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SK Acharya
Asstt Prof. CoH, SDAU, Jagudan Gujarat, India

RA Kaushik
Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

KD Ameta
Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

RB Dubey
Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Correspondence
SK Acharya
Asstt Prof. CoH, SDAU, Jagudan Gujarat, India

Stability analysis in bitter gourd (*Momordica charantia* L.)

SK Acharya, RA Kaushik, KD Ameta and RB Dubey

Abstract
Experiment was carried out at Horticulture Farm, Rajasthan College of Agriculture, Udaipur and Farmer field of Chittaurgarh district during *Kharif and zaid* season, 2012 and 2013. Crossing were made among ten parents of bitter gourd *viz.,* Solan Hara, Pusa Do Mousmi, BG 14, Green Long, MDU-1, IC-85605, IC-45346, IC-68272-1, IC-68237 and Solan Collection using partial diallel mating system to produce 45 F_1 crosses. Parents, their crosses and check *viz*., Jhalri, US-6214 and US-6203 were evaluated in field trials in two locations at Udaipur and Chittaurgarh in two different seasons which consists four environments. The stability analysis revealed that mean square due to genotypes was significant for all the characters in the experiments. The mean square due to linear component *i.e.* G x E (linear) was significant for all the characters except node at which first female flower appeared. For yield and yield contributing traits hybrid P1×P9 was found stable and suitable under favourable environment. Hybrid P_2 x P_6 and P_2 x P_{10} found stable and suitable under favourable environment for quality trait (T.S.S). Hybrid P1×P9 which exhibited stability and suitability under favourable environment for number of fruit per vine, fruit length, fruit weight, specific gravity and total yield per vine.The significant mean squares due to pooled deviation for all the traits except node at which first female flower appeared and yield per vine depicted that the genotypes differed considerably with respect to their stability and prediction for these traits would be difficult.

Keywords: parents, *heterosis, GCA, SCA, yield, Momordica charantia*

Introduction
Bitter gourd (*Momordica charantia* L.) is commonly known as *Karela* in Hindi and an important cucurbits of family Cucurbitaceae. It is a large genus with many species of annual and perennial climbers of which *Momordica charantia* L. is widely cultivated. It was originated from old world tropics, bitter gourd (also known as bitter melon, balsam pear or bitter cucumber) was long ago fanned out into rest of new world. Wild *Momordica charantia* var. *abbreviata*, a native of Asia may be the progenitor of domesticated ones. The selection of best parents for hybridization has to be based upon the complete genetic information and esteemed prepotency of potential parents. Improvement in yield is normally attained through exploitation of the genetically diverse parents in breeding programmes. Keeping the above facts in view, the experiment was carried out to identify the ideal genotype and their cross combinations along with the GxE interaction suitable for the regions.

Materials and Methods
Field experiment was carried out at Horticulture Farm, Department of Horticulture, Rajasthan College of Agriculture, Udaipur and Farmer field of Chittaurgarh district during *Kharif and zaid* season, 2012-2013. Crossing were made among ten parents of bitter gourd *viz.,* Parents {Solan Hara (P_1), Pusa Do-Mousmi (P_2), BG-14 (P_3), Green Long (P_4), MDU-1 (P_5), IC-85605 (P_6), IC-45346 (P_7), IC-68272-1 (P_8), IC-68237 (P_9) and Solan Collection (P_{10})} their crosses and check viz., Jhalri, US-6214 and US-6203 were evaluated in two locations at Udaipur and Chittaurgarh and two environments which consists four environments using partial diallel mating system to produce 45 F_1 crosses. The experiment was laid out in Randomized Block Design with three replications. Randomization of lines was done with the help of random number table as advocated by Fisher (1954) [7].

Results and Discussion

Analysis of variance

The mean squares due to phenotypic stability with regards to different traits on the basis of pooled data are presented in (Table 1) Mean squares due to genotypes including both parents and hybrids were significant for all the characters studied except node number at which first female flower appeared. Significant mean squares due to environment (E) plus genotypes x environment (G x E) interaction were also observed significant for all the characters except node at which first female flower appeared. Mean squares due to environment (linear) were significant for all the characters studied except node at which first female flower appeared and number of flower per vine indicating that macro environmental differences were present under all the environments studied. The mean squares due to genotypes x environment G x E (L) interactions were also significant for all the characters except node at which first female flower appeared and number of female flower per vine. The significant mean squares due to pooled deviation for all the traits except node at which first female flower appeared and yield per vine depicted that the genotypes differed considerably with respect to their stability and prediction for these traits would be difficult.

Days to anthesis of first male flower

A perusal of data (Table 3) revealed that out of 58 genotypes 27 were exhibited non-significant deviation from regression (S^2di), indicating their predictable behavior for this traits. Among the parents, P_6 showed non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) along with mean value lower than the population mean, therefore, it indicates their stability under poor environments and suitability for early flowering. The lines P_2 showed non-significant S^2di and regression coefficient greater than unity (bi >1) with lower mean value than the population mean, thereby indicating its stability under favourable environments and suitability for early flowering. one hybrids *viz*., P_8xP_9 showed non-significant deviation from regression (S^2di) and regression coefficient nearly equal to unity (bi =1) along with mean value lower than the population mean, thereby indicating their average stability under different environments and suitability for earliness. These hybrids would express early flowering in unfavourable environments.

Days to anthesis of first female flower

Stability parameters for this trait (Table 3) revealed that out of 58 genotypes, 21 genotypes exhibited non-significant deviation from regression (S^2di) and would show predictable behavior for days to anthesis of first female flower. Parental line P_{10} exhibited non- significant S^2di and regression coefficient greater than unity (bi >1) with lower mean value than the population mean and would show stable performance for early flowering in favourable environments. Two checks *viz*.- US-6214 and US-6203 showed non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) along with mean value lower than the population mean thereby indicating their stability under favourable environments and suitability for early flowering.

Node at which first female flower appeared

A perusal of data (Table 4) pertaining to the node number at which first female flower appeared revealed that all of 58 genotypes exhibited non-significant deviation from regression indicating their predictable behavior. Among parents, three parental lines P_1, P_7 and P_{910} exhibited non- significant S^2di and regression coefficient (bi <1) with lower mean values than the population mean, thereby indicating stability for early initiation of female flower in unfavourable environments. Among the hybrids eight hybrids *viz*., P_1xP_7, P_1xP_8, P_3xP_4, P_4xP_5, P_4xP_6, P_6xP_9, P_7xP_8 and P_7xP_9 exhibited non- significant S^2di and regression coefficient less than unity (bi <1) with lower mean values than the population mean, indicating their stability for node at which first female flower appeared in unfavourable environment. Nine hybrids *viz*., P_1xP_2, P_1xP_{10}, P_2xP_3, P_2xP_4, P_5xP_8, P_6xP_{10} and check US-6214 & US-6203 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with lower mean values than the population mean. These showed stability for node at which first female flower appeared in favourable environments.

Number of male flower per vine

Non-significant deviation from regression (S^2di) was depicted by 43 genotypes (10 parents, 32 hybrids and 1 checks) indicating their predictable behavior for number of male flower per vine. Among the parents, P_5 and P_9 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with lower mean values than the population mean, indicating their stability under favourable environments for lower number of male flower per vine and lines P_2, P_3, P_4, P_6, P_7, P_8 and P_{10} exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with lower mean values than the population mean, indicating their stability under poor environments for lower number of male flower per vine. Hybrids P_1xP_3 and P_1xP_6 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with lower mean values than the population mean, thereby indicating their stability under unfavourable environments. Two hybrids *viz*., P_2xP_3 and P_2xP_4 showed non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with lower mean values than the population mean, indicating their stability under favourable environments for number of male flower per vine (Table 4).

Number of female flower per vine

A perusal data (Table 5) for this traits revealed that out of 58 genotypes, 45 genotypes (9 parents and 36 hybrids) exhibited non-significant deviation from regression (S^2di), indicating stability and predictability for this trait. Among the parents, P_3 and P_4 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean, indicating their stability under favourable environments for higher number of female flower per vine. Ten hybrids *viz*., P_2xP_3, P_2xP_5, P_2xP_7, P_4xP_7, P_4xP_9, P_5xP_6, P_6xP_7, P_6xP_9, $P_6x\ P_{10}$ and P_7xP_9 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values than the population mean. These hybrids and checks were therefore considered suitable and stable in unfavourable environments**.** Hybrids P_3xP_5, P_3xP_8, P_3xP_{10}, P_4xP_5, P_4xP_{10}, P_5xP_9, P_5xP_{10} and P_6xP_8 showed non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These hybrids and check were therefore considered suitable and stable in favourable environments.

Number of primary branches

A perusal of stability parameters for number of primary branches (Table 5) revealed that out of 58 genotypes 58 genotypes (10 parents, 45 hybrids and 3 checks) exhibited non-significant deviation from regression (S^2di) and is as such predictable for this trait. Parental lines P_6 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values than the population mean, thereby indicating their suitability and stability under unfavourable environments. Twenty nine hybrids exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean and thereby indicating their stability under favourable environments. Six hybrids *viz* P_3xP_5, P_4xP_6, P_4xP_7, P_4xP_9, P_5xP_{10} and P_6xP_8 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values than the population mean, thereby indicating their suitability and stability under unfavourable environments.

Similar results for flowering traits have been reported by Narayan *et al.* (2006) [9], Prasad *et al.* (1987) [12] and Parmar (2000) [11].

Number of fruits per vine

A perusal of data (Table 6) for this character revealed that 37 genotypes (5 parents and 32 hybrids) exhibited non-significant deviation from regression (S^2di), indicating their predictable behavior. Seventeen hybrids *viz*., P_1xP_9, P_2xP_6, P_2xP_8, P_2xP_9, P_3xP_4, P_3xP_6, P_3xP_7, $P_3x\ P_{10}$, P_4xP_7, P_4xP_9, P_5xP_7, P_5xP_9, P_5xP_{10}, P_6xP_7, P_6xP_8, P_6xP_9 and P_7xP_9 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1), with higher mean value than the population mean. These hybrids were considered stable for favourable environments Four hybrids *viz*., P_1xP_5, P_2xP_7, P_4xP_5 and P_6xP_{10} exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean than the population mean. These hybrids thus showed stability for unfavourable environments. Number of fruits per vine is probably the most closely associated trait with yield as evident by a number of reports indicating positive correlation between them (Sharma *et al*., (2016) [14] and Bhave *et al*. (2003) [1].

Fruit length (cm)

Data (Table 6) for fruit length revealed that out of 58 genotypes, 46 genotypes (9 parents, 35 hybrids and 2 checks) exhibited non-significant deviation from regression indicating their predictable behaviour. None of the parental lines exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) along with mean value higher than the population mean. Hybrids P_2xP_4, P_2xP_7, P_3xP_4, P_3xP, P_3xP_{10}, P_4xP_7, P_4xP_{10}, P_5xP_9, P_6xP_8, P_6xP_9, P_6xP_{10} and check Jhalri exhibited non-significant S^2di and regression coefficient less than unity (bi <1) along with mean value higher than the population mean, thereby indicating their stability under unfavourable environments and suitability for longer fruit length. Thirteen hybrids *viz*., P_1xP_3, P_1xP_4, P_1xP_9, P_2xP_3, P_2xP_9, P_2xP_{10}, P_3xP_5, $P_3x\ P_6$, P_4xP_8, P_4xP_{10}, P_5xP_8, P_5xP_{10} and P_6xP_9 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean value than the population mean. These hybrids therefore, identified as stable under favourable environments for longer fruit length.

Fruit weight (g)

Perusal of data (Table 7) pertaining to fruit weight revealed that out of 58 genotypes, 53 genotypes, (8 parents, 42 hybrids and 3 checks) exhibited non-significant deviation from regression indicating their predictable behavior for this trait. Among the parents, one parent *viz.*, P_1 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean, indicating their stability under favourable environments for higher fruit weight. Out of above 42 hybrids, seventeen hybrids exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) along with mean value higher than the population mean, thereby indicating their stability under unfavourable environments and suitability for higher fruit weight. Hybrids P_1xP_6, $P_1x\ P_8$, P_1xP_9, P_2xP_4, P_2xP_6, P_2xP_9, P_3xP_5, P_3xP_6, P_9xP_{10} and check Jhalri exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean, indicating their stability under favourable environments for higher fruit weight.

Fruit diameter (cm)

Fifty genotypes reflecting non-significant deviation from the regression (S^2di) and for their predictable behaviour of fruit diameter. These genotypes include 9 parents, 39 hybrids and 2 checks. Out of above 9 parents, none of the parental line exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) and (bi <1) with higher mean values than the population mean, indicating their stability under favourable and unfavourable environments for higher fruit diameter.Out of above 39 hybrids, thirteen hybrids *viz*., P_1xP_6, P_1xP_8, P_1xP_9, $P_1x\ P_{10}$, P_2xP_6, P_2xP_9, P_2xP_{10}, P_3xP_7, P_3xP_9, P_4xP_9, P_6xP_9 and P_7xP_8 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) along with mean value higher than the population mean, thereby indicating their stability under unfavourable environments and suitability for higher fruit diameter. Hybrids P_2xP_3, P_2xP_8, P_3xP_4, P_3xP_5, P_4xP_5, P_4xP_7, P_5xP_6, P_6xP_7, P_7xP_9, P_7xP_{10}, P_8xP_9 and P_9xP_{10} showed non- significant S^2di and regression coefficient nearly equal to unity (bi =1) with higher mean value than the population mean thereby indicating their average stability under different environments and suitability for higher fruit diameter. Hybrids P_1xP_2, P_1xP_3, P_1xP_5, P_1xP_7, P_2xP_7, P_3xP_6, P_3xP_8, P_3xP_{10}, P_4xP_6, P_4xP_{10}, P_5xP_7, P_5xP_8, P_5xP_9, P_5xP_{10}, P_6xP_8, P_6xP_{10}, P_7xP_8 and P_8xP_{10} exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean, indicating their stability under favourable environments for higher fruit diameter (Table 7).

Specific gravity (g/cc)

Non-significant deviation from regression (S^2di) was depicted by 33 genotypes (5 parents, 25 hybrids and 3 checks) thereby suggesting the predictability of performance of genotypes under reference for specific gravity (Table 8). Parental lines P_5 and P_6 having non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) and higher mean values as compared to the population mean were considered suitable and stable under unfavourable environments. Eight hybrids *viz*., P_1xP_3, P_2xP_4, P_2xP_6, P_3xP_4, P_5xP_8, P_6xP_7, P_8xP_{10} and three checks –Jhalri, US-6214 and US-6203 which manifested non-significant deviation from regression (S^2di) and regression coefficient below unity (bi

<1) along with higher mean values as compared to the population mean, were as such considered stable and suitable under unfavourable environments for specific gravity. Ten hybrids *viz*., P_1xP_2, P_1xP_9, P_1xP_{10}, P_2xP_3, P_2xP_5, P_2xP_{10}, P_5xP_9, P_6xP_8, P_6xP_{10} and P_7xP_{10} with non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) along with higher mean values than the population mean, thereby indicating that these hybrids were stable and suitable under favourable environments.

Number of seeds per fruit

Out of 58 genotypes 11 genotypes exhibited non-significant deviation from regression (S^2di), indicating their predictable behaviour for number of seeds per fruit (Table 8). Parental lines P_1 and P_8 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with lower mean values than the population mean. These lines thus showed its superiority and stability under favourable environments. Two lines *viz*., P_2 and P_9 showed non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with lower mean values than the population mean, indicating their stability and suitability under unfavourable environments for number of seeds per fruit. Hybrid P_4xP_5 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with lower mean values than the population mean, thereby indicating stability under favourable environments.

Yield per vine (kg)

Out of 58 genotypes, 53 genotypes showed non-significant deviation from regression (S^2di) indicating their predictable behavior (Table 9). Parents $P_{1,}$ $P_{2,}$ $P_{9,}$ and P_{10} exhibited non-significant S^2di and regression coefficient nearly equal to unity (bi <1) with higher mean values than the population mean, thereby indicating stability under poor environments for yield per vine. Two other parents *viz*., P_4 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These parents thus showed its superiority and stability under favourable environments. Eleven hybrids *viz*., P_1xP_2, P_1xP_4, P_1xP_7, P_1xP_8, P_2xP_3, P_2xP_{10}, P_3xP_4, P_4xP_5, P_4xP_6, P_5xP_6 and P_7xP_8 and two checks "US-6214" and"US-6203" exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) and higher mean values as compared to the population mean, were considered suitable and stable under unfavourable environments. Fourteen hybrids *viz*., P_1xP_6, P_1xP_9, P_2xP_4, P_2xP_5, P_2xP_6, P_2xP_8, P_2xP_9, P_3xP_5, P_3xP_6, P_3xP_8, P_4xP_9, P_5xP_9, P_6xP_7 and P_6xP_8 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values as compared to the population mean. These hybrids and checks were found stable in favourable environments. Similar findings on yield and its contributing traits as reported by Varalakshmi *et al.* (1998) [16] and Narayanankutty *et al.* (2005) [10].

Vine length (cm)

Predictable behaviour was observed by 47 genotypes out of 58 genotypes these genotypes include 6 parents 38 hybrids and 3 checks (Table 9). Out of above 13 parents, three parents *viz*., P_1, P_2 P_8, P_9 and P_{10} showed non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These parents were therefore stable in favourable environments respectively. Seven hybrids *viz*., P_1xP_7, P_1xP_8, P_3xP_4, P_3xP_5, P_4xP_9, P_4xP_{10} and P_6xP_{10} exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values than the population mean, thereby indicating their suitability and stability under unfavourable environments. Eighteen hybrids *viz*., P_1xP_2, P_1xP_5, P_1xP_6, P_1xP_{10}, P_2xP_4, P_2xP_5, P_2xP_6, P_2xP_{10}, P_3xP_6, P_3xP_7, P_3xP_8, P_3xP_9, P_3xP_{10}, P_4xP_5, P_4xP_6, P_6xP_7, P_6xP_8 and P_6xP_9 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These hybrids were therefore considered suitable and stable in favourable environments.

Days to maturity

Non-significant deviation from regression (S^2di) was depicted by 16 genotypes indicating their predictable behaviour for days to maturity (Table 10). Out of above 10 parents, a lines *viz*., P7 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi <1) with lower mean value than the population mean. Thus, it indicated its stability under unfavourable environments for early maturity. Among the hybrids, P_1xP_7 exhibited non-significant S^2di and regression coefficient lower than unity (bi <1) with lower mean value than the population mean. It thus indicated their stability under poor environment for early maturity. Check US-6214 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with mean value less than the population mean. It thus indicated its stability under favourable environments for early maturity.

Total soluble solids (%)

In case of TSS 40 genotypes (9 parents, 28 hybrids and 3 checks) out of 58 genotypes exhibited non-significant deviation from regression (S^2di), indicating their predictable behavior (Table 10). Five parents *viz*., P_1, P_2, P_3, P_4 and P_5 exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values as compared to the population mean, were considered suitable and stable under unfavourable environments. One parent *viz*., P9 showed non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These parents were therefore considered suitable and stable in favourable environments. Eight hybrids *viz*., P_1xP_9, P_2xP_5, P_2xP_9, P_5xP_6, P_6xP_{10}, P_7xP_8, P_7xP_9, P_8xP_9 and two check "US-6214 & US-6203" exhibited non-significant deviation from regression (S^2di) and regression coefficient less than unity (bi <1) with higher mean values as compared to the population mean, were considered suitable and stable under unfavourable environments. Ten hybrids *viz*., P_1xP_2, P_1xP_8, P_2xP_6, P_3xP_{10}, P_4xP_8, P_4xP_{10}, P_6xP_8, P_6xP_9, P_7xP_{10}, P_9xP_{10} and one check namely "Jhalri" exhibited non-significant deviation from regression (S^2di) and regression coefficient more than unity (bi >1) with higher mean values than the population mean. These hybrids and check were therefore considered suitable and stable under favourable environments.

Ascorbic acid content (mg/100g)

A perusal of data for this character revealed that 29 genotypes (3 parents, 23 hybrids and 3 checks) showed non-significant deviation from regression (S^2di) indicating their predictable behaviour for ascorbic acid content (Table 11). Fourteen hybrids *viz*., P_2xP_6, P_2xP_{10}, P_3xP_8, P_3xP_9, P_4xP_7, P_4xP_8, P_4xP_9, P_5xP_9, P_6xP_7, P_6xP_9, P_7xP_8, P_9xP_{10} and three checks- Jhalri, US-6214 and US-6203 exhibited non-significant deviation from regression (S^2di) and regression coefficient greater than unity (bi >1) with higher mean values than the population mean. These genotypes thus showed its suitability and stability under favourable environments. Seven hybrids P_3xP_7, P_3xP_{10}, P_4xP_{10}, P_5xP_8, P_6xP_8, P_8xP_9 and P_8xP_{10} showed non-significant S^2di and regression coefficient nearly equal to unity (bi =1) with higher mean values than the population mean. This hybrid was thus stable and suitable in performance under different environments for ascorbic acid content.

The significant G x E interaction for yield and fruit quality traits were reported by Das *et al.* (2005) [3] and Dijkhuizen and Staub (2002) [5] in cucumber and in watermelon by Dia (2012) [4]. Mean squares due to pooled deviation (non-linear) were significant for all the characters except for sex ratio and T.S.S. Thus, suggested that linear and non –linear components played important role in building up of total G x E interactions for these traits. Pooled analysis of variance for growth, earliness and yield and quality traits across the three locations was recorded by Vasanthkumar *et al.* (2012) [17] in watermelon. Ceccarelli (1989) [2] expressed that higher attention should be given to the assessment of yield stability.

Similar findings for identification of genotypes for their stability under varying environmental conditions were also reported by Krishnaprasad and Singh (1992) [8], Rajput *et al.* (1994) [13] in bitter gourd for yield and its component and in watermelon by Dia (2012) [4]. In cucumber by Singh and Ram (2012) [15].

Table 1: Analysis of variance Eberhart and Russel (1966)

S. N	Characters	Genotype	E+(G x E)	E (L)	G x E (L)	Pool dev.	Pool Err
		[57]	[174]	[1]	[57]	[116]	[456]
1	Days to anthesis of first male flower	13.03**	4.86**	0.00	4.58**	5.05**	1.25
2	Days to anthesis of first female flower	10.79**	9.68**	0.01	13.20**	8.03**	1.08
3	Node number at which I female flower appeared	0.89	0.91	0.00	1.03	0.86	0.88
4	Number of male flowers per vine	578.30**	65.83**	0.06	103.69**	47.79**	17.53
5	Number of female flowers per vine	7.33**	1.98**	0.00	0.91	2.52**	1.13
6	Number of primary branches	0.41**	1.88**	0.09	5.64**	0.06	0.17
7	Number of fruits per vine	5.18**	2.81**	0.00	1.33*	3.57**	0.94
8	Fruit length (cm)	27.21**	6.03**	0.21	14.83**	1.75**	0.94
9	Fruit weight (g)	725.64**	33.77**	0.55	85.43**	8.66**	6.10
10	Fruit diameter (cm)	1.46**	0.90**	0.04	2.57**	0.09**	0.04
11	Specific gravity (g/cc)	0.00**	0.00**	0.00	0.00**	0.00**	0.00
12	Number of seeds per fruit	38.77**	11.55**	0.00	12.16**	11.34**	0.72
13	Yield per vine (kg)	0.33**	0.03**	0.00	0.07**	0.01	0.01
14	Vine length (cm)	3689.04**	4040.64**	166.51	11396.56**	459.49**	198.82
15	Days to maturity	52.35**	21.50**	0.01	25.05**	19.94**	1.85
16	Total soluble solids (%)	0.29**	0.03**	0.00	0.05**	0.02**	0.00
17	Ascorbic acid (mg/100g)	39.77**	3.39**	0.03	4.05**	3.10**	0.35

*, ** Significant at 5% and 1% respectively.

Table 2: Stability of different parents, hybrids and checks for various traits on bitter gourd

Characters	Average environments (bi=1)	Unfavourable environments (bi <1)	Favourable environments (bi >1)
Days to anthesis of first male flower	P_8 x P_9	-	-
Days to anthesis of first female flower	-	-	-
Node at which first female flower appeared	-	P1 x P7, P1 x P8, P3 x P4, P4 x P5, P4 x P6, P6 x P9, P7 x P8 and P7 x P9	P1 x P2, P1 x P10, P2 x P3, P2 x P4, P5 x P8, P6 x P10 and check US-6214 & US-6203
Number of male flower per vine	-	P1 x P3 and P1 x P6	P2 x P3 and P2 x P4
Number of female flower per vine	-	P2 x P3, P2 x P5, P2 x P7, P4 x P7, P4 x P9, P5 x P6, P6 x P7, P6 x P9, P6 x P10 and P7 x P9	P3 x P5, P3 x P8, P3 x P10, P4 x P5, P4 x P10, P5 x P9, P5 x P10 and P6 x P8
Number of primary branches	-	P3 x P5, P4 x P6, P4 x P7, P4 x P9, P5 x P10 and P6 x P8	-
Number of fruits per vine	-	P1 x P5, P2 x P7, P4 x P5 and P6 x P10	P1 x P9, P2 x P6, P2 x P8, P2 x P9, P3 x P4, P3 x P6, P3 x P7, P3 x P10, P4 x P7, P4 x P9, P5 x P7, P5 x P9, P5 x P10, P6 x P7, P6 x P8, P6 x P9 and P7 x P9
Fruit length (cm)	-	P2 x P4, P2 x P7, P3 x P4, P3 x P7, P3 x P10, P4 x P7, P4 x P10, P5 x P9, P6 x P8, P6 x P9, P6 x P10 and Chech Jhalri	P1 x P3, P1 x P4, P1 x P9, P2 x P3, P2 x P9, P2 x P10, P3 x P5, P3 x P6, P4 x P8, P4 x P10, P5 x P8, P5 x P10 and P6 x P9

Table 3: Stability parameters for days to anthesis of first male flower and days to anthesis of first female flower [Eberhart and Russel (1966)]

SN	Genotype	Days to anthesis of first male flower			Days to anthesis of first female flower		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	43.00	-1.31	3.328*	58.67	9.65	10.506**
2	P2	43.83	3.60	1.292	59.67	-0.34	-0.894
3	P3	44.92	-2.65	4.864**	59.92	1.44	25.313**
4	P4	44.17	-2.67	-0.135	58.17	1.20	9.861**
5	P5	43.33	-1.63	7.440**	57.25	3.30	4.023**

6	P6	43.42	0.27	0.229	56.92	1.71	6.053**
7	P7	46.25	3.97	3.067*	58.67	-0.67	0.005
8	P8	45.17	-0.25	7.022**	60.58	-0.35	4.145**
9	P9	43.42	-2.77	6.453**	59.50	1.99	3.301*
10	P10	45.83	3.04	5.836**	57.42	9.17**+	-0.622
11	P1 x P2	45.67	6.47	11.983**	59.17	5.35	4.531**
12	P1 x P3	44.42	5.53	2.450	61.92	-0.05	-0.039
13	P1 x P4	43.83	7.03**++	-1.187	61.83	-1.17	-0.116
14	P1 x P5	47.33	-4.46	-0.566	61.33	-5.29+	0.104
15	P1 x P6	48.00	2.54	1.663	59.67	-1.34	4.360**
16	P1 x P7	46.08	5.45	14.434**	59.92	6.24*+	-0.799
17	P1 x P8	45.83	2.54	6.612**	59.50	2.40	2.968*
18	P1 x P9	45.58	-7.24	6.450**	61.17	-2.04	6.120**
19	P1 x P10	44.58	-6.19	0.541	61.42	-3.53	2.526*
20	P2 x P3	44.17	-5.15	5.929**	61.83	-0.31	-0.055
21	P2 x P4	48.25	0.04	-1.096	59.75	2.64	-0.093
22	P2 x P5	47.00	3.97	6.577**	58.33	1.23	21.115**
23	P2 x P6	47.08	6.35	9.857**	60.08	-1.04	7.738**
24	P2 x P7	46.17	4.36	6.480**	60.33	0.38	0.764
25	P2 x P8	46.92	4.71	1.421	61.42	-0.27	0.939
26	P2 x P9	47.58	2.45	-0.463	61.17	2.24	6.746**
27	P2 x P10	45.00	-0.41	10.065**	59.50	3.58	5.424**
28	P3 x P4	46.50	4.60	1.778	60.17	1.41	8.246**
29	P3 x P5	46.92	3.69	7.538**	57.17	-0.49	5.123**
30	P3 x P6	44.58	-2.33	11.050**	55.83	-5.59	30.138**
31	P3 x P7	44.17	5.53	2.348	58.00	3.10	13.923**
32	P3 x P8	47.42	5.04	8.825**	60.50	2.59	9.339**
33	P3 x P9	48.83	0.31	-1.204	61.25	0.49	7.221**
34	P3 x P10	48.92	0.22	-1.213	60.00	5.10	8.832**
35	P4 x P5	44.50	-4.43	0.959	59.33	-0.22	31.239**
36	P4 x P6	44.25	-7.14	14.171**	58.75	-4.63	4.633**
37	P4 x P7	48.17	1.42	-0.873	55.50	-4.83	7.280**
38	P4 x P8	45.92	5.27*+	-1.118	58.50	-5.14	5.659**
39	P4 x P9	47.75	2.39	3.125*	59.58	-0.84	4.076**
40	P4 x P10	47.75	-0.08	0.237	61.25	-5.84	0.815
41	P5 x P6	48.00	1.44	0.622	61.50	-1.36	2.955*
42	P5 x P7	47.25	-1.82	0.852	61.08	2.36	0.783
43	P5 x P8	46.17	4.01	15.817**	59.75	-0.57	4.972**
44	P5 x P9	47.42	-3.79	-0.222	59.08	4.99	20.342**
45	P5 x P10	47.67	0.95	3.979*	58.67	10.04	11.574**
46	P6 x P7	48.42	0.35	-0.888	59.00	5.32	12.224**
47	P6 x P8	45.50	7.97	-0.173	61.17	1.18	1.652
48	P6 x P9	43.75	9.73	0.063	59.58	-4.78	0.201
49	P6 x P10	43.33	0.77	2.682*	60.33	-11.71**++	-0.869
50	P7 x P8	44.50	-5.42	11.828**	61.00	0.00	-1.080
51	P7 x P9	45.08	-5.00	7.873**	60.50	-4.10	39.203**
52	P7 x P10	46.58	-4.65	1.271	59.58	-1.19	6.854**
53	P8 x P9	48.50	1.06	-0.768	61.17	1.63	1.265
54	P8 x P10	47.50	-6.17**++	-1.193	59.00	-1.11	20.649**
55	P9 x P10	47.17	3.28	4.438*	58.67	8.22	21.925**
56	Check 1	45.00	-1.09	6.279**	59.08	11.14*+	1.666
57	Check 2	42.25	10.33*+	-0.765	56.75	9.49**++	-0.703
58	Check 3	41.58	3.94	2.423	54.50	7.24**+	-0.757

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 4: Stability parameters for node number at which I female flower appeared and number of male flowers per vine [Eberhart and Russel (1966)]

SN	Genotype	Node number at which I female flower appeared			Number of male flowers per vine		
		μ_i	**b_i**	**S^2d_i**	**μ_i**	**b_i**	**S^2d_i**
1	P1	11.00	9.82	-0.610	120.25	0.35	-15.914
2	P2	11.33	-9.19*+	-0.852	121.08	-0.41	-14.987
3	P3	11.25	10.86	-0.398	120.08	-0.90	-6.066
4	P4	11.33	-5.92	0.524	119.17	-1.21	-15.812
5	P5	11.25	8.97	0.887	122.25	2.36	-15.468
6	P6	11.33	-13.85	0.665	123.83	-2.45*+	-17.125
7	P7	10.92	-2.86	0.437	120.67	0.26	-10.192
8	P8	11.42	-3.05	0.428	121.50	0.56	-12.104
9	P9	11.33	1.38	0.776	124.08	2.00	0.127

10	P10	10.75	-1.04	0.491	121.50	-1.52	-4.775
11	P1 x P2	11.08	1.60	-0.632	129.42	10.87	170.568**
12	P1 x P3	11.17	0.57	0.177	142.00	0.38	30.896
13	P1 x P4	11.33	-0.76	0.342	143.00	-8.01	66.449**
14	P1 x P5	11.33	-2.64	-0.707	143.42	5.88	191.193**
15	P1 x P6	11.58	4.31	-0.309	142.17	-11.73*+	3.904
16	P1 x P7	10.83	-0.69	0.287	145.92	-0.55	-3.549
17	P1 x P8	11.08	-8.84	0.126	145.25	9.54*+	-14.212
18	P1 x P9	11.25	2.93	-0.566	148.50	5.06	46.929*
19	P1 x P10	11.00	5.29	-0.200	144.83	-1.09	184.311**
20	P2 x P3	10.92	7.58	-0.605	137.00	12.17	101.176**
21	P2 x P4	11.00	2.64	0.960	138.92	9.46	30.040
22	P2 x P5	11.83	-0.69	-0.713	150.25	-1.84	90.398**
23	P2 x P6	11.50	7.11	0.350	153.25	-1.18	-1.480
24	P2 x P7	12.08	-6.20	-0.349	154.92	-0.67	5.995
25	P2 x P8	11.75	14.07*+	-0.785	151.58	-5.07	46.745*
26	P2 x P9	11.75	-10.86	1.602	151.75	-8.59	101.461**
27	P2 x P10	11.58	-1.60	-0.632	143.25	6.00	-7.927
28	P3 x P4	11.08	-0.41	-0.058	149.42	2.86	39.487*
29	P3 x P5	11.42	8.28	0.978	149.58	1.43	3.081
30	P3 x P6	10.67	3.40	0.925	154.75	-2.14	-3.856
31	P3 x P7	11.50	-1.32	-0.834	156.92	-2.07	-14.198
32	P3 x P8	11.42	4.88	-0.015	152.42	2.54	2.936
33	P3 x P9	12.25	-4.88	-0.015	148.50	6.47*	-10.597
34	P3 x P10	11.17	1.95	-0.738	146.75	0.43	20.199
35	P4 x P5	11.08	-3.56	-0.153	150.33	-0.02	20.474
36	P4 x P6	10.75	-17.40*+	-0.695	152.00	-0.43	41.498*
37	P4 x P7	11.75	-6.33	0.417	154.50	-4.64	-4.120
38	P4 x P8	11.17	11.14**++	-0.876	151.92	0.68	-17.374
39	P4 x P9	11.83	-1.32	-0.167	156.83	-0.28	-15.378
40	P4 x P10	11.25	-0.85	1.493	152.17	-0.81	13.538
41	P5 x P6	12.33	0.00	-0.765	156.08	0.29	-16.289
42	P5 x P7	11.33	10.45	-0.596	155.00	-0.23	-15.837
43	P5 x P8	10.92	2.42	2.121*	154.67	-0.46+	-17.207
44	P5 x P9	11.83	4.59*+	-0.870	156.92	-1.92	-13.680
45	P5 x P10	12.25	-3.12	2.425*	154.50	0.57	-17.455
46	P6 x P7	11.67	-9.06	0.610	153.83	0.88	0.912
47	P6 x P8	11.33	-11.83	-0.719	151.25	-0.43	-4.356
48	P6 x P9	11.00	-6.55*++	-0.869	149.75	-0.12	-10.732
49	P6 x P10	10.92	6.20	-0.794	155.33	-1.33	4.295
50	P7 x P8	10.92	-14.70	-0.589	154.08	-0.57	12.863
51	P7 x P9	10.92	0.91	-0.285	149.58	0.01	-15.151
52	P7 x P10	11.92	10.10	-0.500	142.17	16.00	549.276**
53	P8 x P9	11.50	5.98	-0.093	132.33	22.54	129.870**
54	P8 x P10	12.58	-1.73	0.143	152.75	2.97	-14.262
55	P9 x P10	11.42	10.92	0.480	151.33	2.01*	-17.274
56	Check 1	11.75	22.63*+	-0.730	152.75	-0.89	-5.492
57	Check 2	10.50	22.97	-0.281	150.92	-1.41	104.400**
58	Check 3	10.00	5.29	-0.533	147.08	-3.58	94.968**

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 5: Stability parameters for number of female flowers per vine and number of primary branches [Eberhart and Russel (1966)]

SN	Genotype	Number of female flowers per vine			Number of primary branches		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	20.58	-1.19	1.886	4.40	0.94**	-0.163
2	P2	20.17	-3.68	-0.871	4.71	0.63**++	-0.168
3	P3	21.33	-5.20	-0.831	4.83	0.73**++	-0.169
4	P4	21.08	-2.71	0.114	4.54	0.77**++	-0.168
5	P5	21.17	-0.22	0.035	4.22	0.79*	-0.017
6	P6	21.00	6.92	-0.313	5.01	0.89**+	-0.169
7	P7	19.58	-1.62	1.753	4.82	0.73*	-0.102
8	P8	21.50	-5.41	2.628*	4.89	0.79**+	-0.164
9	P9	20.83	-1.52	-1.116	4.89	0.49**++	-0.162
10	P10	21.92	-3.36	-0.622	4.39	0.64**++	-0.165
11	P1 x P2	20.92	2.70	0.781	5.50	1.03**	-0.167
12	P1 x P3	21.83	1.51	1.773	5.12	1.57**+	-0.137
13	P1 x P4	20.50	-5.85**++	-1.125	5.08	1.25**+	-0.160
14	P1 x P5	20.92	6.60	-0.860	5.55	1.08**	-0.168

15	P1 x P6	20.08	0.32	21.242**	4.85	0.76*	-0.063
16	P1 x P7	21.00	-1.30	1.617	4.96	1.14**	-0.134
17	P1 x P8	22.08	-8.77**++	-1.116	4.88	1.08**	-0.168
18	P1 x P9	21.75	6.82	-0.134	5.31	1.16**	-0.121
19	P1 x P10	21.17	6.71	1.906	5.20	1.35*	-0.064
20	P2 x P3	22.00	0.86	-0.811	5.48	1.01**	-0.163
21	P2 x P4	21.42	2.05	-1.053	5.27	1.27*	0.074
22	P2 x P5	23.50	-4.55	0.003	5.04	1.06*	0.105
23	P2 x P6	21.75	-0.54	-0.983	4.93	0.97*	0.074
24	P2 x P7	21.67	-3.90	0.045	5.48	1.01**	-0.163
25	P2 x P8	21.33	-8.23	-0.884	5.03	0.91*	-0.055
26	P2 x P9	21.00	3.03	-0.960	5.14	1.30**+	-0.156
27	P2 x P10	20.75	8.98	0.261	5.32	1.02*	0.080
28	P3 x P4	21.42	2.05	0.281	5.47	1.01*	-0.045
29	P3 x P5	22.50	7.14	5.689**	4.99	0.87**+	-0.166
30	P3 x P6	21.42	1.62	1.975	5.37	1.21**++	-0.170
31	P3 x P7	21.42	2.05	0.169	5.14	1.16**	-0.137
32	P3 x P8	21.58	6.17	4.460**	5.42	1.25**	-0.124
33	P3 x P9	21.25	8.33	3.460*	5.30	1.15**	-0.154
34	P3 x P10	21.67	5.19	2.392*	5.07	1.09**	-0.132
35	P4 x P5	22.42	6.38	-1.033	4.97	1.44*	-0.033
36	P4 x P6	21.50	9.30	0.281	4.99	0.87*	-0.052
37	P4 x P7	22.17	0.65	1.140	5.25	0.96*	0.077
38	P4 x P8	20.92	2.27	1.375	5.21	1.07**+	-0.170
39	P4 x P9	22.42	-3.14	-0.930	5.33	0.87**+	-0.166
40	P4 x P10	21.92	11.79	0.560	5.28	1.42**+	-0.134
41	P5 x P6	23.00	-2.17	0.675	5.01	1.18*	-0.062
42	P5 x P7	21.00	3.03	-1.071	4.85	1.34*	-0.063
43	P5 x P8	21.33	-0.00	-0.686	4.85	0.75**++	-0.170
44	P5 x P9	23.08	8.98	-0.183	5.37	1.21**++	-0.170
45	P5 x P10	22.33	4.33	1.649	5.19	0.76**++	-0.170
46	P6 x P7	23.42	-4.01	-0.262	4.99	1.46**++	-0.161
47	P6 x P8	21.83	8.01	-0.877	5.08	0.95**	-0.160
48	P6 x P9	21.67	-2.17	0.786	5.17	1.04**	-0.169
49	P6 x P10	22.17	-2.38	-0.287	5.37	1.21**++	-0.170
50	P7 x P8	21.25	-1.19	-0.781	5.06	0.94**	-0.166
51	P7 x P9	22.00	-0.00	-1.131	5.17	1.32**++	-0.165
52	P7 x P10	23.50	-1.95	4.413**	5.03	0.61**++	-0.170
53	P8 x P9	22.92	9.63	4.381**	4.86	1.05**++	-0.170
54	P8 x P10	22.42	-3.14	2.403*	5.44	1.27**	-0.137
55	P9 x P10	23.08	-0.54	5.906**	5.65	1.16**	-0.161
56	Check 1	26.17	1.51	8.440**	5.25	0.08++	-0.143
57	Check 2	26.50	0.21	12.702**	4.41	0.51	0.167
58	Check 3	26.58	-8.55	2.283*	4.33	0.43+	-0.099

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 6: Stability parameters for number of fruits per vine and fruit length (cm) [Eberhart and Russel (1966)]

S. N	Genotype	Number of fruits per vine			Fruit length (cm)		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	19.17	0.94	1.666	16.01	-0.09	-0.020
2	P2	19.17	0.71	0.494	17.73	0.91	0.002
3	P3	19.92	1.17	3.251*	17.30	1.32*	-0.411
4	P4	19.83	0.00	1.008	17.65	0.97	-0.013
5	P5	20.25	0.55	2.508*	16.42	1.44	1.987*
6	P6	19.42	-0.67	2.489*	17.01	0.74	-0.541
7	P7	18.50	0.52	3.304*	17.11	0.38	0.798
8	P8	19.00	-0.55	12.245**	17.85	0.10	0.135
9	P9	19.42	1.24	-0.882	17.43	1.22*	-0.414
10	P10	19.83	0.90	0.010	17.26	0.60	1.752
11	P1 x P2	19.08	0.72	-0.299	18.95	1.51	0.751
12	P1 x P3	20.00	3.38	2.950*	19.92	1.47*	-0.388
13	P1 x P4	19.33	1.08	-0.872	19.38	1.86*	1.175
14	P1 x P5	20.17	0.50	-0.248	19.17	1.59	3.021*
15	P1 x P6	18.92	6.28	17.725**	18.51	1.65	1.405
16	P1 x P7	19.83	-0.26	0.110	18.64	1.22*	-0.635
17	P1 x P8	21.00	-1.74	4.097**	18.83	1.13**	-0.796
18	P1 x P9	20.50	2.16	0.038	19.42	1.18	0.843
19	P1 x P10	19.92	3.47	3.241*	18.75	1.53*	-0.498

20	P2 x P3	19.75	1.36	-0.369	18.36	1.95**+	-0.641
21	P2 x P4	19.75	0.97	0.087	20.18	0.53	-0.233
22	P2 x P5	19.67	1.72	-0.560	18.63	0.90*	-0.507
23	P2 x P6	20.33	1.97	-0.131	19.11	1.05	5.922**
24	P2 x P7	20.00	0.94	-0.280	19.76	0.52	0.598
25	P2 x P8	20.50	1.92	1.504	18.59	1.12	1.009
26	P2 x P9	20.08	1.75	-0.421	19.32	1.93**+	-0.665
27	P2 x P10	19.67	0.56	0.466	19.70	1.03	2.362*
28	P3 x P4	19.92	1.94	-0.296	20.35	0.75	1.021
29	P3 x P5	20.92	3.22	2.360*	20.00	1.24*	-0.180
30	P3 x P6	20.17	2.68	1.361	18.76	1.36	1.797
31	P3 x P7	20.25	2.19	0.228	19.25	0.87	1.089
32	P3 x P8	19.92	3.59	4.793**	18.92	0.96	3.316*
33	P3 x P9	19.42	2.37	3.117*	20.04	1.30	2.302*
34	P3 x P10	20.08	2.64	1.157	20.01	0.72	1.336
35	P4 x P5	21.00	0.82	-0.918	19.34	0.53	6.358**
36	P4 x P6	18.92	1.03	1.071	19.97	1.15	3.818**
37	P4 x P7	20.00	1.97	-0.131	20.31	0.99**	-0.898
38	P4 x P8	19.33	4.14	5.838**	19.80	1.03	1.208
39	P4 x P9	20.58	1.69	-0.615	19.45	1.23	2.901*
40	P4 x P10	19.75	1.23	0.678	20.42	0.59	1.548
41	P5 x P6	21.25	-1.77	4.124**	20.39	1.40	2.820*
42	P5 x P7	20.25	1.55	-0.445	19.36	1.08	7.170**
43	P5 x P8	19.58	1.81	0.106	20.35	1.42**+	-0.857
44	P5 x P9	20.17	2.03	0.447	21.53	0.56*	-0.759
45	P5 x P10	20.58	2.46	0.948	19.44	1.67**+	-0.828
46	P6 x P7	19.92	2.33	0.257	19.08	0.84**+	-0.921
47	P6 x P8	20.25	2.19	0.228	19.33	0.93*	-0.586
48	P6 x P9	20.42	2.39	0.441	20.84	1.03*	-0.530
49	P6 x P10	20.75	0.21	-0.457	21.52	0.40	-0.232
50	P7 x P8	19.58	1.42	0.387	20.46	0.35*+	-0.870
51	P7 x P9	20.33	1.97	-0.131	20.80	0.62*	-0.762
52	P7 x P10	21.25	-2.91	9.283**	21.04	0.45	-0.427
53	P8 x P9	20.67	-2.50	7.326**	21.03	0.44	-0.365
54	P8 x P10	20.92	-1.75	5.687**	21.00	0.70*	-0.857
55	P9 x P10	21.83	-2.29	10.072**	21.09	0.79	-0.481
56	Check 1	23.67	-4.31	21.644**	35.96	-0.06	3.998**
57	Check 2	24.67	-4.16	16.703**	15.97	1.36*	-0.099
58	Check 3	24.25	-1.77	4.124**	16.01	1.50*	0.248

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 7: Stability parameters for fruit weight (g) and fruit diameter (cm) [Eberhart and Russel (1966)]

SN	Genotype	Fruit weight (g)			Fruit diameter (cm)		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	87.33	-0.06+	-5.721	5.78	1.25**	-0.002
2	P2	90.08	0.46	4.408	6.17	1.10**+	-0.037
3	P3	93.83	-0.28+	-3.958	6.23	0.75**++	-0.037
4	P4	87.67	4.07	27.682**	6.27	0.35+	-0.012
5	P5	60.75	0.64	-3.651	5.77	1.23**	-0.016
6	P6	59.00	1.58*	-2.756	6.08	0.77**++	-0.037
7	P7	59.50	-0.47	-0.248	6.17	0.66**++	-0.038
8	P8	95.75	-0.68+	-4.747	6.35	0.68**++	-0.037
9	P9	91.92	1.78	5.795	6.51	0.77	0.319**
10	P10	84.67	5.15	73.883**	6.23	0.75	0.065
11	P1 x P2	87.17	-0.42	9.115	6.61	1.56	0.335**
12	P1 x P3	91.58	2.83	31.426**	6.61	1.58*	0.272**
13	P1 x P4	84.50	0.61	-4.785	6.33	1.26	0.392**
14	P1 x P5	90.75	4.75	113.728**	6.53	1.37	0.514**
15	P1 x P6	89.58	1.31**+	-5.973	6.55	0.68	0.022
16	P1 x P7	85.58	0.65	-3.344	6.38	1.44*	0.013
17	P1 x P8	106.33	1.05*	-5.578	6.68	0.90*	-0.004
18	P1 x P9	101.00	1.14**+	-6.092	6.99	0.89**+	-0.037
19	P1 x P10	76.67	0.87	1.669	6.96	0.85**++	-0.038
20	P2 x P3	86.00	0.29	8.896	7.02	1.03**	-0.037
21	P2 x P4	97.42	2.19**+	-4.867	6.04	0.86	1.583**
22	P2 x P5	87.75	0.54	-5.557	6.18	1.30**++	-0.037
23	P2 x P6	87.50	1.25	-2.695	6.40	0.92**+	-0.037
24	P2 x P7	79.75	0.23+	-5.545	6.97	1.10**+	-0.037

25	P2 x P8	85.08	0.47	-4.809	6.98	1.08**+	-0.037
26	P2 x P9	96.33	1.76*	-2.766	6.65	0.51**++	-0.038
27	P2 x P10	86.00	1.28	-1.867	7.03	0.83**++	-0.037
28	P3 x P4	81.17	-0.40+	-3.641	6.62	1.08**+	-0.037
29	P3 x P5	96.50	1.22*	-4.065	6.48	1.08**+	-0.037
30	P3 x P6	92.25	1.10	0.339	6.92	1.12**+	-0.037
31	P3 x P7	77.17	0.78	-4.681	7.03	0.83**++	-0.037
32	P3 x P8	87.00	-0.06	5.295	7.08	1.16**++	-0.037
33	P3 x P9	71.00	2.22*+	-4.288	6.93	0.83**++	-0.037
34	P3 x P10	60.08	1.24	-2.753	6.47	1.10**+	-0.037
35	P4 x P5	85.67	0.22+	-5.446	6.42	1.08**+	-0.037
36	P4 x P6	85.67	0.16	-4.372	6.85	1.34**	-0.001
37	P4 x P7	75.42	0.19	-4.659	6.45	1.09	0.340**
38	P4 x P8	77.17	1.34	-2.427	6.21	0.78**+	-0.034
39	P4 x P9	86.25	0.76**	-5.997	6.77	0.92*	0.009
40	P4 x P10	60.83	0.66	-3.783	6.90	1.23*	0.066
41	P5 x P6	82.00	-0.04+	-4.686	6.95	0.99**	-0.037
42	P5 x P7	68.42	0.98	-0.961	6.82	1.12*	0.041
43	P5 x P8	68.50	1.43	2.023	6.93	1.15*	-0.005
44	P5 x P9	85.17	0.20++	-6.002	6.58	1.56**+	0.000
45	P5 x P10	46.08	-0.63+	-3.214	6.52	1.34**++	-0.037
46	P6 x P7	82.67	0.16+	-5.056	6.77	1.01**	-0.037
47	P6 x P8	85.08	0.22+	-5.260	6.35	1.25**++	-0.037
48	P6 x P9	56.58	0.10+	-5.446	6.85	0.86**++	-0.037
49	P6 x P10	60.58	1.33*	-3.841	6.58	1.47**++	-0.037
50	P7 x P8	83.92	0.33	-3.404	6.67	1.32**++	-0.037
51	P7 x P9	78.17	0.30	-3.072	7.03	0.97**	-0.037
52	P7 x P10	61.33	0.72*	-5.432	6.48	1.08**+	-0.037
53	P8 x P9	57.67	1.56*	-2.774	6.83	1.01**	-0.037
54	P8 x P10	63.83	0.08	-0.824	6.85	1.12**+	-0.037
55	P9 x P10	85.67	5.46	50.170**	6.88	1.03**	-0.037
56	Check 1	102.58	1.49*	-4.525	4.05	0.26	0.041
57	Check 2	64.08	0.80	-4.704	4.54	0.26	0.162**
58	Check 3	68.08	1.06*	-5.407	4.36	0.10+	-0.010

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 8: Stability parameters for specific gravity and number of seeds per fruit [Eberhart and Russel (1966)]

SN	Genotype	Specific gravity (g/cc)			Number of seeds per fruit		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	0.95	0.96**	-0.000	19.50	4.40	0.471
2	P2	0.91	1.20	0.000	17.17	-4.25	1.068
3	P3	0.93	1.25	0.000	19.25	-13.00	13.721**
4	P4	0.96	1.70	0.001**	20.42	-18.21	35.007**
5	P5	0.99	0.86	-0.000	20.00	-7.90	16.213**
6	P6	0.98	0.66	0.000	23.17	2.55	27.563**
7	P7	0.96	0.51	0.000*	23.67	23.23	19.077**
8	P8	0.94	1.57	0.002**	19.33	24.07**+	-0.348
9	P9	0.97	-0.18	0.001**	16.83	0.90	-0.582
10	P10	0.94	1.91	0.003**	17.75	0.19	4.651**
11	P1 x P2	1.01	1.00*	-0.000	21.42	-7.39	6.066**
12	P1 x P3	1.00	0.52	-0.000	25.50	-12.06	3.960**
13	P1 x P4	0.99	0.94	-0.000	28.42	-10.92*++	-0.629
14	P1 x P5	0.98	0.30	0.001**	27.92	6.29	12.119**
15	P1 x P6	0.94	0.59	0.000*	23.08	1.35	-0.407
16	P1 x P7	0.92	1.34	0.000	22.75	-2.24	0.153
17	P1 x P8	0.94	1.24	-0.000	24.75	-4.03	2.114*
18	P1 x P9	0.96	1.04*	-0.000	27.50	-2.69	0.538
19	P1 x P10	0.96	1.04**	-0.000	27.50	7.81	1.757*
20	P2 x P3	0.97	1.44	0.000	26.00	0.26	8.275**
21	P2 x P4	0.98	0.76	-0.000	23.42	-9.50	21.885**
22	P2 x P5	0.99	1.05	-0.000	23.42	30.62	34.384**
23	P2 x P6	0.99	0.71	-0.000	20.42	16.94	10.931**
24	P2 x P7	0.97	0.52	0.001**	21.17	4.46	10.454**
25	P2 x P8	0.95	1.08*	-0.000	20.00	-2.26	2.887**
26	P2 x P9	0.94	0.81	0.000**	18.92	-16.85	11.696**
27	P2 x P10	0.97	1.48	0.000	20.58	-14.71	39.378**
28	P3 x P4	0.98	0.78	0.000	19.08	-9.13	7.895**
29	P3 x P5	0.99	0.81	0.000*	21.67	-19.12	7.728**

30	P3 x P6	0.97	1.13	0.001**	19.83	-11.74	1.877*
31	P3 x P7	0.98	-0.09	0.002**	23.92	-23.97	9.968**
32	P3 x P8	0.93	1.15	-0.000	23.25	2.47	2.228*
33	P3 x P9	0.92	0.97	0.000*	24.25	5.92	31.271**
34	P3 x P10	0.95	1.32	-0.000	23.42	23.42	6.828**
35	P4 x P5	0.95	0.46	0.000	20.33	12.38*+	-0.465
36	P4 x P6	0.95	0.97	0.001**	19.67	29.54*+	2.059*
37	P4 x P7	0.94	1.72	0.001**	20.25	2.10	23.285**
38	P4 x P8	0.94	0.88	0.002**	19.42	6.26	9.909**
39	P4 x P9	0.93	2.51	0.001**	21.75	-16.18	35.757**
40	P4 x P10	0.94	1.08	0.001**	19.67	-10.24	14.028**
41	P5 x P6	0.96	1.11	0.001**	20.83	9.11	1.583*
42	P5 x P7	0.94	-0.57	0.003**	19.83	9.84	7.241**
43	P5 x P8	0.96	0.89	-0.000	20.33	2.75	10.472**
44	P5 x P9	0.97	1.12	-0.000	21.33	-17.93	33.405**
45	P5 x P10	0.99	1.41	0.000**	25.92	7.42	1.718*
46	P6 x P7	0.97	0.64	0.000	26.92	9.24	14.935**
47	P6 x P8	0.97	1.44	0.000	26.42	7.80	11.084**
48	P6 x P9	0.97	1.12	0.000*	24.92	15.90	16.730**
49	P6 x P10	0.98	1.77	0.000	27.58	2.82	9.278**
50	P7 x P8	0.97	0.28	0.000	24.83	16.87	19.359**
51	P7 x P9	0.96	0.98	0.000*	27.67	6.65	12.478**
52	P7 x P10	0.96	1.55	0.000	25.33	-18.63	7.565**
53	P8 x P9	0.98	1.56	0.000*	26.08	-9.53	20.645**
54	P8 x P10	0.97	0.53	0.000	25.83	-17.76	8.222**
55	P9 x P10	0.96	1.64	0.000**	26.17	-10.67	1.561*
56	Check 1	0.98	0.68	0.000	22.58	12.31	4.413**
57	Check 2	0.99	0.72	-0.000	19.83	18.57*+	0.134
58	Check 3	0.97	0.71	-0.000	18.75	24.55*+	0.370

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 9: Stability parameters for yield (kg) per vine and vine length (cm) [Eberhart and Russel (1966)]

SN	Genotype	Yield per vine (kg)			Vine length (cm)		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	1.68	0.51	0.006	337.42	1.86**++	-154.541
2	P2	1.73	0.80	0.004	313.58	1.38**	-37.454
3	P3	1.87	-0.71	0.031*	297.92	1.33	2804.899**
4	P4	1.73	2.98*+	-0.006	273.33	0.88	3730.613**
5	P5	1.23	0.50	0.014	268.58	1.02*	233.882
6	P6	1.14	0.55	0.008	274.67	0.91	2008.752**
7	P7	1.10	-0.31	-0.003	316.33	1.37*	785.570**
8	P8	1.82	-1.39	0.111**	319.50	1.31**	-127.958
9	P9	1.79	1.90*	-0.006	339.83	1.73*	288.276
10	P10	1.68	4.38*	0.004	308.42	1.33**	-48.741
11	P1 x P2	1.66	-0.53	0.002	317.92	1.44**+	-133.802
12	P1 x P3	1.95	4.03	0.021*	283.33	0.81	739.858**
13	P1 x P4	1.63	0.59**++	-0.009	276.92	0.51	550.966*
14	P1 x P5	1.99	3.54	0.023*	335.42	1.09*	377.325
15	P1 x P6	1.71	5.06*+	0.004	327.17	1.16*	-68.367
16	P1 x P7	1.69	-0.30++	-0.009	306.75	0.84**+	-192.846
17	P1 x P8	2.23	-1.43+	-0.004	323.67	0.97*	2.432
18	P1 x P9	2.07	2.08*+	-0.008	301.92	0.76	2650.612**
19	P1 x P10	1.53	2.45**+	-0.008	333.50	1.47*	25.682
20	P2 x P3	1.70	0.59	0.005	381.58	1.90*	1464.906**
21	P2 x P4	1.92	1.76	-0.006	316.00	1.12*	-69.099
22	P2 x P5	1.73	1.16*	-0.008	336.92	1.46**+	-105.399
23	P2 x P6	1.79	2.05**+	-0.008	305.83	1.08*	280.004
24	P2 x P7	1.59	0.26	-0.006	319.50	1.18	649.011*
25	P2 x P8	1.75	1.35	0.008	314.00	0.88*	111.338
26	P2 x P9	1.94	2.18**++	-0.009	318.58	0.95	461.003*
27	P2 x P10	1.69	0.71	-0.007	317.92	1.10*	-62.459
28	P3 x P4	1.62	0.49**++	-0.009	319.58	0.97*	-55.332
29	P3 x P5	2.02	2.99*	-0.004	315.00	0.80*	-119.439
30	P3 x P6	1.87	2.36*	-0.005	368.33	1.40**+	-140.098
31	P3 x P7	1.57	1.51**+	-0.009	383.75	1.68**+	-123.536
32	P3 x P8	1.73	1.93*	-0.006	353.75	1.28**+	-157.785
33	P3 x P9	1.38	2.50	0.002	382.50	1.79**++	-194.159
34	P3 x P10	1.21	1.87	-0.005	356.58	1.41*	160.390

35	P4 x P5	1.80	0.21++	-0.009	326.17	1.22**	-173.932
36	P4 x P6	1.62	0.17	0.005	327.25	1.34*	-21.920
37	P4 x P7	1.51	0.94	-0.006	247.25	0.44**++	-185.094
38	P4 x P8	1.50	3.21**+	-0.008	297.42	0.65*	-125.920
39	P4 x P9	1.77	1.29**	-0.009	309.92	0.73	218.501
40	P4 x P10	1.21	0.72	-0.001	302.50	0.70**+	-169.417
41	P5 x P6	1.74	-1.91+	-0.005	271.67	0.57*+	-134.176
42	P5 x P7	1.39	1.23*	-0.008	299.25	0.81*	-75.614
43	P5 x P8	1.35	1.65**+	-0.009	307.67	0.75*	-45.453
44	P5 x P9	1.72	1.02	-0.004	277.00	0.44	1439.467**
45	P5 x P10	0.95	0.30	-0.008	299.50	0.78*	-71.409
46	P6 x P7	1.65	1.28*	-0.009	316.50	1.10**	-131.886
47	P6 x P8	1.73	1.29	-0.006	312.92	1.01*	-98.752
48	P6 x P9	1.16	0.91*	-0.009	317.83	1.04**	-145.319
49	P6 x P10	1.26	0.83	-0.008	309.00	0.75*	-144.004
50	P7 x P8	1.64	0.66	0.004	276.08	0.48*+	-83.644
51	P7 x P9	1.59	1.03**	-0.009	287.50	0.57*	-70.036
52	P7 x P10	1.30	-1.22	-0.003	303.33	0.75*	-101.037
53	P8 x P9	1.18	-0.34	-0.007	258.58	0.45	25.287
54	P8 x P10	1.34	-1.10	0.005	270.92	0.64**++	-197.785
55	P9 x P10	1.84	3.32*	0.001	261.25	0.16*++	-190.991
56	Check 1	2.42	-3.37	0.023*	315.42	0.50	-7.141
57	Check 2	1.58	-1.99*+	-0.007	276.33	0.47*+	-111.700
58	Check 3	1.65	-0.51+	-0.008	274.83	0.48	186.723

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 10: Stability parameters for days to maturity and total soluble solids [Eberhart and Russel (1966)]

SN	Genotype	Days to maturity			Total soluble solids		
		μ_i	b_i	S^2d_i	μ_i	b_i	S^2d_i
1	P1	70.08	6.98	62.515**	4.45	0.80	-0.003
2	P2	66.08	-2.05	22.556**	4.17	0.80	-0.003
3	P3	66.58	-4.16	57.488**	3.60	0.80	-0.003
4	P4	68.75	5.94	42.563**	4.04	0.80	-0.003
5	P5	72.00	0.33	2.116	4.17	0.80	-0.003
6	P6	67.50	-5.50	33.265**	4.37	0.80	-0.003
7	P7	62.83	-0.42	-0.737	3.87	0.80	-0.003
8	P8	66.50	-2.91	99.800**	3.59	0.83	-0.002
9	P9	68.92	15.55	16.566**	4.66	1.60*	-0.004
10	P10	66.75	1.32	19.875**	4.43	4.84	0.024**
11	P1 x P2	73.00	-0.21	5.470*	4.16	2.25	-0.003
12	P1 x P3	75.83	3.77	1.015	3.86	4.65	0.063**
13	P1 x P4	76.17	1.97	3.884*	3.62	-1.49	0.003
14	P1 x P5	75.17	-6.28	4.732*	3.67	2.15	0.001
15	P1 x P6	68.50	-6.54	86.392**	3.70	-0.18	0.003
16	P1 x P7	62.67	0.93	-0.230	4.03	-4.22	0.079**
17	P1 x P8	67.17	17.14*+	0.375	4.27	1.27*	-0.004
18	P1 x P9	67.83	10.77	38.279**	4.35	-0.99	0.005
19	P1 x P10	75.17	-1.80	15.982**	4.18	6.13	0.063**
20	P2 x P3	75.83	-3.42	3.244	3.82	2.89	0.005
21	P2 x P4	75.83	-0.35	5.390*	3.95	-3.58	0.048**
22	P2 x P5	71.58	2.95	3.819*	4.22	0.30	-0.003
23	P2 x P6	75.92	-1.09	24.601**	4.15	2.89	0.005
24	P2 x P7	72.17	-10.10	8.120**	3.75	6.78	0.081**
25	P2 x P8	68.67	-11.26	58.776**	3.85	-6.82	0.150**
26	P2 x P9	71.08	-3.45	39.609**	4.28	0.30	-0.003
27	P2 x P10	72.92	9.42	3.294	3.90	6.88	0.303**
28	P3 x P4	70.75	-4.27	4.189*	3.69	1.11**	-0.004
29	P3 x P5	75.08	4.97	8.865**	3.82	-1.64	0.013*
30	P3 x P6	75.25	7.48	18.813**	3.82	3.54	0.012*
31	P3 x P7	71.17	4.93	29.326**	3.60	2.57	0.002
32	P3 x P8	71.00	12.84	25.488**	3.51	2.28	0.006
33	P3 x P9	71.17	9.73	17.455**	3.84	-7.06	0.112**
34	P3 x P10	71.00	0.70	6.997**	4.18	1.60	-0.003
35	P4 x P5	71.75	0.04	36.636**	4.00	3.86	0.017**
36	P4 x P6	72.58	-2.78	4.570*	3.87	0.63	-0.004
37	P4 x P7	75.42	-3.53	6.324*	4.15	-4.23	0.064**
38	P4 x P8	76.25	-10.38*+	0.211	4.33	2.57	0.002
39	P4 x P9	75.42	5.06	23.809**	4.10	3.86	0.017**

40	P4 x P10	74.83	5.40	36.055**	3.94	1.11**	-0.004
41	P5 x P6	71.25	3.54	1.748	3.98	0.14	-0.003
42	P5 x P7	68.25	12.10	11.154**	3.78	5.48	0.047**
43	P5 x P8	67.58	3.24	29.273**	3.65	-0.99	0.005
44	P5 x P9	69.92	-7.41	4.599*	3.67	2.57	0.002
45	P5 x P10	73.42	2.74	60.867**	3.52	2.25	-0.000
46	P6 x P7	75.25	1.51	17.930**	3.82	-5.45	0.067**
47	P6 x P8	74.50	-2.14	1.231	4.10	1.27*	-0.004
48	P6 x P9	73.17	5.08	1.300	4.05	1.60	-0.003
49	P6 x P10	75.75	1.36	2.620	4.03	0.63	-0.004
50	P7 x P8	77.50	2.01	-0.265	4.17	-1.32	0.009*
51	P7 x P9	75.83	-8.84*+	-1.070	4.37	-0.67	0.003
52	P7 x P10	73.17	0.17	9.308**	4.40	1.92	-0.002
53	P8 x P9	71.50	-2.64	0.490	4.37	0.63	-0.004
54	P8 x P10	73.00	0.42	7.096**	4.23	3.86	0.017**
55	P9 x P10	71.75	-9.79	15.214**	4.07	1.27*	-0.004
56	Check 1	72.92	2.36	5.236*	4.08	0.30	-0.003
57	Check 2	68.00	4.22	4.723*	4.03	2.57	0.002
58	Check 3	65.42	2.31	0.307	4.02	-0.34	0.000

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively.

Table 11: Stability parameters for ascorbic acid (mg/100g) [Eberhart and Russel (1966)]

SN	Genotype	Ascorbic acid (mg/100g)		
		μ_i	b_i	S^2d_i
1	P1	79.17	0.11	0.142
2	P2	79.17	0.42	0.011
3	P3	81.00	-1.31	7.492**
4	P4	80.25	0.39	0.462
5	P5	82.67	0.92	25.081**
6	P6	83.08	0.50	27.937**
7	P7	80.25	0.08	6.023**
8	P8	82.50	-0.59	2.320**
9	P9	83.92	-0.84	6.460**
10	P10	85.08	0.19	1.555**
11	P1 x P2	87.75	-0.29	10.070**
12	P1 x P3	88.33	0.27	1.262*
13	P1 x P4	85.67	-0.30	3.247**
14	P1 x P5	82.75	0.98	-0.078
15	P1 x P6	82.50	1.69*	-0.148
16	P1 x P7	84.83	3.98	8.153**
17	P1 x P8	88.00	-1.44	9.654**
18	P1 x P9	83.25	1.27*	-0.258
19	P1 x P10	84.00	2.55	1.442**
20	P2 x P3	84.92	-1.01	6.871**
21	P2 x P4	81.50	2.27	0.709*
22	P2 x P5	84.25	2.98	2.922**
23	P2 x P6	87.42	1.55*	-0.236
24	P2 x P7	87.25	0.13	1.682**
25	P2 x P8	86.00	2.55	1.442**
26	P2 x P9	87.67	0.27	1.262*
27	P2 x P10	86.00	1.41*	-0.272
28	P3 x P4	85.75	0.41	0.892*
29	P3 x P5	84.92	2.41	1.050*
30	P3 x P6	87.58	2.41	1.050*
31	P3 x P7	89.33	0.84	0.089
32	P3 x P8	88.83	1.69*	-0.148
33	P3 x P9	89.75	1.55*	-0.236
34	P3 x P10	89.67	0.27	1.262*
35	P4 x P5	87.08	-0.16	2.675**
36	P4 x P6	85.33	2.55	1.442**
37	P4 x P7	87.92	1.84	-0.010
38	P4 x P8	89.33	1.98	0.179
39	P4 x P9	90.58	1.27*	-0.258
40	P4 x P10	90.25	0.70	0.306
41	P5 x P6	88.17	-0.59	4.544**
42	P5 x P7	86.17	3.41	4.860**
43	P5 x P8	89.50	0.55	0.574

44	P5 x P9	88.67	1.98	0.179
45	P5 x P10	90.17	1.69*	-0.148
46	P6 x P7	90.83	1.12	-0.193
47	P6 x P8	90.17	0.55	0.573
48	P6 x P9	89.00	1.41*	-0.272
49	P6 x P10	89.42	1.55*	-0.236
50	P7 x P8	89.92	1.27*	-0.258
51	P7 x P9	88.50	-1.16	7.748**
52	P7 x P10	85.83	3.98	8.153**
53	P8 x P9	90.33	0.84	0.089
54	P8 x P10	89.33	0.84	0.089
55	P9 x P10	88.67	1.41*	-0.273
56	Check 1	88.50	0.55	0.574
57	Check 2	87.33	1.41*	-0.272
58	Check 3	87.25	0.70	0.306

*, ** Significantly deviating from zero at 5% and 1% respectively,
+, ++ Significantly deviating from unity at 5% and 1% respectively

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