Annals of Plant and Soil Research 16(4): 319-322 (2014)

MANAGEMENT OF SORGHUM PESTS WITH ECO FRIENDLY APPROACHES

R.K. CHOUDHARY, S.UPADHYAY, V.R. BHAGWAT AND P. SWATHI

Department of Entomology, R.V.S. Krishi Vishwa Vidyalaya, College of Agriculture, Indore (M.P.) 452001

Received: April, 2014, Revised accepted: October 2014

ABSTRACT

A field experiment was carried out in a randomized block design during Kharif season of 2009 and 2010 at the Research Farm, College of Agriculture, Indore (M.P.). The observations were recorded for the insect pests viz., shoot fly (Atherigona soccata Rondani) and stem borer of sorghum crop. Seven treatments along with a check were evaluated for sorghum pests and the seed treatment with thiamethoxam @ 3g/kg seed was recorded effective to manage sorghum shoot fly (A. soccata) and stem borer (C. partellus). The minimum dead hearts due to shoot fly was recorded at 7 and 28 DAE in the treatment i.e. intercrop plot ST + intercrop + NSKE @ 5 % spray (8.45 and 18.09) and ST + intercrop (9.12 and 18.67). The minimum leaf injury due to stem borer was also recorded in the same treatment. The maximum yield and minimum percent of dead hearts due to stem borer after spray was observed in plot which was treated with ST+ lambda-cy-halothrin @ 3 0 g a i / ha^{-1} spray which was at par with ST + fipronil @ 0 . 0 1 % spray followed by ST +chlorpyriphos @ 0.05 % spray.

Key words: Management, sorghum, pest, cost effective

INTRODUCTION

Sorghum **[*Sorghum bicolor* (L.) Moench]** locally known as jowar an important staple food crop is the fifth most important cereal crop after wheat, rice, maize and barley. Grain is mostly for food purpose, consumed in the form of flat breads, biscuits, cakes, and porridges. It is a principal feed ingredient for both cattle and poultry. The major components of pest management in agro - ecosystems are cultural practices, natural enemies, insecticides and host plant resistance. Cultural practices are effective against certain pests. Chemical control is expensive and number of applications may be required, which is often beyond the reach of most of the farmers.Crop production practices may enhance or suppress survival, abundance and severity of damage of sorghum insect pests. These practices can be used to avoid conditions that favour insect pests or activate conditions detrimental to an increase in insect pest abundance or damage. Inter cropping is a cultural management method that involves use of host and non host crops in a field to reduce insect pest abundance and damage. Sorghum benefits most when intercropped with a broadleaf or tap rooted crop such as cotton, or soybean, (Aglave *et al.* (2009). Insecticides are the powerful tools for controlling insect pests of sorghum. Insecticides kill rapidly and are easy to apply. Insecticides can be used to protect planted seed from insect pests. Recently, sorghum seed treated commercially with a systemic insecticide to protect against seed-feeding insects and some seedling insect pests. Key disadvantages of insecticides are cost and broad toxicity. They adversely affect non target organisms in the crop and nearby areas. From a sorghum insect pest management standpoint, cost and killing natural enemies are of most concern. Hence present study was based on cost effective management of sorghum pest and find out the suitable pest management module.

MATERIALS AND METHODS

A research experiment was conduct in *Kharif* 2009 and 2010 at *Sorghum Project (*AICSIP), College of Agriculture, Indore (M.P.). The soil was medium deep black having a uniform topography. The climate of this region is semi-arid, sub tropical having mild winter and summer with uncertain winter rains. The experiment was carried out in randomized block design with three replications and seven treatments under both non spraying and spraying conditions with row to row distance of 45 cm and intra row spacing of 12-15 cm. Recommended nutrients (80:40:40 NPK kg ha^{-1}) were applied as basal dose at sowing time. (T_1 - Farmer practices check, T_2 - Sole crop with S.T. + lambda cyhalothrin 5% SL @30 gai ha^{-1} at 45 DAE, T_3 - Intercrop with soybean, S.T.+spray of NSKE @ 5% at 45 DAE ,T_4 - Intercrop with soybean, S.T. ,T_5 - Sole crop with S.T. + spray of NSKE @ 5% at 45 DAE ,T_6 -Sole crop with S.T. +spray of chlorpyriphos @ 0.05% at 45 DAE and T_7 - Sole crop with S.T. +spray of fipronil 5 SC @ 0.01% at 45 DAE). The observation regarding the incidence of shoot fly (per cent dead heart at 7 and 28 DAE), stem borer [leaf injury (at 30 DAE), dead hearts (at 30 and 45 DAE)] were recorded separately for each treatment. The yield per plot recorded at harvest.

RESULTS AND DISCUSSION

The data on insect pests incidence and yield characters have been presented in Table 1. It was revealed from the data that all seed treated plots were significantly superior as compared to check in reducing the shoot fly dead hearts at 7 and 28 DAE and it was recorded 8.45 – 12.48 and 18.09 – 23.97 percent dead hearts at 7 DAE and 28 DAE in different treatments as against 32.8 and 48.9 percent (at 7 and 28 DAE) dead hearts in untreated check. Similar findings were also reported by Karibasavaraja *et al.*, (2005) and Daware *et al.*, (2012) who reported that thiamethoxam 70WS @ 3 g/kg was most effective against shoot fly and recorded highest ratio (ICBR).

Table 1: Pests incidence and yield attributing characters in different treatments pooled data of 2 years

Treatment	SFDH 7DAE	SFDH 28 DAE	SBLI 30 DAE	SBLI After spray	SBDH Pre spray	SBDH after spray	Yield (kg ha^{-1})
T_1	32.79 III (34.90)	48.90 III (44.37)	23.83 III (29.17)	64.06 VI (53.18)	25.54 III (30.35)	54.35 VII (47.50)	860.36 V
T_2	11.60 II (19.89)	22.66 II (28.42)	15.33 II (23.03)	26.72 I (31.13)	16.64 I (24.08)	19.68 I (26.33)	2439.23 I
T_3	8.45 I (16.90)	18.09 I (25.12)	12.99 I (21.12)	41.43 III (40.05)	17.17 I (24.48)	31.95 IV (34.39)	1693.69 III
T_4	9.12 I (17.51)	18.67 I (25.59)	13.22 I (21.27)	52.59 V (46.49)	17.06 I (24.38)	41.52 VI (40.12)	1110.70 IV
T_5	12.02 II (20.27)	22.80 II (28.52)	15.57 II (23.23)	45.22 IV (42.26)	19.94 (26.49)	34.14 V (35.75)	1214.95 IV
T_6	11.59 II (19.90)	23.97 II (29.31)	16.59 II (24.01)	31.35 II (34.03)	19.56 II (26.24)	25.12 III (30.06)	2051.71 II
T_7	12.48 II (20.69)	23.31 II (28.86)	16.15 II (23.68)	28.40 I (32.18)	17.87 I (24.99)	22.31 II (28.18)	2186.83 I
SEm±	0.76	0.82	0.74	1.08	0.66	0.82	90.9
CD (P=0.5)	2.36	2.54	2.29	3.34	2.04	2.54	280.23
CV	6.18	4.75	5.44	4.70	4.43	4.11	9.54

(Note: The values given in the parenthesis indicates the arcsine transformed values and roman numerical indicates the ranking of the treatments based on its effectiveness.)

The minimum dead hearts percent due to shoot fly was recorded at 7 and 28 DAE in the treatment i.e.ST + intercrop + NSKE spray (8.45 and 18.09) and ST + intercrop (9.12 and 18.67). The next better treatments were ST + lambda-cy-halothrin (11.6 and 22.66), ST + chlorpyriphos (11.6 and 23.97), ST + NSKE (12.02 and 22.80) and ST + fipronil (12.48 and 23.31). Daware *it al.* (2012) reported that, thiamethoxam 70WS @ 3g/kg was most effective against shoot fly and recorded highest ratio (ICBR). The next best treatment was sorghum with seed treatment of thiamethoxam 70 WS, 3 gm/kg+inter-crop. Spurthi *et al.* (2007) reported that intercropping of sorghum with groundnut followed by cowpea showed minimum incidence of shoot fly than in sole sorghum. Jhansi (2004) reported that the percentage of dead hearts due to shoot fly and stem borer was lower in intercropped sorghum (14.3-20.1 and 12.5- 17.2%, respectively) than in sole sorghum (32.2 and 21.2%). The minimum leaf injury was recorded at 30 DAE in the intercrop plot ST + intercrop + NSKE spray (12.99%) which was at par with ST + intercrop (13.22 %). The next better treatments were ST + lambda-cy-halothrin (15.33 %), ST + NSKE (15.57 %), ST + fipronil (16.15 %) and ST + chlorpyriphos (16.59 %). The maximum leaf injury (23.83%) was recorded in untreated control plot. The minimum leaf injury due to stem borer was recorded at after spray in the plot which was treated with ST + lambda-cy-halothrin spray (26.72 %) followed by ST + fipronil spray (28.4 %) and ST + chlorpyriphos spray (31.35 %). The next better treatments were ST + intercrop + NSKE spray (41.43 %) and ST + NSKE spray (45.22 %). The maximum leaf injury due to stem borer recorded in untreated control plot (64.06 %) followed by ST + intercrop (52.59 %). All seed treated plots were significantly superior as compared to check in reducing the dead hearts due to stem borer at pre spray stage and recorded 16.64 to19.94 per cent dead hearts in different treatments as against 25.54 percent dead hearts in check. Similar finding were also reported by Kishore *et al.*,(2004) reported that seed treatment with thiamethoxam showed effective results against sorghum shoot fly (*A. soccata*) and stem borer (*C. partellus*) and gave higher grain yield.

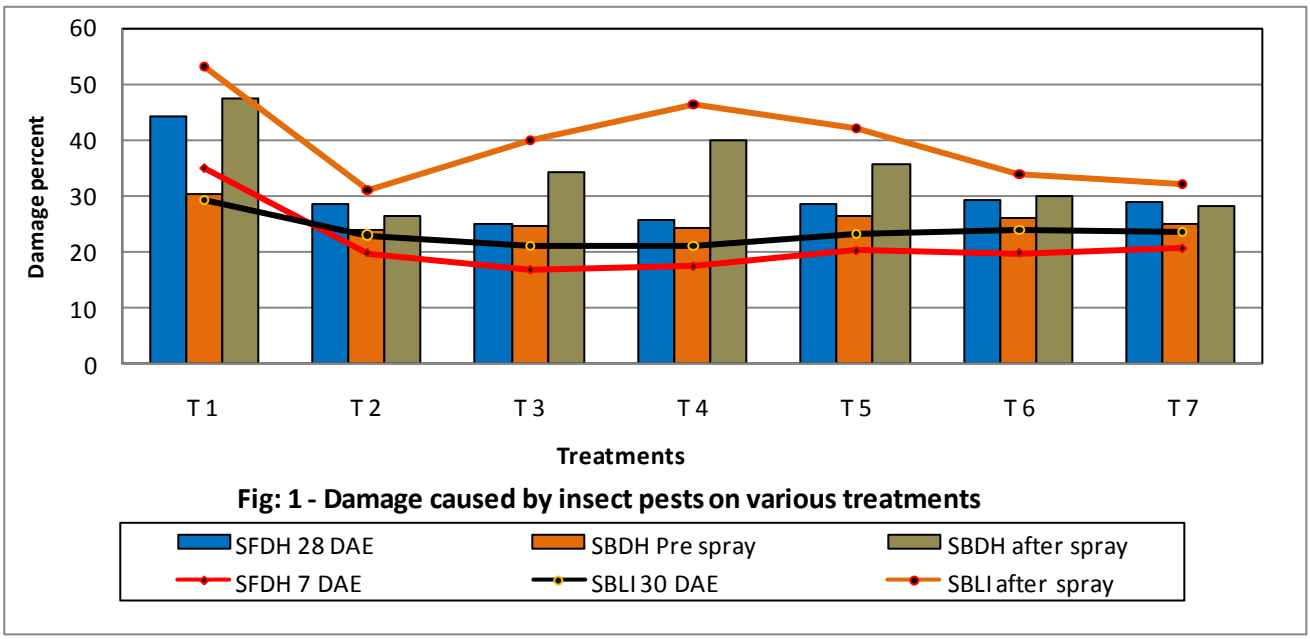

Fig: 1 - Damage caused by insect pests on various treatments

The minimum percent of dead hearts due to stem borer after spray was found plot which was treated with ST + lambda-cy-halothrin spray (19.68 %) which was at par with ST + fipronil spray (22.31 %) followed by ST + chlorpyriphos spray (25.12 %). The next better treatments were ST + intercrop + NSKE spray (31.95 %) and ST + NSKE spray (34.14 %). The maximum dead hearts due to stem borer recorded in untreated control plot (54.35 %) followed by ST + intercrop (41.52 %).

The highest yield was also recorded in the treatment of ST + lambda-cy-halothrin spray (2439.23 kg ha^{-1}) which was at par with ST + fipronil spray (2186.83 kg ha^{-1}) followed by ST + chlorpyriphos spray (2051.71 kg ha^{-1}). The next better treatments were ST + intercrop + NSKE spray (1693.69 kg ha^{-1}) and ST + NSKE spray (1214.95 kg ha^{-1}). The minimum yield recorded in untreated control plot (860.36 kg ha^{-1}) followed by ST + intercrop (1110.70 kg ha^{-1}). Aglave *et al.* (2009) found the intercropping of sorghum+ soybean was found highly profitable when compared to sole. Shekharappa and Kulkarni, (2003) showed that early-sowing, sorghum + red gram (2:1) intercrop and endosulfan spray significantly reduced the infestation of stem borer and resulted in higher yield.

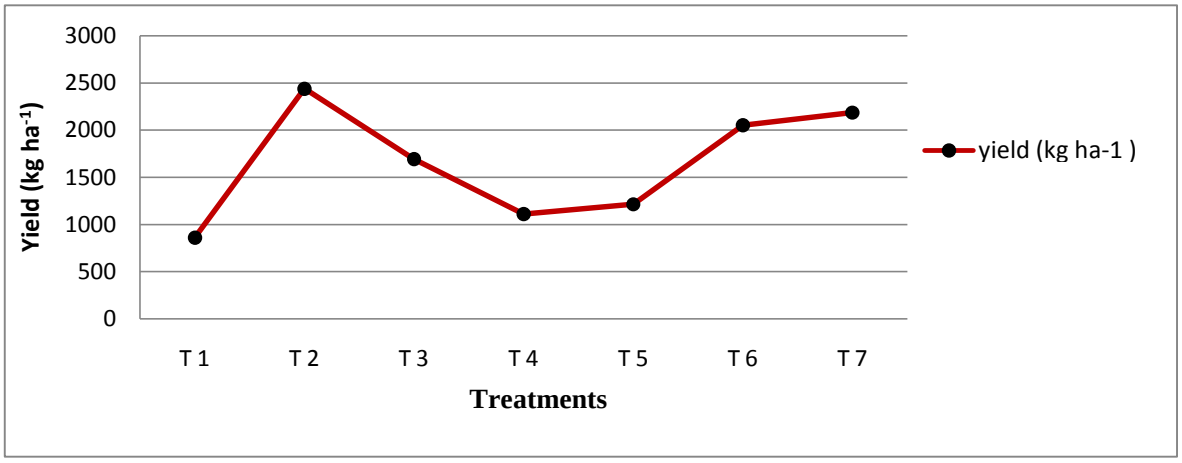

Fig. 2: Performance of various treatments for yield parameters (kg ha^{-1})

REFFERENCES

Aglave, B.N., Jagtap.P.K, Mutkule.D.S, Patil.B.V. (2009) Effect of row ratio on sorghum [*Sorghum bicolor* (L.) Monech] + Soybean [*Glycine max* (L.) Merr.] intercropping under rainfed condition on vertisols. *Journals of Soils and Crops* **19**: (1); 75-78.

Daware, D. G. Bhagwat, V. R. Ambilwade, .P.Kamble, R. J. (2012) Evaluation of integrated pest management components for the control of sorghum shoot pests in rabi season .*Indian Journal of Entomology*; **74**:1, 58-61

Jhansi, K. (2004) Management of shoot fly and stem borer incidence in fodder sorghum by intercropping with leguminous fodder crops. *Indian Journal of Plant Protection.* ***32***: (2); 139.

Karibasavaraja, L.R., Balikai, R.A., and Deshpande, V.P., (2005) Thiamethoxam 70 WS, A new promising seed dress for the suppression of sorghum shootfly. *Annals of Plant Protection Sciences*, **13**: 85-87.

Kishore, Prem, R.K. Gupta,V.T. Gajbhiye, Vinita Mittal, Ganesh Rai and Suman Gupta,(2004)Bioefficacy and persistence of thiamethoxam (Cruiser) in sorghum. *Journal Entomlogical Research.,* **28**(**3**); 253-257.

Shekharappa, and Kulkarni, K. A., (2003) Cultural practices for the management of stem borer, *Chilo partellus* (Swinhoe) in sorghum. *Indian Journal of Plant Protection* 31: (**1**); 134-136.

Spurthi, G. S., Shekarappa Patil, R. K. Puttanavar, M. S. Ramegowda, G. K. (2009) Effect of intercropping on the incidence of stem borer and armyworm in sorghum. *Journal of Entomological Research.* **33**: (**1**,); 89-92.

USDA 2011-12. United States Department of Agriculture (www.usda.org).