



Bio-efficacy of Mortel (Fipronil 0.3 G) against Pink Stem Borer, *Sesamia inferens* in Wheat

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ABSTRACT

Investigations on toxicity of new insecticide namely Mortel (Fipronil 0.3 G) at 15, 17.5 and 20 kg/ha in comparison to Dursban (chlorpyrifos 20 EC) at 3 l/ha as check insecticide were carried out against Pink Stem borer, *Sesamia inferens*, Walker (PSB) in wheat at farmer's field in district Amritsar and Gurdaspur during the rabi season 2020-21. Among the different dosages of Fipronil 0.3% GR (Mortel) tested, Fipronil 0.3% GR @ 20 kg/ha has recorded maximum reduction in tillers damage and higher grain yield of wheat. Highest grain yield of 51.75 and 50.67 q/ha was obtained when Fipronil 0.3% GR (Mortel) was used @ 20 kg/ha in district Amritsar and Gurdaspur, respectively. No dead heart was found at end of first week of application when Fipronil 0.3% GR @ 20 kg/ha was used in Amritsar districts while 0.08 per cent dead hearts were recorded after first week of application in Gurdaspur district. There was no statistical difference in natural enemy count recorded after 1, 2 and 3 weeks of treatments in different dosages of Fipronil 0.3% GR and was statistically on par with that of the untreated check indicating that all the tested dosages of Fipronil were safer to the natural enemies. There were no phytotoxicity effects of Fipronil 0.3% GR on wheat even at higher dosages. As Fipronil @ 20 kg/ha has recorded highest reduction in the tillers damage due to PSB attack and highest grain yield, the highest dosage i.e. Fipronil @ 20 kg/ha may be recommend as an alternative insecticide for the effective management of pink stem borer in wheat.

Key Words: Mortel (Fipronil 0.3 G), Pink Stem Borer, *Sesamia inferens*, Bioefficacy, Wheat

INTRODUCTION

Wheat [*Triticum aestivum* (Linnaeus) Em. Thell] belongs to the family Graminae and it is believed to have originated from South West Asia. It is the most important cereal crop cultivated in temperate area of the world. It is the second important staple food crop, first being the rice. It is a good source of carbohydrates and proteins. Wheat grains contain 12.2 per cent protein, which is more than other cereals. Its baking quality makes it relatively more important crop than any other cereal grains. Wheat flour is used in the form of *chapatti, puri, bread, cake, sweetmeats, halwa*, etc. It provides characteristic substance Gluten which is very essential for bakers. Wheat straw is also used in paper industries and for making temporary huts and roof. The ripe unthreshing ear heads are used to

decorate items. Wheat is one of the leading cereal crops which have provided daily sustenance for a large proportion of the world's population.

There are many biotic constraints that hamper wheat production of which infestation of insect pests is major one. Wheat crop is attacked by 24 species of insect pests (Singh, 1998). Major insect pests of wheat are termite, armyworm, *Mythimna separata*, aphids, *Macrosiphum granarium* (Kirby), Pink stem borer, *Sesamia inferens*, Walker etc. Earlier PSB has been causing economic damage to rice crop only but recently an increase in its damage on wheat and maize has been observed (Ram *et al* 2011, Singh and Kular, 2011, Singh *et al* 2014, Pimental and Peshin, 2014). The importance of this insect is increasing in rice-wheat cropping system on North-western plains of India because

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Table 1. Bioefficacy of Mortel (Fipronil 0.3 G) against pink stem borer, *Sesamia inferens* in wheat in district Amritsar

Treatment	Dosage per acre	Plant population per m row after 3 weeks of sowing	Percent damaged tillers by pink stem borer weeks after application				Predator population per sq m weeks after application				Yield (q/ha)
			Before application	1 week	2 weeks	3 weeks	Before application	1 week	2 weeks	3 weeks	
Mortel	15kg	71.23 (57.57)	2.88 (9.74)	1.88 (7.85)	0.00 (0.00)	0.00 (0.00)	0.27 (2.92)	0.13 (1.71)	0.13 (1.71)	0.33 (3.27)	49.75 (44.84)
Mortel	17.5kg	71.17 (57.55)	2.58 (9.24)	0.59 (3.59)	0.00 (0.00)	0.00 (0.00)	0.20 (2.06)	0.00 (0.00)	0.20 (2.06)	0.27 (2.92)	50.63 (45.35)
Mortel	20kg	73.30 (58.90)	2.94 (9.83)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.27 (2.92)	0.07 (0.85)	0.13 (1.71)	0.20 (2.56)	51.75 (45.98)
Dursban	3 litre	73.10 (58.76)	2.92 (9.81)	1.41 (6.79)	0.00 (0.00)	0.00 (0.00)	0.20 (2.06)	0.00 (0.00)	0.20 (2.06)	0.27 (2.92)	49.90 (44.93)
Control	-	71.90 (57.98)	2.79 (9.58)	3.05 (10.05)	3.39 (10.60)	4.79 (12.64)	0.20 (2.56)	0.17 (2.92)	0.27 (2.92)	0.33 (3.27)	48.83 (44.31)
C.D. (5%)		N/A	N/A	0.57	0.24	0.21	N/A	N/A	N/A	N/A	1.46

Table 2. Bioefficacy of Mortel (Fipronil 0.3 G) against pink stem borer, *Sesamia inferens* in wheat in district Gurdaspur

Treatment	Dosage per hectare	Plant population per m row after 3 weeks of sowing	Percent damage by pink stem borer weeks after application				Predator population per sq m weeks after application				Yield (q/ha)
			Before application	1 week	2 weeks	3 weeks	Before application	1 week	2 weeks	3 weeks	
Mortel	15kg	74.80 (59.87)	1.58 (7.22)	0.64 (4.58)	0.03 (0.60)	0.10 (1.46)	0.20 (2.56)	0.13 (1.71)	0.20 (2.56)	0.27 (2.92)	49.08 (44.46)
Mortel	17.5kg	74.53 (59.68)	1.50 (7.02)	0.25 (2.88)	0.00 (0.00)	0.00 (0.00)	0.13 (1.21)	0.20 (2.06)	0.20 (2.06)	0.27 (2.92)	49.92 (44.93)
Mortel	20kg	70.67 (57.20)	1.52 (7.08)	0.08 (1.34)	0.00 (0.00)	0.00 (0.00)	0.20 (2.06)	0.20 (2.06)	0.20 (2.06)	0.27 (2.92)	50.67 (45.36)
Dursban	3 litre	74.60 (59.72)	1.47 (6.95)	0.57 (4.34)	0.07 (0.85)	0.07 (1.21)	0.27 (2.42)	0.13 (1.71)	0.27 (2.33)	0.27 (2.92)	49.75 (44.84)
Control	-	74.20 (59.48)	1.66 (7.40)	2.09 (8.31)	2.67 (9.39)	3.68 (11.06)	0.27 (2.92)	0.27 (2.92)	0.27 (2.92)	0.33 (3.27)	47.58 (43.60)
C.D. (5%)		N/A	N/A	0.19	0.20	0.13	N/A	N/A	N/A	N/A	1.04

Table 3. Bioefficacy of Mortel (Fipronil 0.3 G) against pink stem borer, *Sesamia inferens* in wheat in districts Amritsar and Gurdaspur (Mean)

Treatment	Dosage per acre	Plant population per m row after 3 weeks of sowing	Percent damage by pink stem borer weeks after application				Predator population per sq m weeks after application				Yield (q/ha)
			Before application	1 week	2 weeks	3 weeks	Before application	1 week	2 weeks	3 weeks	
Mortel	15kg	73.02 (58.72)	2.23 (8.48)	1.26 (6.22)	0.02 (0.30)	0.05 (0.73)	0.23 (2.74)	0.13 (1.71)	0.17 (2.14)	0.30 (3.09)	49.42 (44.65)
Mortel	17.5kg	72.85 (58.62)	2.04 (8.13)	0.42 (3.23)	0.00 (0.00)	0.00 (0.00)	0.17 (1.64)	0.10 (1.03)	0.20 (2.06)	0.27 (2.92)	50.28 (45.14)
Mortel	20kg	71.98 (58.05)	2.23 (8.45)	0.04 (0.67)	0.00 (0.00)	0.00 (0.00)	0.23 (2.49)	0.13 (1.46)	0.17 (1.89)	0.23 (2.74)	51.21 (45.67)
Dursban	3 litre	73.85 (59.24)	2.20 (8.38)	0.99 (5.56)	0.03 (0.43)	0.03 (0.60)	0.23 (2.24)	0.07 (0.85)	0.23 (2.20)	0.27 (2.92)	49.83 (44.88)
Control	-	73.05 (58.73)	2.23 (8.49)	2.57 (9.18)	3.03 (10.00)	4.24 (11.85)	0.23 (2.74)	0.27 (2.92)	0.27 (2.92)	0.33 (3.27)	48.21 (43.96)
C.D. (5%)		N/A	N/A	0.42	0.26	0.36	N/A	N/A	N/A	N/A	0.77

Bio-efficacy of Mortel

of mild winters and reduction in time gap between harvesting of rice and sowing of wheat crop. The pinkish caterpillar of PSB bores into stem and kills central shoots forming 'dead hearts' (Deol, 2002).

Therefore, there is a need to explore the possibilities of increasing the productivity through better understanding of constraints in its production. Keeping in view the importance of wheat crop in the economy of Punjab and the economic losses caused by the PSB, the present study was aimed to find the efficacy of Mortel 0.3 G against PSB on wheat crop.

MATERIALS AND METHODS

Investigations on toxicity of new insecticide namely Mortel (fipronil 0.3 G) at 15, 17.5 and 20 kg/ha in comparison to Dursban (chlorpyrifos 20 EC) at 3 l/ha as check insecticide were carried out against Pink Stem borer, *Sesamia inferens*, Walker in wheat at farmer's field in district Amritsar and Gurdaspur during the rabi season 2020-21. The experiment was laid out in Randomized Complete Block Design (RBD) with 5 treatments including untreated control each replicated three times. The plot size was kept at 100 m². The wheat variety PBW 2967 was used in experiment which was sown in the second week of November, 2020.

The wheat crop was sown using rotavator without burning of the rice stubbles. All the recommended package of practices was followed for growing wheat crop with row to row spacing of 20 cm. The insecticides were mixed with 50 kg/ha fine soil and broadcasted over the entire plot before first irrigation followed by the irrigation. The tillers were recorded from five spots 1 square meter area in each plot and the total number of tillers was recorded three weeks after sowing and data were presented as plant population per meter row in final table. For recording observations on PSB incidence, number of termite damaged tillers and total tillers in these spots were recorded before and after 1, 2 and 3 weeks after the treatment and converted into per cent damage as under. Data were analyzed according to standard statistical procedures.

Number of damaged
tiller

$$\text{Percent damage} = \frac{\text{Number of damaged tiller}}{\text{Total number of tillers}} \times 100$$

RESULTS AND DISCUSSION

Among the different dosages of Fipronil 0.3% GR (Mortel) tested, Fipronil 0.3% GR @ 20 kg/ha has recorded maximum reduction in tillers damage and higher grain yield of wheat. Highest grain yield of 51.75 and 50.67 q/ha was obtained when Fipronil 0.3% GR (Mortel) was used @ 20 kg/ha in district Amritsar and Gurdaspur, respectively (Table 1, 2). Grain yield (49.90 q/ha) was obtained with check insecticide, Dursban 20 EC @ 3 litre/ha while very less grain yield (48.83 q/ha) was obtained in the control plot in district Amritsar (Table 1). Similarly, grain yield (49.75 q/ha) was obtained with check insecticide, Dursban 20 EC @ 3 litre/ha while grain yield (47.58 q/ha) was obtained in the control plot in the district Gurdaspur (Table 2). Sidar *et al* (2017) found 26.67 per cent dead hearts in Fipronil 0.3 G treated maize plot with *Chilo partellus* which was significantly superior over untreated control (36.67%).

No dead heart was found at end of first week of application when Fipronil 0.3% GR @ 20 kg/ha was used in Amritsar districts while 0.08 per cent dead hearts were recorded after first week of application when Fipronil 0.3% GR @ 20 kg/ha was used in Gurdaspur district. There was no statistical difference in natural enemy count recorded after one week of treatments in different dosages of Fipronil 0.3% GR and was statistically on par with that of the untreated check indicating that all the tested dosages of Fipronil were safer to the natural enemies in both the districts. There were no phytotoxicity effects of Fipronil 0.3% GR on wheat even at higher dosages in both the districts.

CONCLUSION

As Fipronil @ 20 kg/ha have recorded highest reduction in the tillers damage due to PSB attack and highest yield, the highest dosage i.e. Fipronil @ 20 kg/jha can be used for the effective management of pink stem borer in wheat.

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