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RESEARCH ARTICLE

Maize inbred lines screening for resistance against *Chilo partellus*

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ABSTRACT

Screening of 145 maize inbred lines comprising of 20 sweet corn, 13 popcorn, 43 QPM, 20 speciality corn and 49 normal maize against *Chilo partellus* during *Kharif* 2009 and 2010 was done at Maize Research Centre, Rajendranagar. Artificial infestation was done at 12 days after germination and leaf injury rating was recorded on 1-9 scale at 30 days after infestation in both the replications. HSSW(HS)C1f3(SH2SH2), DMSC 3, DMSC16, DMSC 28, HKIPC 4B-1, HKIPC 5, HKIPC 8, WINPOP 4, WINPOP 43, V351, CM123, CM133, CM 139, CM 500, CM 502, HKI C78, HKI 141, HKI C323, Ae-40, CML-154, CML-384, NC 392, MIRT&PT-3, HKI 17-2, HKI 26-2-4-(1-2), HKI 31-2, HKI 164-3(2-1)-1, HKI 164-4-(1-3)-2-2, HKI 164-7-7-ER2, HKI 164-7-4ER3, HKI 164-7-4-2,HKI 164-4-(1-3), HKI 193-2-2, CML165, CML167, DMR QPM 03-124, DMR QPM 58-26, CML 175, CL-QRCYQ-47, DMRQPM-03-113, Pool 16BNSEQC3F6x38-1, PFSR/51016-1, PFSR R2, PFSR S3, JCY2-1-2-1-1-B-1-2-3-1-1-1, JCY2-7-1-2-1-B-1-2-1-1, JCY3-7-1-2-1'B-1-1-4-1 and SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2 were least susceptible to *C.partellus* and can be used in breeding stem borer resistant hybrids.

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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 per cent. Among them, spotted stem borer, *Chilo partellus* (Swinhoe) (Crambidae: Lepidoptera) is the most serious one during *Kharif* season causing 26.7-80.4 per cent yield losses in different agroclimatic regions of India (Panwar, 2005). Screening of germplasm from different parts of the world to identify the sources of resistance and utilizing them for the development of varieties have so far remained the main stay in the management of maize pests.

MATERIALS AND METHODS

A total of 145 maize inbred lines comprising of 20 sweet corn, 13 popcorn, 43 QPM, 20 speciality corn and 49 normal maize were supplied by Winter Nursery Centre, DMR, Hyderabad. Inbreds along with two checks, Win synthetic and Basilocal were screened against *C.partellus* during *Kharif* 2009 and 2010 in the fields of Maize Research Centre, Rajendranagar. After thorough land preparation, ridges were formed at 75 cm and sowing was done at a spacing of 20 cm within the row length of 3 m. Two replications were maintained. *C.partellus* was mass multiplied in the laboratory on artificial diet as per the procedure given by Siddiqui *et al.* (1977). At 12 days after germination, each individual plant was artificially infested with 20-25 black headed stage eggs of *C.partellus*. At 30 days after infestation, individual plants were rated on 1-9 scale based on leaf injury rating by Sarup *et al.* (1978).

Based on LIR, plants were classified into 3 categories :

Upto 3.0	:	Least susceptible
3.1-6.0	:	Moderately susceptible
>6.1 to 9.0	:	Highly susceptible

Mean of LIR of individual plants belonging to an inbred line was calculated in both replications and subjected to RBD analysis.

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions habe been presented under following sub heads:

Normal corn :

Pooled data shows that V351, CM123, CM133, CM 139, CM 500, CM 502, HKI C78, HKI 141, HKI C323, Ae-40, CML-154, CML-384, NC 392 were least susceptible. DTPYC9-F 46-3-1 and CM 149 were highly susceptible. V351, CM123, CM133, CM 139, CM 500, CM 502, HKI C78, HKI C323, Ae-40, CML-384, NC 392 were least susceptible in both the years of screening (Table 1).

Table 1: Leaf injury rating of normal corn inbred

Sr. No.	Pedigree	Mean of 2009	Mean of 2010	Mean of 2009 and 2010
1 .	HKI-2-6-2-4(1-2)-4	6.0	6.0	6.0
2.	HKI 586-1 WG' 33	6.2	2.5	4.35
3.	HKI-1040-5	6.7	3.2	4.95
4.	HKI-1040-11-7	5.0	3.6	4.3
5.	HKI-1040C2	4.3	2.2	3.25
6.	HKI-1094-WG	4.3	6.2	5.25
7.	HKI 3322	7.8	2.0	4.9
8.	CML-451 (P2)	4.3	2.0	3.15
9.	DTPYC9-F46-3-1	5.7	7.3	6.5
10.	Gen 6033	4.3	5.8	5.05
11.	Hyd05R/2-1	4.4	2.0	3.2
12.	Hyd05R/13-2	5.3	2.5	3.9
13.	Hyd05R/204-1	5.2	2.0	3.6
14.	LM5	7.8	2.0	4.9
15.	LM6	5.8	2.7	4.25
16.	LM11	4.0	3.3	3.65
17.	LM12	6.5	2.0	4.25
18.	LM15	4.3	4.0	4.15
19.	LM16	3.8	2.3	3.05
20.	V 335	7.2	2.3	4.75
21.	V 341	7.0	2.0	4.5
22.	V 351	2.6	2.6	2.6
23.	V 351-1	5.3	5.7	5.5
24.	CM105	7.7	3.0	5.35
25.	CM114	4.3	3.0	3.65
26.	CM121	3.3	4.3	3.8
27.	CM123	2.0	2.0	2.0
28.	CM124	7.7	4.0	5.85
29.	CM128	4.3	2.5	3.4
30.	CM129	4.3	3.4	3.85
31.	CM132	6.7	3.5	5.1
32.	CM133	2.0	2.0	2.0
33.	CM139	2.0	2.7	2.35
34.	CM144	4.3	2.0	3.15
35.	CM149	8.3	2.7	8.65
36.	CM500	2.0	2.0	2.0
37.	CM501	4.3	2.0	3.15
38.	CM502	2.0	2.0	2.0
39.	HKI C 78	2.0	2.0	2.0
40.	HKI 141	3.3	2.0	2.65
41.	HKI C 323	2.0	3.0	2.5
42.	HKI 1352-5-8-9	6.7	2.2	4.45
43.	Ae-40	2.0	2.0	2.0
44.	CML 141	5.5	5.0	5.25
45.	CML 154	2.0	3.8	2.9
46.	CML 269	5.5	2.0	3.75
47.	CML 384	2.0	2.0	2.0
48.	CML 395	5.5	4.8	5.15
49.	NC 392	2.0	3.0	2.5
50.	Win synthetic	5.5	3.4	4.45
51.	Basilocal (S)	6.7	5.0	5.85
	C.D.	3.02	1.74	1.74

Table 1: Contd.......

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Speciality corn :

Pool 16 BNSEQ. C3F6x38-1, PFSR/51016-1, JCY2-1-2-1-1-B-1-2-3-1-1-1, JCY2-7-1-2-1-B-1-2-1-1, JCY3-7-1-2-1'B-1-1-4-1 and SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2 were least susceptible and high oil population II , Temp.trop. high oil QPM were moderately susceptible in both the years. Pooled data show that pool 16 BNSEQ.C3F6x38-1, PFSR/51016-1, PFSR R2, PFSR S3, JCY2-1-2-1-1-B-1-2-3-1-1-1, JCY2-7-1-2-1-B-1-2-1-1, JCY3-7-1-2-1'B-1-1-4-1 and SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2 were least susceptible (Table 2).

Table 2: Leaf injury rating of speciality corn inbreds

Sr. No.	Pedigree	Mean of 2009	Mean of 2010	Mean of 2009 and 2010
1 .	Pool 16 BNSEQ.C3F6x38-1	2.0	3.0	2.5
2.	High oil population II	4.0	5.0	4.5
3.	SHD-1 ER6	5.5	2.0	3.75
4.	DMHOC 4	7.3	4.3	5.8
5.	Temp.HOC15	7.3	2.0	4.65
6.	02POOL 33 C24	6.7	5.7	6.2
7.	POBLAC 61 C3	7.3	2.0	4.65
8.	Temp. 'Trop High oil QPM	5.5	3.4	4.45
9.	PFSR/51016-1	2.0	2.3	2.15
10.	PFSR-R2	3.8	2.0	2.9
11.	PFSR-R3	6.7	3.2	4.95
12.	PFSR-R9	5.5	2.0	3.75
13.	PFSR-R10	7.5	2.3	4.9
14.	PFSR-S2	9.0	2.3	5.65
15.	PFSR-S3	2.0	3.4	2.7
16.	CM-117-3-2-1-1-1-1-3	6.3	3.3	4.8
17.	SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2	2.0	2.0	2.0
18.	JCY2-1-2-1-1-B-1-2-3-1-1-1	2.0	2.0	2.0
19.	JCY2-7-1-2-1-B-1-2-1-1	2.0	2.0	2.0
20.	JCY3-7-1-2-1'B-1-1-4-1	2.0	2.2	2.1
21.	Win synthetic	5.5	3.4	4.45
22.	Basilocal (S)	6.7	5.0	5.85
	C.D.	2.21	1.85	1.36

Sweet corn :

HSSW(HS)C1f3(SH2SH2), DMSC 3, DMSC16, DMSC 28 were least susceptible in both the years of screening and also as per pooled data. Insec 2(K4)'Insec(K4), Sweet corn Insec 1(K4), CUBA 380, DMSC 1, DMSC-37-3 and Sc Male were moderately susceptible in both the years (Table 3).

Popcorn :

HKIPC 5, HKIPC 8, WINPOP 4, WINPOP 43 were least susceptible and WINPOP 21 was moderately susceptible in both the years. Pooled data showed that HKIPC 4B-1, HKIPC 5, HKIPC 8, WINPOP 4, WINPOP 43 were least susceptible (Table 4).

Table 3: Leaf injury rating of sweet corn inbreds

Sr. No.	Pedigree	Mean of 2009	Mean of 2010	Mean of 2009 and 2010
1.	HSSW(HS)C1f3(SH2SH2)	2.9	3.0	2.95
2.	Insec 2 (K4)	9.0	2.8	5.9
3.	Insec 2 (K4)' Insec (K4)	3.5	5.5	4.5
4.	Mas madu (sh2sh2)	6.8	6.5	6.65
5.	NSS2W9301A(sh2sh2)	7.5	3.0	5.25
6.	Sweet corn 'Insec 1(K4)	3.8	4.0	3.9
7.	Win sweet corn	6.0	6.4	6.2
8.	951-7	3.4	3.0	3.2
9.	CUBA 377	7.0	3.0	5.0
10.	CUBA 380	5.5	4.0	4.75
11.	DMSC1	4.3	4.5	4.4
12.	DMSC3	2.0	2.0	2.0
13.	DMSC6	6.2	2.3	4.25
14.	DMSC8	7.5	5.0	6.25
15.	DMSC16	2.0	2.0	2.0
16.	DMSC20	6.0	3.0	4.5
17.	DMSC28	2.0	2.5	2.25
18.	DMSC36	3.5	3.0	3.25
19.	DMSC-37-3	3.2	4.7	3.95
20.	Sc male	4.8	5.0	4.9
21.	Win synthetic	5.5	3.4	4.45
22.	Basilocal (S)	6.7	5.0	5.85
	C.D.	1.26	2.61	1.37

Table 4: Leaf injury rating of popcorn inbreds

Sr. No.	Pedigree	Mean of 2009	Mean of 2010	Mean of 2009 and 2010
1.	HKI-PC-4B	4.8	2.3	3.55
2.	HKI-PC-4B-1	2.0	3.1	2.55
3.	HKI-PC-5	2.0	2.3	2.15
4.	HKI-PC-7	5.6	2.0	3.8
5.	HKI-PC-8	2.0	2.0	2.0
6.	HKI-PC-8-2	6.2	3.8	5.0
7.	WINPOP-1	6.2	2.2	4.2
8.	WINPOP-2	6.5	2.7	4.6
9.	WINPOP-3	6.5	4.3	5.4
10.	WINPOP-4	3.0	2.5	2.75
11.	WINPOP-16	6.7	3.6	5.15
12.	WINPOP-21	4.3	3.4	3.85
13.	WINPOP-43	2.0	2.0	2.0
14.	Win synthetic	5.5	3.4	4.45
15.	Basilocal (S)	6.7	5.0	5.85
	C.D.	1.66	2.09	1.23

QPM :

MIRT and PT-3, HKI 17-2, HKI 26-2-4-(1-2), HKI 31-2, HKI 164-3(2-1)-1, HKI 164-4-(1-3)-2-2, HKI 164-7-7-ER2, HKI 164-7-4ER3, HKI 164-7-4-2,HKI 164-4-(1-3), HKI 193-2-2, CML165, CML167, DMR QPM 03-124, DMR QPM 58-26, CML 175, CL-QRCYQ-47 were least susceptible in both the years of screening while pooled data show that all the above 17 entries and DMRQPM-03-113 were least susceptible (Table 5).

Table 5: Leaf injury rating of QPM inbreds

Sr. No.	Pedigree	Mean of 2009	Mean of 2010	Mean of 2009and 2010
1 .	MIRT&PT-3	2.0	2.0	2.0
2.	HKI 17-2	2.0	3.0	2.5
3.	HKI 26-2-4-(1-2)	2.0	2.0	2.0
4.	HKI 31-2	2.0	2.0	2.0
5.	HKI 34(1+2)-1	5.5	3.0	4.25
6.	HKI 164-3(2-1)-1	2.0	3.0	2.5
7.	HKI 164-4-(1-3)-2-2	2.0	2.0	2.0
8.	HKI 164-4-(1-3)-2	5.5	2.0	3.75
9.	HKI 164-D-3-3-2	3.8	2.6	3.2
10.	HKI 164-7-7 ER2	2.0	2.0	2.0
11.	HKI 164-7-6x161	5.5	3.7	4.6
12.	HKI 164-7-4 ER3	2.0	2.0	2.0
13.	HKI 164-7-4	6.7	2.0	4.35
14.	HKI 164-7-4-2	2.0	2.0	2.0
15.	HKI 164-7-2	5.5	2.5	4.0
16.	HKI 164-1-4	2.0	4.6	3.3
17.	HKI 164-4-(1-3)	2.0	2.1	2.05
18.	HKI 164-7-6x161-2	9.0	2.0	5.5
19.	HKI 191-1-2-5	6.7	2.0	4.35
20.	HKI 193-2-2	2.0	2.2	2.1
21.	HKI 193-2-2-4	6.7	2.0	4.35
22.	HKI 193-1	8.8	2.0	5.4
23.	HKI 226	7.3	2.0	4.65
24.	CML 165	2.0	2.0	2.0
25.	CML 167	2.0	2.0	2.0
26.	CML 171	6.7	2.0	4.35
27.	CML 172	3.7	3.2	3.45
28.	HKI MBR-139	6.7	3.3	5.0
29.	HKI MBR-139-2	7.3	2.0	4.65
30.	DMR QPM-03-104	6.7	2.2	4.45
31.	DMR QPM-03-113	2.0	4.0	3.0
32.	DMR QPM-03-124	2.0	2.0	2.0
33.	DMR QPM-58-26	2.0	2.0	2.0
34.	CML 158	5.5	2.0	3.75
35.	CML 175	2.7	2.0	2.35
36.	CL-QRCYQ-47	2.0	3.0	2.5
37.	CL-QRCYQ-47-B	5.5	2.5	4.0
38.	CL-QRCYQ-30	5.5	2.0	3.75
39.	CL-QRCYQ-36	6.7	2.0	4.35
40.	CL-QRCYQ-41	6.7	3.6	5.15
41.	CL-QRCYQ-40	6.7	2.0	4.35
42.	CML 451Q	9.0	2.0	5.5
43.	DMRQPM 58	5.3	3.0	4.15
44.	Win synthetic	5.5	3.4	4.45
45.	Basilocal (S)	6.7	5.0	5.85
	CD	2.21	2.32	1.56

Table 5 : Contd……

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HSSW(HS)C1f3(SH2SH2), DMSC 3, DMSC16, DMSC 28, HKIPC 4B-1, HKIPC 5, HKIPC 8, WINPOP 4, WINPOP 43, V351, CM123, CM133, CM 139, CM 500, CM 502, HKI C78, HKI 141, HKI C323, Ae-40, CML-154, CML-384, NC 392, MIRT&PT-3, HKI 17-2, HKI 26-2-4-(1-2), HKI 31-2, HKI 164-3(2-1)-1, HKI 164-4-(1-3)-2-2, HKI 164-7-7-ER2, HKI 164-7-4ER3, HKI 164-7-4-2,HKI 164-4-(1-3), HKI 193-2-2, CML165, CML167, DMR QPM 03-124, DMR QPM 58-26, CML 175, CL-QRCYQ-47, DMRQPM-03-113, Pool 16BNSEQC3F6x38-1, PFSR/51016-1, PFSR R2, PFSR S3, JCY2-1-2-1-1-B-1-2-3-1-1-1, JCY2-7-1-2-1-B-1-2-1-1, JCY3-7-1-2-1'B-1-1-4-1 and SW-930-313-23-PO-49-54-1-3-1-1-1-2-1-2-1-2-3-1-1-2 can be utilized in breeding *C.partellus* resistant hybrids. In earlier studies, Panwar *et al* (2001) reported two genotypes resistant against *C.partellus*.

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