IJPP

RESEARCH ARTICLE

Identification of resistant sources for maize pink stem borer

■ M. ANURADHA

Maize Research Centre, Agricultural Research Institute, Rajendranagar, HYDERABAD (A.P.) INDIA

ABSTRACT

One hundred and thirty three maize inbred lines comprising of 18 sweet corn, 13 popcorn, 38 QPM, 46 normal maize and 18 special trait corns compared with two checks, Winsynthetic and Basilocal were screened against *Sesamia inferens* at Maize Research Centre, Hyderabad during *Rabi* 2009-10 and 2010-11. At 12 days after germination, each individual plant was artificially infested with 10-12 neonate larvae of *Sesamia inferens* with the help of bazooka. At 30 days after infestation plants were rated on 1-9 scale based on leaf injury rating (LIR). Mean LIR was calculated in both the replications and subjected to RBD analysis. HKI 586-1WG'33, HKI-1040-11-7, V335, CM 144, CML 175, HKI 164-7x161-2, HKI 164-4(1-3)2-2, HKI 164-7-4ER-3, DMRQPM03-113, WINPOP-3 and PFSR-R 9 were identified to be least susceptible (LIR 1.0-3.0) against maize pink stem borer.

How to view point the article : Anuradha, M. (2013). Identification of resistant sources for maize pink stem borer. *Internat. J. Plant Protec.*, **6**(2) : 344-348.

INTRODUCTION

Maize has occupied an important place in India due to its potential and greater demand for food, feed and industrial utilization. In India, maize ranks fifth in total area, fourth in production and third in productivity. Around 250 species of insect and mite species attack maize in field and storage conditions (Mathur, 1991). The average loss caused by the insect pests is estimated to be 10 %. Among them, *Sesamia inferens*, Walker is the serious one during *Rabi* in peninsular India. Annual loss of 11.05 crores in *Rabi* is due to *S.inferens* (Siddiqui and Marwaha, 1993). Screening of germplasm from different parts of the world to identify the sources of resistance and utilizing them for the development of hybrids have so far remained the main stay in the management of maize pink stem borer.

MATERIAL AND METHODS

During *Rabi* 2009-10 and 2010-11, 133 maize inbred lines supplied by Winter Nursery Centre, DMR, Hyderabad were screened against *S.inferens* in the field of MRC, Rajendranagar, Hyderabad. After thorough land preparation, ridges were formed at a distance of 75 cm and 3 m wide beds were made. Each maize inbred line was sown in one row at a spacing of 20

cm. Two replications were maintained. *S.inferens* was mass multiplied in the laboratory as per the procedure followed by Reddy *et al.* (2003). At 12 days after germination, each individual plant was artificially infested with 10-12 neonate larvae of *S. inferens* which were mixed with poppy seeds and released into the whorl of the plant with the help of bazooka. At 30 days after infestation plants were rated on 1-9 scale based on leaf injury rating (LIR) given by Reddy *et al.* (2003).

133 inbred lines comprising of 18 sweet corn, 13 popcorn, 38 QPM, 46 normal maize and 18 speciality corn were compared with two checks, Win synthetic and Basi local. Mean of LIR of individual plants belonging to one inbred line was calculated in both the replications and subjected to RBD analysis. Mean LIR of each inbred in two years was calculated and subjected to pooled RBD analysis.

Based on LIR, plants were classified into 3 categories
< 3.0 Least susceptible
3.1- 6.0 Moderately susceptible
>6.1 to 9.0 Highly susceptible

RESULTS AND DISCUSSION

The results obtained from the present study have been presented in the following sub heads :

Sweet corn:

Insec 2(K4)' Insec (K4), NSSW9301A(sh2sh2), Win sweet corn and 951-7 were least susceptible in 2009 screening and all these four were on par with each other. Pooled data showed that all the entries were either moderately susceptible or highly susceptible. HSSW(HS)C1f3(SH2SH2), Insec 2(K4), DMSC 8, DMSC 28 were moderately susceptible in both the years.

Significant differences were found among the entries of each susceptibility group (Table 1).

Popcorn :

In 2009, HKI PC 5, HKI PC 8, WINPOP-1 and WINPOP-2 were least susceptible while in 2010 WINPOP-3 and WINPOP-4 were least susceptible. Pooled data showed that WINPOP-

Table 1: Leaf injury rating of sweet corn inbreds		Mean LIR		
Sr. No.	Pedigree	2009	2010	2009-10
1.	HSSW(HS)C1f3(SH2SH2)	5.0	5.2	5.1
2.	Insec 2(k4)	4.0	4.4	4.2
3.	Insec 2 (K4)' Insec (K4)	3.0	3.5	3.25
4.	Mas madu (sh2 sh2)	5.2	9.0	7.1
5.	NSS2W9301A(sh2sh2)	2.7	9.0	5.85
6.	Sweet corn ´Insec 1 (K4)	7.8	5.7	6.75
7.	Win Sweet Corn	2.0	4.6	3.3
8.	951-7	2.0	7.6	4.8
9.	CUBA 380	7.8	8.5	8.15
10.	DMSC1	3.4	8.0	5.7
11.	DMSC3	5.4	9.0	7.2
12.	DMSC8	4.8	5.0	4.9
13.	DMSC16	5.3	7.2	6.25
14.	DMSC 20	7.3	9.0	8.15
15.	DMSC 28	3.8	5.9	4.85
16.	DMSC 36	6.6	6.3	6.45
17.	DMSC-37-3	4.1	6.4	5.25
18.	Sc Male	4.6	9.0	6.8
19.	Winsynthetic	6.3	8.0	7.15
20.	Basi Local	7.5	9.0	8.25
	C.D.	1.97	1.86	1.27

Table 2 : Leaf injury rating of popcorn inbreds		Mean LIR		
Sr. No.	Pedigree	2009	2010	2009-10
1.	HKI PC 4B	3.4	4.8	4.1
2.	HKI-PC-4B-1	4.6	6.4	5.5
3.	HKI-PC-5	2.8	6.0	4.4
4.	HKI-PC-7	7.8	7.3	7.55
5.	HKI PC 8	3.0	6.8	4.9
6.	HKI-PC-8-2	4.3	7.2	5.75
7.	WINPOP-1	2.0	6.3	4.15
8.	WINPOP-2	2.0	4.4	3.2
9.	WINPOP-3	3.8	2.2	3.0
10.	WINPOP-4	3.8	2.5	3.15
11.	WINPOP-16	6.4	6.3	6.35
12.	WINPOP-21	5.2	4.0	4.6
13.	WINPOP-43	4.2	3.5	3.85
14.	Winsynthetic	6.3	8.0	7.15
15.	Basi Local	7.5	9.0	8.25
	C.D.	1.69	1.93	1.17

Table 3 : Leaf injury rating of normal corn inbreds				
Sr. No.	Pedigree	Mean LIR		
		2009	2010	2009-10
1.	HKI-2-6-2-4(1-2)-4	2.0	5.0	3.5
2.	HKI 586-1 WG´33	2.0	2.4	2.2
3.	HKI 1040-5	4.2	4.3	4.25
4.	HKI-1040-11-7	2.0	2.3	2.15
5.	HKI 1040 C2	3.5	5.0	4.25
6.	HKI 1094-WG	3.3	6.2	4.75
7.	CML 451(P2)	4.3	6.8	5.55
8.	DTPYC9-F 46-3-1	4.5	6.0	5.25
9.	HKI 3322	5.3	9.0	7.15
10.	Gen 6033	5.8	6.4	6.1
11.	Hyd 05 R/2-1	5.2	6.0	5.6
12.	Hyd 05 R/13-2	5.0	5.2	5.1
13.	Hyd 05 R/204-1	6.0	9.0	7.5
14.	LM 5	5.5	3.5	4.5
15.	LM 6	4.3	8.4	6.35
16.	LM11	3.6	7.3	5.45
17.	LM12	3.6	7.6	5.6
18.	LM15	4.0	7.6	5.8
19.	LM 16	2.0	9.0	5.5
20.	V 335	2.0	3.7	2.85
21.	V 341	4.8	4.5	4.65
22.	V 351	6.1	5.1	5.6
23.	CM105	5.0	9.0	7.0
24.	CM114	4.9	9.0	6.95
25.	CM121	4.8	7.8	6.3
26.	CM123	5.2	9.0	7.1
27.	CM 124	7.9	6.2	7.05
28.	CM128	5.3	9.0	7.15
29.	CM 129	6.7	9.0	7.85
30.	CM 132	6.2	5.2	5.7
31.	CM 133	5.9	2.0	3.95
32.	CM 139	4.3	9.0	6.65
33.	CM 144	2.4	2.6	2.5
34.	CM149	4.7	3.9	4.3
35.	CM 500	3.5	8.0	5.75
36.	CM 501	5.4	5.6	5.5
37.	CM 502	5.2	6.6	5.9
38.	HKI C 78	5.6	5.5	5.55
39.	HKI 141	5.9	7.0	6.45
40.	HKI C 323	5.3	2.0	3.65
41.	CML 141	3.0	6.0	4.5
42.	CML 154	3.8	9.0	6.4
43.	CML 269	4.2	3.4	3.8
44.	CML 384	3.4	8.4	5.9
45.	CML 395	2.2	9.0	5.6
46.	NC 392	5.0	8.7	6.85
47.	Winsynthetic	6.3	8.0	7.15
48.	Basi Local	7.5	9.0	8.25
	C.D.	3.38	1.6	1.83

3 was least susceptible. Ten entries with LIR ranging from 3.2 -5.75 were significantly different among each other and moderately susceptible (Table 2).

Normal corn :

HKI 586-1WG'33, HKI-1040-11-7 and CM 144 were least susceptible in both the years of screening. Pooled data showed that V335 was also least susceptible. Significant differences were found between the LIR of eleven moderately susceptible entries (Table 3).

QPM :

CML 175, HKI 164-7x161-2 and HKI 164-4(1-3)2-2 were least susceptible and nine entries were moderately susceptible in both the years. It is evident from the pooled data that HKI 164-7-4ER-3 and DMRQPM03-113 were also least susceptible (Table 4).

		Mean LIR		
Sr. No.	Pedigree	2009	2010	2009-10
1.	MIRT&PT-3	2.2	9.0	5.6
2.	HKI 26-2-4-(1-2)	3.3	7.5	5.4
3.	HKI 31-2	8.3	2.0	5.15
4.	HKI 34(1+2)-1	5.2	4.8	5.0
5.	HKI-164-4-(1-3)-2-2	2.0	2.0	2.0
6.	HKI 164-4-(1-3)-2	3.4	6.6	5.0
7.	HKI 164-3 (2-1)-1	3.0	7.6	5.3
8.	HKI 164-D-3-3-2	3.0	3.5	3.25
9.	HKI 164-7-7 ER2	5.8	8.5	7.15
10.	HKI 164-7-4 ER-3	2.0	3.2	2.6
11.	HKI 164-7-4	3.4	9.0	6.2
12.	HKI-164-7-4-2	5.5	5.1	5.3
13.	HKI 164-7-2	3.0	9.0	6.0
14.	HKI 164-1-4	3.8	4.0	3.9
15.	HKI 164-4-(1-3)	5.0	9.0	7.0
16.	HKI-164-7-6X161-2	2.0	2.9	2.45
17.	HKI 191-1-2-5	5.8	4.6	5.2
18.	HKI 193-2-2	6.4	9.0	7.7
19.	HKI-193-2-2-4	5.1	9.0	7.05
20.	HKI 193-1	5.4	9.0	7.2
21.	HKI 226	2.0	7.0	4.5
22.	CML 165	4.3	8.5	6.4
23.	CML 167	6.0	9.0	7.5
24.	CML 171	7.0	8.0	7.5
25.	CML 172	6.9	2.0	4.45
26.	HKI MBR-139	6.6	5.6	6.1
27.	HKI-MBR-139-2	5.7	5.5	5.6
28.	DMR QPM-03-104	3.8	3.5	3.65
29.	DMRQPM 03-113	3.3	2.5	2.9
30.	DMR QPM-03-124	5.2	9.0	7.1
31.	DMR QPM-58-26	6.5	9.0	7.75
32.	CML175	3.0	3.0	3.0
33.	CLQRCYQ 47	2.7	4.0	3.35
34.	CLQRCYQ-47-B	2.7	9.0	5.85
35.	CLQRCYQ- 36	5.3	5.0	5.15
36.	CLQRCYQ- 41	3.6	6.0	4.8
37.	CLQRCYQ- 40	3.4	6.2	4.8
38.	DMRQPM 58	5.8	5.5	5.65
39.	Winsynthetic	6.3	8.0	7.15
40.	Basi local	7.5	9.0	8.25
	C.D.	2.35	1.64	1.4

Table 4 : Leaf injury rating of QPM inbreds

Sr. No.	Pedigree	Mean LIR		
	High oil corn	2009	2010	2009-10
1.	Pool 16 BNSEQ.C3F6x38-1	5.8	9.0	7.4
2.	HIGH OIL POPULATION II	5.0	6.7	5.85
3.	DMHOC 4	5.0	5.5	5.25
4.	Temp.HOC15	5.0	6.0	5.5
5.	02POOL 33 C24	6.8	9.0	7.9
6.	POBLAC 61 C3	5.7	9.0	7.35
7.	Temp.´Trop High oil QPM	7.3	5.5	6.4
	Disease resistant			
8.	PFSR/51016-1	3.7	5.8	4.75
9.	PFSR - R2	3.8	3.6	3.7
10.	PFSR - R3	7.8	6.2	7.0
11.	PFSR - R9	3.3	2.0	2.65
12.	PFSR - R10	7.5	9.0	8.25
13.	PFSR - S2	8.5	9.0	8.75
14.	PFSR - S3	9.0	6.7	7.85
	Others			
15.	SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2	8.6	7.6	8.1
16.	JCY 2-1-2-1-1B-1-2-3-1-1-1	7.6	9.0	8.3
17.	JCY 2-7-1-2-1-B-1-2-1-1	7.4	9.0	8.2
18.	JCY 3-7-1-2-1-'B-1-1-4-1	6.8	9.0	7.9
19.	Winsynthetic	6.3	8.0	7.15
20.	Basi local	7.5	9.0	8.25
	C.D.	2.98	2.22	1.74

Table 5: Leaf injury rating of special trait corn inbreds

Special trait corn :

In 2009 none of the entries was least susceptible while PFSR-R 9 alone was least susceptible in 2010. Pooled data shows that PFSR-R9 was least susceptible and HOP II, PFSR/ 51016-1, Temp.HOC15, PFSR-R2 and DM HOC 4 were moderately susceptible (Table 5). In earlier study, Sekhar *et al.* (2004) identified 7 sources of resistance against *Sesamia inferens*.

REFERENCES

Mathur, L.M.L. (1991). Genetics of insect resistance in maize.In : Maize genetics perspectives, pp. 238-350.

Reddy, M.L.K., Ramesh Babu, T. and Sree Ramulu, M. (2003). Evaluation of artificial diets for mass rearing of pink stem borer in lab. *J.Res. ANGRAU*, **31**(3) : 13-19.

Sekhar, J.C., Bergvinson, D., Venkatesh, S., Reddy, M.L.K. and Singh, N.N. (2004). Reaction of exotic maize germplasm to pink borer, *Sesamia inferens*. *Indian.J.Entomol.,* **66** (3): 261-263.

Siddiqui, K.H. and Marwaha, K.K. (1993). *The vistas of maize entomology in India* pp. 184. Kalyani Publishers NEW DELHI (INDIA).

6th Year
★ ★ ★ ★ ★ of Excellence ★ ★ ★ ★ ★