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Evaluation of new insecticides against sorghum shoot fly, *Atherigona soccata* Rondani

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Six insecticides viz; thiamethoxam , imidacloprid , acetamiprid , profenofos 40 per cent + cypermethrin 4 per cent , endosulfan @ 0.07 per cent and carbofuran with various concentrations were evaluated against shoot fly of Sorghum (*Sorghum bicolor* L Monech) The shoot fly oviposition, plants with eggs and dead hearts were ranged from 0.95 to 2.88 eggs plant^{-1}, 32.57 to 59.12 % and 6.34 to 29.14 % , respectively in various treatments as against to 1.78 eggs plant^{-1}, 35.76 % and 48.96 %, respectively in untreated control. Maximum grain and fodder yields were obtained from imidacloprid @ 1.2 per cent ST treated plots i.e. 27.59 and 91.67q ha^{-1}, respectively and closely followed by thiamethoxam @ 0.75 per cent ST i.e. 27.50 and 81.92q ha.$^{-1}$, respectively.

Key words : Sorghum, Shoot fly, Chemical control, Imidachloprid, Acetamaprid, Thiamethoxam

INTRODUCTION

Sorghum (*Sorghum bicolor* L. Monech) is the fourth most important cereal crop in India after rice, wheat and maize. Green revolution attempts in other crops including sorghum have failed due to a number of major insect-pests. Shoot fly, (*Atherigona soccata* Rondani) is a serious pest in India. Shoot fly causes damage at seedling stage by killing central shoot called dead hearts. This pest is internal feeder and due to this its control has become difficult. Earlier, the number of insecticides were tested by the scientist against this pest (Jotwani and Prem Kishor,1982, Prem Kishor, 1996). To evolve cost effective control of such pest, various commonly used and easily available insecticides were evaluated.

MATERIALS AND METHODS

A field experiment was conducted at Sorghum Research Station, MAU, Parbhani during *rabi* season of 2001-2002. The trial was laid out in randomised block design with three replications. Each treatment plot was sown at a spacing of 45 x 15 cm with gross plot size of 6.5 x 3.25 m^2 and net plot size of 5.00 x 2.25 m^2. The variety used for this experiment was Maldandi (M-35-1). There were 16 treatments which includes seed treatment, foliar sprays and soil application of various insecticides by different concentrations along with untreated plot (Table 1). The sprayings were under taken with hand operated sprayer on 7th and 17th day after emergence. Observations were recorded at 6, 11, 16, 21, and 28 days after emergence on number of eggs, percentage eggs laid per plant, dead hearts due to shoot fly and grain and fodder yield in quintal ha $^{-1}$. The statistical analysis was carried out as per standard procedure.

RESULTS AND DISCUSSION

The shoot fly oviposition ranged from 0.95 to 2.88 eggs plant^{-1} in different treatments as compared to 1.78 eggs plant^{-1} in untreated control. Maximum egg laying per seedling was observed in the plots of imidacloprid 70 WS @ 1.2 per cent ST (2.88) followed by thiamethoxam 70 WS @0.75 per cent ST (2.81), 0.5 per cent ST (2.75) and carbofuran 3G @ 0.9 kg. a.i ha^{-1}soil application (2.74). Untreated control recorded (1.78) more eggs per seedling than profenofos 40 per cent + cypermethrin 4 per cent @ 0.12 per cent (0.95), 0.08 per cent (1.12) and 0.04 per cent (1.20), respectively. The percentage of plants with eggs ranged from 32.57 to 59.12 % in different treatments as compared to 35.76% in untreated control. Significantly highest per cent of plants with eggs were observed in the plots with seed treatment of thiamethoxam 70 WS @ 0.75 per cent ST (59.12 %) and 0.5 per cent ST (58.73 %) and carbofuran 3G @ 0.9 kg a.i.ha^{-1} (58.70 %). Untreated control (35.76%) recorded maximum per cent of plants with eggs than imidacloprid 70 WS @ 0.4 per cent ST (32.57%), profenophos 40 per cent+ cypermethrin 4 per cent @ 0.12 per cent (33.23%), acetamiprid 20 SP @ 0.009 per cent (34.34%) and endosulfan @ 0.007 per cent (34.51%). The average eggs per plant and percentage of plants with eggs showed that

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Table 1 : Effect of insecticidal treatments on oviposition of sorghum shoot fly, percentage of plants with shoot fly eggs, dead hearts caused by shoot fly and yield.

S. No.	Treatments	Shoot fly			Yield (q ha^{-1}.)	
		Average no. of shoot fly eggs/plant	Mean percentage of plants with eggs	Mean percentage of dead hearts	Grain	Fodder
1	Thiamethoxam 70 WS @ 0.25% ST	2.33 (1.68)	46.36 (42.90)	21.87 (27.88)	23.00	71.80
2	Thiamethoxam 70 WS @ 0.5% ST	2.75 (1.81)	58.73 (50.02)	17.90 (25.02)	26.66	80.60
3	Thiamethoxam 70 WS @ 0.75% ST	2.81 (1.82)	59.12 (50.30)	14.28 (23.22)	27.50	81.92
4	Imidacloprid 70 WS @ 0.4% ST	2.45 (1.71)	32.57 (34.79)	19.71 (26.35)	24.87	72.24
5	Imidacloprid 70 WS @ 0.8% ST	2.70 (1.79)	40.56 (39.75)	14.07 (22.02)	27.46	80.55
6	Imidacloprid 70 WS @ 1.2% ST	2.88 (1.85)	45.32 (42.31)	16.34 (24.58)	27.59	91.67
7	Acetamiprid 20 SP @ 0.003%	1.59 (1.46)	47.76 (43.71)	29.14 (32.67)	17.33	51.64
8	Acetamiprid 20 SP @ 0.006%	1.54 (1.44)	45.79 (42.57)	26.66 (31.08)	18.09	54.00
9	Acetamiprid 20 SP @ 0.009%	1.48 (1.40)	34.34 (35.83)	26.14 (30.75)	18.52	55.37
10	Profenofos 40% + cypermethrin 4% @ 0.04%	1.20 (1.30)	34.64 (36.05)	26.13 (30.74)	17.40	51.83
11	Profenofos 40% + cypermethrin 4% @ 0.08%	1.12 (1.27)	34.57 (36.00)	23.43 (28.94)	18.39	56.80
12	Profenofos 40% + cypermethrin 4% @ 0.12%	0.95 (1.20)	33.23 (35.19)	18.56 (25.51)	20.80	60.65
13	Endosulfan @ 0.07%	1.68 (1.47)	34.51 (35.97)	22.17 (28.08)	21.97	65.17
14	Carbofuran 3G soil application @0.9 kg a.i.ha^{-1}	2.74 (1.80)	58.70 (50.00)	17.85 (24.98)	26.50	80.83
15	Carbofuran 3G @0.03 kg a.i.ha^{-1} ST	2.37 (1.69)	46.50 (43.00)	21.90 (27.89)	23.50	73.10
16	Untreated control	1.78 (1.50)	35.76 (36.67)	48.96 (44.59)	11.20	34.47
	SE±	0.06	0.62	0.39	0.47	0.77
	CD	0.18	1.79	1.13	1.36	2.23

shoot fly preferred the plants of treated seeds for egg laying. However, less number of eggs were recorded in untreated control plots. Similar results were reported by Srivastava and Jotwani (1976), Chandurwar and Karanjkar (1979) and Naitam and Sukhani (1985). The dead hearts caused by shoot fly ranged from 6.34 to 29.14% in different treatments as compared to 48.96% in untreated control. Significantly less dead hearts were

observed in the treatment of imidacloprid 70 WS @ 1.2 per cent ST (6.34%), 0.75 per cent ST (14.28%) and the other treatments viz., with acetamiprid 20SP @ 0.003 per cent (29.14%), 0.006 per cent (26.66%), 0.009 per cent (26.14%) and profenophos 40 per cent+ cypermethrin 4 per cent @ 0.04 per cent (26.13%) were effective as less number of dead hearts were recorded as compared to control. Similar results were reported by Men *et al.*, (1986), Patil *et al.*, (1994), Mote *et al*., (1995), Sharma *et al*., (1996) and Satpute (1999). Maximum grain and fodder yields were obtained from imidacloprid 70 WS @ 1.2 per cent ST treated plots (27.59 and 91.67 q ha^{-1}.) followed by thiamethoxam 70 WS @ 0.75 per cent ST (27.50 and 81.92 q ha^{-1}.) and imidacloprid 70 WS @ 0.8 per cent ST (27.46 and 80.55 q ha^{-1}). Similar results were obtained by Hiremath *et al*., (1995) and Borad *et al*., (1995).

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