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MANAGEMENT OF STEM BORER, *CHILLO PARTELLUS* (SWINHOE) INFESTING SORGHUM [(*SORGHUM BICOLOR*) (L.) MONCH]

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ABSTRACT

The present investigation was carried out at Agronomy farm, Rajasthan College of Agriculture, Udaipur during *Kharif* -2018. Among the insecticides evaluated against stem borer thiamethoxam 25%WG proved to be the most effective in terms of mean leaf injury rating, per cent dead hearts and per cent stem tunneling. The minimum leaf injury rating of 2.67 was recorded in plot treated with thiamethoxam 25%WG 25g a.i./ha followed by flubendiamide 20%WG 25g a.i./ha, emamectin benzoate 5% SG 9.5g a.i./ha, rynaxypyr 0.4% G 30g a.i./ha, fipronil0.3 G 75g a.i./ha and Carbofuran 3G 1000g a.i./ha with leaf injury rating (LIR) of 3.17, 4.77, 5.13, 5.87 and 6.93 respectively. The maximum leaf injury rating (7.97) was recorded with untreated control. The lowest dead heart (10.00%) was recorded with treatment of thiamethoxam followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with dead heart of 20.00, 23.33, 26.67, 30.00 and 40.00 per cent respectively. The highest per cent of dead heart (50.00%) was recorded with untreated control. The lowest tunnel 9.09 per cent was observed in thiamethoxam followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with tunnel of 14.87, 17.47, 19.76, 28.68 and 29.80 per cent respectively. The highest tunnel of 30.78per cent per plant was recorded in untreated control.

Keywords: Novel insecticide, maize stem borer, *Chilo partellus* (Swinhoe)

INTRODUCTION

Chilo partellus (Swinhoe) is a serious pest of sorghum throughout India during *Kharif* season causing grain yield loss of 24.3 to 36.3 per cent. Sorghum is commonly known as sugarcane of temperate region. It is similar to common grain sorghum but with a sugar rich stalk. Besides having rapid growth high sugar accumulation and biomass production potential the crop is characterized by wider adaptability, drought, water logging and saline alkali tolerance (Reddy and Sanjanareddy, 2003). The sugar content in the juice extracted from sweet sorghum varies from 16-23 per cent brix. It has a great potential for jaggery, syrup and most importantly ethanol production (Ratnavati *et al*., 2004).

In India, the stem borer is one of the most serious insect pests of sorghum at the pre-harvest stage. (Sarup *et al*.1987). Sorghum production is severely hampered by sorghum stem borer, *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae). The young stem-borer larvae are small, spotted and yellowish. When full grown, they are 20 to 25 mm long and spotted with colored stripes along the back of the body. Pupation takes place in the stem in a small chamber. The straw colored moth (15 mm), deposits white scale like eggs in overlapping rows, usually on the under-side of the leaves. Stem-borer starts to infest the crop at 3 to 4 weeks after planting and continue up to maturity stage (Subasinghe and Amarasena, 1988).

MATERIALS AND METHODS

The present investigation was carried out at Agronomy farm, Rajasthan College of Agriculture, Udaipur during *Kharif* -2018. The experiment was laid out in a Randomized Block Design (R.B.D.) with seven treatments and replicated thrice. The sorghum seeds of variety SSV 84 were sown in plots size 3.6m X 4.00m at a row distance of 45 cm and plant to plant of 15 cm, respectively. The treatment included 6 novel insecticide formulation, *viz*. Thiamethoxam 25%WG 25g a.i./ha, Flubendiamide 20%WG 25g a.i./ha, Emamectin benzoate 5% SG 9.5g a.i./ha, Rynaxypyr 0.4% G 30g a.i./ha, Fipronil0.3 G 75g a.i./ha and Carbofuran 3G 1000g a.i./ha. The two sprays were applied at 7 DAE and 30 DAE, to compare the efficacy of insecticide

Table 1. Leaf injury rating and damage caused by stem borer on sorghum during *Kharif*, 2018

Treatments	Dose (a.i./ha)	Mean LIR		Per cent dead heart		Percent stem tunnelling at harvest
		28th days	45th days	35 DAA	42 DAA	
Thiamethoxam 25% WG	25g	2.70	1.67	14.96* (6.67)	18.43 (10.00)	17.55 (9.09)
Flubendiamide 20% WG	25g	3.17	2.33	18.43 (10.00)	26.57 (20.00)	22.68 (14.87)
Emamectin benzoate 5% SG	9.5g	4.77	3.53	21.14 (13.33)	28.88 (23.33)	24.70 (17.47)
Rynaxypyr 0.4% G	30g	5.13	4.33	24.09 (16.67)	31.09 (26.67)	26.40 (19.76)
Carbofuran 3 G	1000g	5.87	5.00	33.21 (30.00)	39.23 (40.00)	33.09 (29.80)
Fipronil 0.3 G	75g	6.93	6.33	26.57 (20.00)	33.21 (30.00)	32.38 (28.68)
Control	-	7.97	7.30	39.23 (40.00)	45.00 (50.00)	33.70 (30.78)
S. Em. ±		0.29	0.32	2.30	1.92	0.33
CD at 5%		0.88	0.95	6.93	5.80	0.99

treatments along with untreated control. Infestation symptoms of stem borer damage or shoot holes in the inner rows were counted first time at 28 DAE and second time at 45 DAE. Leaf injury rating from ten selected plants in each plot was scored based on 1-9 scale as suggested by Chatterji *et. al.* (1969). Leaf injury was recorded twice, 28 and the second at 45 days after emergence from each plot. The plants falling into different categories were multiplied with the rating value of that category and total score was obtained by summing up the values under different categories. Leaf injury index was calculated by dividing the total score of each treatment by the plant stand. The dead heart due to attack of stem borer were counted from three inner rows at 28 and 45 DAE and their percentage was calculated on the basis of total plants observed. Ten plants were uprooted at random from each plot at harvesting time. They were dissected and tunnel length was measured with the help of scale in centimeter. Per cent stem tunneling was calculated on the bases of total tunneled length divided by plant height of affected plant. Average per cent stem tunneling per plot was calculated by dividing total length by number of plants taken for tunneling observation.

RESULTS AND DISCUSSION

Effect of different treatments on infestation of *Chilo Partellus* (Swinhoe)

The results obtained on the different type of damages caused by maize stem borer *Chilo Partellus* (Swinhoe) at different stages of crop growth.

Leaf injury rating (LIR)

The data on leaf injury rating at 28th DAE and 45 DAE is presented in Table (1). It is evident from the data on leaf injury rating at 28th DAE during *Kharif*, 2018 that the minimum leaf injury rating of 2.70 was recorded in plot treated with thiamethoxam followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with leaf injury rating of 3.17, 4.77, 5.13, 5.87 and 6.93 respectively. The maximum leaf injury rating (7.97) was recorded with untreated control.

Stem tunnelling by *C. partellus*

The per cent stem tunnel in sorghum plants made by *C. partellus* among the different treatments ranged from 9.09 to 33.09 per cent/plant during *Kharif* 2018 (Table 1). The lowest tunnel 9.09 per cent was observed in thiamethoxam followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with tunnel of 14.87, 17.47, 19.76, 28.68 and 29.80 per cent respectively. The highest tunnel of 30.78 per cent per plant was recorded in untreated control. Similarly, Sidar *et al.*(2017) observed that minimum leaf injury rating was recorded with carbofuran (3.00) which was at par with flubendiamide (3.23) followed by thiamethoxam (3.43), emamectin benzoate (3.57), rynaxypyr (4.03) and

cartap hydrochloride (4.17) treated plots. The highest leaf injury mean value was recorded 4.20 with fipronil. Kulkarni *et.al*. (2015) The observation based on leaf injury, pest infestation, stem tunneling and grain yield revealed that whorl application of carbofuran 3G @7.5 kg/ha and phorate 10 G @7.5 kg/ha proved to be the best followed by emamectine benzoate 5 SG @9.5 kg/ha *viz*; Diazinon 5G, Fipronil 0.3G and Thiocyclam hydrogen oxalate 4G was found to be < 8% as 2g/ha which performed highly effective and economically in reducing the stem borers damage in maize (Fifronil or emamectin)

Dead heart formation by stem borer, *C. Partellus.*

The lowest dead hearts (6.67%) was found with the treatment of with thiamethoxam after 28th followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with dead heats of 10.00, 13.33, 16.67, 20.00 and 30.00 per cent respectively. The highest percent dead heart (40) was recorded with untreated control, significantly higher than rest of the treatments. The lowest dead hearts (6.67%) 45th day after was found with the treatment of thiamethoxam followed by flubendiamide, emamectin benzoate, rynaxypyr, fipronil and Carbofuran with dead heats of 10.00, 13.33, 16.67, 20.00 and 30.00 per cent respectively. The highest per cent dead heart (40) was recorded with untreated control, significantly higher than rest of the treatments. Similar, Sidar *et al* (2017) recored that minimum per cent of dead heart damage was recorded with carbofuran (36.67%) which was at par with flubendiamide (43.33%) followed by rynaxypyr (45.50%), thiamethoxam (46.67%), emamectin benzoate (50.0%), and cartap hydrochloride (56.67%) treated plots. The highest per cent dead heart damage was recorded with fipronil (60.0%).

CONCLUSION

The treatments thiamethoxam 25%WG 25g a.i./ha, (6.67 per cent) was found most effective and the other effective treatments were flubendiamide 20%WG 25g a.i./ha (10.00 per cent) followed by Emamectin benzoate 5% SG (13.33 per cent) and Rynaxypyr 0.4% G 16.67 per cent infestation, which were at par each other. The minimum number of dead heart, minimum tunnel length, were found with the treatment of thiamethoxam 25%WG 25g a.i./ha, followed by flubendiamide 20%WG 25g a.i./ha during *Kharif* 2018.

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