

Varietal evaluation of chilli in the saline belt of West Bengal

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ABSTRACT

Ten number of chilli cultivars were evaluated on the basis of their vegetative growth, flowering behaviour, fruit yield and quality in the saline belt for consecutive two years during 2008-10. The experiment was designed in Randomised Block Design with 10 treatments and 3 replications. Seedlings were spaced at 60 x 45 cm and grown with recommended cultural practices for saline belt of West Bengal. Result showed that in this agro-climatic situation, cv. Beladanga performed the best than others in both the years in relation to most of the characters like highest number of flowers and fruits per plant and highest projected yield of green and dry chilli. Regarding qualitative parameters, maximum capsaicin and ascorbic acid content in the fruit was also obtained in this cultivar. The cultivation of cv. Beladanga in this agroclimatic condition was also found most economical considering the Benefit: Cost ratio (4.03).

Keywords: Chilli, cultivar, quality, saline belt, yield

Chilli (*Capsicum annuum* L.) is an important cash crop, grown extensively in different parts of India. The crop is exploited commercially in the Gangetic alluvial plains of West Bengal especially in the summer months and as an autumn crop extending up to winter months. Sarkar *et al.* (2009) found a significant variations among 49 genotype of Chilli regarding 12 growth and fruit characters in West Bengal condition. Chilli is an important crop in the saline belt of West Bengal particularly. This coastal area includes the district of South 24 – Parganas and Purba Medinipur. The fruits are, therefore, available in the market throughout the year. Recent trend in vegetable cultivation is by using improved or hybrid cultivars to get more yield and/or quality. But insufficient availability of seed of the improved or hybrid varieties is an important constraint of cultivation. However, different well-known local cultivars are grown by the farmers of these areas, but their yield potentiality under the saline condition is unknown to us. However, Chilli varieties of Bapatla, Andhra Pradesh were found to be salt tolerant and withstood the salinity upto 8 EC (Kameswari and Prasad, 2005). Systematic evaluation of available local cultivars is therefore, necessary to identify the suitable cultivar for this region.

MATERIALS AND METHODS

The present investigation was carried out in consecutive two years during 2008-2010 at open cultivable farmers' field at Dakshin Paikbar mouza under Deshapran Block (Contai II) in the Disrtict of Purba Medinipur, West Bengal. The experimental site was located at 21° 47'N latitude and 87° 45'E longitude

and at an altitude of 12.80 m. from the mean sea level. It was situated under sub tropical humid region beside the Bay of Bengal in saline belt. The climate of the experimental site was warm and humid. During investigation period average temperature ranged from 13°C to 33.5°C and average total annual rainfall was about 1434.22 mm. Relative humidity ranged from 38% to 96%. The soil was sandy loam with good water holding capacity and medium soil fertility. The field trials for all the experiments were conducted in Randomized Block Design with 3 replications. The seedlings of 10 cultivars (T₁: Beladanga, T₂ : Bulet, T₃: Contai Black, T₄: Ratnamoni, T₅: Haringhata, T₆: Tara Sundari, T₇: Kajalpati, T₈: Singara, T₉: Jabakusum, T₁₀: Jhanti) were planted in plot measuring 4.5 x 1.5 m with spacing of 60 x 45 cm. Recommended crop management practices and plant protection measures were taken time to time. Ten randomly selected plants from each replication were taken to record the data on vegetative growth characters, flowering and fruit set and yield of the crop. For qualitative analysis matured green and ripe fruits were taken from those plants for ascorbic acid and capsaicin content respectively. The data were analysed statistically as per Fisher's Analysis of Variance Technique as described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Plant height

The mean result over two years shows that (Table 1) cv. Beladanga attained the highest plant height (58.0cm) and on the other hand the lowest plant height was observed in cv. Kajalpati (46.25cm). The variation of plant height of different varieties might be due to interaction between environment and soil. Abdullah *et*

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al. (2003), Bhagyalakshmi et al. (1990), Sreelathakumary and Rajamony (2004) also recorded the variation of plant height among the cultivars in their experiment in saline belt.

On an average, the maximum number of primary branches per plant (3.02) was found in cv. Beladanga, whereas, the minimum value (2.50) was recorded in Haringhata (Table 1). The number of secondary branches per plant varied markedly in both years of experiment and the trend was almost similar to the number of primary branches per plant. However, the

average maximum number of secondary branches per plant (6.62) was found also in Beladanga and lowest in Tara Sundari (5.92). Hence, Beladanga showed an overall encouraging performance in the saline soil on vegetative growth of the plant. Kameswari et al. (2005) reported that at Bapatla in the State of Andhra Pradesh, India, LCA-235 variety was found best in term of vegetative growth in saline soil followed by LCA-64; but variety LCA-234 was found very susceptible to saline soil.

From the average result of both the years, the

Table 1: Growth and Flowering behaviours of chilli cultivars in saline belt of West Bengal

Treatment	Plant height (cm)	No. of primary branches plant ⁻¹	No. of secondary branches plant ⁻¹	Days required to first flower	No. of flowers plant ⁻¹
T ₁	58.00	3.02	6.62	46.00	250.00
T ₂	51.50	2.96	6.38	48.00	180.66
T ₃	52.25	2.98	6.38	52.50	171.00
T ₄	49.75	2.56	5.98	44.00	184.33
T ₅	57.00	2.50	6.16	45.50	181.00
T ₆	55.00	2.56	5.92	49.00	161.66
T ₇	46.25	2.76	6.22	43.00	189.33
T ₈	53.00	2.68	6.28	53.00	182.00
T ₉	55.00	2.92	5.94	50.00	209.00
T ₁₀	48.75	2.84	6.44	54.50	141.66
SEM(±)	0.545	0.054	0.081	1.394	5.411
LSD(0.05)	1.620	0.160	0.240	4.14	16.07

Table 2: Fruit and Yield parameters of chilli cultivars under saline belt of West Bengal

Treatment	No. of fruits per plant	Fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Green chilli yield (qha ⁻¹)	Dry chilli yield (qha ⁻¹)
T ₁	185.00	710.00	9.45	3.30	253.50	63.37
T ₂	150.66	501.30	3.30	4.90	227.50	56.87
T ₃	139.00	308.66	8.00	3.15	101.15	25.00
T ₄	155.33	331.00	6.90	2.00	109.00	27.00
T ₅	155.66	273.00	7.80	1.50	90.00	22.10
T ₆	131.66	253.33	6.85	1.90	83.00	20.50
T ₇	156.33	284.33	6.50	2.90	93.00	23.26
T ₈	157.00	241.33	4.70	4.00	79.00	19.50
T ₉	183.00	305.00	5.60	3.15	100.00	25.33
T ₁₀	112.66	230.00	7.50	2.70	75.50	19.00
SEM(±)	2.709	5.003	0.626	0.325	6.653	2.525
LSD(0.05)	8.045	14.860	1.860	0.965	19.760	7.500

Table 3: Quality parameters of fruits of chilli under saline belt of West Bengal

Treatment	Capsaicin(mg g^{-1} dry biomass)	Ascorbic acid (mg 100g^{-1})
T ₁	82.60	180.00
T ₂	81.50	161.00
T ₃	72.80	160.00
T ₄	67.80	165.50
T ₅	72.00	168.60
T ₆	74.66	175.60
T ₇	76.82	162.80
T ₈	79.00	166.40
T ₉	76.44	179.60
T ₁₀	65.80	150.60
SEM(±)	1.151	0.711
LSD(0.05)	3.420	2.110

earliness to produce first flower was observed (Table 1) in Kajalpati (43.00 days) and delaying of the same was noted in Jhanti (54.50). Flowering is generally controlled by the genotype of the plant and might be due to effect of soil and environment. Gogoi and Gautam (1999) in their experiment recorded the number of days to first flowering was lowest in cv. Soalkuchi.

The highest number of flowers per plant was recorded in (Table 1) the var. Beladanga (250.00), which significantly differed from other varieties (161.66-209.00). The lowest number of flowers per plant was found in var. Jhanti (141.66). The second best flower producing variety identified in this experiment was Jabakusum (209.00).

It is clear from the data of both the years (Table 2), the number of fruits per plant varied markedly among different varieties. In the first year it ranged from 114.66 (Jhanti) to 190.50 (Jabakusum). The second best variety in this regard was Beladanga (180.00), which was *at par* with Bulet, Ratnamoni, Haringhata and Kajalpati. Whereas, in second year, the highest yield was obtained from Beladanga (190.00) and the lowest number of fruit was found with same cultivar (Jhanti) and there is no significant difference among Haringhata and Kajalpati. The average results over the years showed a good result with Beladanga (185.00) and the worst performance was recorded in Jhanti (112.66). Beladanga produced 76.47% more number of flowers and 64.21% fruits respectively per plant as compared to cv Jhanti. Mohanty (2003) evaluated eight chilli cultivars during *kharif* and reported X-235 to be the most superior cultivar, recording a green fruit yield of 144.36 q ha^{-1} and the highest number of fruits per plant (233.97).

The comparative study over the years showed that (Table 2) weight of fruit per plant was significantly different. The maximum fruit weight was recorded in Beladanga (710.00 g) in both the years and lowest yield was observed in Jhanti (230.00g), while there was significant difference in the weight of fruit among the cultivars. However, variety Beladanga showed markedly increase (41.71-208%) on yield per plant over other varieties and same trend was found during investigation in the couple of years (2008-09 & 2009-10). Singh *et al.* (2004) recorded the greatest fruit weight per plant in AC 542 (614 g), followed by AC 517 (575.7 g) and AC 465 (562.7 g), Which was 16.9, 150.3 and 144.7% higher over that of the control JCA 283.

Comparative study over the years revealed that the fruit length of different cultivars was somehow higher in the second year and fruit length (9.45cm) was recorded the highest in Beladanga followed by Contai Black (8.00 cm), whereas lowest fruit length (3.30 cm) was found in cv. Bulet as expected (Table 2). Rani (2001) also observed variation in fruit length among different cultivars in his experiment.

The maximum girth of fruit (4.80 cm) was recorded in the first year in Bulet and the minimum (1.40cm) in Haringhata. However, the result of cv. Beladanga, Contai Black, Singara and Jabakusum were statistically *at par*. Similar trend was also observed in the second year (Table 2).

The projected fruit yield of fresh as well as dry chilli per ha (Table 2) was obtained maximum with Beladanga variety (Fresh chilli 253.50 and dry chilli 63.37 q ha^{-1}) over other cultivars and *at par* with Bulet (fresh chilli 227.50 and dry chilli 56.87 q ha^{-1}). The lowest yield in

the above mentioned parameters was recorded in Jhanti (75.50 q ha⁻¹ and 19.00 q ha⁻¹ respectively) followed by Singara. However, Beladanga performed well and 11.45-237.33% and 11.42-233.52% increased yield on fresh and dry chilli respectively over other varieties were obtained. The reason behind increased yield might be due to more no. of fruits per plant and the weight of fruit. According to Rani (1996) at Bangalore situation in Karnataka, Kalyanpur variety was found superior in comparison to Pusa Jwala on yield.

Fruit samples were collected when the fruits started ripening and were analysed to study the capsaicin content and ascorbic acid in the fruit of the above mentioned cultivars. The content of capsaicin in fruits varied significantly among the cultivars. Maximum was found in var. Beladanga (82.60 mg g⁻¹ dry biomass) followed by Bulet (81.50 mg g⁻¹ dry biomass), whereas, fruit having least capsaicin was Jhanti (65.80 mg g⁻¹ dry biomass). Gomez and Canessa (1988) evaluated twelve chilli cultivars and reported that the highest capsaicin content of dry fruit was 80.52 mg g⁻¹ (Table 3). Capsaicin content was inversely related to fruit diameter, length, and thickness.

Ascorbic acid content

Ascorbic acid content in Beladanga (180.0 mg 100g⁻¹) was recorded the highest and lowest was in Jhanti (150.6 100g⁻¹) in chilli (Table 3). According to Mac Gollivray (1953) the fruit containing ascorbic acid of 175mg 100g⁻¹ of green chilli is ideal for high quality fruit. From this point of view cv. Beladanga is considered a good variety.

The present investigation with an objective to identify the suitable varieties of chilli in terms of fruit yield and quality in the saline belt by considering the agro-climatic situation and soil, it has been found that cv. Beladanga performed the best in the direction of its superiority on above mentioned parameters over others varieties. The second best variety namely Bulet may also be considered for cultivation in this belt during rabi season for higher production, whereas cv.Jhanti and Singara were found unsuitable. The reason might be that variety of Beladanga and Bulet are adapted better in the microclimate as well as soil of saline belt, but Jhanti and Singara could not suit well.

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