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Review

Screening of advanced breeding material of sorghum against shoot fly (*Atherigona soccata*) (Rondani)

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The present investigation of screening of nineteen advanced breeding lines of sorghum along with three checks against shoot fly was carried out in randomized Block Design (RBD) on the farm of Sorghum Research Unit, Dr. PDKV, Akola in kharif 2004-05. The advanced breeding lines were screened on the basis of average number of eggs laid and percent dead hearts per plant at 7, 14, 21 and 28 days after emergence. Resistant check IS-18551 and IS-2205 recorded significantly minimum number of eggs per plant and was closely followed by AKSV-37 and AKSV-30. The resistant check also exhibited minimum average percentage of dead hearts.

Key words: Sorghum, Block Design (RBD), *Atherigona soccata*

INTRODUCTION

Sorghum is an important crop of Vidarbha region but in reducing the productivity of sorghum insect-pests are major constraints. Seven to eight major pests causes economic losses to this crop. In view of seriousness of shoot fly (*Atherigona soccata* Rond) problem in sorghum and owing to the limitations like high costs and toxic hazards of chemicals, it is necessary to develop varieties or hybrids which possess resistance of shoot fly.

In Maharashtra jowar, shoot fly is one of the major pests of sorghum causing dead hearts in early seedling stage, reducing plant population thereby causing heavy yield losses up to 75.60% in grain and 68.90%. Some of the scientists had screened sorghum cultivars, hybrids and promising lines for their resistance to shoot fly. Nevertheless, it was felt necessary to test some advanced breeding materials for their resistance so as to make use of them in future breeding programme.

MATERIALS AND METHODS

The experiment was conducted in statistically randomize-ed Block Design (RBD) with three replications on the farm of Sorghum Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Nineteen advanced breeding lines were sown in kharif along with two resistant and one susceptible check in two row plots of 3 m length.

The recommended dose of fertilizers was applied to the trial and all intercultural operations were carried out at proper time. The observation on number of eggs laid on five randomly selected plants was recorded on 7^{th}, 14^{th} and 21^{st} days after emergence. From the data, average number of eggs per plant was worked out. Similarly, number of dead hearts caused by shoot fly infestation was counted on 14^{th}, 21^{st} and 28^{th} days after emergence and cumulative percent dead hearts were worked out. The data collected on average number of eggs per plant and percent of dead hearts were subjected to analysis of variance.

RESULTS AND DISCUSSION

The data presented in Table 1 revealed significant difference in respect of ovipositional preferences by shoot fly in field under natural infestation conditions. On the 7^{th} day after emergence, the average number of eggs per

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Table 1. Average number of eggs per plant laid by sorghum shoot fly on 7th, 14th and 21st days after emergence (DAE).

S/No.	Treatments	Average number of eggs/plant		
		7th DAE	14th DAE	21st DAE
1	AKSV-11	0.17(0.81)	0.80(1.14)	1.60(1.44)
2	AKSV-15	0.13(0.79)	1.17(1.29)	1.97(1.57)
3	AKSV-18	0.07(0.75)	1.07(1.24)	1.40(1.37)
4	AKSV-20	0.03(0.73)	0.73(1.09)	2.00(1.58)
5	AKSV-21	0.53(0.99)	0.83(1.15)	1.03(1.19)
6	AKSV-23	0.13(0.79)	0.87(1.16)	2.07(1.59)
7	AKSV-24	0.07(0.75)	1.10(1.26)	1.77(1.50)
8	AKSV-27	0.07(0.75)	1.23(1.31)	1.60(1.45)
9	AKSV-28	0.10(0.77)	1.17(1.27)	1.67(1.47)
10	AKSV-29	0.00(0.71)	0.87(1.16)	1.40(1.37)
11	AKSV-30	0.17(0.81)	0.20(0.83)	0.93(1.19)
12	AKSV-31	0.07(0.75)	0.60(1.03)	1.90(1.55)
13	AKSV-32	0.13(0.79)	1.07(1.24)	2.17(1.61)
14	AKSV-33	0.07(0.75)	0.97(1.20)	2.83(1.82)
15	AKSV-34	0.07(0.75)	1.00(1.22)	1.67(1.44)
16	AKSV-35	0.13(0.79)	0.96(1.20)	1.83(1.53)
17	AKSV-36	0.03(0.73)	0.60(1.03)	1.74(1.49)
18	AKSV-37	0.00(0.71)	0.53(0.99)	0.63(1.04)
19	AKSV-38	0.07(0.75)	0.33(0.90)	1.00(1.22)
20	CSH-9 ©	0.33(0.91)	1.23(1.31)	1.63(1.46)
21	IS-2205 ©	0.00(0.71)	0.10(0.77)	0.80(1.13)
22	IS-18551 ©	0.00(0.71)	0.10(0.77)	0.33(0.90)
	F test	Sig.	Sig.	Sig.
	SE (M) ±	0.04	0.08	0.11
	CD at 5%	0.12	0.23	0.31

The results in parenthesis are square root (x + 0.5) transformed values.

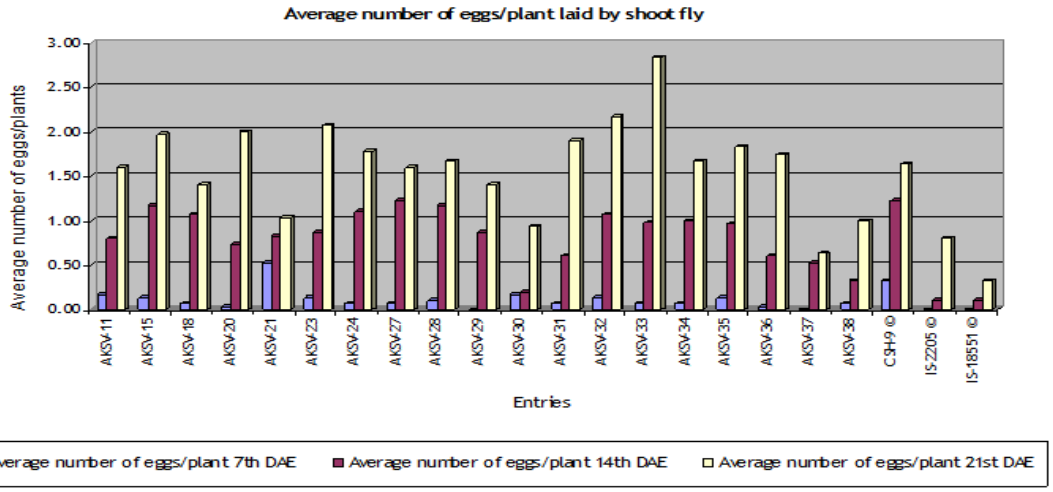

Figure 1. Average number of eggs per plant laid by sorghum shoot fly.

plant was observed in the range of 0.00 to 0.53 (Figure 1). No eggs were observed on check IS-2205, IS-18551, AKSV-29 and AKSV-37 while it was maximum on AKSV-21 (0.53) and CSH-9 (0.33). On the 14th day after

Table 2. Average percent of dead hearts by sorghum shoot fly on 14th, 21st and 28thdays after emergence (DAE).

S/No.	Treatments	Average percent dead hearts/plant		
		14th DAE	21st DAE	28th DAE
1	AKSV-11	47.23(43.41)	62.06(52.05)	75.82(60.75)
2	AKSV-15	33.43(35.23)	47.77(43.72)	58.88(50.69)
3	AKSV-18	32.19(34.55)	36.76(37.32)	52.29(46.36)
4	AKSV-20	30.73(33.59)	35.14(36.30)	60.12(50.88)
5	AKSV-21	25.27(30.13)	26.41(30.87)	63.45(52.99)
6	AKSV-23	33.65(35.40)	38.42(38.27)	55.33(48.07)
7	AKSV-24	19.38(25.98)	42.01(40.09)	49.16(44.43)
8	AKSV-27	25.59(30.33)	33.80(35.47)	57.36(49.29)
9	AKSV-28	26.27(30.77)	41.59(40.10)	64.34(53.50)
10	AKSV-29	27.90(31.81)	54.76(47.73)	62.45(52.32)
11	AKSV-30	10.00(15.00)	70.83(58.29)	57.81(46.04)
12	AKSV-31	30.01(33.19)	65.48(54.11)	86.34(67.52)
13	AKSV-32	31.85(34.35)	45.66(42.49)	69.92(57.09)
14	AKSV-33	34.77(30.09)	47.62(43.63)	73.61(59.10)
15	AKSV-34	23.61(28.65)	45.37(42.30)	80.95(64.24)
16	AKSV-35	21.67(27.59)	36.58(37.13)	64.58(53.64)
17	AKSV-36	11.10(19.03)	72.41(52.33)	72.41(58.33)
18	AKSV-37	10.00(15.00)	35.32(36.17)	68.36(56.25)
19	AKSV-38	20.74(26.59)	22.38(28.07)	49.13(44.47)
20	CSH-9 ©	20.76(27.02)	35.40(36.42)	71.74(58.17)
21	IS-2205 ©	0.00(0.00)	19.44(25.77)	31.56(33.95)
22	IS-18551 ©	0.00(0.00)	7.98(16.34)	20.10 (26.59)
	F test	Sig.	Sig.	Sig.
	SE (M) ±	2.69	3.52	4.49
	CD at 5%	7.55	9.89	12.62

The results in parenthesis are arc sin transformed values.

emergence, IS-2205 (0.10), IS-18551 (0.10), AKSV-30 (0.20) and CSH-9 (0.33) least were preferred for oviposition by shoot fly while CSH-9 (1.23), AKSV-27 (1.23) and AKSV-28 (1.17) showed maximum oviposition. Significantly, minimum number of shoot fly eggs was noted in resistant check IS-18551 (0.33) and IS-2205 (0.80) and AKSV-37 (0.63) on the 21st days after emergence. Overall range of shoot fly eggs was 0.33 to 2.83 per plant. Maximum number of eggs was noticed in the genotype AKSV-33 (2.83).

The significant differences observed in ovipositional preferences during present investigation are supported by Ingle (1999) while resistance of IS-18551 was also reported by Singh et al. (1995). Mote et al. (1986) also observed the similar range of ovipositional preference on 14th and 21st days after emergence. The range of average percent dead hearts observed on 14th days after emergence was 0.00 to 47.23% (Table 2). No dead hearts infestation was observed in resistant check IS-18551, and IS-2205 (Figure 2). Minimum percentage of shoot fly dead hearts on genotype AKSV-37 and AKSV-30 (10.00 %) was observed. Significant maximum percentage of dead hearts were recorded in AKSV-11 (47.23 %) followed by AKSV-33 (34.77 %) and AKSV-23 (33.65 %). On 21st days after emergence, significant minimum percentage of shoot fly dead hearts was noticed on resistant check on IS-18551 (7.98 %) and IS-2205 (19.44 %). The range of average percent dead hearts on 21st days after emergence was 7.98 to 72.41 percent. Genotype AKSV-36 suffered to the extent of 72.41%.

The resistant check IS-18551 and IS-2205 showed significantly minimum percent of dead hearts on 28th days after emergence, that is, 20.10 and 31.56% respectively while none of the entry was performed outstanding over the check. The range of percent dead hearts was 20.10 to 86.34%. Genotype AKSV-31 showed maximum susceptibility by suffering to the extent of 86.24% dead hearts on 28th days after emergence.

These results are in close proximity with the earlier findings by Patel and Sukhani (1990). Premikishore and Kishore (2001) and Kandalkar et al. (2000) also screened the new sorghum genotypes for shoot fly resistance and observed the varied range of percent dead hearts on 14th,

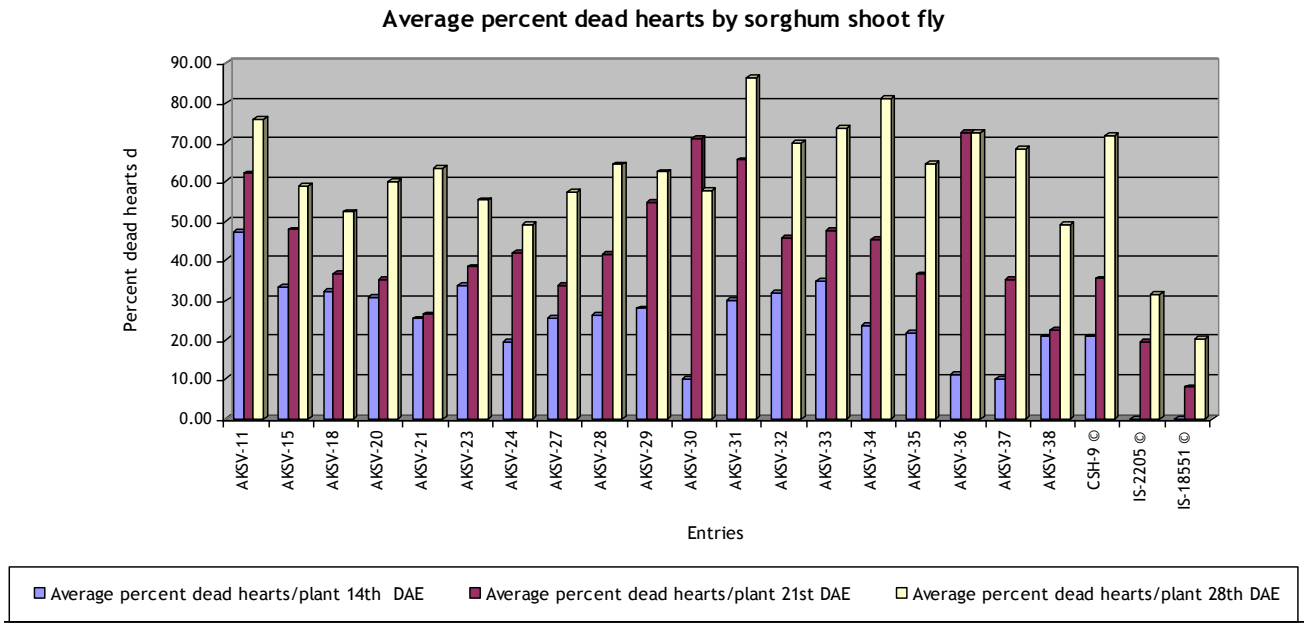

Figure 2. Average percent dead hearts by sorghum shoot fly.

21st and 28th DAE. Overall, none of the entry was found superior for the resistance against shoot fly over resistant check IS-18551 and IS-2205.

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