causes major damage by feeding inside the stem causing dead hearts at tillering stage and empty white heads at ripening stage and ultimately reduced yield by more than 11 per cent in India (Saxena *et al*, 1972). Signs of damage in wheat were similar to those recorded in rice and damage caused by larvae of this insect is expressed as "dead hearts" at seedling stage and "white ears" at ear-head stage (Deol, 2002).

It occasionally causes heavy losses in restricted areas. From an estimate, it was found that every one

per cent increase in stem borers' incidence at the vegetative phase resulted in a loss of 0.28 per cent yield in rice (Jaipal *et al*, 2005). In Rajasthan, 5.7 to 11.1 per cent infestation has been recorded in wheat varietal trials (Singh, 1986). A lot of work on the effect of tillage conditions on agronomic parameters is available in literature (Azam *et al*, 2008) but very little information is available regarding their effect on insect pests. Thus survey were carried out on wheat grown under different tillage conditions during the last years which indicated medium to high damage caused by pink stem borer in sporadic early sown zero tilled wheat fields in north-western plains of India (Anonymous, 2008).

Indiscriminate use of synthetic pesticide for controlling a pest resulted in problems including pest resistance, pest outbreak, pest resurgence, environmental pollution and finally health hazard to consumers. To overcome these problems, resistant varieties are now being used in many developed and developing countries for combating the pest infestations with the aim of increasing cereal production because the use of resistant varieties in pest management is considered to be commercial and safer as compared to the chemical insecticides.

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Very few sources of resistance (BAW 743 and BAW 769) are available in literature against this pest (Ahad *et al.*, 2002). The present study was under taken to assess infestation by pink stem borer on different wheat Varieties grown under different tillage conditions

## MATERIALS AND METHODS

The field experiment was conducted at farmers' field of Bahircap, Balupur Barnapara and Pulbanda villages of Ratua 1 block, Malda, West Bengal, India (25°13'1.51"N latitude and 87°55'29.02"E latitude) during rabi season of 2013-14 and 2014-15. Eleven varieties of wheat were evaluated against stem borer in correlation with the stage of the crop and different tillage condition. The eleven varieties were DBW 39, DBW 17, PBW 621, CBW 38, Sonalika, K 307, HD 2687, HD 2827, Francolin, Gautam and PBW 343. The seeds were sown during last week of November, 2013 and 3rd week of November, 2014 with recommended dose of fertilizer at the time of land preparation. The varieties were treated as treatments and locations as replications. Two methods of tillage operations were done in this experiment i.e. conventional and zero tillage. In conventional tillage the plot area was 0.27 ha to 0.47 ha with 20 cm row to row spacing, while in zero tillage sowing was done by 11 tyne seed drill with the plot size 50 sq.m. Three irrigations were given at 21, 42 and 75 DAS in both the tillage systems. Here, the infestation at later stage of the crop was recorded because infestation of pink stem borer was gradually increased in mature stage compared to early stage as reported by Shawkhatuzzama *et al.* (2013). The infestation was recorded just after 1st flowering and before 50 per cent flowering stage of the crop i.e. 84-90 DAS and after that the observation was taken at weekly interval up to the harvest of the crop by direct counting the white ear-head per plant per square meter area. The percentage of infestation was calculated by the formula:

$$\text{Percentage of infestation} = \frac{\text{Number of white ear-head}}{\text{Number of total plants counted}} \times 100$$

No pesticides were applied during the course of study and for these fields only regular management tactics (cultural, prophylactic, etc.) were used. Percentage of infestation was compared by using correlation coefficient (IBM SPSS Statistics Data Editor software, version 19.0; SPSS Inc., Chicago, USA) in both tillage conditions.

## RESULTS AND DISCUSSION

### Per cent of infestation by pink stem borer in respect to stage of the crop

Considering the pooled mean, it was evident that mean per cent infestation of pink stem borer was higher at maturity stage than the early stage in all eleven varieties in both the years. Ahad *et al.* (1995) reported the similar results that the pink borer infested wheat field only at the later stage of plants resulting in white head symptoms.

### Per cent of infestation by pink stem borer in different tillage conditions

The mean per cent infestation of pink stem borer was comparatively more in zero tillage plots as compared to conventional tillage plots as shown in (Table 1). Higher incidence of pink stem borer in zero tillage was also reported by Razzaq *et al.* (1997) and Singh (2012). It may be due to incomplete destruction of the rice stubbles that have remained in the field even after ploughing several times as described by Inayatullah *et al.* (1989). Literature also proved that medium to high damage caused by pink stem borer in sporadic early sown zero tilled wheat fields in north-western plains of India (Anonymous, 2008).

It was observed that under conventional tillage condition, amongst the eleven varieties of wheat, pooled mean per cent of stem borer infestation was highest in HD2687 (5%) followed by HD2827 (4.75%). The lowest mean per cent of stem borer infestation was noticed in DBW17 as depicted in Table 1. Likewise, under zero tillage condition, the highest pooled mean per cent of stem borer infestation was observed in PBW343 (7.19%) among the eleven varieties of wheat followed by PBW621 (4%). The mean per cent of stem borer infestation was lowest in CBW 38 (0.94%).

## Infestation of *Sesamia inferens* in Wheat

**Table 1. Pooled data of the effect of infestation of stem borer under conventional and zero tillage conditions.**

Sr. No.	Variety	Conventional tillage condition		Zero tillage condition	
		Mean per cent infestation by Stem Borer	Yield (q/ha)	Mean per cent infestation by Stem Borer	Yield (q/ha)
1.	DBW 39	1.0	23.6	1.94	25.1
2.	DBW 17	0.75	23.4	1.06	27.3
3.	PBW 621	1.5	14.2	4.0	18.5
4.	CBW 38	1.75	12.0	0.94	30.7
5.	Sonalika	2.0	9.0	3.31	24.0
6.	K 307	2.0	22.0	1.00	30.0
7.	HD 2687	5.0	17.2	1.75	14.6
8.	HD 2827	4.75	12.8	2.00	29.9
9.	Francolin	4.0	15.2	1.00	23.1
10.	Gautam	1.0	16.4	1.75	12.9
11.	PBW 343	2.5	15.4	7.19	14.7

### CONCLUSION

Among the eleven wheat varieties/lines, in general, none of them was found to be resistant to pink stem borer. However, DBW17 showed better tolerance followed by DBW39, CBW38 and K307 at later stage irrespective of tillage condition. From the experiment, it can be inferred that DBW17, DBW39, CBW 38 and K307 were found comparatively promising against pink stem borer infestation.

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