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Research Article

Investigations on the Least Susceptible Genotype of Sorghum Against Stem Borer (*Chillo partellus*) - in Northern M.P Region

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ABSTRACT

A field experiment was conducted at the Department of Entomology, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Viswa Vidyalaya, Gwalior,(M.P) during kharif season 2016, to study the least susceptible variety of sorghum genotypes (Sorghum bicolor) against stem borer(Chillopartellus). The genotypes under test were evaluated for the incidence of stem borer (Chillopartellus) on the basis of leaf injury and dead heart caused by borer in the stem. The test sorghum genotypes differed significantly with respect to per cent leaf injury caused by stem borer at 30 and 45 days after emergence (DAE). The minimum per cent leaf injury was recorded at 30 DAE in genotype SPV-2327(12.09%) and the maximum leaf injury per cent was recorded in ICSSH 82(36.5%). Similarly at 45 DAE, the per cent leaf injury caused by stem borer in test genotypes differed significantly. The minimum leaf injury was recorded in genotype SPV2327 (22.44%) and the maximum per cent of leaf injury caused by stem borer was recorded in genotype ICSSH 82(38.8%). The data recorded on dead heart caused by stem borer in different genotypes under test revealed that minimum dead heart per cent at 30 DAE was observed in the genotype SPV 2328 (14.33%) and the maximum dead heart per cent was recorded in genotype ICSSH82 (40.41%).Similarly at 45 DAE, the per cent dead heart symptoms were differed significantly. The minimum dead heart symptoms were observed in the genotype SPV 2328 (20.5%) and the maximum dead heart percent was recorded in ICSSH-82 (46.3%).

Key words: *Sorghum, Genotypes, Stem borer, Per cent leaf injury, Dead heart.*

INTRODUCTION

Sorghum (*Sorghum bicolor* L.) is one of the most important cereal crops in Africa, Asia, USA, Australia and Latin America. In India, sorghum is planted in an area of 7.79 million ha with an annual production of 6.45 million tonnes[1]. Under subsistence farming conditions, the productivity levels are quite low (500–800kg/ha), primarily due to biotic and abiotic constraints. Over 150 species of insects infest the sorghum crop at different stages of growth in the semi-arid tropics and cause an estimated loss of 1 billion US$ annually[3].

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Among these, sorghum shoot fly *Atherigona soccata* (Rondani), spotted stemborer *Chilopartellus* (Swinhoe), sorghum midge *Stenodiplosis sorghicola* (Coquillett), head bugs *Calocoris angustatus* (Lethiery) and *Eurystylusoldi* (Poppius), sugarcane aphid *Melanaphis sacchari* (Zehntner), shoot bug (*Peregrinus maidis* (Ashmead) and the oriental armyworm *Mythimna separata* (Walker) are the most important pests. Agronomic practices, natural enemies, synthetic insecticides and host plant resistance have been employed for minimizing the losses due to insect pests in sorghum. However, farmers cannot plant at times when pest damage can be avoided as planting times are dictated by the onset of rainfall, while insecticide application is beyond the reach of resource-poor farmers in the semi-arid tropics[9]. Host plant resistance can play a major role in minimizing the extent of losses in this crop[7] and is compatible with other tactics of pest management, including the use of natural enemies and chemical control .Importantly, deployment of insect-resistant cultivars in integrated pest management would also lead to a drastic reduction in pesticide residues in food and food products, and reduce environmental pollution. Considerable progress has been made in screening and breeding for resistance to sorghum shoot fly, spotted stem borer, head bugs, midge and sugarcane aphid[7], and a number of genotypes with different levels of resistance to these pests have been identified. However, the levels of resistance to some insect species are low to moderate. In general, two or more insect species attain damaging proportions on the same crop in a crop-growing season. Therefore, cultivars with multiple resistance to the major pests that damage the crop during the various stages of crop growth in a region would be the most desirable. In the present study, testing of different genotypes was done to check the resistance against sorghum stem borer.

MATERIAL AND METHODS

A field experiment was conducted at the department of entomology, College of agriculture, R.V.S Krishi vishwavidyalaya, Gwalior (M.P) during kharif season 2016. The experiment was carried out in a randomized block design (RBD) with 20 treatments and three replications. The 20 sorghum genotypes were obtained from the ICRISAT (Patancheru, Hyderabad). Sorghum genotypes were taken and they are planted in 5m length of two rows each with a spacing of 45 cm between the rows and 12 cm between the plants. A recommended dose of 80 kg N, 40 kg P and 40 kg k were applied and the other agronomic practices were followed. The observations to know the percent leaf injury and dead heart caused by stem borer was recorded at 30 and 45 days after emergence. Total number of plants showing leaf injury and dead heart symptoms were recorded in each genotype replication wise and subjected to statistical analysis. The significance of difference between the treat mental means was tested by the Critical Differences (CD) test at 5% level of probability. The experimental data were statistically analysed with the methods described by Panse and Sukhatme, 1978.

RESULTS AND DISCUSSION

The results revealed that there was significant difference for susceptibility in sorghum genotypes on the basis of percent leaf injury and percent dead hearts caused by stem borer (table-1). Per cent leaf injury recorded at 30 DAE showed significant difference. The leaf injury ranged from 12.09 to 29.03%.The lowest leaf injury % was recorded in genotype SPV2327 (12.09) followed by SPV2326 (16.13) and ICSSH88(16.3). Similarly at 45 DAE, the leaf injury was ranged from 22.44 to 38.8 %, the lowest leaf injury was recorded in genotype SPV2327 (22.44) followed by DHBM3 (22.81), ICSSH88 (22.96). The present findings were also in accordance with the findings reported by Sarailoo*et al.*[6], Bhadviya *et al.*[2], Vyas *et al*[10].

Table 1: Per cent leaf injury caused by stem borer in different genotypes of Sorghum

S.no	Genotypes	Per cent leaf injury at 30 DAE	Per cent leaf injury at 45 DAE
1	ICSV 25335	20.87(27.18)*	32.53(34.77)*
2	ICSSH 87	29.23(32.73)	32.63(34.83)
3	ICSSH 86	24.4(29.60)	30.53(33.54)
4	ICSV 25306	27.2(31.43)	31.73(34.28)
5	ICSSH 82	36.5(37.17)	38.8(38.53)
6	ICSSN 79	23.53(29.01)	23.83(29.22)
7	ICSSH 88	16.3(23.80)	22.96(28.62)
8	DHBM 5	17.7(24.87)	24.76(29.83)
9	DHBM 4	29.03(32.60)	32.63(34.83)
10	DHBM 2	25.61(30.40)	34.88(36.20)
11	ICSV 25308	16.6(24.03)	23.26(28.83)
12	ICSV 25333	18.63(25.56)	29.23(32.73)
13	ICSV 15006	20.05(26.60)	31.51(34.15)
14	SPV 2326	16.13(23.67)	28.43(32.22)
15	SPV 2327	12.09(20.34)	22.44(28.27)
16	SPV 2328	17.7(24.87)	23.06(28.70)
17	DHBM 1	23.58(29.05)	29.71(33.03)
18	DHBM 3	22.51(28.32)	22.81(28.52)
19	SSV 84	20.07(26.61)	31.53(34.16)
20	CSH 22 SS	20.33(26.80)	33.03(35.08)
	SEm±	(0.20)	(0.21)
	CD	(0.57)	(0.61)

Significant difference was observed between the dead hearts produced by sorghum stem borerat 30 and 45 DAE. At 30 DAE, the per cent dead hearts ranged from 14.33 to 40.41. The lowest number of dead hearts were recorded in genotype SPV2328 (14.33) followed by DHBM3 (19.7), ICSV 25335(21.07). Similarly at 45 DAE, the dead heart percentage ranged from 20.5 to 46.13. The minimum number of dead hearts was recorded in genotype SPV2328 (20.5) followed by DHBM3 (24.13) and DHBM 4 (26.1). Similar results were reported by Kishore *et al.*[4], Vyas *et al.*[10], Teli*et al.*, who screened different genotypes of the sorghum against stem borer.

Table 2: Per cent dead hearts caused by stem borer in different genotypes of Sorghum

S.no	Genotypes	Per cent dead heart at 30DAE	Per cent dead heart at 45DAE
1	ICSV 25335	21.07(27.32)*	35.5(36.57)*
2	ICSSH 87	21.5(27.62)	35.16(36.37)
3	ICSSH 86	28.57(32.31)	34.81(36.15)
4	ICSV 25306	24.08(29.38)	36.24(37.01)
5	ICSSH 82	40.41(39.47)	46.13(42.78)
6	ICSSN 79	39.65(39.03)	45.09(42.18)
7	ICSSH 88	30.93(33.79)	40.26(39.38)

8	DHBM 5	34.13(35.75)	38.4(38.29)
9	DHBM 4	24.76(29.84)	26.1(30.72)
10	DHBM 2	30.43(33.48)	43.06(41.01)
11	ICSV 25308	27.23(31.45)	33.5(35.36)
12	ICSV 25333	27.7(31.75)	31.07(33.87)
13	ICSV 15006	30.24(33.36)	31.88(34.37)
14	SPV 2326	22.53(28.33)	39.3(38.82)
15	SPV 2327	26.06(30.69)	31.3(34.02)
16	SPV 2328	14.33(22.23)	20.5(26.92)
17	DHBM 1	33.63(35.44)	38.3(38.23)
18	DHBM 3	19.7(26.34)	24.13(29.42)
19	SSV 84	24.51(29.67)	32.48(34.74)
20	CSH 22 SS	24.7(29.80)	27.93(31.90)
	SEm±	**(0.20)**	(**0.16)**
	CD	**(0.59)**	**(0.45)**

CONCLUSION

From the above experiment it can be concluded that Genotype SPV2327 showed least susceptibility to percent leaf injury caused by stem borer followed by SPV2326 and DHBM3.

Genotypes SPV2328 showed least susceptibility to dead hearts caused by stem borer followed by DHBM3 and ICSV25335.

Genotypes found less susceptible in the present studies may be screened with some newly developed genotypes, to found out the source of resistance against major pests of sorghum.

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