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Short communication

Evaluation of red and yellow capsicum hybrids for quality attributes in naturally ventilated polyhouse in mid hills of western himalayas

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Bell pepper (*Capsicum annuum* L. var. *grossum* Sendt.), commonly known as sweet pepper or capsicum or Shimla mirch, is native of Mexico. It was introduced in India by the Britishers in the 19th century in Shimla hills. In India, capsicum including chillies is cultivated over an area of 5,50,000 ha with the production and productivity of 51,00,000 tones and 9.27 tonnes/ ha including hot pepper (FAO, 2007). It is commercially grown in Himachal Pradesh, Jammu and Kashmir, Uttrakhand, Arunachal Pradesh and Darjeeling District of West Bengal during summer months and as an autumn crop in Maharashtra, Karnataka, Tamil Nadu and Bihar. In Himachal Pradesh, it is extensively grown as cash crop (June-October) in zone I, zone II and zone III in open environment and covers an area of 2,447 ha with the production of 31,810 tonnes including hot pepper (Anonymous, 2008).

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Information relating to performance of hybrids of bell pepper for quality attributes under protected environment both for green and coloured fruits is meager. In spite of economic importance of the crop in hilly regions under protected conditions, research efforts have not been made to evaluate the existing hybrids of bell pepper for production of green or coloured fruits especially in mid hills of the sub temperate western Himalayas. Therefore, the present study was aimed to asse the performance of red and yellow capsicum hybrids for quality attributes under naturally ventilated polyhouse at the Experimental Farm of Department of Vegetable Science and Floriculture, CSK Himachal Pradesh Krishi Vishavavidyalaya, Palampur during the year 2007.

The experimental material for the present study comprised of 16 genotypes of capsicum i.e Hybrid-1, Hybrid-2, Hybrid-3**,** Hybrid-4, Hybrid-5, Hybrid-6, Hybrid-7, Hybrid-8, Hybrid-9, Hybrid-10, Hybrid-11, Hybrid-12, Hybrid-13, Hybrid-14, Hybrid-15, Hybrid-16 and two standered. Viz. Bharat (F_1 hybrid check) and California Wonder (OP check). These genotypes were planted in randomized block design in 3 replications in a 24 x 10 m modified naturally ventilated polyhouse having fan pad system. The crop was grown on 20 cm raised bed of 70 cm width. Besides the application of vermicompost @ 5 tonnes per hectare, basal dose of chemical fertilizers were applied as per recommended package of practices (50 kg each of N, P, K per hectare). The fertigation was given once a week by applying liquid fertilizer (19:19:19) after third week of transplanting and was stopped 15 days before final harvest. The nursery was sown on 2nd February, 2007 and seedlings were transplanted on 9th April, 2007. Twelve plants of each genotype were planted at inter row distance of 45 cm and intra plant distance of 30 cm Irrigation was applied through drip twice a week. The crop was trained on 4 stems through nylon twines by retaining one flower and

Table 1: Performance of capsicum hybrids for various quality attributes

Genotypes/ Traits	Ascorbic acid (mg/100 g)	Capsaicin content (%)	Colouring matter (ASTA Units)	Total carotenoids content (mg/100 g)	Pericarp thickness (mm)
Hybrid-1	118.74	0.087	98.70	--	4.63
Hybrid-2	101.63	0.093	--	2.15	6.11
Hybrid-3	118.62	0.076	104.10	--	5.73
Hybrid-4	107.27	0.086	97.80	--	6.03
Hybrid-5	119.93	0.065	101.66	--	6.46
Hybrid-6	104.92	0.112	88.46	--	6.10
Hybrid-7	118.78	0.110	116.30	--	6.18
Hybrid-8	117.23	0.062	94.76	--	6.31
Hybrid-9	106.55	0.087	108.93	--	6.36
Hybrid-10	117.38	0.108	--	2.76	6.28
Hybrid-11	114.96	0.056	--	2.90	6.15
Hybrid- 12	107.00	0.068	--	2.50	6.15
Hybrid-13	109.02	0.086	101.60	--	5.91
Hybrid-14	107.85	0.071	--	4.26	6.08
Hybrid-15	107.89	0.075	111.73	--	6.10
Hybrid-16	105.10	0.086	102.80	--	6.60
Bharat (Hybrid check)	113.59	0.088	104.86	--	5.78
California Wonder (OP check)	122.33	0.084	105.83	--	6.05
SE (d)	1.790	0.003	--	--	0.236
CD (0.05)	3.638	0.007	--	--	0.480
CV (%)	1.954	5.472	--	--	4.776

two leaves per node. The observations were recorded on 5 competitive plants in each entry and the observations were recorded on various horticultural and quality traits. The observations were recorded on various quality traits such as ascorbic acid content (mg/100 g)**,** capsaicin content (%), colouring matter (red ripe stage), pericarp thickness (mm) and total carotenoids content (mg /100 g) (yellow ripe stage). The pericarp thickness was measured with the help of vernier caliper and mean values were calculated. Ascorbic acid content was estimated at marketable green fruit stage by '2, 6- dichlorophenol-indophenol Visual Titration Method' as described by Ranganna (1979). The capsaicin content in the marketable green fruits was determined by Colorimetric method using Folin – Ciocalteau reagent described by Bajaj (1980). The capsaicin concentration in different samples was noted from the standard capsaicin curve and finally the results were converted into percentage. Colouring matter at red ripe stage was determined as per procedure given by A.O.A.C. (1980). Total carotenoids content in yellow coloured capsicum genotypes was determined as per procedure given by Mahadevan and Sridhar, 1986.

Pericarp thickness was highest in Hybrid-16 (6.60 mm) followed by Hybrid-5 (6.46 mm) and Hybrid-9 (6.36 mm) (Table 1). Minimum pericarp thickness was observed in Hybrid-1 (4.63 mm) followed by Hybrid-3 (5.73) and Hybrid-13 (5.91).Fourteen hybrids were at par with this OP check (California wonder) with respect to pericarp thickness. Whereas 5 hybrids *viz.*, Hybrid-16, Hybrid-5, Hybrid-9, Hybrid-8 and Hybrid-10 were superior to Bharat Hybrid (standard check). Bell pepper fruits with thicker pericarp not only withstand long distance transportation, but also have invariably longer shelf life. Hybrids16,5 and 9 offer promise for long distance transportation. Valsikova and Belko, (2004) have also observed significant variation for flesh thickness among capsicum genotypes.

California Wonder (OP check) had the maximum ascorbic acid content (122.33 mg/100 g) followed by Hybrid-5 (119.93 mg/100 g) and Hybrid-7 (118.78 mg/100 g) while, Hybrid-2 had the minimum ascorbic acid content (101.63 mg/100 g) followed by Hybrid-6 (104.92 mg/100 g) and Hybrid-16 (105.10 mg/100 g). Ascorbic acid content ranged from 101.63 mg/100 g to 122.33 mg/100 g with an overall mean of 112.15 mg/

100 g (Table 1). Perusal of data (Table 1) revealed that over allmean for capsaicin was 0.083% with a range of 0.056% to 0.112%.Where 7 hybrids had significantly lower capsaicin content than both the checks i.e. Bharat (hybrid check) and California Wonder (OP check). These findings are also in close conformity with Valsikova and Belko, *(*2004).

Among red coloured genotypes, Hybrid-7 had maximum colouring matter (116.30 ASTA units) followed by Hybrid-15 (111.73 ASTA units) and Hybrid-9 (108.93 ASTA units) whereas Hybrid-6 (88.46 ASTA units) had minimum amount of colouring matter followed by Hybrid-8 (94.76 ASTA units) and Hybrid-4 (97.80 ASTA units). The standard checks Bharat and California Wonder had 104.86 ASTA units and 105.83 ASTA units respectively. Among the yellow coloured genotypes, Hybrid-14 (4.26 mg/100 g) had maximum total carotenoids content followed by Hybrid-11 (2.90 mg/ 100 g), whereas Hybrid-1 (2.15 mg/100 g) had lowest total carotenoids content followed by Hybrid-12 (2.50 mg/100 g).

From the present study, it may be concluded that Hybrid-5and Hybrid-7 are the most promising for quality traits as these contain higher values for ascorbic acid, colouring matter and pericarp thickness.

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