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Short Communication

Cytoplasmic genetic male sterility in chilli (*Capsicum annuum* L.)

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Chilli (*Capsicum annuum* L.) is an important commercial spice cum vegetable crop grown in India and occupies an area of 0.956 m. ha with an annual production of 0.945 m. tonnes (1). Though India stands first in chilli cultivation covering 45 per cent of the world hectarage, its productivity is quite low (1 t/ha dry chilli) as compared to USA, China, South Korea, Taiwan, etc. (3-4 t/ha dry chilli). The main reason for low productivity in India is the use of open pollinated varieties and only 2.6 per cent of chilli area is under hybrid varieties (2). The recent experience provides the superiority of F_1 hybrids in chillies for earliness, high productivity, high fruit weight and above all high dry recovery (3 and 4). Development of hybrid seeds by hand emasculation and pollination is a tedious process and involves high cost. Exploitation of heterosis economically depends on the development of new techniques, which lead to cheap hybrid seed production. The concept of male sterility has been commercially exploited in several vegetable, fruit, spice and flower crops.

During 1990-91 male-sterile plant was naturally observed in the experimental plot of IIHR, Hessaraghatta, Bangalore. Profuse growth was observed in male sterile plant compared to fertile ones. The male-sterile plants had shriveled anthers and were devoid of pollen grains. Crosses were made with its sister lines as well as with different genetic backgrounds and normal pod setting were observed. The crossed seeds obtained on the male sterile plants were planted in the next season. The F_1 plants were male fertile indicating recessive gene action for male sterility. The fertile F_1s of different crosses were backcrossed as pollen parents to corresponding fertile parents and through progeny testing two types of populations were identified from the cross. Identified heterozygous progenies were selfed and the obtained progenies were crossed with male sterile parent. After evaluating the progeny corresponding maintainers (B lines with normal cytoplasm and male sterile nuclear genes) were identified, which had given 100% male sterile progeny. Thus, four different male-sterile lines along with their corresponding maintainer lines were identified. The four male sterile lines developed were found stable at IIHR, Bangalore for sterility in the different seasons (*kharif* and *rabi*) tested for two years.

The morphological characters of four cytoplasmic-genetic male-sterile lines MS-1, MS-2, MS-3 and MS-4 (A-line) and their corresponding maintainers (B-line) developed are given in Table 1. The plant characters like height and spread were observed more in male sterile plants compared to their maintainers probably due to the lack of fruit set in MS lines. Whereas for the other characters studied *viz.*, fruit length, fruit width and 20 fruit weight, due to lack of sufficient pollen availability, male sterile lines had shown less mean values compared to their corresponding maintainer lines. The four male-sterile lines developed were crossed into a common restorer line, PMR 76 during *kharif* 2000. The hybrids developed were evaluated for yield and component characters in the following season along with a check CH-I and have shown significantly higher performance over the check

Table 1. Mean performance of identified male-sterile (A and B) lines for different characters

Line	Cross/ parent	Days to 50% flowe-ring	Fruit length (cm)	Fruit width (cm)	20 fruit weight (g)	Plant height (cm)	Plant spread (cm)
MS-1	Male sterile line (A line)	37	5.50	0.70	22.85	78.30	60.80
	Maintainer (B line)	34	5.65	0.91	32.25	69.15	49.98
MS-2	Male sterile line (A line)	36	3.33	1.03	23.85	80.84	65.50
	Maintainer (B line)	36	4.13	1.06	33.00	58.33	51.65
MS-3	Male sterile line (A line)	43	5.00	0.65	21.50	79.95	66.66
	Maintainer (B line)	43	6.00	0.74	32.50	71.65	65.84
MS-4	Male sterile line (A line)	44	8.93	0.51	20.00	116.60	59.33
	Maintainer (B line)	43	9.20	0.53	21.00	107.50	53.15

for the character fresh fruit yield per plant. Apart from that a hybrid, MS-2 × PMR-76 had shown tolerance to powdery mildew disease, whereas, MS-3 × PMR-76 had shown resistant reaction under field condition. Except MS-4 × PMR-76 all the other hybrids are early in flowering compared to the chilli hybrid, CH-1. The mean performance of MS hybrids for the characters fresh fruit yield per plant (g), dry fruit yield per plant (g) and fruit length (cm) were more than the check (Table 2). As the results are encouraging the four stable CGMS lines identified can be well utilized for the development of high yielding F_1 hybrids in chilli.

Table 2. Mean performance of the four hybrids developed using CGMS lines for different characters along with a check

Cross/ check	Days to 50% flowe-ring	Fresh fruit yield/ pt (g)	Dry fruit yield/ pt (g)	Fruit length (cm)	Fruit width (cm)	Plant height (cm)	Plant spread (cm)
MS1 × PMR76	30.0	195.0	57.3	7.0	0.8	57.5	37.5
MS2 × PMR76	32.5	242.0	54.3	9.5	1.0	70.0	42.5
MS3 × PMR76	36.2	253.5	62.9	9.4	0.9	85.6	68.7
MS4 × PMR76	38.5	185.5	50.0	8.8	1.0	71.2	43.7
CH1 (Check)	36.5	152.0	49.3	6.1	1.1	81.2	45.0
Grand Mean	34.7	205.6	55.7	8.2	1.0	73.1	47.5
CD (P=0.05)	7.9	81.9	12.4	2.5	0.1	9.8	24.9
CD (P=0.01)	13.1	135.5	20.6	4.1	0.2	16.2	41.22
CV%	8.2	14.3	8.0	11.0	5.2	4.8	18.9

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