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Identification of Restorer and Maintainer lines in Chilli (*Capsicum annuum* L.)

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ABSTRACT

Genetic investigation has taken up identify maintainer and stable restorer lines Chilli pepper involving 45 diverse germplasm lines. In the study three cytoplasmic male sterile (CMS) lines namely CCA-4261, CCA-4916 and CCA-4917 wiht100% sterility has been identified by examining the pollen fertility.126 test hybrids were generated by involving rest of 42 lines and three CMS lines . Based on the restoration of fertility in test hybrids32 were lines identified as stable fertility restorers and four lines PBC-534, PBC-385, PBC-362 and PBC-292 as sterility maintainers.

Key words: *CMS, restorers, maintainers, pollen*

INTRODUCTION

In Chilli (*Capsicum annuum* L.) the major bottleneck in exploitation of hybrid vigor is the complicated technique of seed production, which involves hand emasculation and pollination that makes hybrid seed more costly. This paved the way for intensification of research in utilization of male sterility systems in hot pepper. Now, different male sterility systems are available in hot pepper. Among these, cytoplasmic genetic male sterility (CGMS) system appears to be a good substitute for hand emasculation to curtail the cost of hybrid seed to a great extent. The identification of fertility restorer and sterility maintainer from available germplasm for CMS line is important to broaden the genetic base in heterosis breeding program. Therefore an attempt was made at Botany department, Yeshwantrao Chavan College Tulajapur to identify restorers and maintainers for CMS line.

MATERIAL AND METHODS

In the present study 42 Chilli lines were grown along with three CMS lines namely CCA-4261, CCA-4916 and CCA-4917 in the field of department of botany in the kharif season of 2014. Three cytoplasmic lines CCA-4261, CCA-4916 and CCA-4917 were obtained from AVRDC Taiwan. All 42 lines were crossed with CMS lines to develop 126 hybrids. On the basis of pollen dehiscence the plants were classified as male fertile and male sterile[5].

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Cytoplasmic male sterility is important in many crops for hybrid seed production as well as for research on nuclear and mitochondrial interaction[1].

Fifty plant of each hybrid were planted in the field at 60 X 90 spacing in kharif 2014. Based on their fertility restoration, inbred plants were classified into three categories (i) Stable for fertility restoration (ii) stable for sterility maintainer (iii) inbred plants still segregating[3]

RESULTS AND DISCUSSION

Out of the 126 hybrids under the field condition in summer 2015, fertility was restored in 96 F1, partially restored in 18 F1 and sterility was maintained in 12 F1 (Table 1). Variations were observed for the presence of fertility restorer gene in the genotypes used as male on CMS lines. The stable restorers (lines which restores cent percent fertility upon crossed with all three CMS lines). Among the 42 lines, 32 lines, namely PC-1, G-4, LCA-960, LCA-310, LCA-304, LCA-235, P Jwala, Shankeshwar local, Pusa Sadabahar, HPL-1, 2, 3, 4, 5, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, Byadgi Dabbi-1 were stable for fertility restoration (Rf) while, four lines namely, PBC-534, PBC-385, PBC-362 and PBC-292 were identified as sterility maintainers (rf) whereas, remaining six lines namely, Phule Jyoti, B Dabbi-2, B Dabbi-3, B Kaddi-1, B Kaddi-2 and B Kaddi-3 were found partial restorer (mix of fertile and sterile plants). Fertility restoration analysis revealed presence of fertility restoration gene in majority of the lines. Similarly findings have been reported in previous studies by Gulyas et al[2], Kumar et al.[3] and Singh et al[4].

CONCLUSION

It could be concluded from the study that all the three male sternly lines were stable for cytoplasmic male sterility (CMS). Fertility restoration analysis revealed presence of fertility restoration gene and sterility maintainer gene in 32 and four lines respectively. Majority of the lines exhibited fertility restoration gene, whereas only four lines PBC-534, PBC-385, PBC-362 and PBC-292 exhibited sterility maintainer gene. Hence these four lines can be used for conversion into male sterility through backcross breeding programe to generate genetic variability for male sterility in chilli.

Table 1: Stable restorer and maintainer lines in chilli

Sl. no	Lines used as Male	F1 plants	CMS lines used as Female						Remark
			CCA-4261		CCA-4916		CCA-4917		
			FP	(%) F1	FP	(%) F1	FP	(%) F1	
1	PC-1	50	50	100	50	100	50	100	Restorer
2	G-4	50	50	100	50	100	50	100	Restorer
3	LCA-960	50	50	100	50	100	50	100	Restorer
4	LCA-310	50	50	100	50	100	50	100	Restorer
5	LCA-304	50	50	100	50	100	50	100	Restorer
6	LCA-235	50	50	100	50	100	50	100	Restorer
7	P Jwala	50	50	100	50	100	50	100	Restorer
8	Shankeshwar L	50	50	100	50	100	50	100	Restorer
9	P Sadabahar	50	50	100	50	100	50	100	Restorer
10	HPL-1	50	50	100	50	100	50	100	Restorer
11	HPL-2	50	50	100	50	100	50	100	Restorer
12	HPL-3	50	50	100	50	100	50	100	Restorer
13	HPL-4	50	50	100	50	100	50	100	Restorer
14	HPL-5	50	50	100	50	100	50	100	Restorer
15	HPL-6	50	50	100	50	100	50	100	Restorer
16	HPL-7	50	50	100	50	100	50	100	Restorer

17	HPL-8	50	50	100	50	100	50	100	Restorer
18	HPL-9	50	50	100	50	100	50	100	Restorer
19	HPL-10	50	50	100	50	100	50	100	Restorer
20	HPL-11	50	50	100	50	100	50	100	Restorer
21	HPL-12	50	50	100	50	100	50	100	Restorer
22	HPL-13	50	50	100	50	100	50	100	Restorer
23	HPL-14	50	50	100	50	100	50	100	Restorer
24	HPL-15	50	50	100	50	100	50	100	Restorer
25	HPL-16	50	50	100	50	100	50	100	Restorer
26	HPL-17	50	50	100	50	100	50	100	Restorer
27	HPL-18	50	50	100	50	100	50	100	Restorer
28	HPL-19	50	50	100	50	100	50	100	Restorer
29	HPL-20	50	50	100	50	100	50	100	Restorer
30	HPL-21	50	50	100	50	100	50	100	Restorer
31	HPL-22	50	50	100	50	100	50	100	Restorer
32	B Dabbi-1	50	50	100	50	100	50	100	Restorer
33	B Dabbi-2	50	38	76	33	66	42	83.5	PR
34	B Dabbi-3	50	40	80	42	84	37	74	PR
35	B Kaddi-1	50	29	59	34	69	36	75	PR
36	B Kaddi-2	50	33	67	35	70	39	78	PR
37	B Kaddi-3	50	37	74	36	73	40	80	PR
38	PBC-534	50	00	00	00	00	00	00	Maintainer
39	PBC-385	50	00	00	00	00	00	00	Maintainer
40	PBC-362	50	00	00	00	00	00	00	Maintainer
41	PBC-292	50	00	00	00	00	00	00	Maintainer
42	Phule Jyoti	50	36	72	30	60	29	58	PR

*FP: Fertile plants, PR: Partial restorer

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