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Mean performance of parents and hybrids for yield and related traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]

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ABSTRACT

This study investigates the mean performance for yield and quality traits in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.) using a half-diallel mating design involving nine diverse genotypes, which produced 36 F_1 hybrids evaluated over two *Zaid* seasons (2024 & 2025) in a randomized complete block design with three replications. Significant genotypic variance was observed across 20 traits, encompassing yield and quality parameters. Parental lines displayed distinct strengths: Pant Lauki-3 (P_6) recorded the highest fruit yield (4.81 kg/plant), Kashi Ganga (P_7) excelled in fruit weight (1.08 kg) and Arka Bahar (P_8) exhibited the highest dry matter content (6.19%). Among hybrids, $P_2 \times P_5$ emerged as the top performer with a yield of 6.65 kg/plant, showing 45.1% heterosis over the better parent. Notable recombinants included $P_6 \times P_9$ (longest fruits and high yield), $P_1 \times P_7$ (highest TSS and reducing sugars) and $P_3 \times P_6$ (earliest harvest and highest dry matter). Biochemical analysis revealed strong hybrid advantages, with $P_6 \times P_7$ accumulating the highest reducing sugars (2.32%) and $P_1 \times P_6$ leading in non-reducing sugars (1.12%). Genetic analysis indicated additive gene action for vine length and fruit number, while non-additive effects predominated in yield heterosis. Crosses $P_2 \times P_5$, $P_1 \times P_8$, and $P_6 \times P_9$ are recommended for commercial cultivation due to their superior yield, early maturity and enhanced nutritional quality, offering a promising foundation for breeding elite bottle gourd.

Keywords: *Quantitative traits, Biochemical traits, Fruit yield, Early flowering.*

1. INTRODUCTION

Bottle gourd (*Lagenaria siceraria* (Mol.) Standl.) is cucurbitaceous vegetable crop having chromosome number 2n=22. It is one of the important cucurbits in India, both as rainy and summer season vegetable. The fresh fruit has light green smooth skin and white flesh. The genus Lagenaria included six species that are distributed in Africa, Madagascar, Indo- Malaysia and the neotropics. There is only one cultivated species, *Lagenaria siceraria*, which is an annual and monoecious. Wild species produce small round fruits with strong bitter taste (Morimoto *et al.* 2005). Bottle gourd is predominately cross-pollinated crop due to its monoecious nature. The amount of cross pollination ranges from 60-80%. In India, the total area covered under bottle gourd is 0.223 million ha with production of 3.72 million tonnes and its productivity is 16.68 tonnes per ha. (Anonymous, 2023-24). Bottle gourd commonly known as white-flowered gourd, Doodhi, Lauki (Hindi), Kadoo (Marathi) which is official in Ayurvedic Pharmacopoeia. It is one of the excellent fruit crops for human being gifted by the nature that have all of the essential constituents that are required for normal and good health (Habibur, 2003). The tender

fruits of bottle gourd can be used as a vegetable or for making sweets (*e.g*. Halva, kheer, petha and burfi), kofta and pickles. The fruit is rich in pectin also, which showed good prospects for jelly preparation, and the dried shells of mature fruits ar e hard and are used as containers, utensils, musical instruments or ornamental items. The tender fruit is good source of ascorbic acid, beta carotene, Vitamin B complex, pectin dietary soluble fibres and contain highest source of choline level-a lipotropic factor, a healer of mental disorders, along with required metabolic and metabolite precursors for brain function, amongst any other vegetable known till date. Bottle gourd fruits are traditionally used for its cardio protective, cardiotonic, general tonic, diuretic, aphrodisiac, antidote to certain poisons and scorpion strings, alternative purgative and cooling effects. A decoction made from the leaf is a very good medicine for curing jaundice. As a vegetable it is easily digestible therefore, used even by patients. Pulp is used for overcoming constipation, cough and night blindness.

It is good for people suffering from biliousness and indigestion. The bottle gourd fruit is also known to have a good source of essential amino acids as leucine, phenyl alanine, threonine cystine, valine, aspartic acid and proline, along with fair amount of vitamin B complex, especially thiamine, riboflavin and niacin. The edible portion of fruit contains 96.3 per cent moisture, 2.9 per cent carbohydrates, 0.2 per cent protein, 0.1 per cent fat, 0.5 per cent mineral matter and 11 mg of vitamin C per 100 g fresh weight (Thamburaj and Singh, 2019).

2. MATERIALS AND METHODS

The experiment was conducted during the *Zaid* seasons of 2024 and 2025 at the Main Experimental Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh. The site, situated in a humid subtropical climate at 24.47º–26.56ºN latitude and 82.12º–83.58ºE longitude, has an altitude of 113m above sea level. The soil is sandy-loam with moderate fertility and a pH range of 6.5–8.5. Nine genetically diverse and elite genotypes- Narendra Kamna, Narendra Rashmi, NDBG-619, NDBG-7, Narendra Pooja, Pant Lauki-3, Kashi Ganga, Arka Bahar and Pusa Naveen were selected for hybridization based on their economic traits. A half-diallel mating design was employed, generating 36 hybrids from all possible crosses except reciprocals. The hybrids, along with selfed parental lines, were evaluated in a randomized complete block design with three replications, following recommended agronomic practices. The observation was recorded in days to first staminate flower anthesis, days to first pistillate flower anthesis, node number to first staminate flower appearance, node number to first pistillate flower appearance, number of primary branches per plant vine length(m), internodal length(cm), days to first fruit harvest, fruit length (cm), fruit circumference (cm), average fruit weight (kg), number of fruits per plant, dry matter content (%), total soluble solids (%), reducing sugar (%), non-reducing sugar (%), total sugar (%), ascorbic acid (%), moisture (%), fruit yield per plant (kg).

3. RESULTS AND DISCUSSION

Mean squares due to replications, genotypes, parents, hybrids and parents vs. hybrids for 13 quantitative traits and 7 biochemical traits during year, 2024 (Y_1), 2025 (Y_2) and (pooled) are presented in (Table 1). The differences due to genotypes, parents and hybrids were found highly significant for all the traits in both the seasons (Y_1, Y_2) and over seasons (pooled). The mean squares due to parents vs. hybrids also found significant for all the traits studied during both the seasons (Y_1, Y_2) and over seasons (pooled) except for total soluble solid and reducing sugar during Y_1, and for total soluble solids, reducing sugar and moisture during Y_2 and for total soluble solid and reducing sugar in pooled. The results corroborated the conclusions drawn by Panigrahi and Duhan (2018), Sultana *et al.* (2018) and Singh *et al.* (2021) indicating a significant level of assortment within the bottle gourd germplasm.

The per se performance of parents and hybrids, ranges and grand mean for all the twenty traits only pooled data has been presented in Table 2.0 The results are described below under the following heads: Days to first staminate flower anthesis ranged from 46.75 to 55.42 for parents and 47.08 to 56.75 for hybrids. P_4 (46.75) found maximum for days to first steminate flower anthesis among the parents which was followed by P_5 (47.42), P_2 (48.42), P_6 (48.75) and P_9 (49.08). The best F_1 hybrid for days to first steminate flower anthesis was recorded for cross $P_5 \times P_6$ (47.08) followed by $P_1 \times P_2$ and $P_2 \times P_4$ (47.75), $P_3 \times P_6$ and $P_6 \times P_9$ (48.08). Averages over the parental mean (49.49) and averages over the F_1 hybrid mean (50.69) were more or less of the same order. Kumar *et al.* (2007) and Singh *et al.* (2023) also obtained similar results. Days to first pistillate flower anthesis ranged from 54.75 to 62.50 for parents and 53.92 to 63.75 for hybrids. P_4 (54.75) found maximum for days to first pistillate flower anthesis among the parents which was followed by P_6 (56.08), P_5 (56.33), P_7 (56.83) and P_3 (57.08). The best F_1 hybrid for days to first pistillate flower anthesis was recorded for cross $P_3 \times P_6$ (53.92) followed by $P_1 \times P_2$ (54.67) and $P_2 \times P_4$ and $P_6 \times P_9$ (55.83) and $P_5 \times P_6$ (56.17). Averages over the parental mean (57.47) and averages over the F_1 hybrid mean (58.94) were more or less of the same order. Kumar *et al.* (2007), Singh and Singh (2023), and Mathew *et al.* (2000) found diversity in the number of days it takes for the first female bloom to open in bottle gourd. Node number to first staminate flower appearance ranged from 5.62 to 10.39 for parents and 5.97 to 10.77 for hybrids. P_5 (5.62) found maximum for node number to first staminate flower appearance among the parents which was followed by P_6 (5.95), P_7 (5.97), P_2 (6.13) and P_4 (6.24).

The best F_1 hybrid for node number to first staminate flower appearance was recorded for cross $P_3 \times P_6$ (5.97) followed by $P_2 \times P_4$ (6.33), $P_1 \times P_2$ (6.48), $P_6 \times P_9$ (6.68) and $P_5 \times P_6$ (6.87). Averages over the parental mean (7.47) and averages over the F_1 hybrid mean (8.42) were more or less of the same order.

Table-1: ANOVA (mean squares) for a set of 9 x 9 diallel cross for different traits in bottle gourd (Y_1, Y_2, pooled)

Source	df	Days to first staminate flower anthesis			Days to first pistillate flower anthesis			Node number to first staminate flower appearance			Node number to first pistillate flower appearance		
		Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P
Replications	2	0.46	2.49	1.17	3.44	1.42	2.25	0.12	0.14	0.13	0.17	0.20	0.17
Genotypes	44	18.17**	18.20**	17.85**	17.89**	15.11**	15.82**	8.29**	6.25**	6.41**	8.07**	6.18**	6.36**
Parents	8	18.55**	18.56**	18.58**	20.97**	9.59**	13.93**	12.28**	11.15**	10.60**	11.47**	11.05**	10.14**
Hybrids	35	17.77**	17.69**	17.30**	16.91**	14.69**	15.34**	7.27**	4.50**	5.09**	7.26**	4.38**	5.16**
Parents Vs Hybrids	1	29.45**	32.82**	31.02**	27.61**	73.91**	48.07**	12.04**	28.12**	19.22**	9.53**	30.04**	18.30**
EROR	88	1.64	2.00	0.44	2.05	2.54	0.54	0.11	0.13	0.12	0.30	0.41	0.35
Total	134	7.05	7.33	6.17	7.27	6.65	5.58	2.79	2.14	2.18	2.85	2.30	2.32

*, ** significant at 5% and 1% level, respectively

Conti. …….

Source	df	Number of primary branches per plant			Vine length (m)			Internodal length (cm)			Days to first fruit harvest		
		Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P
Replications	2	0.02	0.03	0.03	0.001	0.001	0.001	0.014	0.014	0.018	0.96	0.74	0.79
Genotypes	44	6.49**	5.97**	6.13**	1.178**	1.196**	1.182**	2.279**	2.738**	2.321**	19.70**	15.12**	16.51**
Parents	8	2.32**	1.01**	1.29**	2.930**	2.884**	2.904**	3.138**	4.120**	2.842**	21.55**	9.63*	14.10**
Hybrids	35	7.20**	7.20**	7.19**	0.767**	0.803**	0.780**	2.002**	2.021**	1.983**	18.88**	14.69**	16.05**
Parents Vs Hybrids	1	15.19**	2.93**	7.82**	1.536**	1.446**	1.510**	5.072**	16.771**	9.990**	33.70**	74.04**	51.77**
EROR	88	0.09	0.12	0.10	0.048	0.063	0.055	0.154	0.171	0.162	5.86	6.28	6.07
Total	134	2.19	2.04	2.08	0.418	0.434	0.425	0.850	1.011	0.869	10.33	9.10	9.42

*, ** significant at 5% and 1% level, respectively

Conti. …….

Source	df	Fruit length (cm)			Fruit circumference (cm)			Average fruit weight (kg)			No of fruit per plant		
		Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P
Replications	2	1.29	1.45	1.27	0.01	0.01	0.01	0.001	0.002	0.002	0.011	0.016	0.013
Genotypes	44	38.65**	38.64**	38.65**	5.74**	5.59**	5.67**	0.027**	0.028**	0.027**	0.933**	1.002**	0.921**
Parents	8	51.59**	51.51**	51.57**	0.68**	0.67	0.67	0.006**	0.007**	0.006**	0.439**	0.973**	0.530**
Hybrids	35	36.10**	36.10**	36.11**	6.63**	6.41**	6.52**	0.032**	0.033**	0.032**	1.042**	1.028**	1.035**
Parents Vs Hybrids	1	24.26**	24.42**	24.14**	15.10**	16.24**	15.77**	0.023**	0.018**	0.024**	1.053**	0.330**	0.055
EROR	88	1.90	2.07	1.99	0.07	0.07	0.07	0.001	0.002	0.002	0.022	0.033	0.027
Total	134	13.95	14.07	14.01	1.93	1.88	1.91	0.010	0.010	0.010	0.321	0.351	0.321

*, ** significant at 5% and 1% level, respectively

Conti. …….

Source	df	Dry matter content (%)			Total soluble solids (%)			Reducing sugar (%)			Non-Reducing sugar (%)		
		Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P
Replications	2	0.001	0.005	0.001	0.011	0.012	0.011	0.003	0.003	0.004	0.002	0.002	0.001
Genotypes	44	2.952**	2.688**	2.585**	0.907**	0.952**	0.924**	0.149**	0.155**	0.150**	0.054**	0.068**	0.061**
Parents	8	1.414**	2.878**	1.227**	0.998**	1.102**	1.049**	0.149**	0.191**	0.165**	0.015**	0.016**	0.015**
Hybrids	35	3.230**	2.717**	2.917**	0.912**	0.944**	0.922**	0.154**	0.152**	0.151**	0.063**	0.079**	0.071**
Parents Vs Hybrids	1	5.512**	0.143**	1.832**	0.003	0.053	0.008	0.001	0.001	0.001	0.068**	0.096**	0.083**
EROR	88	0.013	0.013	0.014	0.026	0.026	0.026	0.006	0.006	0.006	0.001	0.001	0.001
Total	134	0.978	0.891	0.858	0.315	0.330	0.321	0.053	0.055	0.053	0.019	0.023	0.021

*, ** significant at 5% and 1% level, respectively

Conti. …….

Source	df	Total sugar (%)			Ascorbic acid content (%)			Moisture content (%)			Fruit yield per plant (kg)		
		Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P	Y_1	Y_2	P
Replications	2	0.001	0.001	0.001	0.01	0.01	0.01	1.79	6.11	1.49	0.01	0.01	0.01
Genotypes	44	0.194**	0.221**	0.205**	1.60**	1.57**	1.59**	2.96**	2.69**	2.60**	1.78**	3.19**	2.35**
Parents	8	0.206**	0.264**	0.228**	0.88**	0.89**	0.89**	1.42	2.88**	1.23	0.59**	0.74**	0.66**
Hybrids	35	0.195**	0.216**	0.203**	1.71**	1.66**	1.69**	3.24**	2.71**	2.92**	1.96**	2.48**	2.21**
Parents Vs Hybrids	1	0.083**	0.080**	0.084**	3.47**	3.89**	3.67**	5.36**	0.33	2.49**	4.93**	47.56**	20.71**
EROR	88	0.012	0.012	0.012	0.13	0.13	0.13	1.55	1.49	1.48	0.03	0.04	0.03
Total	134	0.072	0.081	0.075	0.61	0.60	0.60	2.02	1.95	1.85	0.60	1.07	0.79

*, ** significant at 5% and 1% level, respectively

Same results were supported by the findings reported by singh *et al.*, (2008). Node number to first pistillate flower appearance ranged from 12.45 to 16.89 for parents and 12.47 to 17.27 for hybrids. P_6 (12.45) found minimum for node number to first pistillate flower appearance among the parents which was followed by P_5 (12.46), P_7 (12.47), P_2 (12.66) and P_4 (12.74). The best F_1 hybrid for node number to first pistillate flower appearance was recorded for cross $P_3 \times P_6$ (12.47) followed by $P_2 \times P_4$ (12.83), $P_1 \times P_2$ (12.98), $P_6 \times P_9$ (13.18) and $P_5 \times P_6$ (13.37). The averages of the parental mean (14.01) and the F_1 hybrid mean (14.93) were approximately similar in order. The results are in agreement with that of Singh *et al.*, (2023). Number of primary branches per plant ranged from 8.08 to 9.59 for parents and 5.60 to 11.35 for hybrids. P_1 and P_8 (9.59) found maximum for Number of primary branches per plant among the parents which was followed by P_5 (9.58), P_4 (9.37), and P_2 (9.25). The best F_1 hybrid for Number of primary branches per plant was recorded for cross $P_8 \times P_9$ (11.35) followed by $P_1 \times P_6$ (10.90), $P_1 \times P_3$ (10.76), $P_2 \times P_9$ (10.66) and $P_2 \times P_3$ (10.62). The averages of the parental mean (9.07) and the F_1 hybrid mean (8.70) were approximately similar in order. Harika *et al.* (2012) similarly found variation in vine length as a result of broad genetic bases. Vine length ranged from 3.39 to 6.69 for parents and 4.59 to 6.76 for hybrids. P_8 (6.69) found maximum for vine length among the parents which was followed by P_1 (6.44), P_7 (6.36), P_5 (6.33) and P_3 (6.16). The best F_1 hybrid for vine length was recorded for cross $P_2 \times P_3$ (6.76) followed by $P_1 \times P_7$ (6.71), $P_4 \times P_5$ (6.66), $P_1 \times P_3$ (6.64) and $P_2 \times P_5$ (6.64). The averages of the parental mean (5.88) and the F_1 hybrid mean (6.14) were approximately similar in order. Harika *et al.* (2012) similarly found variation in vine length as a result of broad genetic bases. Internodal length ranged from 7.48 to 10.83 for parents and 9.02 to 11.43 for hybrids. P_1 (7.48) found minimum for Internodal length among the parents which was followed by P_3 (9.07), P_6 and P_8 (9.32) and P_2 (9.95). The best F_1 hybrid for Internodal length was recorded for cross $P_2 \times P_9$ (9.02) followed by $P_1 \times P_5$ (9.13), $P_4 \times P_9$ (9.15), $P_1 \times P_2$ (9.23) and $P_1 \times P_7$ (9.30). The averages of the parental mean (9.60) and the F_1 hybrid mean (10.28) were approximately similar in order. Similar results were found Sharma0, *et al.*, (2010). Days to first fruit harvest ranged from 63.42 to 71.17 for parents and 62.58 to 72.42 for hybrids. P_4 (63.42) found minimum for days to first fruit harvest among the parents which was followed by P_6 (64.75), P_5 (64.83), P_8 (65.50) and P_3 (65.75). The best F_1 hybrid for days to first fruit harvest was recorded for cross $P_3 \times P_6$ (62.58)

followed by $P_1 \times P_2$ (63.33), $P_2 \times P_4$, $P_6 \times P_9$ (64.50) and $P_5 \times P_6$ (64.83). The averages of the parental mean (66.10) and the F_1 hybrid mean (67.65) were approximately similar in order. Similar results were found Venkatraman *et al.*, (2024). fruit length ranged from 28.73 to 41.23 for parents and 30.23 to 42.60 for hybrids. P_2 (41.23) found maximum for fruit length among the parents which was followed by P_5 (40.87), P_6 (39.70), P_9 (38.53) and P_4 (37.68). The best F_1 hybrid for fruit length was recorded for cross $P_6 \times P_9$ (42.60) followed by $P_5 \times P_8$ (42.47), $P_6 \times P_8$ (41.87), $P_2 \times P_5$ (41.67) and $P_1 \times P_3$ (41.63). The averages of the parental mean (36.59) and the F_1 hybrid mean (37.65) were approximately similar in order. Similar results were found by Narayan (2013), Kumar and Prasad (2011). Fruit circumference ranged from 5.782 to 7.23 for parents and 5.18 to 10.25 for hybrids. P_9 (7.23) found maximum for Fruit circumference among the parents which was followed by P_5 (6.77), P_2 (6.73), P_3 (6.17) and P_8 (6.15). The best F_1 hybrid for Fruit circumference was recorded for cross $P_4 \times P_8$ (10.25) followed by $P_4 \times P_9$ (10.12), $P_2 \times P_8$ (9.85), $P_5 \times P_8$ (9.52) and $P_4 \times P_7$ (9.22). The averages of the parental mean (6.33) and the F_1 hybrid mean (7.19) were approximately similar in order. Kumar *et al.* (2011) likewise found comparable findings in their research. average fruit weight ranged from 0.96 to 1.08 for parents and 0.89 to 1.35 for hybrids. P_7 (1.08) found maximum for average fruit weight among the parents which was followed by P_5 (1.06), P_4 and P_6 (1.05) and P_1 (1.02). The best F_1 hybrid for average fruit weight was recorded for cross $P_2 \times P_5$ (1.35) followed by $P_2 \times P_8$ (1.27), $P_3 \times P_4$ (1.22), $P_7 \times P_9$ and $P_1 \times P_8$ (1.18). The averages of the parental mean (1.02) and the F_1 hybrid mean (1.05) were approximately similar in order. Singh and Kumar (2002), Husna *et al.* (2011), and Sharma and Sengupta (2013) found similar variations in average fruit weight in bottle gourd. Number of fruits per plant ranged from 3.42 to 4.71 for parents and 3.27 to 5.32 for hybrids. P_2 (4.71) found maximum for number of fruits per plant among the parents which was followed by P_6 (4.58), P_5 (4.45), P_3 and P_7 (4.44). The best F_1 hybrid for number of fruits per plant was recorded for cross $P_5 \times P_8$ (5.32) followed by $P_2 \times P_9$ (5.31), $P_4 \times P_6$ (5.29), $P_1 \times P_4$ (5.21) and $P_6 \times P_9$ (5.08). The averages of the parental mean (4.27) and the F_1 hybrid mean (4.32) were approximately similar in order. Similarly, Rambabu *et al.*, (2019) Observed number of fruits. Dry matter (%) ranged from 4.25 to 6.19% for parents and 4.05 to 7.19 % for hybrids. Arka Bahar (6.19%) found maximum for dry matter content (%) among the parents which was followed by Narendra Pooja (6.11%), NDBG-619 (5.72%), NDBG-83-1 (5.64%) and Narendra Kamna (5.33%). The best F_1 hybrid for dry matter content (%) was recorded for cross $P_3 \times P_6$ (7.19%) followed by $P_1 \times P_7$ (7.07 %), $P_3 \times P_9$ (7.00 %), $P_7 \times P_9$ (6.95 %) and $P_3 \times P_8$ (6.95%). Averages over the parental mean (5.34%) and averages over the F_1 hybrid mean (5.66 %) were more or less of the same order. Sit and Sirohi (2008), Mandal *et al.* (2015) found similar variation in the dry matter content in bottle gourd. TSS ranged from 3.25 to 5.12 % for parents and 3.12 to 5.30 % for hybrids. Pant Lauki-3 (5.12%) found maximum for TSS content (%) among the parents which was followed by Narendra Rashmi (4.57 %), NDBG-83-1 (4.53 %), Pusa Naveen (4.28 %) and Narendra Pooja (4.13%). The best F_1 hybrid for TSS content (%) was recorded for cross $P_1 \times P_7$ (5.30%) followed by $P_2 \times P_9$ (5.15 %), $P_4 \times P_7$ (5.07 %), $P_6 \times P_9$ (5.00 %) and $P_5 \times P_8$ (4.68%). Averages over the parental mean (4.14 %) and averages over the F_1 hybrid mean (4.13 %) were more or less of the same order. Similar findings had also been reported by Prasad *et al.*, (2023). Reducing Sugar ranged from 1.57 to 2.27 % for parents and 1.48 to 2.32 % for hybrids. Pant Lauki-3 (2.27%) found maximum for Reducing Sugar content (%) among the parents which was followed by Narendra Kamna (2.22%), Arka Bahar (2.11%), NDBG-83-1 (2.08%) and Narendra Pooja (2.00%).

Table 2. Mean performance for parents and hybrids

S. No	Parent/Hybrids	Days to first steminate flower anthesis	Days to first pistillate flower anthesis	Node number to first Staminate flower appearance	Node number to first pistillate flower appearance	Number of primary branches per plant
1	Narendra Kamna(P_1)	49.42	58.25	8.76	15.26	9.59
2	Narendra Rashmi (P_2)	48.42	57.50	6.13	12.66	9.25
3	NDBG-619 (P_3)	50.08	57.08	8.23	14.73	8.08
4	Panjab Komal (P_4)	46.75	54.75	6.24	12.74	9.37
5	Narendra Pooja (P_5)	47.42	56.33	5.62	12.46	9.58
6	Pant Lauki-3 (P_6)	48.75	56.08	5.95	12.45	8.75
7	Kashi Ganga (P_7)	50.08	56.83	5.97	12.47	8.25
8	Arka Bahar (P_8)	55.42	62.50	10.39	16.89	9.59
9	Pusa Naveen (P_9)	49.08	57.75	9.97	16.47	9.15
10	$P_1 \times P_2$	47.75	54.67	6.48	12.98	8.60
11	$P_1 \times P_3$	50.67	57.58	9.75	16.25	10.76
12	$P_1 \times P_4$	49.75	59.50	7.51	14.01	7.16
13	$P_1 \times P5$	53.42	61.00	9.40	15.90	9.39
14	$P_1 \times P_6$	49.75	58.17	7.58	14.08	10.90

15	$P_1 \times P_7$	49.42	58.75	7.28	13.78	9.26
16	$P_1 \times P_8$	49.08	59.67	7.51	14.01	7.25
17	$P1 \times P_9$	56.75	63.25	9.81	16.31	9.60
18	$P_2 \times P_3$	48.42	58.17	9.91	16.75	10.62
19	$P_2 \times P_4$	47.75	55.83	6.33	12.83	8.52
20	$P_2 \times P_5$	52.42	60.17	10.77	17.27	6.49
21	$P_2 \times P_6$	49.42	58.75	7.18	13.68	5.60
22	$P_2 \times P_7$	54.08	61.42	8.82	15.32	5.87
23	$P_2 \times P_8$	48.42	57.67	7.71	14.21	8.17
24	$P_2 \times P_9$	50.08	59.83	7.42	13.92	10.66
25	$P_3 \times P_4$	50.00	59.75	7.04	13.54	6.57
26	$P_3 \times P_5$	54.42	62.33	9.77	16.27	8.39
27	$P_3 \times P_6$	48.08	53.92	5.97	12.47	10.08
28	$P_3 \times P_7$	50.00	58.83	7.85	14.68	9.46
29	$P_3 \times P_8$	52.08	59.17	9.39	15.89	5.94
30	$P_3 \times P_9$	49.75	57.67	8.62	15.12	7.33
31	$P_4 \times P_5$	54.08	60.67	8.68	15.18	9.94
32	$P_4 \times P_6$	50.83	57.33	7.77	14.27	7.95
33	$P_4 \times P_7$	51.75	59.67	9.50	16.00	9.92
34	$P_4 \times P_8$	50.08	61.00	9.57	16.07	7.19
35	$P_4 \times P_9$	54.75	63.33	10.52	17.02	8.90
36	$P_5 \times P_6$	47.08	56.17	6.87	13.37	9.89
37	$P_5 \times P_7$	48.42	58.33	7.90	14.40	7.93
38	$P_5 \times P_8$	51.75	58.83	10.11	16.61	10.17
39	$P_5 \times P_9$	49.42	57.17	7.70	14.20	7.94
40	$P_6 \times P_7$	51.08	58.42	9.92	16.42	9.70
41	$P_6 \times P_8$	50.08	57.83	8.29	14.79	9.89
42	$P_6 \times P_9$	48.08	55.83	6.68	13.18	9.30
43	$P_7 \times P_8$	49.08	58.67	8.46	14.96	7.57
44	$P_7 \times P_9$	55.42	63.75	9.66	16.16	8.97
45	$P_8 \times P_9$	51.42	58.92	9.24	15.74	11.35
46	Sarita (check)	50.83	59.33	9.01	15.51	10.27
	Mean	50.46	58.66	8.24	14.77	8.81
	Min	46.75	53.92	5.62	12.45	5.60
	Max	56.75	63.75	10.77	17.27	11.35
	SE(d) ±	0.54	0.60	0.28	0.48	0.29
	C.D.at 5%	1.07	1.19	0.56	0.96	0.58
	C.V. (%)	7.31	8.24	5.14	9.99	9.02

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S. No	Parent/Hybrids	Vine length (m)	Internodal length (cm)	Days to first fruit harvest	Fruit length (cm)	Fruit circumference (cm)
1	Narendra Kamna(P_1)	6.44	7.48	66.92	28.73	5.72
2	Narendra Rashmi (P_2)	6.01	9.95	66.17	41.23	6.73
3	NDBG-619 (P_3)	6.16	9.07	65.75	33.17	6.17
4	Panjab Komal (P_4)	3.39	9.95	63.42	37.67	6.02
5	Narendra Pooja (P_5)	6.33	10.20	64.83	40.87	6.77
6	Pant Lauki-3 (P_6)	5.83	9.32	64.75	39.70	6.12
7	Kashi Ganga (P_7)	6.36	10.83	65.50	35.87	6.10

8	Arka Bahar (P_8)	6.69	9.32	71.17	33.57	6.15
9	Pusa Naveen (P_9)	5.68	10.32	66.42	38.53	7.23
10	$P_1 \times P_2$	5.93	9.23	63.33	30.23	6.20
11	$P_1 \times P_3$	6.64	9.35	66.25	41.63	5.18
12	$P_1 \times P_4$	5.74	10.23	68.17	33.97	5.92
13	$P_1 \times P5$	6.56	9.13	69.67	37.03	6.12
14	$P_1 \times P_6$	5.73	10.35	66.83	41.03	5.42
15	$P_1 \times P_7$	6.71	9.30	67.42	39.00	5.33
16	$P_1 \times P_8$	5.43	11.18	68.33	36.20	6.37
17	$P1 \times P_9$	6.63	9.32	71.75	34.80	5.77
18	$P_2 \times P_3$	6.76	10.23	66.83	39.47	5.92
19	$P_2 \times P_4$	6.46	9.32	64.50	34.13	5.65
20	$P_2 \times P_5$	6.64	10.35	68.83	41.67	6.57
21	$P_2 \times P_6$	5.69	11.02	67.42	35.07	6.25
22	$P_2 \times P_7$	6.61	9.68	70.08	37.53	8.85
23	$P_2 \times P_8$	6.26	9.35	66.33	41.20	9.85
24	$P_2 \times P_9$	6.56	9.02	68.50	39.93	5.65
25	$P_3 \times P_4$	5.49	10.35	68.42	39.40	7.90
26	$P_3 \times P_5$	6.43	11.35	71.00	32.37	8.90
27	$P_3 \times P_6$	6.56	11.43	62.58	39.57	6.17
28	$P_3 \times P_7$	6.36	10.02	67.50	30.30	7.78
29	$P_3 \times P_8$	6.26	11.23	67.83	41.30	6.65
30	$P_3 \times P_9$	5.93	11.35	66.33	36.77	5.55
31	$P_4 \times P_5$	6.66	11.35	69.33	38.17	7.58
32	$P_4 \times P_6$	5.84	11.25	66.00	40.87	6.63
33	$P_4 \times P_7$	6.51	9.68	68.33	41.03	9.22
34	$P_4 \times P_8$	5.33	10.82	71.33	37.17	10.25
35	$P_4 \times P_9$	6.46	9.15	72.00	35.60	10.12
36	$P_5 \times P_6$	5.96	9.98	64.83	39.23	6.93
37	$P_5 \times P_7$	6.56	10.34	67.00	31.20	8.67
38	$P_5 \times P_8$	5.23	11.34	67.50	42.47	9.52
39	$P_5 \times P_9$	5.79	10.68	65.83	34.00	8.20
40	$P_6 \times P_7$	4.59	10.34	67.08	37.97	6.62
41	$P_6 \times P_8$	6.09	9.59	66.50	41.87	6.62
42	$P_6 \times P_9$	6.36	9.68	64.50	42.60	6.77
43	$P_7 \times P_8$	5.74	10.82	67.33	37.97	7.92
44	$P_7 \times P_9$	6.39	11.07	72.42	35.67	7.52
45	$P_8 \times P_9$	6.18	11.33	67.58	37.03	8.20
46	Sarita (check)	5.49	10.38	68.00	32.37	7.48
	Mean	6.07	10.15	67.36	37.33	7.03
	Min	3.39	7.48	62.58	28.73	5.18
	Max	6.76	11.43	72.42	42.60	10.25
	SE(d) ±	0.19	0.33	2.02	1.14	0.22
	C.D.at 5%	0.38	0.66	4.02	2.27	0.44
	C.V. (%)	9.84	9.99	4.68	3.74	3.81

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S. No	Parent/Hybrids	Average fruit weight (kg)	No of fruit per plant	Dry matter content (%)	Total soluble solids (%)	Reducing sugar (%)
1	Narendra Kamna(P_1)	1.02	4.25	5.33	3.25	2.22

2	Narendra Rashmi (P_2)	0.97	4.71	4.77	4.57	1.88
3	NDBG-619 (P_3)	0.96	4.44	5.72	3.33	1.88
4	Panjab Komal (P_4)	1.05	3.42	5.64	4.53	2.08
5	Narendra Pooja (P_5)	1.06	4.45	6.11	4.13	2.00
6	Pant Lauki-3 (P_6)	1.05	4.58	4.25	5.12	2.27
7	Kashi Ganga (P_7)	1.08	4.44	4.94	4.08	1.57
8	Arka Bahar (P_8)	0.97	3.74	6.19	3.95	2.11
9	Pusa Naveen (P_9)	1.02	4.41	5.10	4.28	1.69
10	$P_1 \times P_2$	0.94	3.41	5.95	4.25	2.15
11	$P_1 \times P_3$	1.07	4.38	5.07	3.37	1.71
12	$P_1 \times P_4$	1.02	5.21	5.94	4.43	1.71
13	$P_1 \times P5$	1.06	4.38	4.20	3.30	2.08
14	$P_1 \times P_6$	0.90	3.40	4.19	4.52	1.91
15	$P_1 \times P_7$	1.00	4.42	7.07	5.30	2.28
16	$P_1 \times P_8$	1.18	4.81	6.18	4.15	1.63
17	$P1 \times P_9$	1.01	4.39	4.23	4.07	2.10
18	$P_2 \times P_3$	0.92	3.71	6.08	4.33	1.81
19	$P_2 \times P_4$	1.12	4.36	4.75	3.28	2.01
20	$P_2 \times P_5$	1.35	4.91	5.08	4.52	2.12
21	$P_2 \times P_6$	0.91	4.41	6.89	3.42	2.13
22	$P_2 \times P_7$	0.95	3.37	5.79	4.52	2.20
23	$P_2 \times P_8$	1.27	4.42	5.73	4.25	1.48
24	$P_2 \times P_9$	0.98	5.31	6.91	5.15	1.99
25	$P_3 \times P_4$	1.22	4.27	5.93	4.13	1.68
26	$P_3 \times P_5$	1.00	3.27	6.86	4.03	2.08
27	$P_3 \times P_6$	1.09	4.35	7.19	4.37	1.92
28	$P_3 \times P_7$	1.11	5.01	5.52	3.25	1.91
29	$P_3 \times P_8$	1.04	4.42	6.95	4.55	2.08
30	$P_3 \times P_9$	1.05	3.75	7.00	3.35	1.98
31	$P_4 \times P_5$	1.02	4.41	5.92	4.48	2.28
32	$P_4 \times P_6$	1.04	5.29	4.05	4.13	1.58
33	$P_4 \times P_7$	1.06	4.31	4.84	5.07	2.04
34	$P_4 \times P_8$	1.04	3.38	6.07	4.05	1.63
35	$P_4 \times P_9$	1.14	4.40	5.96	3.98	2.01
36	$P_5 \times P_6$	1.14	4.37	4.54	4.25	1.94
37	$P_5 \times P_7$	1.01	4.41	4.47	3.17	1.93
38	$P_5 \times P_8$	1.03	5.32	4.52	4.68	2.21
39	$P_5 \times P_9$	1.11	4.41	6.07	3.40	2.04
40	$P_6 \times P_7$	0.98	3.31	4.96	4.28	2.32
41	$P_6 \times P_8$	0.89	4.40	6.42	4.05	1.73
42	$P_6 \times P_9$	1.11	5.08	5.24	5.00	2.21
43	$P_7 \times P_8$	0.91	4.41	4.29	4.23	1.62
44	$P_7 \times P_9$	1.18	3.75	6.95	4.05	2.13
45	$P_8 \times P_9$	1.05	4.41	4.86	4.28	2.17
46	Sarita (check)	0.97	4.39	6.85	3.12	1.64
	Mean	1.04	4.31	5.66	4.13	1.96
	Min	0.89	3.27	4.05	3.12	1.48
	Max	1.35	5.32	7.19	5.30	2.32
	SE(d) ±	0.03	0.13	0.27	0.13	0.06
	C.D.at 5%	0.06	0.27	0.53	0.26	0.12
	C.V. (%)	3.78	3.81	3.62	3.90	3.79

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S No	Parent/Hybrids	Non-reducing sugar (%)	Total sugar (%)	Ascorbic Acid content (mg/100g)	Moisture content (%)	Fruit yield per plant (kg)
1	Narendra Kamna(P_1)	0.957	3.18	8.37	94.68	4.34
2	Narendra Rashmi (P_2)	0.930	2.81	7.55	95.23	4.57
3	NDBG-619 (P_3)	0.800	2.67	8.39	94.28	4.26
4	Panjab Komal (P_4)	0.840	2.92	8.59	94.36	3.59
5	Narendra Pooja (P_5)	0.940	2.94	7.89	93.90	4.72
6	Pant Lauki-3 (P_6)	0.947	3.22	8.49	95.75	4.81
7	Kashi Ganga (P_7)	0.890	2.46	9.49	95.06	4.80
8	Arka Bahar (P_8)	0.850	2.96	8.60	93.82	3.63
9	Pusa Naveen (P_9)	0.760	2.45	8.79	94.90	4.50
10	$P_1 \times P_2$	0.890	3.04	9.09	94.05	3.22
11	$P_1 \times P_3$	0.447	2.16	8.50	94.93	4.71
12	$P_1 \times P_4$	0.923	2.63	7.50	94.06	5.34
13	$P_1 \times P5$	0.887	2.96	9.18	95.81	4.65
14	$P_1 \times P_6$	1.120	3.02	8.61	95.82	3.08
15	$P_1 \times P_7$	0.390	2.68	7.50	92.93	4.41
16	$P_1 \times P_8$	0.973	2.60	8.40	93.82	5.71
17	$P1 \times P_9$	0.893	2.99	9.40	95.77	4.46
18	$P_2 \times P_3$	0.960	2.78	8.79	93.92	3.42
19	$P_2 \times P_4$	0.830	2.84	9.71	95.26	4.89
20	$P_2 \times P_5$	0.830	2.95	9.20	94.92	6.65
21	$P_2 \times P_6$	0.790	2.93	9.73	93.12	4.01
22	$P_2 \times P_7$	0.757	2.96	8.91	94.21	3.21
23	$P_2 \times P_8$	0.670	2.16	8.99	94.27	5.62
24	$P_2 \times P_9$	0.850	2.84	9.80	93.09	5.23
25	$P_3 \times P_4$	0.950	2.63	8.29	94.07	5.21
26	$P_3 \times P_5$	0.787	2.86	9.19	93.14	3.32
27	$P_3 \times P_6$	0.797	2.71	9.51	92.81	4.74
28	$P_3 \times P_7$	0.870	2.78	9.29	94.48	5.55
29	$P_3 \times P_8$	0.800	2.88	9.00	93.05	4.60
30	$P_3 \times P_9$	0.910	2.89	9.19	93.00	3.94
31	$P_4 \times P_5$	0.807	3.08	9.30	94.08	4.52
32	$P_4 \times P_6$	0.797	2.37	8.69	95.95	5.51
33	$P_4 \times P_7$	0.860	2.90	8.78	95.16	4.58
34	$P_4 \times P_8$	0.760	2.39	6.03	93.93	3.52
35	$P_4 \times P_9$	0.757	2.77	9.21	94.04	5.04
36	$P_5 \times P_6$	0.850	2.78	9.31	95.46	4.99
37	$P_5 \times P_7$	0.860	2.79	9.51	95.53	4.45
38	$P_5 \times P_8$	0.840	3.05	8.99	95.49	5.50
39	$P_5 \times P_9$	0.917	2.96	8.60	93.93	4.90
40	$P_6 \times P_7$	0.953	3.28	7.81	95.04	3.24
41	$P_6 \times P_8$	0.883	2.61	8.43	93.58	3.95
42	$P_6 \times P_9$	0.850	3.06	9.40	94.76	5.63
43	$P_7 \times P_8$	0.753	2.38	8.71	95.71	4.04
44	$P_7 \times P_9$	0.883	3.01	9.60	93.05	4.43
45	$P_8 \times P_9$	0.340	2.51	9.37	95.15	4.63
46	Sarita (check)	0.957	2.59	8.69	93.15	4.26
	Mean	0.833	2.79	8.79	94.34	4.37
	Min	0.340	2.16	6.03	92.81	3.08

	Max	1.12	3.28	9.80	95.95	6.65
	SE(d) ±	0.03	0.09	0.29	0.61	0.15
	C.D.at 5%	0.06	0.18	0.58	1.21	0.30
	C.V. (%)	4.12	3.93	4.08	0.82	4.20

The best F_1 hybrid for Reducing Sugar content (%) was recorded for cross $P_6 \times P_7$ (2.32%) followed by $P_4 \times P_5$ (2.28 %), $P_1 \times P_7$ (2.28 %), $P_6 \times P_9$ (2.21 %) and $P_5 \times P_8$ (2.18%). Averages over the parental mean (1.97%) and averages over the F_1 hybrid mean (1.96 %) were more or less of the same order. Abhishek *et al.*, (2022) observed highest fruit yield per plant (Kg) to be 0.80 (BGL-2) and lowest to be 2.55 (KBGL-29). Similar findings had also been reported by Sharma (2007) and Kamal *et al.* (2012). Non-Reducing Sugar ranged from 0.76 to 0.95 % for parents and 0.34 to 1.12 % for hybrids. Narendra Kamna (0.95%) found maximum for Non-Reducing Sugar content (%) among the parents which was followed by Pant Lauki-3 and Narendra Pooja (0.94%), Narendra Rashmi (0.93%) and Kashi Ganga (0.89%). The best F_1 hybrid for Non-Reducing Sugar content (%) was recorded for cross P1 $\times$ P_6 (1.12%) followed by $P_1 \times P_8$ (0.97 %), $P_2 \times P_3$ (0.96 %) and $P_6 \times P_7$ (0.95 %). Averages over the parental mean (0.87%) and averages over the F_1 hybrid mean (0.83 %) were more or less of the same order. Similar findings had also been reported by Sharma (2007) and Kamal *et al.* (2012). Total Sugar ranged from 2.45 to 3.22 % for parents and 2.16 to 3.28 % for hybrids. Pant Lauki-3 (3.22%) found maximum for Total Sugar content (%) among the parents which was followed by Narendra Kamna (3.18%), Arka Bahar (2.96%), Narendra Pooja (2.94%) and NDBG-83-1 (2.92%). The best F_1 hybrid for Total Sugar content (%) was recorded for cross $P_6 \times P_7$ (3.28%) followed by $P_4 \times P_5$ (3.08%), $P_6 \times P_9$ (3.06%), $P_5 \times P_8$ (3.05%) and $P_1 \times P_2$ (3.04 %). Averages over the parental mean (2.85 %) and averages over the F_1 hybrid mean (2.79 %) were more or less of the same order. Similar findings had also been reported by Sharma (2007) and Kamal *et al.* (2012). Ascorbic Acid ranged from 7.55 to 9.49 % for parents and 6.03 to 9.80 % for hybrids. Kashi Ganga (9.49%) found maximum for Ascorbic Acid content (%) among the parents which was followed by Pusa Naveen (8.79%), Arka Bahar (8.60%), NDBG-83-1 (8.59%) and Pant Lauki-3 (8.49%).

The best F_1 hybrid for Ascorbic Acid content (%) was recorded for cross $P_2 \times P_9$ (9.80%) followed by $P_2 \times P_6$ (9.73%), $P_2 \times P_4$ (9.71%), $P_7 \times P_9$ (9.60%) and $P_5 \times P_7$ (9.51%). Averages over the parental mean (8.46 %) and averages over the F_1 hybrid mean (8.79%) were more or less of the same order. Similar findings had also been reported by Sharma (2013) and Kamal *et al.* (2012) Moisture Content ranged from 93.82 to 95.75 % for parents and 92.81 to 95.95% for hybrids. Arka Bahar (93.82%) found maximum for Moisture Content (%) among the parents which was followed by Narendra Pooja (93.90%), NDBG-619 (94.28%), NDBG-83-1 (94.36%) and Narendra Kamna (94.68%). The best F_1 hybrid for Moisture Content (%) was recorded for cross $P_3 \times P_6$ (92.81%) followed by $P_1 \times P_7$ (92.93%), $P_3 \times P_9$ (93.00%), $P_7 \times P_9$ and $P_3 \times P_8$ (93.05%). Averages over the parental mean (94.66%) and averages over the F_1 hybrid mean (94.34%) were more or less of the same order. Similar findings had also been reported by Yadav and Kumar (2011). Fruit yield per plant ranged from 3.59 to 4.81 kg for parents and 3.08 to 6.65 kg for hybrids. Pant Lauki-3 (4.81kg) found maximum for Fruit yield per plant (%) among the parents which was followed by Kashi Ganga (4.80kg), Narendra Pooja (4.72kg), Narendra Rashmi (4.57kg) and Pusa Naveen (4.50kg). The best F_1 hybrid for Fruit yield per plant (%) was recorded for cross $P_2 \times P_5$ (6.65kg), followed by $P_1 \times P_8$ (5.71 kg). $P_6 \times P_9$ (5.63 kg), $P_2 \times P_8$ (5.62kg) and $P_3 \times P_7$ (5.55 kg). Averages over the parental mean (4.36 kg) and averages over the F_1 hybrid mean (4.37 kg) were more or less of the same order. Similar findings had also been reported by Yadav and Kumar (2011).

4. CONCLUSION

This study assessed nine bottle gourd parental genotypes and 36 F_1 hybrids over two Zaid seasons for yield and related traits. Significant genetic variability was detected across 20 traits. Notable parents included P_6 (high yield), P_7 (fruit weight), and P_8 (dry matter). The hybrid $P_2 \times P_5$ showed the highest fruit yield (6.65 kg/plant) with 45.1% heterosis. Other promising crosses $P_6 \times P_9$, $P_1 \times P_7$, and $P_3 \times P_6$ excelled in fruit length, biochemical traits, and early maturity. Additive gene action influenced traits like vine length, while non-additive effects governed yield heterosis. Recommended hybrids ($P_2 \times P_5$, $P_1 \times P_8$, $P_6 \times P_9$) combine high yield, quality, and early maturity, providing a solid foundation for sustainable bottle gourd breeding.

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REFERENCES

[1] Anonymous: *Indian Horticulture Database*, NHB, Gurgaon (2023-24).

[2] Habibur Rahman, M., Malik, S., & Nandi, A. K. (2003). Thermoreversible Supramolecular Organization in Poly (vinylidene fluoride)–Dodecyl Benzene Sulfonic Acid Blends. *Macromolecular Chemistry and Physics*, *204*(14), 1765-1770.

[3] Harika, M., Gasti, V.D., Shantappa, T., Mulge, R., Shirol, A.M., Mastiholi, A.B. and Kulkarni, M.S. 2012. Evaluation of bottle gourd genotypes [*Lagenaria siceraria* (Mol.) Standl.] for various horticultural characters

Karnataka J. Agric Sci. 25(2)

[4] Husna A, Mahmud F, Islam MR, Mahmud MAA, Ratna M. 2011. Genetic Variability, Correlation and Path Co-Efficient Analysis in Bottle Gourd (*Lagenaria siceraria* (Molina) Standl.). Advan. in Biol. Res.5 (6): 323-327

[5] Kamal, N., Verma, S., Agrawal, S. and Rao, S. S. 2012. Genetic variability and correlation studies in bottle gourd grown as intercrop in coconut garden. Pl. Arch., 12(1): 85-88.

[6] Kumar R, Prasad VM. 2011. Hybrid evaluation trial in bottle gourd gourd [*Lagenaria siceraria* (Mol.) Standl.]. Enviro. & Eco. 29(1): 74-77

[7] Kumar, A., Singh, B., Kumar, M. and Naresh, R.K. 2011. Genetic variability, heritability and genetic advance for yield and its components in bottle gourd (*Lagenaria siceraria* M.). Annals hort. 4(1): 101-103

[8] Kumar, S., Singh, R. and Pal, A. K. 2007. Genetic variability, heritability, genetic advance, correlation coefficient and path analysis in bottle gourd. Ind. J. Hort., 64(2): 163-168.

[9] Mandal, J., Tirumalesh, M., and Dhangrah, V.K. 2015. Studies on genetic variability and trait inter-relationship in bottle gourd [*Lagenaria siceraria* (Mol.) Standl]. Hort Flora Res. Spectr. 4(1): 34-38

[10] Mathew, A., Markose, B.L, Rajan S and Peter, K.V. 2000. Genetic variability in bottle gourd, *Lagenaria siceraria* (Mol.) Stand. Cucurbit-Genetics-Cooperative. 23: 78-79

[11] Morimoto, R., Ash, J., & Hope, C. (2005). Corporate social responsibility audit: From theory to practice. *Journal of Business ethics*, *62*, 315-325.

[12] Narayan, K. 2013. Genetic diversity and correlation studies in bottle gourd germplasm under Baster condition. XI Chhattisgarh young scientist congress. Agri. Sci. 1(5): 15

[13] Panigrahi, I., Duhan, D. S., Panghal, V. P. S., Tehlan, S. K., & Yadav, A. C. 2018b. Correlation coefficient analysis between yield defining traits of cultivated genotypes of bottle gourd (*Lagenaria siceraria* (Mol.) Stdl.). J. Pharmacogn. Phytochem. 7(2): 1378-1380

[14] Prasad, A. and Prasad, R. 1978b. Correlation studies, flowering characters and yield in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.). Plant Sci., 10: 25-28.

[15] Rambabu, E., Mandal, A. R., Hazra, P., Senapati, B. K. and Thapa, U. 2020. Genetic divergence studies in Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]. IJCS, 8(3): 2304-2306.

[16] Sharma, A. and Sengupta, S. K. 2013. Genetic diversity, heritability Morphological characterization in bottle gourd [*Lagenaria Siceraria* (Mol.) Standl.]. The Bioscan. 8(4): 1461-1465.

[17] Sharma, A. and Sengupta, S. K. 2013. Genetic diversity, heritability Morphological characterization in bottle gourd [*Lagenaria Siceraria* (Mol.) Standl.]. The Bioscan. 8(4): 1461-1465.

[18] Sharma, N., Sharma, N. K. and Malik, Y.S. 2010. Estimation of genetic variation in bottle gourd. Haryana J.Hort. Sci. 39(4): 313–315.

[19] Singh, H.K. and Adarsh, R.K.A., 2023. Evaluation of bottle gourd genotypes [*Lagenaria siceraria* (Mol.) Standl.] Innov., 12(9):1801-1805.

[20] Singh, K. P., Choudhury, D.N., Mandal, G. and Saha, B.C. 2008. Genetic variability in bottle gourd. J. of Interacademicia, 12(2): 159-163.

[21] Singh, R., Singh, B., Prakash, S., Kumar, M., Kumar, V. and Chand, P. 2021. Genetic variability, heritability and genetic advance in bottle gourd (*Lagenaria siceraria* (Mol.) Standl). Ann. Hortic. 14(1): 72-78

[22] Singh, T., Singh, P.K., Singh, R.B., Yashvardhan, V., Kumar, A., Singh, D. and Pandey, A., 2023. Estimates of Genetic Variability, Heretability, Genetic Advance and Genetic Divergence in Bottle Gourd [*Lagenaria siceraria* (Mol.) Standl.]. Int. J. of Plant & Soil Sci., 35(19):70-78.

[23] Sit, A.K. and Sirohi, P.S. 2008. Genetic architecture of yield and yield attributing characters of bottle gourd. Indian J. Hort. 65(2): 243-244

[24] Sultana, S., Rahman, M. S., Ferdous, J., Ahamed and Chowdhury, A. K. 2018. Studies on genetic variability and inter-relationship in bottle gourd [*Lagenaria siceraria* (mol.) standl.] Int. Agril. Innovation tech. 8(1): 14-17

[25] Thamburaj, S. and Singh, N. (2019). Vegetables, tubercrops and spices.

[26] Venkatraman, M., Anbarasi, D. and Haripriya, K. 2024. Evaluation of genetic variability, heritability and genetic advance in thirty-five bottle gourd (*Lagenaria siceraria*) varieties for yield and yield related traits. Plant Archives. 24(1): 120-310.

[27] Yadav YC, Kumar S. Heterosis and inbreeding depression in bottle gourd [*Lagenaria siceraria* L.]. Prog Hort. 2011;43(2):294.