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Manifestation of heterosis for earliness, fruit yield, yield attributing characters. in sweet pepper

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Abstract
The field experiments were carried out at Central Research Farm, Gayeshpur, B.C.K.V, West Bengal during autumn-winter season of 2017-18 under side ventilated low cost poly house to evaluate Seven diverse Inbred lines (variety and breeding lines) of sweet pepper and their five F1 hybrids for characterization through various morphological, growth, yield and quality characters and for identification of best cross combination through analysis of heterosis for different characters. From the study, Mean sum of squares clearly suggested significant difference of the genotypes (parental genotypes and hybrids) for all the 18 characters excepting total chlorophyll content of fruit at matured green stage even at 1% level of significance which clearly endorsed the presence of wide genetic variability for the character concerned both among the parental genotypes and resultant hybrids. All the hybrids manifested negative heterosis over mid-parental value for days to 1st flowering. Four hybrids registered marked positive heterosis ranging between 28.91 and 46.50% over mid parent and between 2.99 to 38.67% over better parent for fruit yield per plant. Highest yielding hybrid, Baby Bell x C/4 did not register highest heterosis over neither mid-parent nor the better parent which suggested that both per se performance and manifestation of heterosis should be considered for the selection of promising hybrids. Two hybrids, Baby Bell x Ayesha and 8/4 x Royal Wonder manifested marked positive heterosis over the mid-parental value in case total chlorophyll content. Most of the hybrids registered marked positive heterosis in total sugar content ranging from 9.04 to 55.33 % over mid parental value and from 7.02 to 64.65 % over better parent. All the hybrids had fruits with higher reducing sugar content compared to the parental genotypes indicating dominance for the conditioning of this character. Three hybrids registered positive heterosis over mid-parent however, none manifested positive heterosis over the better parent in the case of Ascorbic acid content of fruit.

Keywords: Inbred lines, hybrids, variety, heterosis, yield, sweet pepper

Introduction
Sweet pepper or Bell pepper (*Capsicum annuum* L.) under the family Solanaceae is an important vegetable crop, grown worldwide for its delicate taste, pleasant flavour and colour. With their beautifully shaped form and vividly coloured exterior of diverse colours, bell or sweet peppers have been called "the Christmas ornaments of the vegetable world," to which is added a crunchy texture and tangy taste. Building on the diversity in nature, bell peppers reflect the remarkable creativity of human beings, both in the development of numerous cultivars and hybrids and in the diverse dishes in which they are used. The crop was originated in the new world tropics and subtropics and introduced in India by the Britishers in nineteenth century in Shimla and Nilgiri hills. The crop is now widely cultivated in different states of India including West Bengal as autumn-winter crop in the plains and summer crop in the hill condition. Sweet pepper cultivation is very popular in Peri-Urban production systems because of easy access to urban markets. It is basically a cool season crop and day temperatures less than 30 °C is favorable for growth and yield.

The genus Capsicum has 5 domesticated, 10 semi domesticated and 20 wild taxa (Andrews 1984, McLeod *et al*. 1982, Pickersgill 1971). Botanically, there is no difference between hot peppers and sweet peppers (bell peppers): both are derived from species of *Capsicum*, plants in the Solanaceae or tomato family. The bell pepper is the only member of the *Capsicum* genus that does not produce capsaicin (C18H27NO3), a lipophilic chemical that can cause a strong burning sensation when it comes in contact with mucous membranes. The absence of capsaicin in sweet peppers is due to a recessive form of a gene that eliminates capsaicin and, consequently, the “hot” taste usually associated with the rest of the *Capsicum* genus.

There is need of strengthening germplasm collection, maintaining, documenting, conservation and screening for breeding and develop new cultivars, development of bell pepper hybrids capable of forming fruits in hotter months. Emphasis should be given to develop hybrids with

indeterminate growth habit, because, Indian farmers do not like to have uniform maturity of bell pepper due to market fluctuation. Sequential or multiple harvesting can be possible only with indeterminate plants. Being a cool-season crop, tropicalization is necessary so that, its availability can be ensured easily in non-traditional areas. There is strong need to build up stability/adaptability. Seed production techniques for F_1 hybrids have to be standardized. Possibility of using genetic or cytoplasmic-genetic male sterility with marker genes should be explored. Germplasm should be strengthened by introducing heat and drought tolerance cultivars as a strategy for climate change. It is a versatile crop plant and its consumption is on the increase all over the world. Market and consumption of sweet peppers still growing due mainly to pepper fruits nutritional value (Kim *et al*., 2014). Hence, nutritional quality of the hybrids should be considered during development of hybrids in sweet pepper.

Heterosis is defined as the superiority of the F1 hybrid over both its parents in terms of yield and other characters (Singh, 1999). It has been widely used in agriculture to increase yield and to broaden adaptability of hybrid varieties and applied to increasing number of crop species (Meyer *et al*., 2004). If the hybrid is superior to the mid-parent (average to two parents), it is called as heterosis. However, the term heterosis describes increased size and yield in crossbred as compared to the corresponding inbred lines; if there is no increase in yield and other characters, there is no heterosis (Shull, 1948). Heterobeltiosis expresses the betterment over the better parent; likewise, standard heterosis expresses the heterosis over the standard varieties. Superiority of F1 over mid-parent is not so important in practical breeding since it does not offer any advantages over better parents. Extensive work on heterosis breeding in vegetable crops has been carried out and tremendous improvement has been made on its exploitation over the past several years (Kallo, 1988). Sood and Kumar (2010) [9] had also reported high heterosis for most of the characters in sweet pepper. Likewise, heterotic effects in hot peppers were reported for important traits (Om and Pyo, 1981). However, limited information is available at heterosis breeding in sweet pepper. In most of the cases, better parent of the hybrid may be to commercial varieties. Therefore, the present study was undertaken to select the suitable parental combinations with better heterotic response on fruit yield and other characters for commercial hybrid production in sweet pepper.

Materials and Method

The field experiments were carried out at Central Research Farm, Gayeshpur, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal during autumn-winter season. Topographic situation of the experimental site comes under Gangetic new alluvial plains of West Bengal with sandy loam soil. Seven diverse Inbred lines (variety and breeding lines) of sweet pepper viz,, Baby Bell, 8/4, C/4, C/4(Yellow), Ayesha, Arya, and Royal Wonder maintained at the Department of Vegetable crops, Bidhan Chandra Krishi Viswavidyalaya constituted the parental genotypes for the study. The following five hybrids were developed by crossing diverse parental genotypes following conventional hybridization method viz. Royal Wonder x Arya (Medium sized fruit, red x medium sized fruit, yellowish Red), Royal Wonder x Ayesha (Medium sized fruit, red x very Big fruit, red), Baby Bell x Ayesha (Small fruit, Red x Very big sized fruit, Red), Baby Bell x C/4 (Small fruit, Red x Very big sized fruit, Red), 8/4 x Royal Wonder (Medium sized fruit, Orange-red x Medium sized fruit, Red).

The 12 genotypes (7 parental genotypes and 5 hybrids) were evaluated (transplanting in mid to end of the October) underside ventilated low cost poly house. The genotypes were grown in randomized block design with 3 replications keeping 10 plants in each replication in 60 x 60 spacing in both ways to study the manifestation of different characters in them. Five random plants per replication in each genotype were selected for recording the data on different characters. The seeds of all the genotypes, were sown on 25th September, 2017 in raised bed nursery. The seedlings were transplanted in the main field on 30 October, 2017.

In each genotype, 5 selected plants per replication were selected to record different vegetative growth and flowering characters- Plant height, Number of primary branches in the main stem per plant Leaves per plant, Leaf area (cm2), Days to first flowering, Total fruits per plant.

Two fruits per genotype per replication were taken from the periodical harvest at full Maturity stage with the development of specific colour in the fruits from the randomly selected plants per replication for recording the following observations- Fruit weight (g), Fruit length (cm), Fruit breadth (cm), Pericarp thickness (cm), Total seeds per fruit, Test weight of seed, Fruit yield per plant (g).

Three randomly selected immature fruit at green stage before turning to particular colour were harvested to make a composite sample for estimation of total chlorophyll content of the fruit. The other proximate compositions of the fruits were estimated from the replication-wise composite samples in both matured green and respective coloured stage using standard methods. The observations were- Total chlorophyll contents of immature fruits (mg/100g fresh pulp), Total sugar content (%), Reducing sugar content (%), β-carotene content (mg/100g fresh pulp), Ascorbic acid content (mg/100g fresh pulp).

The collected data were statistically analyzed. Mean values of each entry in each replication for all the traits were subjected to statistical analysis by using MS Office Excel software. For analysis of variance, Data were analyzed by the methods out lined by Panse and Sukhatme (1967) using the mean values of random plants in each replication from all treatments to find out the significance of treatment effect. The significance was tested by referring to the values of F table (Fisher and Yates, 1967).

For 18 different characters, heterosis and heterobeltiosis of 5 F1 hybrids were analyzed using the procedure given by Turner (1953) and Fonesca and Patterson (1968). Heterosis was estimated by (F1 -MP) × 100/MP and heterobeltiosis by (F1 -BP) × 100/BP, where MP = Mid Parent, BP = Best Parent/Higher Parent.

Results and Discussions

Analysis of variance for genotypes i.e. parental lines and crosses showed highly significant differences for most of the characters studied (Table 1). 7 parental genotypes and their 5 F1 hybrids were evaluated for 18 characters to determine the manifestation of heterosis over mid parent and better parent. The estimates of heterosis expressed in percentage increase or decrease for the concerned quantitative character over mid parent and better parental value have been presented in Table 2, 3, 4, 5, 6 and discussed character wise.

Table 1: Analysis of variance for Plant growth, flowering, fruit, seed and fruit quality characters of the parental lines and hybrids of sweet pepper

Character	Mean sum of squares		
	Genotypes	Replication	Error
Plant height(cm)	452.89**	58.40	12.36
Leaf no/plant	1333.27**	18.28	15.06
primary branches per plant	5.91**	0.71	0.09
Average leaf area(sq. cm)	574.45**	19.27	3.79
Days to 1st flowering	42.44**	0.34	5.78
Fruit weight(g)	3630.03**	48.36	31.38
Number of fruits/plant	26.54**	0.28	1.15
Fruit length(cm)	16.96**	0.35	0.27
Fruit width(cm)	3.89**	0.194	0.187
Fruit yield/plant(g)	258633.39**	4023.63	1520.34
Pericarp thickness(mm)	2.83**	0.03	0.09
Average no of seeds/fruit	2774.50**	8.53	66.41
100 seed weight(mg)	1.82**	0.05	0.12
Total chlorophyll content at mature green stage(mg/100g)	11.66	0.10	5.80
Total sugar content (%)	0.77**	0.04	0.05
Reducing sugar (%)	1.58**	0.07	0.02
Ascorbic acid content at mature green stage(mg/100g)	252.92**	27.12	24.48
β-carotene content at coloured stage(mg/100g)	0.35**	0.04	0.01

Test the significance
*significant at 5%; **significant at 1%

Vegetative growth, flowering and fruit characters

Plant height

Plant height ranged between 52.64 cm in Royal Wonder x Arya and 63.70 cm in Baby Bell x C/4. All the parental genotypes were determinate in growth habit and quite naturally, all the hybrids showed determinate growth habit. All the hybrids excepting 8/4 x Royal Wonder manifested positive heterosis ranging from 7.84 to 18.24 % over mid parent and only 3 hybrids manifested positive heterosis ranging from 3.38 to 16.18 % over better parent. Heterosis for plant height over mid parent was also reported earlier by Reddy and Rao (2017). Growth habit and plant height of the parental genotypes and hybrids in the present investigation suggested to have been under the control of additive genetic variance.

Number of primary branch / plant

Number of primary branches per plant ranged between 3.91 in Baby Bell x Ayesha and 5.86 in Baby Bell x C/4. Average number of primary branches per plant in the hybrids was lesser than the parental mean which indicated that partial dominance of lower branch number played important role for the expression of this character. Only one hybrid Royal Wonder x Ayesha manifested marked positive heterosis of 22.51% over mid parent. Four hybrids showed marked negative heterosis ranging between -11.10 to -54.76% over better parent.

Leaves per plant

Leaves per plant ranged very widely between 43.67 in 8/4 x Royal Wonder and 82.75 in Baby Bell x C/4. Average number of leaves per plant in the hybrids was lesser than the parental mean which also indicated that partial dominance of lower leaf number per plant played important role for the expression of this character. Only one hybrid Royal Wonder x Ayesha manifested marked positive heterosis of 53.42 % over mid parent and 25.51% over better parent. Most of the hybrids showed marked negative heterosis both over mid-parent and better parent for this character.

Table 2: Manifestation of heterosis (%) over Mid Parent (MP) and Better Parent (BP) for plant height, leaf no and primary branches per plant

Cross Combination	Plant Height		Leaf no/plant		Primary branches/plant	
	MP	BP	MP	BP	MP	BP
RW x Arya	18.24	16.18	0.16	-4.92	-3.45	-11.10
RW x Ayesha	12.01	-3.59	53.42	25.51	22.51	1.13
BB X Ayesha	7.84	3.38	-3.44	-36.78	-33.43	-54.76
BB x C/4	10.72	7.17	-12.63	-32.05	-10.71	-32.254
8/4 X RW	-16.42	-37.98	- 37.10	-45.66	-20.91	-26.26

Leaf area (cm^2)

Average leaf area was expressed in cm^2 ranged between 26.61 cm^2 in Baby Bell x Ayesha and 45.47 cm^2 in 8/4 x Royal Wonder. Only one hybrid Royal Wonder x Ayesha manifested marked positive heterosis of 39.45 % over mid parent and 33.49% over better parent. Average leaf area in the hybrids was slightly lesser than the parental mean. Expression of leaf area indicated that partial dominance of lower leaf number per plant played important role for the expression of this character.

Days to first flowering

Days to first flowering ranged between 51.43 in Baby Bell x Ayesha and 57.73 in Royal Wonder x Arya. Average number of days to flowering in the hybrids was slightly lesser than the parental mean which indicated partial dominance of early flowering character. All the hybrids manifested negative heterosis over mid-parental value which suggested the possibility of developing earliness in the hybrids.

Fruit, seed characters and fruit yield

Fruit weight (g)

Average fruit weight ranged between 85.12g in Baby Bell x Ayesha and 137.48 g in Royal Wonder x Arya. In all the hybrids excepting one (Royal Wonder x Arya), average fruit weight was slightly lesser than the mid-parental value indicating additive gene action for the control of this character. The hybrid, Royal Wonder x Arya manifested 43.91 % and 30.49 % positive heterosis over the mid-parental value and better-parental value respectively.

Table 3: Manifestation of heterosis (%) over Mid Parent (MP) and Better Parent (BP) for leaf area, days to 1st flowering and fruit weight

Cross Combination	Leaf area		Days to 1st flowering		Fruit weight	
	MP	BP	MP	BP	MP	BP
RW x Arya	-9.08	-23.71	-4.29	-5.18	43.91	30.49
RW x Ayesha	39.45	33.49	-11.46	-12.82	5.43	-22.58
BB X Ayesha	2.01	-10.66	-6.67	-1.63	-2.70	-36.21
BB x C/4	-11.16	-46.32	-2.54	6.78	-1.23	127.38
8/4 X RW	-31.93	-28.40	-3.27	0.87	-6.61	-14.93

Fruit number per plant

Fruit number per plant ranged between 7.13 in Royal Wonder x Arya and 10.33 in Baby Bell x C/4. Average number of fruits per plant in the hybrids was slightly lesser than the parental mean Fruit bearing propensity in the hybrids clearly indicated additive genetic variance with some inclination towards low-fruitedness for the control of this character. Only one hybrid, Royal Wonder x Ayesha manifested marked positive heterosis of 29.08% over mid-parent for this character. Mid-parent heterosis for this character has also been reported earlier (Rao and Reddy, 2017).

Fruit length (cm)

Fruit length ranged between 6.05 cm in Baby Bell x C/4 and 7.25 cm in Royal Wonder x Ayesha among the hybrids. Mean fruit length in the hybrids was lesser than that of the mid-parental value and better parent. All the hybrids manifested negative heterosis ranging from – 10.09% to -29.21 % and from -12.71 % and -44.98 % over mid and better parent, respectively. However, heterobeltiosis for this character has also been recorded earlier (Mahmoud and El-Eslamboly, 2015) which clearly indicated the importance of specific cross combination for the expression of heterosis for the concerned character.

Fruit width (cm):

Maximum breadth of the sampled fruits were measured periodically and then averaged which ranged between 5.09 cm in Baby Bell x C/4 and 5.63 cm in Royal Wonder x Ayesha. Mean fruit width in the hybrids was lesser than that of the mid-parental value and better parent. All the hybrids manifested negative heterosis ranging from – 1.73% to -15.59% and from -2.46% and -26.59% over mid and better parent, respectively. However, heterobeltiosis for this character has also been recorded earlier (Yadahalli *et al*, 2017) which further indicated the importance of specific cross combination for the expression of heterosis for the concerned character.

Table 4: Manifestation of heterosis (%) over Mid Parent (MP) and Better Parent (BP) for fruit number, fruit length and width

Cross Combination	Fruit number per plant		Fruit length		Fruit width	
	MP	BP	MP	BP	MP	BP
RW x Arya	-8.93	-15.2	-11.01	-12.71	-1.73	-5.88
RW x Ayesha	29.08	4.09	-12.43	-19.35	-15.59	-26.59
BB X Ayesha	-5.16	-37.9	-10.09	-31.19	-14.68	-17.53
BB x C/4	-5.62	-28.3	-12.65	-33.37	-4.57	-16.55
8/4 X RW	-6.61	-14.93	-29.21	-44.98	-3.59	-2.46

Pericarp thickness (cm)

The sampled fruits per replication were cut into two halves to measure the pericarp thickness with the help of digital slide callipers which ranged between between 3.62 mm in Baby Bell x Ayasha and 5.52 mm in Royal Wonder x Arya among the hybrids. Mean pericarp thickness in the fruits of the hybrids was lesser than that of the mid-parental value and better parent. All the hybrids manifested negative heterosis ranging from – 8.15 % to -17.42 % and from -7.12 % and -35.39 % over mid and better parent, respectively.

Average seed number per fruit

Total number of seeds were scraped gently from the cut halves of the completely ripe fruits which has become slightly flaccid in nature and then averaged which ranged between 55.27 in 8/4 x Royal Wonder and 111.53 in Baby Bell x Ayesha. Average seed number in the fruits of the hybrids was higher than the parental mean which indicated better fertilization and seed development in the hybrids compared to the parental inbreds. All the hybrids registered marked positive heterosis ranging from 33.14 to 118.41 % over mid parental value and 4 hybrids manifested marked positive ranging from 5.42 to 71.72 % over better parent.

100 seed weight (mg)

100-seed weight ranged between 8.05 mg in Baby Bell x Ayesha and 9.27 mg in Baby Bell x C/4 among the hybrids. On an average, seed weight in the hybrids showed slightly decreasing trend compared to that of the parental genotypes which might have happened due to much higher number of seeds in the fruits. Three hybrids registered low range of negative heterosis (-3.06 to -11.81 %) and four hybrids registered low range of negative heterosis (-4.84 to -12.76 %) over mid-parent and better parent respectively, for this character. The hybrid, Baby Bell x C/4 registered positive heterosis over both mid-parent and better parent, respectively for this character.

Fruit yield per plant (g)

Total fruit weight in periodical harvest from the selected plants per replication was recorded and then averaged which ranged between 625.21 g in 8/4 x Royal Wonder and 953 g in Baby Bell x C/4. Fruit yield in the hybrids suggested manifestation of dominance and over-dominance for the conditioning of this character. Four hybrids registered marked positive heterosis ranging between 28.91 and 46.50 per cent

over mid parent and between 2.99 to 38.67 per cent over better parent for fruit yield per plant. Highest yielding hybrid, Baby Bell x C/4 did not register highest heterosis over neither mid-parent nor the better parent which suggested that both per se performance and manifestation of heterosis should be considered for the selection of promising hybrids. This result agreed well to the earlier reports of Kohli and Chatterjee (2001), Ibrahim *et al* (2001), Sweta Rani (2003), Kumari (2008) and Sharma *et al*. (2010) [7].

Table 5: Manifestation of heterosis (%) over Mid Parent (MP) and Better Parent (BP) for fruit yield, pericarp thickness, avg. no. of seeds, 100 seed weight

Cross Combination	Fruit yield per plant		Pericarp thickness		Average no of seeds per plant		100 seed weight	
	MP	BP	MP	BP	MP	BP	MP	BP
RW x Arya	28.91	2.99	-8.15	-7.12	62.46	-0.24	1.05	-12.76
RW x Ayesha	46.51	38.67	-12.23	-14.47	118.41	52.25	-8.91	-6.36
BB X Ayesha	33.96	32.42	-16.12	-35.39	77.74	71.72	-11.81	-4.84
BB x C/4	38.50	15.19	-13.83	-27.68	51.75	72.46	8.31	8.82
8/4 X RW	-11.78	-33.16	-17.42	-17.52	33.14	5.42	-3.06	-6.14

Fruit quality characters

Total chlorophyll content (mg/100g fresh pulp)

Total chlorophyll content in the fruits of matured green stage ranged between 10.15 mg/100g fresh pulp in Royal Wonder x Ayesha and 14.54 mg/100g fresh pulp in 8/4 x Royal Wonder. Most of the hybrids manifested negative heterosis over mid-parent (-21.86 to -27.21%) and better parent (-0.81 to -30.71%). Two hybrids, Baby Bell x Ayesha and 8/4 x Royal Wonder manifested marked positive heterosis over the mid-parental value.

Total sugar content (%)

Total sugar content content in the fruits of coloured stage ranged between 2.6 % in Royal Wonder x Arya and 3.48 in 8/4 x Royal Wonder among the hybrids. Most of the hybrids registered marked positive heterosis ranging from 9.04 to 55.33 % over mid parental value and from 7.02 to 64.65 % over better parent.

Reducing sugar content (%)

Reducing sugar content content in the fruits of coloured stage ranged 1.64% in Royal Wonder x Arya and 3.01 in 8/4 x Royal Wonder among the hybrids. All the hybrids had fruits with higher reducing sugar content compared to the parental genotypes indicating dominance for the conditioning of this character. All the hybrids registered high and positive heterosis over both mid and better parent.

Ascorbic acid content (mg/100g fresh pulp) Ascorbic acid content in the fruits ranged between 63.09mg/100g fresh pulp in Baby Bell x Ayesha and 85.37 mg/100g fresh pulp in 8/4 x Royal Wonder. Three hybrids registered positive heterosis over mid-parent however, none manifested positive heterosis over the better parent.

β carotene content (mg/100g fresh pulp)

β carotene content in the fruits of the coloured stage ranged between 0.667 mg/100g fresh pulp in Royal Wonder x Ayesha and 0.707 mg/100g fresh pulp in Baby Bell x Ayesha among the hybrids. None of the hybrids registered positive heterosis over both mid-parent and better parent for this character.

Wide variation could be recorded among the parental genotypes as well as hybrids for most of the characters under study. The results of Table. 2, 3, 4, 5, 6 as discussed in detailed that most of the hybrids manifested positive heterosis over the mid parental values however, ranking of the hybrids based on manifestation of heterosis and per se performance did not match.

Further what is more important is that in respect of days to 1st flowering all the hybrids manifested negative heterosis over mid-parental value which suggested the possibility of developing earliness in the hybrids. The present experiment amply justified the possibility of increasing yield by exploiting heterosis in sweet pepper. The presence of higher heterosis indicated the presence of wider genetic diversity between parental genotypes. Therefore, with increased diversity between parental stocks of genotypes, higher level of heterosis is expected in F1 hybrids.

Table 6: Manifestation of heterosis (%) over Mid Parent (MP) and Better Parent (BP) for different fruit quality characters

Cross Combination	Total chlorophyll		Total sugar		Reducing sugar		Ascorbic acid		Beta carotene	
	MP	BP	MP	BP	MP	BP	MP	BP	MP	BP
RW x Arya	-22.78	-26.55	-6.38	-10.75	39.82	18.79	6.35	-6.29	0.51	-9.24
RW x Ayesha	-27.21	-30.71	9.04	7.029	86.56	69.70	-12.3	-22.4	-1.18	-11.88
BB X Ayesha	11.83	7.82	34.38	26.91	80.87	53.51	-12.7	-18.53	-7.40	-24.54
BB x C/4	-21.86	-26.03	55.33	64.65	105.7	78.20	11.48	-3.07	-23.56	-29.56
8/4 X RW	20.54	-0.81	47.58	33.80	140.46	168.9	9.35	-2.06	-22.23	-28.66

The medium sized (94.41 g fruit weight) and red fruited hybrid, Baby Bell x C/4 emerged as the best (953.81 g fruit yield per plant). The highest yielding and red fruited hybrid Baby Bell x C/4 marginally surpassed the yield of the orange fruited parental genotype, 8/4.

It could be concluded that high fruit yield was manifested in the hybrids mainly through increased fruit number and fruit weight. The present study also showed that plant height, number of fruits per plant, average fruit weight, fruit length, fruit width and sugar content emerged as important characters for developing plants with higher fruit yield and enhanced quality in sweet pepper. The authenticity of utilizing widely divergent genotypes for the development of promising and high yielding hybrids in sweet pepper has found ample support from the present study.

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