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Chemical Control of Maize Stem Borer (*Chilo partellus* Swin.)

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Abstract: The results of chemical control of maize stem borer *Chilo partellus* Swin. revealed that Furadan 3G proved significantly more effective in the reduction of percent dead hearts, pest infestation and in increase of stalk and cobs weight, average number of cobs/plant and grain yield followed by Ripcord 100 g/l EC and Tamaron SL 600. High dose of all the three insecticides gave better control of maize stem borer than medium and low doses. However, medium and low doses of insecticides were also found significantly better compared to the check.

Key words: Maize, stem borer, *Chilo partellus*, chemical control

Introduction

Many insect pests like maize stem borer, European corn borer, pink borer, shootfly, cutworms and aphid attack maize crop and adversely affect its production. Among these insects, maize stem borer *Chilo partellus* is most destructive one. In severe infestation at seedling stage it causes loss up to 75%. It attacks all parts of the maize plant except roots (Anonymous, 1986). Khan (1983) tried granular formulation of Carbofuran, Disulfoton, Diazinon and Fenthion at 0.60, 1.50 and 1.75 kg a.i./ha respectively against the maize stem borer *Chilo partellus* and concluded that the systemic compound (Carbofuran and Disulfoton) applied in the furrow were more effective than the non-systemic compounds as foliar applications. Marwaha *et al.* (1984) reported that on the basis of percent dead hearts and leaf injury, the soil treatment with Carbofuran granules at 1.0 kg a.i./ha and seed treatment with Carbofuran at 3.0 kg a.i./ha were superior to other treatments. Ahmad (1987) concluded that the application of Furadan, Temic and Paden to "sunehari" maize had influence on the physiomorphic character of the crop. He further observed that insecticide treatment increased grain yield, height, number of leaves per plant, leaf area index and dry matter contents. Halimie *et al.* (1989) carried out studies in Faisalabad, Pakistan during 1987 on maize CV Neelam. Carbofuran as whorl treatment at 0.75 kg a.i./ha after 25 and 45 days of sowing reduced infestation of pyralid *C. partellus* to 6.77% and resulted in highest yield and highest cost benefit ratio in comparison with other methods of application. Rahim and Masud (1992) tested fourteen insecticides in spray, dust or granules against the pyralid *C. partellus* on saddabahr in Pakistan. In term of yields Furadan (Carbofuran) among granular formulation gave good results. The objective of this experiment was to find out effective insecticides with appropriate dose for the control of maize stem borer *Chilo partellus* (Swin.).

Materials and Methods

An experiment was conducted at the farm of Agricultural Faculty, Gomal University, D.I. Khan, Pakistan. Kisan variety of maize was sown in plots (3 × 2 m²) with tar water condition. Row to row and plant to plant distances were kept 60 cm and 25 cm, respectively. All agronomic practices were given uniformly as and when needed in all of the treatments. The experiment was laid down in randomized complete block design with split plot arrangement. Insecticides (Table 1) were given importance and hence were kept in the sub-plots. Low, medium and high doses of the insecticides were applied to maize variety kisan. Three plots in each replication were kept untreated. The treatment of insecticides to crop was done at economic threshold level of the pest and

repeated twice at an interval of 15 days. First treatment of insecticides was given on 4th September and second on 19th September, 1997. The data were recorded at weekly interval on the basis of dead hearts and plant infestation. The data were subjected to the statistical analysis. The means regarding insecticides and their doses were separated by LSD test.

Table 1: List of insecticides and their doses used against *Chilo partellus* (Swin.) on maize crop

Insecticides	Common Name	Dose per hectare		
		Low	Medium	High
Tamaron SL 600	Methamedaphos	0.750 L	1.00 L	1.25 L
Furadan 3G	Carbofuran	17.29 kg	19.76 kg	22.23 kg
Ripcord 100g/l EC	Cyperrnethrin	0.500 L	0.600 L	0.750 L

Results and Discussion

Percent-dead-hearts: Data (Table 2) of chemical control trial conducted against maize stem borer reveal that the dead hearts were significantly less in all the treated plots compared to the check plots. At all of the three doses Furadan was found most effective, followed by Tamaron and Ripcord. Low doses of all tested-insecticides were found non-significantly different from each other and significantly different from the check in the control of maize stem borer. The medium and high doses of all insecticides were found significantly better than the check in the reduction of dead hearts percentage in maize crop. The number of dead hearts recorded in all the treated plots were found non-significantly different from each others.

Table 2: Effect of insecticides and their doses on percent dead hearts by stem borer

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	6.63 C	4.83 DEF	3.55 FG	8.80 B	5.90 C
Furadan	5.71 CD	4.00 EFG	3.09 G	9.26 AB	5.52 C
Ripcord	6.64 C	5.25 CDE	4.16 EFG	10.34 A	6.60
Control	9.57 AB	10.19 AB	10.03 AB	9.88 AB	8.82 A
Mean	7.14 E	6.02 C	5.21 D	9.57 A	

Means followed by different letters are significantly differed from each others at 5% level of probability
LSD value for chemicals = 0.66
LSD value for closes = 0.66
LSD value for interaction = 1.32

These results further reveal that Furadan was ranked first in the reduction of dead hearts to 5.52%, followed by Tamaron and Ripcord which reduced the dead hearts to 5.90 and 6.60% respectively, compared to 8.82% in the control plots. Furadan and Tamaron were non-significantly different from

each other, while Ripcord was significantly different from these two insecticides at 5% level of probability. All of the tested insecticides were significantly different from the control in the reduction of dead hearts percentage. High dose of the insecticides was found significantly better than the medium and low doses. Medium dose was found significantly more effective than low dose. All of the tested doses of the insecticides were found significantly different from the control.

Percent infestation: Data (Table 3) show that the per cent infestation of maize stem borer was significantly less in all the treated plots compared to the check plots. The results reveal that Tamaron was most effective in the control of the pest followed by Ripcord and Furadan at low dose. At medium dose Furadan was found more effective, followed by Tamaron and Ripcord in the reduction of the pest infestation. All of the tested insecticides were found equally effective in the control of the pest infestation at high dose and were non-significantly different from each other at 5% level of probability.

Table 3: Effect of different insecticides and their doses on percent infestation by stem borer in maize crop

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	12.18 BC	10.79 BCD	9.10 D	19.57 A	12.91 B
Furadan	13.42 B	9.26 D	8.17 D	18.05 A	12.23 B
Ripcord	12.80 BC	11.27 BCD	9.88 CD	17.90 A	12.96 B
Control	19.13A	18.12 A	20.63A	18.98 A	19.26A
Mean	14.38 B	12.36 C	11.99 C	18.67 A	

Means followed by different letters are significantly differed from each others at 5% level of probability
LSD value for chemicals = 1.38
LSD value for doses = 1.40
LSD value for interaction = 2.79

The results also reveal that Furadan was found most effective in the reduction of maize stem borer infestation, followed by Tamaron and Ripcord. All of the three insecticides were found non-significantly different from each other and were found significantly different from the check at 5% level of probability. High and medium doses of the insecticides were found significantly more effective than low dose. However, low dose was also found significantly different from check in the reduction of the pest infestation.

Weight of stalk (kg/plot): Results (Table 4) show that the stalk weight per plot of maize was significantly more in all of the treated plots compared to untreated plots. The data reveal that

Table 4: Effect of different insecticides and their doses on stalk weight (kg/plot) of maize crop

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	6.50 F	7.50 E	8.08 D	5.08 CG	6.79 C
Furadan	8.50 CD	9.50 B	10.17 A	5.33 CG	8.38 A
Ripcord	7.17 E	8.42 CD	8.92 C	5.17 CG	7.42 B
Control	5.33 CG	5.42 CG	5.58 CG	5.58 CG	5.48 D
Mean	6.88 C	7.71 B	8.19 A	5.29 D	

Means followed by different letters are significantly differed from each others at 5% level of probability
LSD value for chemicals = 0.25
LSD value for doses = 0.25
LSD value for interaction = 0.50

Furadan was significantly most effective in the control of maize stem borer and in the increase of maize stalk weight per plot followed by Ripcord and Tamaron at the three tested doses.

The insecticides were significantly different from each other, as well as from the check at 5% level of probability. All the three tested doses were found significantly different from each other in the control of pest and in the increase of stalk weight of maize.

Cobs weight (kg/plot): Data (Table 5) regarding cobs weight (kg/plot) reveal that the cobs weight of maize was significantly increased in all of the treated plots compared to the untreated plots at all of three tested doses of the insecticides.

Furadan was most effective followed by Ripcord and Tamaron. All of these tested insecticides and their doses were found significantly different from each other at 5% level of probability.

The results show that Furadan was most effective in the control of the pest and in the increase of average cobs weight, followed by Ripcord and Tamaron at low dose. Furadan and Ripcord were found non-significantly different from each other, while Tamaron was significantly different from these two insecticides. All of the insecticides were significantly different from the check at 5% level of probability. At medium dose Furadan and Ripcord were found significantly better than Tamaron in the increase of cobs weight (kg) per plot. The results obtained at high dose show that all of the treatments were found significantly better than the check and all of them were found significantly different from each others.

Table 5: Effect of different insecticides and their doses on cobs weight (kg/plot) of maize crop

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	3.58 E	3.92 D	4.08 CD	3.00 F	3.65 C
Furadan	4.17 CD	4.58 B	5.17 A	3.33 EF	4.31 A
Ripcord	4.08 CD	4.33 BC	4.58 B	3.17 F	4.04 B
Control	3.25 F	3.25 F	3.33 EF	3.25 F	3.27 D
Mean	3.77 C	4.02 B	4.29 A	3.19 D	

Means followed by different letters are significantly differed from each others at 5% level of probability
LSD value for chemicals = 0.15
LSD value for doses = 0.15
LSD value for interaction = 0.29

Average number of cobs/plant: Results (Table 6) indicate that the average number of cobs/plant of maize were significantly increased in all the treated plots compared to untreated plots at all of three tested doses of insecticides.

Table 6: Effect of insecticides and their doses on average number of cobs/plant of maize crop

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	0.93 BC	0.95 BC	0.97 BC	0.70 D	0.89 B
Furadan	0.93 BC	0.99 B	1.06 A	0.68 D	0.92 A
Ripcord	0.93 BC	0.96 BC	0.98 BC	0.68 D	0.89 B
Control	0.66 D	0.65 D	0.68 D	0.64 D	0.66 C
Mean	0.86 B	0.89 B	0.92 A	0.68 C	

Means followed by different letters are significantly differed from each others at 5% level of probability
LSD value for chemicals = 0.03
LSD value for doses = 0.03
LSD value for interaction = 0.05

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The data show that number of cobs per plant were significantly increased in all of the tested insecticides at low and medium doses compared to the check.

At high dose Furadan was found significantly better than Ripcord and Tamaron, while Ripcord and Tamaron were found equally effective in the increase of number of cobs/plant compared to check. Results of the treatment further reveal that Furadan was found significantly more effective, followed by Ripcord and Tamaron which were found equally effective in the increase of number of cobs/plant. The number of cobs/plant obtained in the control plots were significantly less compared to the treated plots.

Table 7: Effect of insecticides and their doses on grain weight(Kg) per plot of maize crop

Treatment	Doses				Mean
	Low	Medium	High	Control	
Tamaron	2.69 E	2.94 D	3.06 CD	2.25 F	2.73 C
Furadan	3.12 CD	3.43 B	3.88 A	2.50 EF	3.23 A
Ripcord	3.06 CD	3.24 BC	3.43 B	2.38 F	3.03 B
Control	2.44 F	2.44 F	2.50 EF	2.44 F	2.46 D
Mean	2.83 C	3.01 B	3.22 A	2.39 D	

Means followed by different letters are significantly differed from each others at 5% level of probability

LSD value for chemicals = 0.11

LSD value for doses = 0.11

LSD value for interaction = 0.22

Grain Weight (kg) per plot: The data (Table 7) indicate that all the treatments significantly increased the grain weight per plot compared to control at all of three tested doses of insecticides. Furadan was found best followed by Ripcord and Tamaron. At low and medium doses Furadan and Ripcord were found more effective than Tamaron while at high dose all of the tested insecticides were found significantly different from each others in the reduction of pest population and in the increase of grain weight/plot. Furadan was found significantly better followed by Ripcord and Tamaron.

High dose of the insecticides was found significantly most effective, followed by medium and low doses.

It can be concluded from the results of chemical control trial conducted against maize stem borer that Furadan (Carbofuran) was proved most effective in the reduction of percent dead hearts, % infestation and increased stalk weight per plot, cobs weight, average number of cobs per plant and grain weight per plot followed by Ripcord and Tamaron.

High dose of the tested insecticides was found most effective in the control of the pest, followed by medium and low doses. All of the tested doses were found significantly effective against the pest compared to the check. Khan (1983), Marwaha *et al.* (1984), Ahmad (1987), Halimie *et al.* (1989), and Rahim and Masud (1992) also reported the effectiveness of Furadan against maize stem borer.

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