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MANIFESTATION OF HETEROBELTIOSIS AND STANDARD HETEROSIS FOR YIELD AND YIELD CONTRIBUTING CHARACTERS IN *SOLANUM MELONGENA* L.

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ABSTRACT

Brinjal is one of the most demanding and majorly cultivating solanaceous crops throughout India. In order to fulfil the yield targets and meet diverse preferences of locals based on different color, shape, size, taste and presence or absence of spines etc., the plant breeders are focusing on producing such high-yielding hybrids of eggplant. Therefore, the main importance needs to be laid on breeding programme in order to create variability and to identify the desirable segregants between the parents. Exploitation of heterosis has become a potential tool for improvement of brinjal. The aim of present investigation is to estimate the nature and magnitude of heterobeltiosis and standard heterosis for yield and yield contributing characters. The material comprised of eight genotypes *viz.,* Ruchira, Puna Selection, RHRBR-1, RHRBR-196, RHRBR-54, RHRBR-74, RHRBR-34 and RHRBR-2. The data recorded on parameters *viz.,* plant height, number of primary branches per plant, number of flowers per inflorescence, days to 50 % flowering, plant spread (S-N), plant spread (E-W), length of fruit, fruit diameter, number of fruits per plant, average fruit weight, yield per plant and yield per hectare. The estimates of heterosis revealed that Ruchira x RHRBR-54, Ruchira x RHRBR-74, Puna Selection x RHRBR-1, Puna Selection x RHRBR-54, RHRBR-196 x RHRBR-54, RHRBR-196 x RHRBR-74, RHRBR-54 x RHRBR-74, RHRBR-54 x RHRBR-34, RHRBR-54 x RHRBR-2 and RHRBR-74 x RHRBR-2 exhibited high heterobeltiosis and standard heterosis for yield per plant and yield per hectare during both the seasons. These superior crosses can be exploited commercially as hybrids.
Keywords **:** high-yielding hybrids, heterobeltiosis, standard heterosis, variability and desirable segregants etc.

Introduction

Brinjal (*Solanum melongena* L.) is one of the majorly cultivated solanaceous crops throughout India. In past few years, farmer's interest and preferences for brinjal hybrids has significantly increasing. Additionally, in order to overcome yield targets and meet the demands, researchers are concentrating on producing high-yielding hybrid eggplants. As Brinjal is one of the most demanding vegetable crops, it is necessary to improve the locally preferred cultivars or develop new hybrid combinations for high yield, quality, consumer acceptability and meet diverse preferences of locals based on different color, shape, size, taste and presence or absence of spines etc. However, due to continued selection, much of the variability has exhausted. Creation of genetic variation is crucial in order to broaden the gene pools in any given crop population. Therefore, the main emphasis needs to be laid on breeding programme in order to create variability and to identify the desirable segregants, between the parents. Information about heterosis of crosses is critical in crop improvement.

Exploitation of heterosis has become a potential tool for improvement of brinjal because of its hardy nature, ease at crossing due to large size of flower, large number of seeds per fruit and wider adaptability to varied agro-climatic conditions.

The ultimate objective of a plant breeder is to achieve desirable heterosis. Heterosis has been commonly used in many crops to boost the output and increase the adaptability of the hybrids. In order to get most out of heterosis, the germplasm or parents must be divided into distinct heterotic groups. Heterotic groups are the germplasm that mix well when crossed with the genotypes from another heterotic groups (Reif *et al.,* 2003).

Materials and Methods

The experiment was conducted in Randomized Block Design at All India Coordinated Research Project on Vegetable Crops, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri during June, 2022 to December, 2023. The material for the present investigation comprised of eight genotypes *viz.,* Ruchira, Puna Selection, RHRBR-1, RHRBR-196, RHRBR-54, RHRBR-74, RHRBR-34 and RHRBR-2, selected on the basis of distinct morphological and qualitative characters which were crossed in 8 x 8 diallel mating system without reciprocal to obtain 28 hybrids. The 28 hybrids, 8 parents and 2 standard hybrid checks (Krishna and Phule Arjun) were evaluated in two diverse seasons *viz., kharif* and summer season to estimate the nature and magnitude of heterobeltiosis and standard heterosis for yield and yield contributing characters. To ensure a successful crop, all recommended agronomic and plant protection techniques were followed throughout the growing season.

Five plants per treatments from each replication were randomly selected for recording the observations such as plant height, number of primary branches per plant, days to 50 % flowering, plant spread (S-N) and (E-W), length of fruit, fruit diameter, number of fruits per plant, average fruit weight, yield per plant and yield per hectare. The values of F_1 averaged over replications were used for estimating heterosis. The magnitude of heterosis was calculated as percentage increase or decrease of F_1 mean over the mean of better parent (BP) and standard hybrid check (SC) i.e., heterobeltiosis and standard heterosis respectively (Turner, 1953 and Hays *et al.*, 1955).

A) Per cent heterosis over better parent (BP)

$$\text{Per cent heterosis over BP} = \frac{\overline{F_1} - \overline{BP}}{\overline{BP}} \times 100$$

B) Per cent superiority over standard hybrid check (SC)

$$\text{Per cent heterosis over SC} = \frac{\overline{F_1} - \overline{SC}}{\overline{SC}} \times 100$$

Where,

$\overline{F_1}$ = Mean of the F_1 hybrid

$\overline{BP}$ = Mean of the better parent of that particular F_1 cross

$\overline{SC}$ = Mean of the Standard hybrid check of that particular character

Result and Discussion

Heterosis were expressed as percentage increases or decreases over better parent (heterobeltiosis) and standard hybrid checks (economic or standard heterosis). Positive heterosis was considered as favourable heterosis for plant height, number of primary branches per plant, plant spread (S-N) and (E-W), length of fruit, fruit diameter, number of fruits per plant, average fruit weight, yield per plant and yield per hectare with the exception of days to 50% flowering, where negative effect of heterosis was desirable. Analysis of variance for 8 x 8 half diallel of Brinjal is presented in Table-1.

According to the analysis of variance for parents, hybrid and parent versus hybrid revealed that there is a significant difference among the parents and hybrids over both seasons at the 5 and 1 percent level of significance for all the characters. The data of heterobeltiosis and economic heterosis for yield and yield contributing characters in brinjal are summarized in Table-2 and the heterotic effects are presented under following headings.

Plant Height (cm)

For plant height, Puna Selection x RHRBR-196 (31.33 %) showed the highest significant positive heterobeltiosis and Puna Selection x RHRBR-196 showed the highest significant positive standard heterosis over Krishna (7.30 %) and Ruchira x RHRBR-74 (10.11 %) over Phule Arjun during *kharif*.

Similarly, during summer Puna Selection x RHRBR-196 (33.65%) showed the highest significant positive heterobeltiosis and Ruchira x RHRBR-74 (5.30 %) highest significant positive heterosis over Krishna and no other cross had shown significant heterosis over Phule Arjun.

Number of primary branches per plant

During *kharif*, for number of primary branches per plant, among 28 hybrids, Puna Selection x RHRBR-54 (25.64 %) showed the highest significant positive heterosis over better parent. Puna Selection x RHRBR-196 (23.60 %) showed highest significant positive heterosis over standard hybrid check-1 and Puna Selection x RHRBR-196 (20.45 %) showed highest significant positive heterosis over standard hybrid check-2.

Similarly, in summer, Puna Selection x RHRBR-196 (28.21 %), RHRBR-1 x RHRBR-54 (27.03 %) and RHRBR-1 x RHRBR-74 (27.03 %) showed the highest significant positive heterosis over better parent. Puna Selection x RHRBR-196 (19.05 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-196 (11.11 %) over Phule Arjun.

Days to 50% flowering

In *kharif*, Ruchira x Puna Selection (-9.82 %) 74 showed highest significant negative heterosis over better parent, Puna Selection x RHRBR-196 (-22.88 %), Puna Selection x RHRBR-1 (-22.03 %), and RHRBR-54 x RHRBR-74 (-22.03 %) showed highest significant negative heterosis over Krishna and Puna Selection x RHRBR-196 (-24.17 %) followed by RHRBR-54 x RHRBR-74 (-23.33 %) over Phule Arjun.

In summer, Ruchira x RHRBR-54 (-5.13 %) showed highest significant negative heterosis over better parent and (Puna Selection x RHRBR-196) (-12.50 %) showed significant negative heterosis over Krishna and Ruchira x RHRBR-54 (-12.61 %) followed by Puna Selection x RHRBR-196 (-11.71 %) over Phule Arjun.

Negative heterosis for this trait indicates earliness which is desirable. The heterotic effects in negative direction of better parent heterosis and standard heterosis for days to 50% flowering revealed that there is presence of dominant genes for the development of earliness in brinjal.

Plant spread (S-N)

In *kharif*, Puna Selection x RHRBR-54 (33.61 %) followed by Puna Selection x RHRBR-34 (32.69 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-54 (17.30 %) followed by Ruchira x RHRBR-54 (13.25 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-54 (9.96 %) followed by Ruchira x RHRBR-54 (6.16 %) showed highest significant positive heterosis over Phule Arjun.

In summer, Puna Selection x RHRBR-54 (42.34 %) followed by Puna Selection x RHRBR-34 (33.78 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-54 (17.18 %) followed by P_2 x P_7 (Puna Selection x RHRBR-34) (9.81%) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-54 (11.20 %) showed highest significant positive heterosis over Phule Arjun.

Plant spread (E-W)

In *kharif,* Puna Selection x RHRBR-54 (30.78 %) followed by Ruchira x RHRBR-74 (26.26 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-54 (18.98 %) followed by Ruchira x RHRBR-74 (16.03 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-54 (11.70 %) followed by Ruchira x RHRBR-74 (8.92 %) showed highest significant positive heterosis Phule Arjun.

In summer, Puna Selection x RHRBR-54) (33.00 %) followed by Ruchira x RHRBR-74 (19.38 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-54 (16.44 %) followed by Ruchira x RHRBR-74 (9.39 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-54 (11.15 %) over Phule Arjun. For plant spread positive heterosis is desirable. Heterobeltiosis and standard heterosis in F_1 hybrids varied significantly for plant spread. The variations accomplished in the plant spread of hybrid combinations were due to the genotypic divergence in the parental lines and their specific combining abilities for the traits.

Length of fruit

In *kharif,* the crosses RHRBR-54 x RHRBR-34) (18.07 %) followed by RHRBR-1 x RHRBR-2 (12.82 %) showed highest significant positive heterosis over better parent, RHRBR-196 x RHRBR-54 (26.44 %) followed by RHRBR-196 x RHRBR-74 (21.07 %) over Krishna and RHRBR-196 x RHRBR-54 (25.94 %) followed by RHRBR-196 x RHRBR-74) (20.59 %) showed the highest significant positive heterosis over Phule Arjun. Similar, trend was noticed in summer season.

Fruit diameter

In *kharif,* RHRBR-1 x RHRBR-2 (15.87 %) showed highest significant positive heterosis over better parent. RHRBR-196 x RHRBR-54) (19.14 %) followed by P_4 x P_6 (RHRBR-196 x RHRBR-74) (14.27 %) over standard hybrid check-1 and RHRBR-196 x RHRBR-54 (29.04 %) followed by RHRBR-196 x RHRBR-74 (23.77 %) over standard hybrid check-2

showed highest significant positive heterosis. Similar trend was observed in summer season also.

Fruit length and fruit diameter are the most significant factors that directly influences the yield, the larger the fruit length and diameter, the better the yield, hence, positive heterosis is preferred. The results derived from heterosis for fruit length and fruit diameter are more or less, in consonance with the earlier findings of Patidar *et al*., (2016), Gharge *et al.,* (2016[a]), Sujin and Karuppaiah (2018), Bagade *et al*., (2020), Reddy *et al.,* (2020), Varma *et al*., (2020), Singh *et al*., (2021), Timmareddygari *et al*., (2021) and Phor *et al.,* (2022).

Number of fruits per plant

In *kharif*, Puna Selection x RHRBR-1 (49.14 %) followed by RHRBR-54 x RHRBR-74 (26.77 %) showed highest significant positive heterosis over better parent. Puna Selection x RHRBR-1 (92.43 %) followed by RHRBR-54 x RHRBR-74 (38.17 %) over standard hybrid check-1 and Puna Selection x RHRBR-1) (65.31 %) followed by RHRBR-54 x RHRBR-74) (18.70 %) showed highest significant positive heterosis over standard hybrid check-2.

In summer, Puna Selection x RHRBR-1 (49.36 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-1 (182.04 %) followed by RHRBR-54 x RHRBR-2 (85.92 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-1 (189.05 %) followed by RHRBR-54 x RHRBR-2) (90.55 %) exhibited highest significant positive heterosis over Phule Arjun.

Average fruit weight

In *kharif*, Puna Selection x RHRBR-54 (22.12 %) parent followed by Puna Selection x RHRBR-196 (18.61 %) showed highest significant positive heterosis over better, Puna Selection x RHRBR-54 (52.29 %) showed highest significant positive heterosis over standard hybrid check-1 followed by RHRBR-196 x RHRBR-54 (49.19 %) and Puna Selection x RHRBR-54 (50.85 %) showed highest significant positive heterosis over standard hybrid check-2.

In summer, RHRBR-196 x RHRBR-34) (25.18 %) followed by Puna Selection x RHRBR-54) (25.09 %) showed highest significant positive heterosis over better parent, RHRBR-196 x RHRBR-34 (45.32 %) followed by RHRBR-196 x RHRBR-2 (43.97 %) showed highest significant positive heterosis over standard hybrid check-1 and RHRBR-196 x RHRBR-34) (50.81 %) followed by RHRBR-196 x RHRBR-2 (49.41 %) exhibited highest significant positive heterosis over standard hybrid check-2.

The number of fruits per plant and average fruit weight is directly proportional with the higher yield, hence heterosis in positive direction is desirable for this trait. The above results are congruent with the reports of Varma *et al*., (2020), Timmareddygari *et al*., (2021), Singh *et al*., (2021), Phor *et al*., (2022) and Susmitha *et al*., (2023).

Yield per plant

In *kharif*, Puna Selection x RHRBR-1 (100.79 %) showed highest significant positive heterosis over better. Puna Selection x RHRBR-1 (86.55 %) showed highest significant positive heterosis over standard hybrid check-1 and Puna Selection x RHRBR-1 (58.63 %) showed highest significant positive heterosis over standard hybrid check-2.

In summer, Puna Selection x RHRBR-1) (94.65 %) showed highest significant positive heterosis over better parent. Puna Selection x RHRBR-1 (81.84 %) showed highest significant positive heterosis over standard hybrid check-1 and Puna Selection x RHRBR-1 (50.54 %) showed highest significant positive heterosis over standard hybrid check-2.

Yield per hectare

In *kharif*, Puna Selection x RHRBR-1 (100.72) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-1 (86.49 %) showed highest significant positive heterosis over Krishna and Puna Selection x RHRBR-1 (58.58 %) followed by RHRBR-196 x RHRBR-54 (51.00 %) showed highest significant positive heterosis over Phule Arjun.

In summer, Puna Selection x RHRBR-1 (94.31 %) showed highest significant positive heterosis over better parent, Puna Selection x RHRBR-1) (81.73 %) followed by RHRBR-196 x RHRBR-54 (67.54 %) showed highest significant positive heterosis over standard hybrid check-1 and Puna Selection x RHRBR-1 (50.63 %) showed highest significant positive heterosis over standard hybrid check-2. The above findings are in congruence with the results of Bhatt *et al.,* (2019), Khobragade *et al.,* (2019), Bagade *et al*., (2020), Deshmukh *et al*., (2020), Timmareddygari *et al*., (2021), Phor *et al*., (2022), Gill *et al.,* (2023) and Susmitha *et al*., (2023).

Conclusion

In the present investigation, the cross combinations *viz.,* Ruchira x RHRBR-54, Ruchira x RHRBR-74, Puna Selection x RHRBR-1, Puna

Selection x RHRBR-54, RHRBR-196 x RHRBR-54, RHRBR-196 x RHRBR-74, RHRBR-54 x RHRBR-74, RHRBR-54 x RHRBR-34, RHRBR-54 x RHRBR-2 and RHRBR-74 x RHRBR-2 which exhibited high heterobeltiosis and economic heterosis for yield per plant and yield per hectare during both the seasons. The level of heterosis is strongly correlated with the diversity among the parents which integrate several favorable diverse alleles of differed genes. Factors like heterozygosity, non-allelic interactions like epistasis and dominance and maternal interactions, all contribute to the manifestation of heterosis. The F_1 hybrids provide a number of benefits, including early maturity, high yield, better quality, uniformity and greater adaptability. Identified superior cross combinations in present investigation can be exploited as a commercial hybrid and these hybrids can also be used for further study of F_2 generation.

Table 1 : Analysis of variance for different characters in 8 x 8 half diallel of Brinjal

Source	DF	Plant Height (cm)		Number of primary branches per plant		Days to 50% flowering		Plant spread (cm) (S-N)		Plant spread (cm) (E-W)	
		Kharif	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer
Replicates	1	0.06	22.20	0.98**	0.00	11.36	0.37	73.49*	38.30*	15.78	2.957
Treatments	35	594.05**	530.05**	0.23**	0.31**	25.46**	11.75**	309.63**	323.31**	185.70**	153.33**
Parents	7	670.31**	615.75**	0.13	0.09*	22.73	17.57**	169.25**	191.58**	74.64**	86.01**
Hybrids	27	488.76**	420.61**	0.21**	0.31**	26.05**	9.44**	274.59**	282.38**	185.68**	152.94**
Parent Vs. Hybrid.	1	2902.59	2884.83**	1..31**	2.12**	28.47**	33.45**	2238.22**	2350.73**	963.95**	635.18**
Error	35	4.99	6.43	0.06	0.04	3.27	1.54	9.91	7.18	8.67	6.82
Total	71	295.30	264.77	0.16	0.17	14.32	6.56	158.55	163.47	96.04	78.99

Table 1 (Contd…)

Source	DF	Length of fruit (cm)		Fruit diameter (cm)		Number of fruits per plant		Average weight of fruit (g)		Yield per plant (kg)		Yield per hectare (q)	
		Kharif	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer
Replicates	1	0.01	0.07	0.00	0.01	2.63	7.41*	8.82*	5.09	0.04*	0.01	830.69*	264.58
Treatments	35	1.05**	1.19**	0.91**	0.91**	134.50**	112.2**	458.36**	420.46**	1.05**	0.75**	23104.26**	16461.11**
Parents	7	1.39**	1.82**	1.45**	1.54**	42.89**	38.98**	258.10**	197.13**	0.13**	0.11**	2987.04**	2375.06**
Hybrids	27	0.91**	0.96**	0.75**	0.72**	162.13**	134.26**	490.17**	445.76**	1.30**	0.92**	28592.49**	20234.31**
Parent Vs.Hy.	1	2.51**	2.85**	1.30**	1.73**	29.44**	29.11**	1001.53**	1300.48**	0.71*	0.60**	15742*	13187.16**
Error	35	0.01	0.02	0.01	0.01	1.32	1.37	1.94	1.39	0.01	0.01	162.89	147.70
Total	71	0.52	0.60	0.45	0.45	66.99	56.09	227.04	208.02	0.52	0.37	11481.43	8191.17

** Significant at 1% level and* Significant at 5% level

Table 2 : Heterosis (%) over better parent, mid parent and standard hybrid check in 8 x 8 half diallel in Brinjal

Crosses	Plant height						Number of primary branches per plant					
	Kharif			Summer			*Kharif*			Summer		
	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2
P_1 x P_2	10.12**	-1.12	-2.12	12.54**	-3.09	-3.95	2.38	0.00	-2.27	-7.32	-9.52*	-15.56**
P_1 x P_3	2.56	-7.91**	-8.85**	6.59*	-8.21**	-9.02**	4.76	2.33	0.00	0.00	-2.38	-8.89*
P_1 x P_4	15.15**	3.40	2.34	15.67**	-0.40	-1.28	2.22	6.98	4.55	9.76*	7.14	0.00
P_1 x P_5	10.88**	-0.44	-1.45	7.87**	-3.47	-4.32	0.00	-2.33	-4.55	-2.44	-4.76	-11.11*
P_1 x P_6	22.94**	11.24**	10.11**	22.29**	5.30*	4.37	-2.22	2.33	0.00	0.00	-2.38	-8.89*
P_1 x P_7	2.53	-7.94**	-8.87**	6.17*	-8.58**	-9.38**	11.90	9.30	6.82	7.32	4.76	-2.22
P_1 x P_8	1.94	-8.47**	-9.40**	5.84*	-8.86**	-9.67**	-2.38	-4.65	-6.82	-4.88	-7.14	-13.33**
P_2 x P_3	4.30	-35.72**	-36.37**	7.14	-38.48**	-39.02**	7.50	0.00	-2.27	8.11	-4.76	-11.11*
P_2 x P_4	31.33**	7.30**	6.21**	33.65**	4.87*	3.94	17.78**	23.26**	20.45**	28.21**	19.05**	11.11*
P_2 x P_5	12.41**	0.52	-0.50	9.23**	-2.25	-3.12	25.64**	13.95*	11.36	10.81*	-2.38	-8.89*
P_2 x P_6	-1.33	-10.72**	-11.63**	4.51	-10.19**	-10.98**	2.22	6.98	4.55	18.92**	4.76	-2.22
P_2 x P_7	0.14	-16.30**	-17.15**	2.56	-17.12**	-17.85**	2.56	-6.98	-9.09	2.70	-9.52*	-15.56**
P_2 x P_8	-2.80	-40.09**	-40.70**	3.55	-40.54**	-41.06**	0.00	-4.65	-6.82	-5.41	-16.67**	-22.22**
P_3 x P_4	-5.82*	-23.05**	-23.83**	-3.44	-24.24**	-24.90**	-2.22	2.33	0.00	12.82*	4.76	-2.22
P_3 x P_5	2.73	-8.14**	-9.07**	1.74	-8.96**	-9.76**	20.00**	11.63	9.09	27.03**	11.90*	4.44
P_3 x P_6	-12.95**	-21.24**	-22.04**	-9.68**	-22.39**	-23.07**	6.67	11.63	9.09	27.03**	11.90*	4.44
P_3 x P_7	-24.18**	-36.63**	-37.27**	-21.76**	-36.78**	-37.34**	12.50	4.65	2.27	21.62**	7.14	0.00
P_3 x P_8	11.57**	-40.31**	-40.91**	5.59	-41.65**	-42.16**	9.76	4.65	2.27	16.22**	2.38	-4.44

P_4 x P_5	8.12**	-3.32	-4.31*	7.40**	-3.89	-4.74	6.67	11.63	9.09	23.08**	14.29**	6.67
P_4 x P_6	9.48**	-0.94	-1.95	12.80**	-3.06	-3.92	-4.44	0.00	-2.27	-5.13	-11.90*	-17.78**
P_4 x P_7	9.13**	-8.78**	-9.71**	12.85**	-8.81**	-9.61**	-6.67	-2.33	-4.55	0.00	-7.14	-13.33**
P_4 x P_8	-5.82*	-23.05**	-23.84**	-2.01	-23.12**	-23.80**	-8.89	-4.65	-6.82	-5.13	-11.90*	-17.78**
P_5 x P_6	13.32**	2.54	1.49	7.85**	-3.49	-4.34	13.33*	18.60**	15.91**	8.11	-4.76	-11.11*
P_5 x P_7	5.68*	-5.51*	-6.47**	5.54*	-5.55*	-6.39**	5.13	-4.65	-6.82	10.81*	-2.38	-8.89*
P_5 x P_8	10.76**	-0.96	-1.96	3.03	-7.80**	-8.62**	7.32	2.33	0.00	0.00	-11.90*	-17.78**
P_6 x P_7	8.92**	-1.44	-2.45	3.51	-11.05**	-11.84**	-2.22	2.33	0.00	8.11	-4.76	-11.11*
P_6 x P_8	-7.63**	-16.42**	-17.27**	-13.73**	-25.86**	-26.52**	-6.67	-2.33	-4.55	2.86	-14.29**	-20.00**
P_7 x P_8	8.23**	-9.53**	-10.45**	11.77**	-9.68**	-10.48**	0.00	-4.65	-6.82	2.70	-9.52*	-15.56**
S.E.+	2.23	2.23	2.23	2.53	2.53	2.53	0.25	0.25	0.25	0.19	0.19	0.19
C.D.5%	4.58	4.58	4.58	5.20	5.20	5.20	0.52	0.52	0.52	0.39	0.39	0.39
C.D.1%	6.09	6.09	6.09	6.91	6.91	6.91	0.69	0.69	0.69	0.51	0.51	0.51

Table 2 (Contd…)

Crosses	**Days to 50 % flowering**					
	Kharif			**Summer**		
	BP	**SC-1**	**SC-2**	**BP**	**SC-1**	**SC-2**
P_1 x P_2	-9.82**	-15.08**	-15.37**	-3.56	1.31	4.63
P_1 x P_3	-3.01	-16.29**	-16.58**	-3.79	-5.05*	-1.93
P_1 x P_4	-6.18	-15.77**	-16.06**	-3.60	-4.86*	-1.74
P_1 x P_5	-6.94	-18.72**	-19.00**	-5.13*	-6.02*	-2.93
P_1 x P_6	-4.36	-12.48**	-12.78**	-2.62	-2.80	0.39
P_1 x P_7	1.93	-8.49*	-8.81**	2.43	2.62	5.98*
P_1 x P_8	4.84	-6.07	-6.39	7.69**	9.91**	13.51**
P_2 x P_3	-5.22	-18.20**	-18.48**	-4.73	-5.98*	-2.90
P_2 x P_4	-6.56	-16.12**	-16.41**	-5.06*	-6.30*	-3.22
P_2 x P_5	-1.39	-13.86**	-14.16**	-3.58	-4.49	-1.35
P_2 x P_6	-7.01	-14.90**	-15.20**	-1.50	-1.68	1.54
P_2 x P_7	8.88*	-2.25	-2.59	3.92	4.11	7.53**
P_2 x P_8	9.28*	-2.08	-2.42	1.47	3.55	6.95**
P_3 x P_4	12.65**	-2.77	-3.11	2.46	1.12	4.44
P_3 x P_5	5.22	-9.19**	-9.50**	-1.89	-3.18	0.00
P_3 x P_6	12.45**	-2.95	-3.28	5.11*	3.74	7.14**
P_3 x P_7	20.48**	3.99	3.63	4.17	2.80	6.18*
P_3 x P_8	16.27**	0.35	0.00	4.17	2.80	6.18*
P_4 x P_5	-5.75	-17.68**	-17.96**	1.89	0.56	3.86
P_4 x P_6	-4.83	-14.56**	-14.85**	-2.08	-3.36	-0.19
P_4 x P_7	-5.60	-15.25**	-15.54**	-0.19	-1.50	1.74
P_4 x P_8	-8.70*	-18.20**	-18.48**	3.22	1.87	5.21*
P_5 x P_6	-1.14	-13.65**	-13.95**	-3.02	-3.93	-0.77
P_5 x P_7	0.79	-11.96**	-12.26**	-2.83	-3.74	-0.58
P_5 x P_8	0.60	-12.13**	-12.44**	-2.20	-3.11	0.07
P_6 x P_7	-1.93	-11.96**	-12.26**	-4.49	-4.67	-1.54
P_6 x P_8	2.90	-7.80*	-8.12*	3.18	2.99	6.37*
P_7 x P_8	-2.51	-12.65**	-12.95**	2.05	2.24	5.60*
S.E.+	1.81	1.81	1.81	1.24	1.24	1.24
C.D.5%	3.71	3.71	3.71	2.55	2.55	2.55
C.D.1%	4.92	4.92	4.92	3.38	3.38	3.38

Table 2 (Contd…)

Crosses	**Plant Spread (S-N)**						**Plant Spread (E-W)**					
	Kharif			**Summer**			***Kharif***			**Summer**		
	BP	**SC-1**	**SC-2**	**BP**	**SC-1**	**SC-2**	**BP**	**SC-1**	**BP**	**SC-1**	**BP**	**SC-1**
P_1 x P_2	-0.35	-5.97*	-11.86**	3.25	-5.48*	-10.30**	8.21**	-0.55	-6.64*	3.39	-5.26*	-9.57**
P_1 x P_3	-5.93*	-9.58**	-15.24**	-6.94**	-11.50**	-16.02**	-10.89**	-9.08**	-14.64**	-10.39**	-8.96**	-13.10**
P_1 x P_4	11.41**	5.12	-1.46	15.07**	5.34*	-0.03	13.09**	5.60*	-0.87	14.44**	4.86	0.09
P_1 x P_5	20.03**	13.25**	6.16*	16.08**	6.27*	0.85	23.00**	13.03**	6.11*	16.01**	6.30*	1.47
P_1 x P_6	19.03**	12.31**	5.28*	19.84**	9.71**	4.12	26.26**	16.03**	8.92**	19.38**	9.39**	4.42
P_1 x P_7	1.45	-4.28	-10.27**	4.42	-4.41	-9.28**	-0.85	-8.89**	-14.46**	0.75	-7.68**	-11.88**
P_1 x P_8	-5.10	-10.46**	-16.06**	-2.77	-10.99**	-15.53**	5.04	-3.47	-9.38**	1.14	-7.33**	-11.54**
P_2 x P_3	15.02**	10.55**	3.63	12.05**	6.56**	1.12	8.13**	10.33**	3.57	-4.52	-3.00	-7.41**

P_2 x P_4	16.73**	3.58	-2.90	10.94**	-3.12	-8.06**	2.87	-3.95	-9.82**	8.62**	-5.42*	-9.71**
P_2 x P_5	33.61**	17.30**	9.96**	42.34**	17.18**	11.20**	30.78**	18.98**	11.70**	33.00**	16.44**	11.15**
P_2 x P_6	3.59	-7.55**	-13.34**	11.04**	-7.13**	-11.87**	6.84*	-2.2	-8.19**	3.1	-7.03**	-11.25**
P_2 x P_7	32.69**	10.00**	3.12	33.78**	9.81**	4.21	12.45**	1.46	-4.75	16.88**	1.78	-2.85
P_2 x P_8	2.60	-15.87**	-21.14*	8.11*	-15.15**	-19.48**	0.28	-10.86**	-16.32**	-4.21	-16.59**	-20.38**
P_3 x P_4	11.62**	7.28*	0.57	11.57**	6.09*	0.68	0.73	2.78	-3.51	0.11	1.7	-2.92
P_3 x P_5	6.80*	2.66	-3.77	-0.22	-5.11*	-9.95**	2.42	4.51	-1.89	0.23	1.83	-2.8
P_3 x P_6	13.71**	9.30**	2.46	10.01**	4.61	-0.72	-0.35	1.68	-4.54	-1.98	-0.42	-4.94*
P_3 x P_7	-12.26**	-15.67**	-20.95**	-14.29**	-18.50**	-22.66**	-10.37**	-8.55**	-14.14**	-17.45**	-16.13**	-19.95**
P_3 x P_8	-9.51**	-13.02**	-18.46**	-8.90**	-13.37**	-17.79**	-15.58**	-13.87**	-19.14**	-16.46**	-15.13**	-18.99**
P_4 x P_5	-1.02	-12.17**	-17.67**	-3.17	-15.44**	-19.75**	1.17	-5.54	-11.32**	3.84	-9.09**	-13.22**
P_4 x P_6	22.26**	9.12**	2.29	23.50**	7.85**	2.35	6.67*	-0.4	-6.49*	7.19*	-3.34	-7.74**
P_4 x P_7	1.52	-9.92**	-15.56**	-0.56	-13.17**	-17.59**	1.65	-5.09	-10.90**	5.45	-8.42**	-12.58**
P_4 x P_8	11.65**	-0.93	-7.13**	4.67	-8.60**	-13.26**	2.9	-3.92	-9.80**	11.30**	-3.95	-8.31**
P_5 x P_6	16.37**	3.86	-2.64	26.64**	5.92*	0.51	22.15**	11.81**	4.97	14.68**	3.41	-1.29
P_5 x P_7	14.72**	9.12**	2.29	9.46**	-9.89**	-14.49**	8.02*	-1.73	-7.74**	6.44*	-6.81**	-11.05**
P_5 x P_8	-5.29	-9.92**	-15.56**	9.48**	-9.87**	-14.47**	13.19**	2.98	-3.32	6.81*	-6.49*	-10.74**
P_6 x P_7	15.50**	-0.92	-7.12**	-6.97*	-22.19**	-26.16**	-5.83	-13.80**	-19.08**	-8.16**	-17.18**	-20.95**
P_6 x P_8	5.90	-12.21**	-17.70**	9.93**	-8.06**	-12.75**	10.00**	0.69	-5.48*	6.19*	-4.25	-8.60**
P_7 x P_8	21.08**	3.86	-2.64	-3.31	-20.64**	-24.68**	-4.61	-13.94**	-19.20**	-3.57	-16.25**	-20.06**
S.E.+	3.15	3.15	3.15	2.68	2.68	2.68	2.94	2.94	2.94	2.61	2.61	2.61
C.D.5%	6.46	6.46	6.46	5.50	5.50	5.50	6.04	6.04	6.04	5.36	5.36	5.36
C.D.1%	8.58	8.58	8.58	7.30	7.30	7.30	8.02	8.02	8.02	7.12	7.12	7.12

Table 2 (Contd…)

Crosses	**Length of Fruit**						**Fruit diameter (cm)**					
	Kharif			**Summer**			***Kharif***			**Summer**		
	BP	**SC-1**	**SC-2**	**BP**	**SC-1**	**SC-2**	**BP**	**SC-1**	**SC-2**	**BP**	**SC-1**	**SC-2**
P_1 x P_2	-10.29**	0.56	0.16	-8.54**	4.72	2.05	-2.40*	0.83	9.20**	-3.30*	-0.17	11.63**
P_1 x P_3	-2.72*	0.4	0	-6.47**	-0.17	-2.71	-7.83**	-4.79**	3.13*	-10.72**	-7.82**	3.07
P_1 x P_4	1.18	16.35**	15.88**	2.4	22.07**	18.97**	-1.40	10.81**	20.02**	-0.69	8.49**	21.30**
P_1 x P_5	5.28**	8.65**	8.22**	1.97	8.85**	6.08*	3.91**	7.34**	16.26**	-0.64	2.58	14.70**
P_1 x P_6	-0.47	2.72	2.31	0.47	7.25**	4.52	-1.36	1.90	10.37**	-3.46*	-0.33	11.44**
P_1 x P_7	-4.97**	-1.92	-2.31	-4.42	2.02	-0.57	-8.95**	-5.94**	1.88	-9.19**	-6.24**	4.84*
P_1 x P_8	0.08	3.29*	2.87*	-0.32	6.40*	3.69	-0.40	2.89*	11.44**	-0.73	2.50	14.60**
P_2 x P_3	-23.73**	-14.50**	-14.84**	-22.74**	-11.54**	-13.79**	-9.78**	-16.25**	-9.29**	-9.52**	-17.80**	-8.09**
P_2 x P_4	-0.7	14.18**	13.73**	-2.54	16.18**	13.22**	-4.85**	6.93**	15.82**	-4.95**	3.83*	16.09**
P_2 x P_5	-4.72**	6.81**	6.38**	-9.71**	3.37	0.74	1.78	-5.53**	2.32	2.20	-7.15**	3.81*
P_2 x P_6	-12.65**	-2.08	-2.47	-10.30**	2.7	0.08	0.18	-7.01**	0.71	0.82	-8.40**	2.42
P_2 x P_7	-14.30**	-3.93**	-4.31**	-16.26**	-4.13	-6.57*	-5.69**	-12.46**	-5.18**	-8.14**	-15.56**	-5.58**
P_2 x P_8	-19.87**	-10.18**	-10.53**	-33.41**	-23.76**	-25.70**	-4.53**	-11.39**	-4.02**	-3.30	-12.15**	-1.77
P_3 x P_4	-16.86**	-4.41**	-4.79**	-16.40**	-0.34	-2.87	-15.79**	-5.36**	2.50	-13.56**	-5.57**	5.58**
P_3 x P_5	-0.56	-15.22**	-15.56**	-2.44	-15.84**	-17.98**	-1.76	-17.16**	-10.28**	5.42*	-17.47**	-7.72**
P_3 x P_6	8.77**	-0.64	-1.04	15.04**	3.12	0.49	-2.22	-16.34**	-9.38**	1.52	-16.81**	-6.98**
P_3 x P_7	9.40**	-3.93**	-4.31**	7.36*	-2.95	-5.42*	-14.55**	-21.04**	-14.48**	-16.83**	-23.54**	-14.51**
P_3 x P_8	12.82**	-1.28	-1.68	17.29**	-2.27	-4.76	15.87**	-16.25**	-9.29**	15.71**	-19.13**	-9.58**
P_4 x P_5	9.97**	26.44**	25.94**	6.29**	26.71**	23.48**	6.02**	19.14**	29.04**	8.83**	18.89**	32.93**
P_4 x P_6	5.30**	21.07**	20.59**	-2.76	15.92**	12.97**	1.69	14.27**	23.77**	0.99	10.32**	23.35**
P_4 x P_7	0.84	15.95**	15.48**	-2.69	16.01**	13.05**	-12.63**	-1.82	6.34**	-10.13**	-1.83	9.77**
P_4 x P_8	4.88**	20.59**	20.11**	4.17	24.18**	21.02**	-17.69**	-7.51**	0.18	-15.23**	-7.40**	3.53
P_5 x P_6	6.23**	-2.96*	-3.35*	10.24**	-1.18	-3.69	3.28*	-11.63**	-4.29**	4.47*	-14.39**	-4.28*
P_5 x P_7	18.07**	3.69**	3.27*	16.87**	5.64*	2.96	-4.64**	-11.88**	-4.56**	-5.70**	-13.31**	-3.07
P_5 x P_8	8.06**	-5.45**	-5.83**	9.77**	-5.31*	-7.72**	1.37	-14.52**	-7.42**	6.70**	-16.47**	-6.60**
P_6 x P_7	11.23**	1.6	1.2	16.78**	5.56*	2.87	-3.57**	-10.89**	-3.49*	-4.07*	-11.81**	-1.40
P_6 x P_8	12.54**	2.80*	2.39	19.92**	7.50**	4.76	8.10**	-7.51**	0.18	10.46**	-9.48**	1.21
P_7 x P_8	-2.74	-14.58**	-14.92**	-1.58	-11.04**	-13.30**	0.80	-6.85**	0.89	1.09	-7.07**	3.91*
S.E.+	0.08	0.08	0.08	0.15	0.15	0.15	0.07	0.07	0.07	0.09	0.09	0.09
C.D.5%	0.17	0.17	0.17	0.30	0.30	0.30	0.15	0.15	0.15	0.20	0.20	0.20
C.D.1%	0.22	0.22	0.22	0.40	0.40	0.40	0.20	0.20	0.20	0.27	0.27	0.27

Table 2 (Contd…)

Crosses	Average weight of fruit (g)						Number of fruits per plant					
	Kharif			Summer			*Kharif*			Summer		
	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2
P_1 x P_2	10.61**	6.83**	5.82*	17.16**	5.35**	9.33**	-16.38**	-22.71**	-33.60**	-25.89**	1.46	3.98
P_1 x P_3	7.26**	3.59	2.61	12.60**	1.24	5.07*	-46.21**	-30.60**	-40.38**	-47.04**	0.00	2.49
P_1 x P_4	-8.22**	17.83**	16.72**	-1.62	14.21**	18.52**	-14.80**	-25.55**	-36.04**	-22.99**	-2.43	0.00
P_1 x P_5	16.63**	12.64**	11.57**	19.44**	7.39**	11.45**	16.64**	27.13**	9.21**	10.16*	63.11**	67.16**
P_1 x P_6	8.62**	4.90*	3.91	14.03**	2.53	6.40**	6.60	6.94	-8.13*	-0.17	40.29**	43.78**
P_1 x P_7	-6.93**	0.77	-0.18	2.61	4.58*	8.53**	-31.66**	-27.13**	-37.40**	-38.46**	-2.91	-0.50
P_1 x P_8	9.99**	6.22**	5.22*	14.30**	2.77	6.65**	-40.00**	-30.91**	-40.65**	-36.47**	1.46	3.98
P_2 x P_3	11.07**	-3.15	-4.06	1.81	-9.35**	-5.93**	49.14**	92.43**	65.31**	49.36**	182.04**	189.05**
P_2 x P_4	18.61**	52.29**	50.85**	21.03**	40.50**	45.81**	24.91**	15.46**	-0.81	15.25**	57.77**	61.69**
P_2 x P_5	22.12**	12.17**	11.11**	25.09**	11.37**	15.58**	-10.85**	-2.84	-16.53**	-1.97	45.15**	48.76**
P_2 x P_6	2.82	-5.18*	-6.08**	4.47*	-6.98**	-3.47	-12.58**	-12.30**	-24.66**	-8.12	29.13**	32.34**
P_2 x P_7	-24.93**	-18.72**	-19.48**	-24.16**	-22.70**	-19.78**	-40.24**	-36.28**	-45.26**	-42.46**	-9.22	-6.97
P_2 x P_8	1.37	-11.61**	-12.44**	-6.52**	-16.77**	-13.63**	-29.86**	-19.24**	-30.62**	-27.96**	15.05*	17.91**
P_3 x P_4	9.09**	40.07**	38.75**	16.97**	35.79**	40.92**	-38.88**	-21.14**	-32.25**	-37.28**	18.45**	21.39**
P_3 x P_5	-22.96**	-29.24**	-29.91**	-17.55**	-29.10**	-26.42**	-18.83**	4.73	-10.03**	-17.48**	55.83**	59.70**
P_3 x P_6	-12.07**	-18.92**	-19.68**	-7.99**	-21.22**	-18.25**	-25.92**	-4.42	-17.89**	-23.91**	43.69**	47.26**
P_3 x P_7	-28.77**	-22.87**	-23.60**	-26.82**	-25.42**	-22.60**	-29.10**	-8.52*	-21.41**	-28.53**	34.95**	38.31**
P_3 x P_8	0.45	-23.99**	-24.70**	4.85	-25.14**	-22.32**	-32.27**	-12.62**	-24.93**	-31.36**	29.61**	32.84**
P_4 x P_5	16.20**	49.19**	47.78**	18.53**	37.60**	42.80**	9.12**	18.93**	2.17	15.74**	71.36**	75.62**
P_4 x P_6	13.58**	45.83**	44.46**	20.29**	39.64**	44.91**	10.06**	10.41**	-5.15	9.84*	54.37**	58.21**
P_4 x P_7	15.78**	48.66**	47.26**	25.18**	45.32**	50.81**	-24.26**	-19.24**	-30.62**	-24.62**	18.93**	21.89**
P_4 x P_8	14.84**	47.44**	46.05**	24.02**	43.97**	49.41**	-32.88**	-22.71**	-33.60**	-31.91**	8.74	11.44
P_5 x P_6	14.12**	5.24*	4.24	19.10**	2.42	6.29**	26.77**	38.17**	18.70**	18.03**	74.76**	79.10**
P_5 x P_7	8.18**	17.14**	16.04**	11.84**	13.98**	18.29**	10.56**	20.50**	3.52	12.62**	77.67**	82.09**
P_5 x P_8	12.73**	3.54	2.56	7.56**	-7.51**	-4.01*	13.97**	31.23**	12.74**	16.41**	85.92**	90.55**
P_6 x P_7	3.11	11.64**	10.59**	2.04	3.99*	7.92**	19.82**	27.76**	9.76**	13.85**	79.61**	84.08**
P_6 x P_8	-4.43	-11.87**	-12.70**	-0.95	-15.20**	-11.99**	-22.47**	-10.73**	-23.31**	-20.67**	26.70**	29.85**
P_7 x P_8	-17.22**	-10.37**	-11.21**	-14.59**	-12.95**	-9.67**	-38.08**	-28.71**	-38.75**	-23.71**	21.84**	24.88**
S.E.+	1.39	1.39	1.39	1.20	1.20	1.20	1.15	1.15	1.15	1.17	1.17	1.17
C.D.5%	2.86	2.86	2.86	2.45	2.45	2.45	2.36	2.36	2.36	2.40	2.40	2.40
C.D.1%	3.80	3.80	3.80	3.26	3.26	3.26	3.13	3.13	3.13	3.18	3.18	3.18

Table 2 (Contd…)

Crosses	Yield per plant (kg)						Yield per hectare (q)					
	Kharif			Summer			*Kharif*			Summer		
	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2	BP	SC-1	SC-2
P_1 x P_2	-2.31	-17.36**	-29.73**	-12.46*	-24.21**	-37.25**	-2.24	-17.38**	-29.74**	-12.29*	-24.04**	-37.04**
P_1 x P_3	-22.37**	-27.87**	-38.67**	-22.82*	-27.89**	-40.31**	-22.54**	-28.03**	-38.80**	-23.07**	-28.05**	-40.36**
P_1 x P_4	-21.44**	-12.22**	-25.36**	-24.18**	-20.79**	-34.42**	-21.42**	-12.21**	-25.34**	-24.25**	-20.82**	-34.37**
P_1 x P_5	42.93**	43.28**	21.83**	37.50**	24.47**	3.05	43.01**	43.29**	21.85**	37.52**	24.47**	3.17
P_1 x P_6	21.11**	12.22**	-4.57	19.69**	2.37	-15.25**	21.20**	12.28**	-4.52	19.69**	2.24	-15.25**
P_1 x P_7	-35.94**	-25.92**	-37.01**	-36.87**	-27.89**	-40.31**	-36.00**	-26.05**	-37.11**	-36.85**	-27.83**	-40.18**
P_1 x P_8	-14.25**	-26.41**	-37.42**	-8.77	-26.05**	-38.78**	-14.25**	-26.52**	-37.52**	-8.62	-25.93**	-38.61**
P_2 x P_3	100.79**	86.55**	58.63**	94.65**	81.84**	50.54**	100.72**	86.49**	58.58**	94.31**	81.73**	50.63**
P_2 x P_4	57.33**	75.79**	49.48**	50.88**	57.63**	30.50**	57.49**	75.94**	49.61**	50.69**	57.51**	30.56**
P_2 x P_5	8.78*	9.05*	-7.28	27.03**	15.00**	-4.79	8.70*	8.91*	-7.39*	26.84**	14.80**	-4.84
P_2 x P_6	-10.03*	-16.63**	-29.11**	-1.52	-14.74**	-29.41**	-10.14*	-16.75**	-29.21**	-1.43	-14.64**	-29.25**
P_2 x P_7	-55.18**	-48.17**	-55.93**	-56.22**	-50.00**	-58.61**	-55.15**	-48.18**	-55.93**	-56.36**	-50.14**	-58.67**
P_2 x P_8	-16.52**	-28.36**	-39.09**	-21.28**	-31.84**	-43.57**	-16.56**	-28.50**	-39.20**	-21.42**	-31.95**	-43.60**
P_3 x P_4	-1.09	10.51*	-6.03	9.57*	14.47**	-5.23	-1.06	10.54*	-6.00	9.35*	14.30**	-5.26
P_3 x P_5	-25.85**	-25.67**	-36.80**	-16.06**	-21.58**	-35.08**	-26.01**	-25.86**	-36.96**	-16.09**	-21.52**	-34.95**
P_3 x P_6	-16.58**	-22.49**	-34.10**	-13.80**	-19.47**	-33.33**	-16.52**	-22.44**	-34.04**	-13.97**	-19.54**	-33.31**
P_3 x P_7	-38.90**	-29.34**	-39.92**	-37.56**	-28.68**	-40.96**	-38.88**	-29.37**	-39.94**	-37.41**	-28.48**	-40.72**
P_3 x P_8	-28.42**	-33.50**	-43.45**	-26.20**	-31.05**	-42.92**	-28.49**	-33.56**	-43.50**	-26.35**	-31.12**	-42.90**
P_4 x P_5	58.86**	77.51**	50.94**	60.45**	67.63**	38.78**	58.95**	77.57**	51.00**	60.29**	67.54**	38.87**
P_4 x P_6	44.20**	61.12**	37.01**	46.85**	53.42**	27.02**	44.27**	61.18**	37.06**	46.57**	53.20**	26.98**
P_4 x P_7	4.02	20.29**	2.29	7.60	22.89**	1.74	3.97	20.13**	2.16	7.48	22.82**	1.80
P_4 x P_8	1.97	13.94**	-3.12	6.30	11.05*	-8.06*	2.08	14.04**	-3.02	6.45	11.27*	-7.77*

P_5 x P_6	43.90**	44.25**	22.66**	40.41**	27.11**	5.23	43.90**	44.18**	22.61**	40.60**	27.25**	5.48
P_5 x P_7	21.99**	41.08**	19.96**	25.81**	43.68**	18.95**	22.15**	41.14**	20.03**	25.95**	43.92**	19.30**
P_5 x P_8	35.61**	35.94**	15.59**	34.88**	22.11**	1.09	35.73**	36.00**	15.65**	34.99**	22.18**	1.27
P_6 x P_7	23.47**	42.79**	21.41**	16.36**	32.89**	10.02**	23.59**	42.81**	21.44**	16.18**	32.76**	10.04**
P_6 x P_8	-15.04**	-21.27**	-33.06**	-10.46*	-23.42**	-36.60**	-15.03**	-21.28**	-33.06**	-10.61*	-23.64**	-36.71**
P_7 x P_8	-44.82**	-36.19**	-45.74**	-44.24**	-36.32**	-47.28**	-44.65**	-36.05**	-45.62**	-44.27**	-36.32**	-47.21**
S.E.+	0.09	0.09	0.09	0.08	0.08	0.08	12.76	12.76	12.76	12.15	12.15	12.15
C.D.5%	0.18	0.18	0.18	0.17	0.17	0.17	26.19	26.19	26.19	24.94	24.94	24.94
C.D.1%	0.23	0.23	0.23	0.23	0.23	0.23	34.76	34.76	34.76	33.10	33.10	33.10

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