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Evaluation of sponge gourd (*Luffa cylindrica*) hybrids for yield-contributing traits

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Abstract

The study was undertaken to find the performance of 28 hybrids of sponge gourd [*Luffa cylindrica* (L.) Roem.] through diallel mating design excluding reciprocals at Rajasthan Agricultural Research Institute, Durgapura, Jaipur, Rajasthan. Observations were recorded on days to initiation of first female flower, days to 50% flowering, number of nodes at which first female flowers appear, number of primary branches/vine, vine length at final harvesting, days to first fruit harvesting, fruit size, average fruit weight, average fruit yield (g/plant), average fruit yield (kg/plot), total fruit yield (q/ha.). Among the hybrids, 'VRSG-17-27 × Pusa Chikni', 'VRSG-17-27 × Kashi Shreya', 'Kashi Shreya × PSG-40', 'Kashi Shreya × Pusa Chikni', 'VRSG-17-4 × VRSG-17-27 and 'VRSG-17-27 × PSG-40'excelled n number of nodes at which first female flower appears, days to initiation of first female flowers appear and fruit yield. Thus, first generation hybrids can be well-utilized for exploiting hybrid vigor to achieve higher yield with improved quality.

Key words: Evaluation, Genotype, Hybrids, Generation, Diallel

Sponge gourd [*Luffa cylindrica* (L.) Roem.] belonging to family Cucurbitaceae, has chromosome number 2n=26. Due to their excellent nutritional content and hardy fibrous vascular system, sponge gourds have become popular for harvesting both mature green and dry fruit. Heterosis resulting from crosses between strains or between different races or varieties is theoretically known as the reverse of inbreeding depression, and forms an important means of genetic improvements (Singh *et al.*, 2023). Through heterosis breeding, it is often possible to combine desired alleles in regular fashion without waiting for longer term as in case of development of open-pollinated cultivars. Despite its importance and diversified use, very little attention has been made for improvement in horticultural traits. (Bairwa *et al.,* 2017). Hence, present study was undertaken to evaluate performance of its hybrids along with their parents for yield related traits.

MATERIALS AND METHODS

The experiment was conducted at Rajasthan Agricultural Research Institute, Durgapura, Jaipur, during summer 2020 with eight diverse parents, *viz.* VRSG-17-4, VRSG-17-27, Kashi Shreya, PSG-40, Pusa Supriya, Pusa Chikni, Pusa Sneha and Phule Prajakta of sponge gourd to make crosses in diallel fashion excluding reciprocals. The resulting hybrids of 28 cross combinations were evaluated in a randomized block design with three replications during *kharif* and late- *kharif* 2020. A total of 36 genotypes (28 F_1s hybrid and 8 parents) were grown under drip system on raised bed by sowing two seeds per hill with an inter row spacing of 1.2 m and plant- to- plant spacing of 0.60 m, accommodating 16 plants per treatment in (4.80 m long) raised bed.

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All the recommended cultural practices were followed. The observations were recorded on five randomly selected plants of each genotype and average was taken under each environment avoiding border plants. The pooled data of both environments were subjected to statistical analysis to derive information on relative heterosis and better parent heterosis/ heterobeltiosis. The analysis of variance was carried out for randomized block design as per the procedure (Panse and Sukhatme,1985). Relative heterosis and heterobeltiosis were calculated according to the method suggested by Fonseca and Patterson (1968).

RESULTS AND DISCUSSION

The analysis of variance was carried out to test the significance of differences among parents and their hybrids. This result clearly indicated that there were significant variations in mean performance among parents and their hybrids for all characters studied growth and yield parameters, thus offering scope for selecting high-yielding hybrids with good quality traits. The days to initiation of first female flower, days to 50% flowering, number of nodes to first female flower appearing and days to first fruit harvesting were used as criteria for earliness. Besides, yield attributes possessed direct impact on yield and heterosis behaviour, with number of primary branches/vine, vine length, fruit size, average fruit weight and average fruit yield (Table 1).

There was significant negative heterosis for E_1 (-13.15%) VRSG-17-27 × Pusa Chikni to 8.76% (Kashi Shreya ×PSG-40) and for E_2 (-10.91%) (VRSG-17-27 × Kashi Shreya) to 16.73% (VRSG-17-27 × Phule Prajakta).

Heterobeltiosis values for E_1 fluctuated from -12.94% (VRSG-17-27 × Kashi Shreya) to 12.02% (PSG-40 × Pusa Sneha) and for E_2 from -12.12% (VRSG-17-27 × Kashi Shreya) to 18.62% (PSG-40 × Pusa Sneha).

Heterosis values ranged from -17.44% (Kashi Shreya × Pusa Chikni) to 5.14% (Pusa Chikni × Pusa Sneha) in E_1 and from -13.51% (Kashi Shreya X Pusa Chikni) to 19.66% (Pusa Chikni × Pusa Sneha) in E_2. Significant negative heterobeltiosis was observed in nine crosses for environment E_1 and five crosses for environment E_2, while positive heterobeltiosis was evident in six crosses for E_1 and five crosses for E_2. Heterobeltiosis values for E_1 fluctuated from -13.23% (VRSG-17-27 × Kashi Shreya) to 7.25% (VRSG-17-27 × Pusa Sneha) and for E_2 from -10.99% (VRSG-17-27 × Kashi Shreya) to 17.8% (VRSG-17-27 × Pusa Sneha). Similar findings were also reported by Patil *et al.* (2019). "Number of nodes at which first female flower appears" showed highly significant and negative heterosis ranged from -24.89 % (Kashi Shreya × PSG-40) to 11.19% (Pusa Supriya×Pusa Chikni) and its varied range from -16.46% (Kashi Shreya × PSG-40) to 16.40% (Pusa Supriya × Pusa Chikni) under both environmental conditions. Heterobeltiosis ranged from -18.12 % to 8.69%, and the cross combination VRSG-17-27 × PSG-40 showed negative and highly significant results over better parents in E_1 while in E_2, varied range from -14.08 % (Kashi Shreya × Pusa Chikni) to 16.30% (Pusa Chikni × Pusa Sneha).

The highest value of positive and significant heterosis for "number of primary branches/ vine" was found in hybrid VRSG-17-27 × Phule Prajakta (18.32%) in E_1 and in E_2 range was observed between -21.99% (Pusa Sneha × Phule Prajakta) to 17.31% (VRSG-17-27 × Pusa Chikni). Heterobeltiosis range was exhibited between -17.96% to 21.03 % and -32.49% to 14.69% in both environments E_1 and E_2, respectively (VRSG-17-4 × Kashi Shreya). In the evaluation of hybrid combinations for vine length at final harvest (m), significant positive heterosis was observed in eight crosses for environment E_1 and five crosses for environment E_2 compared to mid-parent (MP) (Table 1). Heterosis values ranged from -19.02% (Pusa Sneha × Phule Prajakta) to 21.74% (VRSG-17-4 × VRSG-17-27) in E_1 and from -20.44% (Pusa Sneha × Phule Prajakta) to 16.70% (VRSG-17-27 × Pusa Chikni) in E_2.

Heterobeltiosis values for E_1 fluctuated from -4.24% (VRSG-17-4 × Pusa Chikni) to 34.92% (PSG-40 × Pusa Chikni) and for E_2 from -12.40% (VRSG-17-4 × Pusa Chikni) to 32.11% (PSG-40 × Pusa Chikni). These findings are also in conformity with those of Masud *et al.* (2021) and Venugopala Reddy *et al.* (2019). Negative and significant value of heterosis over mid parent for days to first fruit harvesting was exhibited by VRSG-17-27 × Kashi Shreya in E_1 (-11.62%) and -11.13% in E_2. Similar as, heterobeltiosis ranged from the -12.72% (VRSG-17-27 × PSG-40) to 2.97% (VRSG-17-27 × Pusa Supriya) under the E_1 and E_2 varied range from -12.51 % to 9.42%. For "fruit size (length x girth) cm^2" the cross- combination VRSG-17-27 × Pusa Chikni (38.71%) and VRSG-17-27 × PSG-40 (37.13%) showed positive and significant maximum value for relative heterosis, particularly in both environments E_1 and E_2, respectively.

A positive and highly significant value of heterobeltiosis was recorded for hybrid VRSG-17-27 × PSG-40 (40.99%) in E_1 and 39.29% in E_2. The findings are accordance with Hedau and Sirohi (2004) and Chauhan *et al.* (2018). Heterosis value ranged from -30.66% to 29.53% in E_1 and from -32.15% to 25.96% in E_2. Similar observations were also recorded by Islam *et al.* (2008). For average fruit yield (g/plant) an assessment of hybrid combinations revealed significant positive heterosis values for E_1 ranged from -28.46% (Pusa Sneha × Phule Prajakta) to 34.43% (VRSG-17-27 × Kashi Shreya) and for E_2 from -32.11% (Pusa Sneha × Phule Prajakta) to 30.58% (VRSG-17-27 × Pusa Chikni).

Heterobeltiosis values for E_1 fluctuated from -29.72% (Pusa Sneha × Phule Prajakta) to 42.17% (VRSG-17-27 × Kashi Shreya) and for E_2 from -31.33% (VRSG-17-4 × Kashi Shreya) to 36.21% (VRSG-17-27× Pusa Chikni). These results are in conformity with the findings of Sanandia *et al.* (2008); Singh and Singh (2018). According to the results, enhanced heterotic effect on fruit yield was largely attributed to the number of fruits per vine and fruit weight. The number of branches on each vine, vine length, and fruit length were additional characteristics that contributed in a secondary but still significant way to improved yield (Table 2).

CONCLUSION

VRSG-17-27 × Pusa Chikni, VRSG-17-27 × Kashi Shreya and Kashi Shreya × PSG-40 produced maximum significant relative heterosis and heterobeltiosis for most of the yield -attributing characters. So, these could be recommended for breeding programme.

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Table 1: Estimates of heterosis and heterobeltiosis for days to initiation of first female flower (DIFFF), days to 50% flowering (DF), number of nodes at which first female flowers appear (NNFFFA), number of primary branches/vine (NPB) and vine length at final harvesting (VLFH)

Cross	DIFFF				DF				NNFFFA				NPB				VLFH			
	Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis	
	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
P1×P2	-1.75	8.56**	-5.39*	2.78	-2.37	4.17	3.91	10.8**	4.61	8.29	0.24	3.64	-2.62	-12.01**	-11.77*	-27.51**	21.74**	9.85	13.01*	6.48
P1×P3	2.32	11.67**	-3.58	3.69	-1.16	3.24	4.47*	8.5**	-1.62	-0.89	-2.02	-1.34	-8.51*	-19.8**	-17.96**	-32.49**	0.3	-7.48	14.55**	5.9
P1×P4	-7.35**	-1.33	-0.99	7.83**	2.98	9.17**	3.63	11.09**	-6.57	3.09	-2.28	3.38	5.89	-4.24	-6.21	-19.47**	3.31	-7.65	20.25**	12.16*
P1×P5	-3.28	-2.38	-6.69**	-6.32*	-1.95	-1.47	5.93**	7.12**	2.45	7.66	6.11	9.51*	-5.31	-9.26	-12.03*	-21.78**	4.67	1.5	10.8	8.07
P1×P6	-1.33	5.99*	-0.62	7.97**	-6.19*	2.85	0.99	8.89**	4.46	4.84	-1.11	-0.93	-1.36	-11.56*	-8.04	-20.85**	-0.33	-9.01	-4.24	-12.4*
P1×P7	-7.13**	-2.98	-7.74**	-5.24	-6.55**	-3.28	2.63	5.53*	-9.12*	3.51	-2.55	4.48	-8.35	-17.05**	4.21	-7.97	5.94	0.42	7.11	3.06
P1×P8	-9.2**	-7.12**	-8.73**	-5.55*	-7.08**	-2.33	1.05	6.62**	5.05	10.5*	-0.96	6.34	1.69	-4.78	18.94**	8.87	0.9	-2.72	5.91	0.52
P2×P3	-11.92**	-10.91**	-12.94**	-12.12**	-15.21**	-13.46**	-13.23**	-10.99**	-18.46**	-16.22**	-13.49**	-11.2*	18.29**	14.34**	13.47**	13.24**	19.28**	16.43**	24.57**	22.08**
P2×P4	4.44	8.14**	-8.28**	-8.06**	-12.74**	-12.21**	-11.09**	-10.65**	-24.76**	-13.8**	-18.12**	-10.28*	17.1**	16.99**	17.08**	11.04*	17.9**	16.67**	24.22**	22.9**
P2×P5	-2.71	8.6**	-2.43	6.44*	-1.88	4.15	5.21*	10.89**	-2.42	6.31	-2.84	3.77	3.11	-3.05	12.41**	2.65	-4.73	-11.56*	-1.26	-9.12
P2×P6	-13.15**	-10.83**	-9.69**	-9.68**	-15.1**	-12.9**	-4.5	-3.5	2.66	6.67	-16.26**	-13.26**	18.32**	17.31**	18.13**	11.71*	18.22**	16.7**	25.46**	21.57**
P2×P7	1.09	6.68*	-0.05	5.57	1.33	12.14**	7.25**	17.8**	-10.04**	6.51	4.38	15.96**	-6.48	-6.66	11.52*	2.56	1.07	-4.07	-1.75	-10.71
P2×P8	8.23**	16.73**	1.04	5.9*	-1.95	10.3**	0.27	13.19**	1.99	11.24*	-5.91	4.68	5.66	1.68	19**	5.57	3.76	-3.16	-0.04	-10.31
P3×P4	8.76**	11.31**	2.09	3.3	-14.6**	-13.38**	-11.8**	-9.07**	-24.89**	-16.46**	-15.07**	-9.49*	17.02**	13.01**	18.19**	12.3*	14.94**	11.06*	25.24**	24.05**
P3×P5	-10.34**	-1.16	-4.28	3.38	-2.47	1.35	3.14	5.89*	2.15	8.17	-1.68	2.19	-5.26	-13.7**	6.16	-2.88	4.17	-1.07	11.45*	0.7
P3×P6	-11.36**	-10.04**	-12.33**	-11.49**	-17.44**	-13.51**	-12.6**	-9.38**	-16.82**	-15.9**	-14.83**	-14.08**	14.27**	11.38**	21.05**	14.69**	16.75**	15.44**	20.85**	19.47**

Cross	DIFFF				DF				NNFFFA				NPB				VLFH			
	Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis	
	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
P3×P7	-2.8	1.37	-4.88*	-0.5	-9.68**	-2.22	-0.55	6.3*	-2.42	12.07*	4.01	12.34**	-13.51**	-16.55**	3.11	-5	6.1	3.09	3.31	-7.8
P3×P8	-6.95**	-0.85	-4.41	-0.78	0.9	11.01**	-2.98	6.51*	-14.82**	-9.7*	-12.15**	-4.97	2.56	-4.47	-2.48	-13.34**	1.06	-3.49	-0.94	-12.69*
P4×P5	-2.98	4.33	1.16	10.65**	-0.48	4.96	2.27	8.35**	-8.85*	-4.5	-2.16	0.23	1.89	-4.11	8.41	4.15	-10.6*	-17.82**	18.45**	7.96
P4×P6	4.61*	5.47*	-7.08**	-6.87*	-16.22**	-13.51**	-8.54**	-8.04**	-22.21**	-14.51**	-15.6**	-10.89*	17.13**	16.02**	12.9**	12.56*	13.04**	10.43*	34.92**	32.11**
P4×P7	2.72	4.63	12.02**	18.62**	-14.96**	-6.51*	-12.1**	-2.94	-3.43	-0.58	0.65	1.93	10.45**	10.35*	6.1	2.7	-2.9	-8.75	9.74	-1.23
P4×P8	-2.1	1.84	0.35	5.44	-6.57**	4.39	2.97	16.87**	-2.07	2.49	-0.16	1.25	2.65	-1.12	-0.62	-7.41	0.65	-6.97	10.63	-1.68
P5×P6	-6.57**	1.36	-0.79	8.25**	-4.42	4.23	2.38	9.09**	11.19**	16.4**	-0.12	2.88	-12.2**	-18.1**	10.27*	6.24	2.11	-4.07	6.41	-4.84
P5×P7	-0.56	4.89	-4.73*	-1.76	1.69	5.78*	-5.57**	-1.79	-11.96**	-4.92	-3.68	-0.05	3.71	-2.31	4.82	4.01	9.21	6.67	5.7	4.25
P5×P8	-6.99**	-3.96	-4.53*	-0.8	1.85	7.61**	-4.3*	2.16	-3.14	-3.05	-4.31	-0.55	8.72*	6.12	6.62	3.26	17.37**	16.68**	-4.28	-6.92
P6×P7	-5.31*	-2.75	-3.25	2.2	5.14*	19.66**	-0.87	10.11**	-8.09*	4.27	8.69*	16.3**	0.25	-0.8	10.17*	6.95	6.92	2.75	2.25	-9.67
P6×P8	-9.96**	-5.54*	-3.48	1.17	2.3	18.4**	-4.7*	8.83**	-10.85**	-6.58	-4.32	2.54	3.75	-0.98	13.45**	5.99	-4.39	-9.67	19.29**	4.09
P7×P8	4.49*	6.68**	-2.51	-1.78	-5*	-3.57	-6.82**	-4.44	-5.56	1.89	4.29	4.43	-19.08**	-21.99**	13.77**	9.36	-19.02**	-20.44**	10.62	9.05
S.Em.±	**0.92**	**1.06**	**1.20**	**1.38**	**1.15**	**1.33**	**1.13**	**1.30**	**0.46**	**0.53**	**0.53**	**0.61**	**0.21**	**0.24**	**0.32**	**0.37**	**0.27**	**0.32**	**0.26**	**0.31**

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Table 2: Estimates of heterosis and heterobeltiosis for days to first fruit harvest (DFFH), fruit size (cm^2) (FS), average fruit weight (g) (AFW) and average fruit yield (g/plant) (AFY).

Cross	DFFH				FS				AFW				AFY			
	Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis		Heterosis		Hetero-beltiosis	
	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
P1×P2	-4.82*	-1.83	2.22	5.45*	8.08	-10.17*	8.67	-10.74*	26.45**	11.73*	30.93**	9.48	32.65**	15.84*	33.78**	10.85*
P1×P3	-4.75*	-2.31	-5.91**	-2.15	10.9*	-9.89*	11.72*	-10.42*	0.37	-8.99	-16.11**	-26.97**	5.47	-5.44	-20.84**	-31.33**
P1×P4	-8.5**	-5.94*	-6.78**	-3.6	23.47**	1.69	-11.95*	-28.35**	4.02	-9.08	8.22	-10.11*	9.05	-5.83	7.57	-11.54*
P1×P5	-5.57**	-5.53*	-8.32**	-7.66**	24.76**	11.11*	34.17**	18.45**	5.79	1.85	-12.46*	-15.83*	8.19	0.42	-14.74*	-15.21
P1×P6	0.18	3.42	-2.27	-0.22	17.52**	-1.23	18.86**	-1.26	-0.4	-10.79	-3.72	-17.81**	4.57	-7.41	-6.32	-20.54**
P1×P7	-10.32**	-7.36**	-11.03**	-7.78**	-12.97*	-25.08**	-14.21**	-26.92**	7.32	0.51	28.63**	15.08**	12.99	4.73	31.41**	17.7**
P1×P8	-4.99**	-2.93	-4.33*	-3.35	-19.13**	-26.44**	-20.13**	-27.39**	-4.31	-8.52	1.08	-9.27	4.18	1.62	-0.89	-10.9
P2×P3	-11.62**	-11.13**	-10.83**	-10.12**	36.59**	32.76**	38.76**	34.54**	29.53**	25.85**	36.59**	30.26**	34.43**	30.47**	42.17**	34.63**
P2×P4	-10.37**	-10.08**	-12.72**	-12.51**	38.71**	37.13**	40.99**	39.29**	21.28**	19.78**	26.68**	25.63**	25.68**	24.06**	30.49**	29.26**
P2×P5	4.02*	7.34**	2.97	7.01**	3.71	-4.18	3.98	-4.36	-5.72	-13.78*	-1.2	-14.62**	-4.48	-10.61	0.94	-16.72**
P2×P6	-9.09**	-9.02**	-7.98**	-7.05**	35.07**	33.22**	37.3**	35.37**	27.91**	25.96**	34.96**	31.64**	32.69**	30.58**	40.15**	36.21**
P2×P7	-6.47**	-0.25	-6.74**	-0.17	8.42*	3.94	8.81*	4.11	9.98*	3.32	8.49	0.45	14.29*	7.11	9.83	0.52
P2×P8	-5.78**	-0.65	-6**	-2.01	16.06**	4.93	17.87**	5.24	4.54	-3.76	7.83	-0.49	11.78	-0.23	9.07	-0.56
P3×P4	-9.04**	-8.83**	-11.26**	-10.77**	18.02**	16**	18.96**	16.71**	17.85**	13.12*	26.8**	19.97**	22.25**	17.17**	30.84**	22.8**
P3×P5	-3.8	-1.29	-5.01**	-0.47	7.05	-3.65	7.28	-4.07	16.83**	9.76	24.3**	12.04*	11.63	7.51	32**	13.98*
P3×P6	-5.85**	-5.25*	-5.03**	-3.29	31.5**	26.09**	33.25**	27.42**	20.11**	18.49**	26.45**	23.56**	24.73**	22.98**	30.6**	27.16**
P3×P7	0.23	6.27**	1.37	9.42**	7.62	0.4	8.14	0.46	7.39	3.72	13.29**	9.83	11.73	7.77	15.52**	11.42
P3×P8	-5.43**	-0.86	-2.83	2.13	6.65	-6	7.62	-6.49	1.29	-4.19	14.46**	10.57*	8.55	-0.45	16.89**	12.28*
P4×P5	-2.72	0.06	-2.45	1.63	-2.79	-11.12*	-3.07	-11.82*	-17.68**	-25.56**	-7.55	-20.66**	-16.61**	-22.9**	-6.69	-23.59**
P4×P6	-7.26**	-6.88**	-8.27**	-7.11**	27.39**	24.23**	28.92**	25.6**	15.54**	12.38*	21.45**	17.5**	19.79**	16.4**	24.6**	19.98**
P4×P7	-3.32	2.75	-5.26**	1.68	4.07	-1.32	4.32	-1.33	-3.48	-10.39*	-18.85**	-25.43**	-0.02	-7.42	-21.79**	-29.03**
P4×P8	-1.79	3.21	-0.02	4.48*	25.1**	11.95**	27.43**	12.58**	0.79	-8.27	1.21	-7.3	7.67	-4.99	1.4	-8.34
P5×P6	3.36	6.75**	1.04	3.91	-20.59**	-25.68**	-22.03**	-27.34**	2.55	-4.87	1.75	-10.15*	3.92	-1.26	4.57	-11.7*
P5×P7	2.35	5.68**	-5.1**	-2.35	-31.71**	-34.3**	-33.76**	-36.44**	11.28*	8.13	22.14**	13.29*	12.84*	12.67	29.65**	15.56*
P5×P8	3.66*	5.85**	-2.42	-2.13	-9.75*	-11.86*	-9.98	-12.87*	16.25**	15.42*	3.35	-3.82	21.5**	15.46*	6.75	-4.49
P6×P7	-0.59	6.12**	-1.82	3.98	13.66**	10.44*	14.3**	10.88*	8.35	3.29	12.81**	6.94	12.67*	7.21	14.89**	8
P6×P8	1.34	6.95**	-4.05*	-1.02	5.93	-3.02	31.43**	18.85**	8.49	1.32	3.43	-2.29	-0.61	-10.02	3.99	-2.64
P7×P8	-5.42**	-4.39*	0.48	3.07	-12.27**	-17.49**	-10.48*	-16.74**	-30.66**	-32.15**	-25.3**	-25.57**	-28.46**	-32.11**	-29.72**	-30.01**
S.Em.±	**1.05**	**1.22**	**1.18**	**1.36**	**13.69**	**15.81**	**13.50**	**15.58**	**7.32**	**8.45**	**5.84**	**6.74**	**148.14**	**171.06**	**98.47**	**113.70**

Where, P_1 = VRSG-17-4; P_2 = VRSG-17-27; P_3 = Kashi Shreya; P_4 = PSG-40; P_5 = Pusa Supriya; P_6 = Pusa Chikni; P_7 = Pusa Sneha; P_8 = Phule Prajakta

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