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Genetic variability, heritability and genetic advances analysis for quantitative traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] genotypes

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Abstract

Thirty-one genotypes of bottle gourd were evaluated at CCS Haryana Agricultural University, Hisar to find out the genetic variability, heritability and potential for screening suitable genotypes for future improvement programmes. Considerable amount of variability was noticed for various traits. The maximum phenotypic and genotypic coefficient (PCV and GCV) was observed for diameter of fruit (26.06 and 27.10 cm), number of primary branches (24.48 and 27.24), nodes to first male flower (22.77 and 24.87) and weight of 100 seeds (20.12 and 21.25), while moderate values were estimated for number of fruits per vine (19.21 and 20.82), nodes to first female flower (18.58 and 21.48), vine length at the time of final harvest (14.69 and 17.34), fruit yield per vine (14.56 and 15.66) and fruit yield per hectare (15.51 and 16.55). High heritability coupled with high genetic advance as percent of mean was observed for diameter of fruit, length of fruit, nodes to first male flower and weight of 100 seeds indicating that these traits were under the strong influence of additive gene action. Moderate heritability and low genetic advance values were observed for the characters days to first male flower opening, days to first female flower opening, days to first fruit harvest and days to 50% flowering. The promising genotypes giving high fruit yield were GH 30 and GH 32 and early maturing were IC 092414 and GH 34.

Keywords: Bottle gourd, variability, GCV, PCV, heritability and genetic advance

Introduction

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] or white flowered gourd is one of the most important cucurbitaceous crop belongs to the family cucurbitaceae with 2n=2x=22. Appearance of first pistillate flower at lower node is the indication of earliness of the variety. On the other hand, higher the node number for the position of first pistillate flower, the maximum would be the production of the pistillate flower. Thus, shorter interval between the appearance of first staminate and first pistillate flower indicates shorter life of a plant. Its tender fruits are rich source of carbohydrates, protein, fat and vitamin C, which are used as a vegetable or for making pickles and sweets, *e.g.*, *halva*, *kheer*, *petha* and *burfi*. Its juice could be prepared without adding any chemical preservative in it with minimal thermal processing because during this processing the minimum and maximum loss of ascorbic acid blend juice have been recorded 22.97% at 80ºC for 5 minutes and 47.70% at 95ºC for 30 minutes, respectively (Gajera and Joshi 2014). In addition, the seeds and seed oil are edible. Generally, the mineral composition of seed is found to be relatively high as compared to its fruit, except for calcium, zinc, cobalt and chromium. Composition also indicates the seed to be a good source of dietary fibers. Bottle gourd seeds are the potential source of protein, lipid, macro- and micronutrients, and if utilized properly, its seeds can solve the problem of malnutrition and serve as raw material for agro-based industries (Hassan et al. 2008). The role of genetic variability in a crop is of paramount importance in selecting the best genotypes for making rapid improvement in yield and related characters as well as to select most potential parents for making the hybridization programme successful (Singh et al. 2014). Therefore, it is necessary to obtain adequate information on the magnitude and type of genetic variability and their corresponding heritability. This is because selection of superior genotypes is proportional to the amount of genetic variability present and extent to which the traits are heritable. The selection efficiency is increases, if the traits are selected based

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on high heritability coupled with high genetic advance over the mean value. The magnitude of such estimates also suggests the extent to which improvement is possible through selection. Keeping the above facts in view, the present study was undertaken to estimates the component of variance, heritability and genetic advance over mean in different bottle gourd genotypes.

Materials and Methods

The present study was conducted at research farm of the Department of Vegetable Science, CCS, Haryana Agricultural University, Hisar (India) during Spring-Summer season, 2015. The experimental materials consist of seed of thirty one genotypes of bottle gourd viz., GH 28, GH 29, GH 30, GH 31, GH 32, GH 33, GH 34, GH 35, GH 36, GH 37, GH 38, GH 9, GH 20, GH 27, HBG 34 and HBG 36 procured from Department of Vegetable Science, CCSHAU, Hisar; IC 042345, IC 092363, IC 092371, IC 092372, IC 092404, IC 092414, IC 092420, IC 092424, IC 092426, IC 092428, IC 092436, IC 092462 and IC 092465 from Indian Institute of Vegetable Research, Varanasi; and two commercial varieties Pusa Naveen and Pusa Summer Prolific Long from IARI, New Delhi. The experiment was sown in Randomized Block Design with three replications with a plot size of 2.5 m x 3.3 m and 2.5m x 60 cm spacing in third week of March 2015. Half dose of nitrogen fertilizer along with full dose of phosphorus and potassium was applied at the time of land preparation and the remaining half dose of nitrogen was top dressed 30 days after sowing. Before sowing, the seed was treated with captan @ 3 g per kg seed. After sowing, the field was irrigated lightly. Other agronomic practices and plant protection measures were undertaken as per package of practices for vegetable crops for Haryana state. The observations were recorded on fourteen quantitative characters *viz*., days to 50% flowering, number of primary branches, days to first male flower opening, days to first female flower opening, nodes to first male flower, nodes to first female flower, days to first fruit harvest, length of fruit (cm), diameter of fruit (cm), vine length at the time of final harvest (m), weight of 100 seeds (g), number of fruits per vine, fruit yield per vine (kg) and yield per hectare (t). The statistical analysis of data was carried out by OPSTAT (http://14.139.232.166/opstat/index.asp) statistical software developed by CCSHAU, Hisar, Haryana (Sheoran 2010).

Results and Discussion

Growth and phonological parameters: Significant differences were recorded among the genotypes with respect to days to 50% flowering, which ranged from 7.00 (GH 9, GH 28, GH 32 and GH 36) to 11.67 (IC 042345) days, with overall mean 8.91 days (Table 1). The number of primary branches per plant ranged from 4.00 to 12.33 with a mean of 8.82 at the time of final harvest. The maximum number of primary branches per plant was observed in genotype HBG 34 and minimum was in IC 092428. Other genotypes with above ten primary branches per plant were GH 30, GH 38, IC 092428,GH 35, GH 20 and GH 9, whereas, the remaining genotypes were having 4 to 9 branches per plant. The variation in days to 50 % flowering and number of branches per vine might have been due to its own genetic makeup, seed vigour and due to vine length, internodal length, hormonal factor and environmental factor confirming to Sharma and Sengupta (2013) for all the characters in bottle gourd crop. Day to opening of first male flower was recorded in between 40.67 and 52.00 days. The genotype GH 37 took minimum days (40.67) followed by GH 33(41.33) and GH 32 (41.67) days. The genotype IC 042345 and IC 092372 took maximum days (52.00) to first male flower, while the average number of days taken to first male flower of thirty-one genotypes was 45.71 days. The genotypes differed significantly with regard to first female flower opening. The genotype GH 37 took least number of days to female flowering (42.33) followed by GH 32 (45.00), IC 092363 (45.00), GH 9 (45.33), GH 20 (45.67) and IC 092420 (46.33) days. However, the maximum number of days for female flower opening was taken by genotype IC 092428 and IC 042345 (58.33) followed by IC 092404 (56.33), IC 092372 (56.00) and IC 092414 (55.67) days. The number of days from sowing to first appearance of female flower is an important character that indicates earliness or lateness of the crop in general. The variation in first appearance of male and female flower might have been due to internodal length, number of internodes, genetic nature, environmental factor and vigour of the crop. Similar results have been reported by Husna et al. (2014) in bottle gourd.

Significant differences were noticed with regard to the nodes to first male flower among the different genotypes studied. The genotype IC 092404 recorded the highest nodes (13.33) to first male flower production followed by GH 27 (12.33), PSPL (12.00), IC 092462 and IC 092465 (11.00). The lowest number of nodes (5.67) was observed in GH 33 followed by GH 34 (6.00), IC 092414 (6.00) and GH 35 (6.33). Earliness is one of the main attribute, which is measured in terms of node to first female flower appearance. Among the genotypes, the range of variation was observed from 6.3 to 16.00 with mean value of 10.70 for node number of flowers per plant. The genotype IC 092414 differed significantly

with respect to number of nodes up to first female flower and recorded female flower at earliest node (6.30), which was followed by GH 34 (7.00) and GH 33 (7.70). The highest nodes for first female flower was recorded in IC 092404 (16.00) followed by IC 092428 (14.70) and GH 27 (13.70). The variation in node number at which first male and female flower appears might have been due to specific genetic makeup of different hybrids and prevailing environmental conditions. These results are in close conformity with the finding of Mangala et al. (2015) for node number at first female flower in bottle gourd. Days to first fruit harvest ranged from 54.00 to 79.00 days and all the varieties differed significantly for this trait. The first fruit was harvested significantly earlier in two genotypes GH 37 (54.00) and GH 9 (54.33) days followed by IC 092462 (56.00) and GH 32 (56.67) days. The genotype IC 042345 took maximum number of days (79.00) to reached harvesting stage, while the genotype IC 092428 (75.33), IC 092372 (72.33) and IC 092414 (69.67) were the next in order. The variation in days to first fruit to harvesting might have been due to genetic factor, environmental factor, hormonal factor and vigour of the crop. These results are in close conformity with the finding of Bhardwaj et al. (2013) in bottle gourd.

Fruit number, size and yield parameters: A wide variation was found among the bottle gourd genotypes for the number of fruits per vine, which significantly varied from 3.4 to 7.7 among the genotypes with an overall mean of 5.71 (Table 1). The genotype IC 092428 recorded minimum number of fruits per vine and GH 30 recorded the maximum number of fruits per vine.

Table 1: Mean values of coefficient of variation for growth and yield character in bottle gourd

Genotypes	Days to 50% flowering	Number of primary branches	Days to first male flower opening	Days to first female flower opening	Nodes to first male flower	Nodes to first female flower	Days to first fruit harvest
GH 28	7.00	7.00	45.67	50.00	9.67	11.0	63.00
GH 29	7.67	10.33	46.33	50.00	10.33	11.3	64.33
GH 30	9.00	12.00	47.00	49.67	7.67	9.7	60.67
GH 31	8.67	8.00	44.33	49.00	8.00	10.0	59.33
GH 32	7.00	11.00	41.67	45.00	7.00	9.7	56.67
GH 33	8.67	10.33	41.33	50.00	5.67	7.7	58.00
GH 34	7.33	9.33	46.00	51.00	6.00	7.0	62.00
GH 35	10.00	11.33	44.33	49.00	6.33	10.3	68.33
GH 36	7.00	10.00	46.00	50.67	8.67	10.7	57.00
GH 37	9.00	8.33	40.67	42.33	6.00	8.7	54.00
GH 38	9.00	11.67	44.00	47.00	7.33	11.3	62.33
IC 042345	11.67	5.00	52.00	58.33	10.67	11.7	79.00
IC 092363	8.00	9.00	43.00	45.00	6.67	8.0	59.33
IC 092371	9.00	5.33	45.33	52.33	8.00	11.3	61.00
IC 092372	10.67	7.33	52.00	56.00	7.67	8.0	72.33
IC 092404	9.33	10.00	49.67	56.33	13.33	16.0	64.33
IC 092414	11.33	11.33	50.33	55.67	6.00	6.3	69.67
IC 092420	8.33	8.33	44.00	46.33	9.00	10.0	60.33
IC 092424	10.67	6.33	49.33	55.00	8.67	10.7	66.00
IC 092426	9.33	5.67	44.67	49.00	9.33	11.3	58.00
IC 092428	11.00	4.00	51.33	58.33	11.67	14.7	75.33
IC 092436	8.33	9.00	42.67	48.67	10.33	11.7	57.00
IC 092462	8.67	6.67	45.00	49.00	11.00	12.0	56.00
IC 092465	9.33	7.33	47.00	50.33	11.00	12.7	63.33
GH 9	7.00	10.67	42.67	45.33	7.67	9.3	54.33
GH 20	10.33	11.00	46.00	45.67	8.00	11.3	58.00
GH 27	8.33	7.00	44.00	49.33	12.33	13.7	61.33
HBG 34	8.67	12.33	45.00	49.67	8.00	10.3	59.67
HBG 36	10.00	8.00	47.33	53.67	9.67	12.0	64.00
P.N.	8.00	10.67	44.00	47.00	10.33	11.3	63.67
PSPL	8.00	9.00	44.33	48.67	12.00	12.0	67.00
General Mean	8.91	8.82	45.71	50.11	8.84	10.70	62.43
SE(d)	0.736	0.861	1.041	1.576	0.722	0.942	1.779
CD at 5%	1.477	1.727	2.087	3.161	1.448	1.888	3.568
CV (%)	10.080	11.961	2.789	3.850	10.005	10.778	3.491

Per se performance of genotypes contd...

Genotypes	Length of fruit (cm)	Diameter of fruit (cm)	Vine length at the time of final harvest (m)	Weight of 100 seeds (g)	Number of fruits per vine	Fruit yield per vine (kg)	Yield (t/ha)
GH 28	25.4	8.2	4.15	10.0	5.7	5.00	28.60
GH 29	24.7	7.9	5.10	12.3	6.9	4.80	30.00
GH 30	24.7	8.0	5.47	14.2	7.7	5.43	32.80
GH 31	31.7	8.0	4.55	11.1	6.2	4.23	24.47
GH 32	34.6	8.1	5.63	13.6	7.3	5.03	31.20
GH 33	26.5	7.5	5.34	14.5	6.7	4.53	29.20
GH 34	34.8	7.2	4.81	13.4	6.2	4.87	27.20
GH 35	26.7	8.0	5.96	14.0	7.1	4.90	29.40
GH 36	22.3	8.4	5.32	13.9	6.2	4.10	24.60
GH 37	33.6	8.7	4.96	15.5	6.6	5.10	26.80
GH 38	31.9	9.7	4.95	16.6	7.5	4.47	30.60
IC 042345	18.5	16.6	3.65	20.6	3.6	3.40	18.22
IC 092363	30.0	6.8	5.28	17.6	5.6	3.57	21.40
IC 092371	31.2	7.6	3.64	15.6	3.9	3.50	20.61
IC 092372	12.5	10.0	4.32	24.5	4.3	3.54	21.22
IC 092404	29.1	7.5	5.14	15.6	5.6	3.93	23.60
IC 092414	7.8	12.2	5.71	17.7	5.2	3.93	22.50
IC 092420	23.1	7.4	4.88	16.4	5.0	4.67	26.30
IC 092424	29.7	7.3	4.30	16.8	5.1	4.38	27.99
IC 092426	27.7	7.1	4.17	18.0	5.3	4.38	25.38
IC 092428	30.6	8.7	3.63	22.7	3.4	3.01	17.80
IC 092436	28.5	3.1	4.71	22.0	5.6	4.60	25.20
IC 092462	31.7	6.3	3.80	15.3	5.3	4.20	27.22
IC 092465	30.5	7.1	4.44	15.0	4.8	3.93	23.60
GH 9	32.2	8.3	5.32	14.5	6.2	4.00	24.00
GH 20	31.3	7.9	4.74	12.5	6.1	5.03	28.80
GH 27	23.0	7.9	4.35	15.7	4.5	3.43	20.57
HBG 34	32.1	7.1	6.20	19.8	7.1	4.83	29.40
HBG 36	27.5	8.0	4.28	15.6	4.9	3.13	18.80
P.N.	21.0	8.7	3.50	15.2	6.2	4.10	24.60
PSPL	36.2	6.2	3.70	13.9	5.4	3.86	22.10
General Mean	27.46	8.11	4.71	15.94	5.71	4.26	25.30
SE(d)	1.978	0.490	0.354	0.887	0.374	0.200	1.189
CD at 5%	3.967	0.983	0.710	1.778	0.750	0.402	2.385
CV (%)	8.823	7.406	9.206	6.813	8.014	5.765	5.757

The other genotypes ranging above 7 number of fruits per vine were GH 32, GH 35, GH 38, and HBG 34. Seventeen genotypes recorded number of fruits per plant lower than the general mean and the remaining 14 were above general mean. The number of fruits per vine is one of the major factors for deciding the fruit yield of the crop. The variation in number of fruits per vine might have been due to sex ratio, fruit set percentage, genetic nature and their response to varying environmental conditions. Variation in number of fruits per vine was also reported by Mangala et al. (2015) in bottle gourd. There was significant difference among the genotypes for length of fruit. It was ranged from 7.8 to 36.2 cm with a mean of 27.46 cm. The less fruit length was recorded by the genotype IC 092414 and more by PSPL. The other genotypes showed more fruit length above the mean beside PSPL were GH 34, GH 32, GH 37, GH 9 and IC 092462. The diameter of fruit ranged from 3.1 to 16.6 cm and the general mean for diameter of fruit was 8.11 cm. The highest diameter was recorded with genotype IC 042345 (16.6 cm), followed by genotype IC 092414 (12.2 cm) and IC 092372 (10.0 cm), whereas, the minimum fruit diameter was observed in genotype IC 092436 (3.1 cm). The variation in fruit length and diameter might have been due to genetic nature, environmental factor and vigour of the crop Mangala et al. (2015) has reported similar findings in bottle gourd. The genotype IC 092372 recorded significantly higher 100 seeds weight (24.5 g) followed by IC 092428 (22.7 g) and IC 092436 (20.58 g). The lowest weight (10.0 g) of 100 seeds was recorded in GH 28 followed by GH 31 (11.1 g), GH 29 (12.3 g), GH 20 (12.5 g) and GH 34 (13.4 g). The grand mean vine length observed at the time of final harvest was 4.71 m. It ranged from 3.50 to 6.20 m. The maximum vine length (6.20 m) was recorded in genotype HBG 34 and the lowest vine length (3.50 m) in Pusa Naveen Other varieties with vine length above five meter were GH 29, GH 30, GH 32, GH 33, GH 35, GH 36, IC 092363, IC 092404, IC 092414 and GH 9.

Vine length of remaining genotypes was below five meter. The higher fruit length results in to higher fruit weight. The longest fruit length in HBG 34 and highest seed weight in IC 092372 might be due to its hybrid vigour and adoptability to Hisar agro-climatic conditions confirming to finding Mangala et al. (2015) for fruit length in bottle gourd.

The fruit yield per vine of bottle gourd varied significantly among the 31 genotypes from 3.01 kg to 5.43 kg, with general mean value 4.26 kg. The maximum fruit yield per plant was recorded in genotype GH 30 and minimum fruit yield per vine was recorded in genotype IC 092428. The most promising genotypes having fruit yield high than general mean were GH 28, GH 29, GH 30, GH 32, GH 33, GH 34, GH 35, GH 37, GH 38, IC 092420, IC 092424, IC 092426, IC 092436, GH 20 and HBG 34. Sixteen genotypes showed yield less than the general mean. The bottle gourd genotypes studied in the present investigation showed a wide range of variation, *i.e.*, from 17.80 to 32.80 t/ha, with a mean value of 25.30 t/ha. The genotype GH 30 (32.80 t/ha) was the highest yielder among the genotypes under study. The genotypes GH 32 (31.20 t/ha), GH 38 (30.60 t/ha), GH 29 (30.0 t/ha), GH 35 (29.40 t/ha) and HBG 34 (29.40 t/ha) were the next in order. The lowest fruit yield was obtained in IC 092428 (17.80 t/ha) followed by IC 042345 (18.22 t/ha), HBG 36 (18.80 t/ha), GH 27 (20.57 t/ha) and IC 092371 (20.61 t/ha). The variation in fruit yield per vine might have been due to fruit set percentage, fruit length, number of fruits per vine, fruit weight, fruit width, genetic nature, environmental factor and vigour of the crop. These findings are in close conformity with findings of Bhardwaj et al. (2013) for yield per plant, Sharma and Sengupta (2013) for all the characters and Mangala et al. (2015) for yield per vine in bottle gourd.

Components of variation and genetic parameters: The results with regard to PCV (phenotypic coefficient of variation), GCV (genotypic coefficient of variation), heritability broad sense (h^2), genetic advance (GA) and genetic advance as per cent of mean (GAM) for fourteen characters are furnished in Table 2.

Higher values for phenotypic coefficient of variability were obtained than that of genotypic coefficients of variability values, indicating the influence of environment variation on these traits. The days to 50% flowering followed by nodes to first female flower, number of primary branches, vine length at the time of final harvest and nodes to first male flower had larger differences between PCV and GCV values, as these were most influenced by the environment. The remaining characters recorded have smaller difference between PCV and GCV values, as they were less influenced by the environment, indicating reliability of selection based on these traits. The genotypic and phenotypic variances in terms of unit of their expression were observed high for length of fruit (39.76 and 45.63) followed by days to first fruit harvest (33.06 and 37.80). The genotypic and phenotypic variances were observed lowest in fruit yield per vine (0.38 and 0.44), vine length at the time of final harvest (0.48 and 0.67), number of fruits per vine (1.20 and 1.41) and days to 50% flowering (1.13 and 1.19). The moderate genotypic and phenotypic variance was observed in yield per hectare (15.40 and 17.52), days to first female flowering opening (14.80 and 18.52) and weight of 100 seeds (10.29 and 11.47). In general, the magnitude of phenotypic variance and coefficients of variation was higher than their respective genotypic estimates, indicating the environment influence on the expression of these characters. Similar, to this study high GCV for length of fruit and days to first fruit harvest was reported by Singh et al. (2002) in bottle

Table 2: Components of variation and estimates of genetic parameters for various characters in bottle gourd

Characters	Components of variance		Coefficient of variation		h2 (%)	Genetic advance	Genetic advance % of mean
	Genotypic	Phenotypic	Genotypic (%)	Phenotypic (%)			
Days to 50% flowering	1.41	2.22	13.28	16.67	63.44	1.95	21.79
Number of primary branches	4.66	5.77	24.48	27.24	80.72	3.99	45.30
Days to first male flower opening	8.59	10.21	6.41	6.99	84.09	5.54	12.11
Days to first female flower opening	14.80	18.52	7.68	8.59	79.94	7.09	14.14
Nodes to first male flower	4.31	5.09	22.77	24.87	83.81	3.80	42.94
Nodes to first female flower	3.95	5.28	18.58	21.48	74.82	3.54	33.11
Days to first fruit harvest	33.06	37.80	9.21	9.85	87.44	11.08	17.74
Length of fruit (cm)	39.76	45.63	22.49	24.16	86.66	11.84	43.13
Diameter of fruit (cm)	4.47	4.83	26.06	27.10	92.53	4.19	51.65
Vine length at final harvest (m)	0.48	0.67	14.69	17.34	71.80	1.21	25.64
Weight of 100 seeds (g)	10.29	11.47	20.12	21.25	89.72	6.26	39.26
Number of fruits per vine	1.20	1.41	19.21	20.82	85.18	2.09	36.53
Fruit yield per vine (kg)	0.38	0.44	14.56	15.66	86.45	1.19	27.89
Yield per hectare (t)	15.399	17.52	15.51	16.55	87.89	7.58	29.96

gourd. Bhardwaj et al. (2013) revealed high GCV for node number at which first male and female flower appeared and length of fruit in bottle gourd. Whereas, Pandit et al. (2009) noted moderate GCV for days to first female flower opening, fruit length, fruit weight and weight of 100 seed and fruit yield in bottle gourd.

High estimates of phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were recorded for diameter of fruit (26.06 and 27.10%), number of primary branches (24.48 and 27.24%), nodes to first male flower (22.77 and 24.87%) and weight of 100 seeds (20.12 and 21.25%), indicating that a greater amount of genetic variability was present for these characters. Moderate value for PCV and GCV was estimated for number of fruits per vine (19.21 and 20.82%), nodes to first female flower (18.58 and 21.48%), yield per hectare (15.51 and 16.55%), vine length at the time of final harvest (14.69 and 17.34%) and fruit yield per vine (14.56 and 15.66%), indicating that a moderate amount of genetic variability was present in these characters, which provided average scope for selection. The lowest estimates of PCV and GCV were observed for traits like days to first male flower opening (6.41 and 6.99%), days to first female flower opening (7.68 and 8.59%) and days to first fruit harvest (9.21 and 9.85%), indicating limited scope for improvement among these traits. These results corroborate the findings of Singh et al. (2014) and Muralidharan et al. (2014) in bottle gourd. High heritability estimates were observed for diameter of fruit (92.53%), weight of 100 seeds (89.72%), yield per hectare (87.89%) days to first fruit harvest (87.44%), length of fruit (86.66%), fruit yield per vine (86.45%), number of fruits per vine (85.18%), days to first male flower opening (84.09%) and nodes to first male flower (83.81%). However, moderate heritability estimates were recorded for number of primary branches (80.72), days to first female flower (79.94%), nodes to first female flower (74.82%), vine length at the time of final harvest (71.80%) and days 50% flowering (63.44%). However, none of the characters under study reported for low heritability estimates. High and moderate estimates of heritability for these traits advocate that the selection based on phenotypic performance of these characters would be more effective. High genetic advance as per cent of mean was observed for diameter of fruit (51.65%), number of primary branches (45.30%), length of fruit (43.13%) and nodes to first male flower (42.94%); moderate for weight of 100 seeds (39.26%), number of fruits per vine (36.53%), nodes to first female flower (33.11%), yield per hectare (29.96%), vine length (25.64%) and days to 50% flowering (21.79%); and low for days to first male flower opening (12.11%), days to first female flower opening (14.14%) and days to first fruit harvest (17.74%). The results of the present investigation are also in agreement with previous studies carried out on bottle gourd by several workers like Yadav and Kumar (2012), Sharma and Sengupta (2013) and Mangala et al. (2015). Thus, the material assessed possessed ample scope of their improvement through selection and utilization in breeding for higher yield and quality.

सारांश

लौकी की 31 प्रभेदों में परपम्पर आनुवांशिक विविधता संकलन वंशागतित्व और भावी सुधार कार्यक्रम के तहत इन प्रभेदों की छँटनी करने के लिए यह प्रयोग चौधरी चरण सिंह हरियाणा कृषि विश्वविद्यालय, हिसार में किया गया था । भिन्नता विश्लेषण से स्पष्ट हुआ कि सभी 14 लक्षणों के लिए विविधता की ज्यादा मात्रा पायी गयी। अध्ययन से पता चला कि अधिकतम पितृ और मातृ गुणांक (पीसीवी और जीसीवी) के लिए, फल का व्यास (26.06 और 27.10), प्राथमिक शाखाओं की संख्या (24.48 और 27.24), गांठों में पहले नर पुष्प विन्यास (22.77 और 24.87) और 100 बीज के वजन के लिए (20.12 और 21.25) सबसे अधिक मात्रा के संयोजन पाये गये जबकि मध्यम पितृ ओर मातृ गुणांक के लिए फलों की संख्या प्रति बेल (19.21 और 20.82) प्रथम मादा पुष्पन (18.58 और 21.48) के पार्श्व गांठ प्रति हेक्टेयर फल उपज (15.51 और 16.55), अंतिम तुड़ाई के समय लता की लंबाई (14.69 ओर 17.34) और प्रति लता फल की उपज (14.56 और 15.66) के लिए बीच के संयोजक थे। उच्च वंशागतित्व के साथ उच्च अनुवांशिकता मिलकर फल का व्यास, फल की लंबाई, प्रथम नर पुष्प क्यू पार्श्व गांठ पर 11 भास और 100 बीजों के वनज के लिए अनुकूल एवं प्रभावशाली पाये गये। यह अध्ययन दर्शाता है कि ये लक्षण योगात्मक जीन प्रतिक्रिया के मजबूत प्रभाव में थे। मध्यम विरासत और कम अनुवांशिक अग्रिम मूल्यों को वर्णों के दिनों के पहले नर पुष्प खिलन, पहले मादा फूलों के खिलने के दिन प्रथम बार फूल की लंबाई के दिन और 50 प्रतिशत अंकुरण के दिनों के लिए उत्तम पाया गया। उच्च फल उपज देने वाले उत्कृष्ट प्रभेदों जीएच 30 और जीएच 32 थे और प्रभेद में पाया गया।

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