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# Correlation coefficient studies for fruit yield and its components in tomato (*Solanum lycopersicum* L.)

**Ghadage NC[1*], Kulkarni GU[2], Bipasha Datta[3], Raju Shyadambi[4]**
[1, 3, 4] M. Sc. (Agri.) Genetics & Plant Breeding, Department of Genetics and Plant Breeding, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India
[2] Associate Professor, Department of Genetics and Plant Breeding, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

**Abstract**
Heterosis, general and specific combining abilities and correlation coefficient were estimated using 9 lines of tomato (*Solanum lycopersicum* L.) and 4 testers and their $F_1$ hybrids, bred in line x tester fashion. The present study revealed that none of the parent was best combiner for all the traits indicating differences in genetic variability for different characters among the parents. The correlation coefficients had been worked out with a view to know the relationship between different statistical parameters used in the present investigation. Correlation coefficient between *per se* performance and GCA effects, *per se* performance and SCA effects as well as *per se* performance and heterobeltiosis in tomato. Correlation coefficient between heterobeltiosis and SCA effect as well as standard heterosis and SCA effect in tomato analysed.

**Keywords:** correlation coefficient, general combining ability, specific combining ability, line and tester, tomato

## Introduction
Tomato (*Solanum lycopersicum* L.) is one of the most important world's largest vegetable crop ranks third after potato and onion. It is originated in Peru of South America region (Soni and Soni, 2010) [6]. Tomato is mainly grown as rabi crop in the plains of India including tropical, sub-tropical and temperate regions. However, in the hilly region it can also be grown as a summer and rainy season crop. It is a typical day neutral plant and self-pollinated crop but up to 5 % cross pollination also occurs through insects such as bees (Singh *et al.*, 2004) [5]. It is a warm season crop reasonably resistant to heat, drought and grows under wide range of soil and climatic conditions. Optimum temperature for tomato cultivation is 20-24˚C. The annual worldwide production of tomatoes has been estimated at 177.8 million tonnes from total production area of about 4.7 Mha with a productivity of 37.01 tonnes/ha (FAO, 2016). India ranks 2nd in the world with the total area of 0.80 Mha with production and productivity of 19759.92 tonnes and 25 tonnes/ha, respectively (Indian Horticulture Database, 2018). The combining ability study is a powerful tool to discriminate good as well as poor combiners for choosing appropriate parental material in plant breeding programme. GCA reveals the existence of additive gene effects while SCA reveals non–additive gene effects. Information about GCA effects is beneficial while choosing best combiner parents and SCA effects reveals best cross combinations for further appraisal.

## Material and Methods
The present investigation was conducted at Vegetable Research Station, Junagadh Agricultural University, Junagadh, during late *kharif* 2017-18 for development of crosses and late *kharif* 2018-19 for evaluation of crosses and parents. Geographically, Junagadh is situated at 21.5˚N latitude and 70.5˚E longitude with an altitude of 60 meters above the mean sea level. Experimental material contains nine lines (females) namely, JTL-15-05, JTL-12-07, JTL-16-03, JTL-16-07, JTL-15-02, JTL-12-02, JTL-16-05, JTL-16-08, JTL-17-06 and four testers (males) *i.e*. JT-3, AT-3, DVRT-2, Punjab Chhuhara of tomato (*Solanum lycopersicum* L.) were selected on the basis of their phenotypic variability resulted into thirty-six crosses along with their thirteen parents including one standard check variety (JT-3) was evaluated. The experiment was laid out in a Randomized Block design (RBD) with three replications. Five competitive plants were randomly selected for recording the observations on different characters such as days to 50% flowering, plant height (cm), number of branches per plant, number of clusters per plant, number of fruits per cluster, total number of fruits per plant days to first harvest, fruit yield per plant (kg), average fruit weight (g), numbers of locules per fruit, pericarp thickness (mm), total numbers of pickings, fruit polar diameter (cm), fruit equatorial diameter (cm), days to last harvest, total soluble solid (ºBrix) and acidity (%). The combining ability analysis were carried out by using Line × Tester mating design as suggested by Kempthorne (1957) [4] which is analogous to North Carolina Design-II of Comstock and Robinson (1952) [1].

## Results and Discussion
In the present study, the analysis of variance for combining ability for all the seventeen characters is presented Table 1. Specific combining ability effects for different characters in tomato Table 2. The correlation coefficients had been worked

out with a view to know the relationship between different statistical parameters used in the present investigation. With regard to parental line, positive correlation was observed between *per se* performance and GCA effect for all trait except number of fruit per cluster, total number of fruit per plant, number of locules per fruit, pericarp thickness, total number of pickings, fruit equatorial diameter and days to last harvest (Table 3). Thus, the association between *per se* performance of parents and their GCA effects suggested that while selecting the parents for hybridization programme, *per se* performance of parent should be given due consideration. Thus, if character is uni-directional controlled by a set of alleles and additive effects important, the choice of parents on the basis of the *per se* performance may be become effective.

A comparison of mean performance of crosses and their SCA effects presented in Table 3 revealed that *per se* performance of crosses was positively significantly correlated with their SCA effect in all characters indicating strong association of *per se* performance and SCA effect of the 36 hybrids. On the other hand, *per se* performance of crosses compared with heterobeltiosis revealed significant and positive correlation for all traits. Likewise, while comparing SCA effects with heterobeltiosis and standard heterosis showed significant and positive relationship for all the traits (Table 4). This may be due to fact that *per se* performance realized value, whereas SCA effect is an estimate, measured as the deviation of $F_1$ over parent's performance. Therefore, for a given cross, performance of effect may or may not be high depending upon the performance of parental line. If a cross combination showing high SCA effects involving both the parents with good GCA effect the same is likely to be exploited rather more profitably in varietal breeding programme.

**Table 1:** Analysis of variance for combining ability and variance components for different characters in tomato

| Source | d.f. | Days to 50% Flowering | Plant height (cm) | Number of branches per plant | Number of clusters per plant | Number of fruits per cluster | Total number of fruits per plant | Days to first harvest | Fruit yield per plant (Kg) | Average fruit weight (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| Replications | 2 | 3.73 | 1504.58* | 2.02 | 8.04 | 0.04 | 95.52 | 21.19 | 0.55* | 765.26** |
| Lines | 8 | 7.02 | 3540.08**++ | 3.06**++ | 13.81 | 0.33** | 1654.97*+ | 58.62 | 4.65*+ | 211.50 |
| Testers | 4 | 11.44 | 625.91 | 0.24 | 10.62 | 0.40 | 1329.09 | 35.32 | 4.94*+ | 149.25 |
| Lines× Testers | 24 | 8.62** | 541.16 | 0.85 | 9.12** | 0.37** | 624.29** | 29.86 | 1.45** | 169.65** |
| Error | 70 | 3.76 | 350.10 | 0.80 | 3.00 | 0.18 | 52.09 | 19.25 | 0.14 | 60.53 |
| Variance Components | | | | | | | | | | |
| $\sigma^2$l | | 0.271 | 265.83** | 0.188** | 0.900 | 0.013 | 133.57* | 3.281 | 0.376* | 12.58 |
| $\sigma^2$t | | 0.284 | 10.21 | -0.021 | 0.282 | 0.008 | 47.29 | 0.595 | 0.178* | 3.28 |
| $\sigma^2$lt | | 1.617** | 63.68 | 0.016 | 2.040** | 0.065** | 190.73** | 3.537 | 0.436** | 36.37** |
| $\sigma^2$gca | | 0.280 | 88.86 | 0.043** | 0.472* | 0.009 | 73.84** | 1.42* | 0.239** | 6.14 |
| $\sigma^2$sca | | 1.617 | 63.68 | 0.016 | 2.040** | 0.065** | 190.73** | 3.537 | 0.436** | 36.37** |
| $\sigma^2$gca/ $\sigma^2$sca | | 0.985 | 1.39 | 2.687 | 0.231 | 0.138 | 0.387 | 0.401 | 0.548 | 0.168 |

| Source | d.f. | Number of locules per fruit | Pericarp thickness (mm) | Total number of pickings | Fruit polar diameter (cm) | Fruit equatorial diameter (cm) | Days to last harvest | Total soluble solid (°Brix) | Acidity (%) |
|---|---|---|---|---|---|---|---|---|---|
| Replications | 2 | 0.21 | 0.44 | 5.12 | 0.01 | 0.06 | 211.14 | 0.67 | 0.02 |
| Lines | 8 | 0.37 | 0.43 | 10.01*+ | 0.23 | 0.27 | 501.57** | 1.39 | 0.03 |
| Testers | 4 | 0.28 | 0.20 | 10.03 | 0.05 | 0.23 | 1461.63**++ | 0.42 | 0.009 |
| Lines× Testers | 24 | 0.62** | 0.49 | 3.93* | 0.23** | 0.29* | 302.56* | 0.62 | 0.02* |
| Error | 70 | 0.24 | 0.22 | 2.17 | 0.07 | 0.14 | 168.93 | 0.47 | 0.01 |
| Variance Components | | | | | | | | | |
| $\sigma^2$l | | 0.010 | 0.017 | 0.653* | 0.013 | 0.010 | 27.71 | 0.076 | 0.001 |
| $\sigma^2$t | | 0.001 | -0.0006 | 0.291 | -0.0007 | 0.003 | 47.87** | -0.001 | 0.001 |
| $\sigma^2$lt | | 0.124** | 0.0902** | 0.585* | 0.051** | 0.047* | 44.54* | 0.049 | 0.0036* |
| $\sigma^2$gca | | 0.0043 | 0.0048 | 0.402** | 0.003 | 0.005 | 41.67** | 0.022* | 0.0005 |
| $\sigma^2$sca | | 0.124* | 0.092** | 0.585* | 0.051** | 0.047* | 44.54** | 0.049 | 0.0036* |
| $\sigma^2$gca/ $\sigma^2$sca | | 0.034 | 0.0521 | 0.687 | 0.058 | 0.106 | 0.935 | 0.448 | 0.138 |

**Table 2:** Specific combining ability effects for different characters in tomato

| Genotype | Days to 50% Flowering | Plant height (cm) | Number of branches per plant | Number of clusters per plant | Number of fruits per cluster | Total number of fruits per plant | Days to first harvest | Fruit yield per plant (Kg) |
|---|---|---|---|---|---|---|---|---|
| JTL-15-05 × JT-3 | -0.287 | -1.923 | 0.171 | -0.046 | -0.132 | 8.093 | 1.093 | -0.477* |
| JTL-15-05 × AT-3 | -0.213 | 10.303 | -0.303 | -0.120 | -0.295 | 11.537** | -1.944 | 0.088 |
| JTL-15-05 × DVRT-2 | -0.028 | 10.936 | -0.058 | -0.639 | 0.379 | 10.907* | -1.759 | 1.402** |
| JTL-15-05 × Punjab Chhuhara | 0.528 | -19.316 | 0.190 | 0.806 | 0.049 | -13.537** | 2.611 | -1.013** |
| JTL-12-07 × JT-3 | 0.296 | - | -1.062* | 1.087 | -0.207 | 4.843 | 0.593 | 0.534* |

| | | 32.915** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| JTL-12-07 × AT-3 | 1.370 | 9.944 | 0.531 | 1.413 | 0.030 | 11.620** | 2.222 | 0.279 |
| JTL-12-07 × DVRT-2 | -2.111 | 15.144 | 0.642 | 0.894 | -0.196 | -0.676 | -0.926 | -0.196 |
| JTL-12-07 × Punjab Chhuhara | 0.444 | 7.826 | -0.110 | -3.394** | 0.374 | -15.787** | -1.889 | -0.618** |
| JTL-16-03 × JT-3 | -0.204 | 6.660 | 0.321 | 2.437* | 0.068 | 0.426 | -1.491 | 0.100 |
| JTL-16-03 × AT-3 | 1.204 | -11.314 | 0.114 | -1.437 | 0.238 | -1.463 | 0.139 | -0.151 |
| JTL-16-03 × DVRT-2 | -2.944* | -6.747 | -0.042 | -0.022 | 0.245 | 2.907 | -1.676 | 0.280 |
| JTL-16-03 × Punjab Chhuhara | 1.944 | 11.401 | -0.394 | -0.978 | -0.551* | -1.870 | 3.208 | -0.229 |
| JTL-16-07 × JT-3 | 0.380 | 3.194 | 0.371 | -2.096 | 0.151 | -5.824 | -0.491 | -0.682** |
| JTL-16-07 × AT-3 | 0.120 | -10.181 | -0.436 | 1.296 | -0.312 | 24.954** | -2.194 | 1.207** |
| JTL-16-07 × DVRT-2 | 0.639 | 1.253 | -0.392 | -0.089 | 0.295 | -12.009** | -0.343 | -0.435* |
| JTL-16-07 × Punjab Chhuhara | -1.139 | 5.734 | 0.456 | 0.889 | -0.134 | -7.120 | 3.208 | -0.090 |
| JTL-15-02 × JT-3 | -1.037 | 8.027 | 0.721 | -2.930** | -0.316 | -11.491** | 0.426 | -0.629** |
| JTL-15-02 × AT-3 | 0.037 | -6.881 | -0.086 | 0.130 | -0.079 | -16.380** | -0.611 | -0.867** |
| JTL-15-02 × DVRT-2 | -1.111 | -3.114 | 0.025 | 0.344 | 0.162 | 4.657 | 0.241 | 0.231 |
| JTL-15-02 × Punjab Chhuhara | 2.111 | 1.968 | -0.660 | 2.456* | 0.232 | 23.213** | -0.056 | 1.266** |
| JTL-12-02 × JT-3 | 2.546* | -7.240 | -0.312 | 0.437 | -0.216 | -4.157 | -1.157 | -0.167 |
| JTL-12-02 × AT-3 | -2.380 | 11.853 | 0.214 | -0.837 | 0.521* | -6.046 | 1.472 | 0.129 |
| JTL-12-02 × DVRT-2 | -0.194 | -15.514 | -0.008 | 1.244 | -0.205 | 4.657 | -0.009 | -0.200 |
| JTL-12-02 × Punjab Chhuhara | 0.028 | 10.901 | 0.106 | -0.844 | -0.101 | 5.546 | -0.306 | 0.238 |
| JTL-16-05 × JT-3 | 0.130 | 13.727 | -0.695 | 0.204 | -0.232 | -6.324 | 1.926 | 0.730** |
| JTL-16-05 × AT-3 | 0.537 | 7.753 | 0.431 | 1.596 | -0.262 | -2.546 | 6.222* | -0.021 |
| JTL-16-05 × DVRT-2 | 2.389* | -5.814 | 0.075 | -2.122* | -0.055 | -1.509 | 0.407 | -0.467* |
| JTL-16-05 × Punjab Chhuhara | -3.056** | -15.666 | 0.190 | 0.322 | 0.549* | 10.380* | -8.556** | -0.242 |
| JTL-16-08 × JT-3 | -1.370 | 2.094 | 0.755 | 1.654 | 0.259 | 23.509** | -3.407 | 0.797** |
| JTL-16-08 × AT-3 | 0.704 | -16.147 | -0.986 | -3.020** | 0.230 | -13.380** | -3.111 | -0.348 |
| JTL-16-08 × DVRT-2 | 1.889 | 8.619 | 0.125 | 0.061 | -0.130 | -10.343* | 5.407 | -0.583** |
| JTL-16-08 × Punjab Chhuhara | -1.222 | 5.434 | 0.106 | 1.306 | -0.359 | 0.213 | 1.111 | 0.135 |
| JTL-17-06 × JT-3 | -0.454 | 8.377 | -2.270 | -0.746 | 0.626* | -9.074* | 2.509 | -0.206 |
| JTL-17-06 × AT-3 | -1.380 | 4.669 | 0.522 | 0.980 | -0.070 | -8.296 | -2.194 | -0.314 |
| JTL-17-06 × DVRT-2 | 1.472 | -4.764 | -0.367 | 0.328 | -0.496* | 1.407 | -1.343 | -0.032 |
| JTL-17-06 × Punjab Chhuhara | 0.361 | -8.282 | 0.115 | -0.561 | -0.059 | 15.963** | 1.028 | 0.552* |
| SE± | 1.120 | 10.802 | 0.518 | 1.00 | 0.246 | 4.167 | 2.533 | 0.217 |
| CD at 5% | 2.235 | 21.545 | 1.034 | 1.995 | 0.491 | 8.311 | 5.052 | 0.433 |

| Genotype | Average fruit weight (g) | Number of locules per fruit | Pericarp thickness (mm) | Total number of picking | Fruit polar diameter (cm) | Fruit equatorial diameter (cm) | Days to last harvest | Total soluble solids (°Brix) | Acidity % |
|---|---|---|---|---|---|---|---|---|---|
| JTL-15-05 × JT-3 | -14.443** | -0.335 | 0.221 | 0.843 | -0.186 | -0.457* | 8.759 | 0.311 | -0.032 |
| JTL-15-05 × AT-3 | -3.233 | 0.020 | 0.025 | 0.472 | 0.134 | 0.199 | 1.611 | 0.147 | 0.036 |
| JTL-15-05 × DVRT-2 | 10.116* | 0.043 | -0.050 | 0.620 | 0.170 | 0.149 | 5.093 | -0.243 | -0.114 |
| JTL-15-05 × Punjab Chhuhara | 7.560 | 0.272 | -0.196 | -1.935* | -0.118 | 0.108 | -15.463* | -0.216 | 0.110 |
| JTL-12-07 × JT-3 | 0.969 | -0.335 | 0.059 | 0.509 | 0.239 | 0.195 | -0.241 | -0.051 | -0.022 |
| JTL-12-07 × AT-3 | -1.925 | 0.154 | -0.256 | -0.194 | -0.029 | 0.061 | 9.611 | 0.402 | -0.010 |
| JTL-12-07 × DVRT-2 | -5.189 | 0.109 | 0.271 | 0.620 | -0.213 | -0.523* | 7.426 | -0.359 | 0.133* |
| JTL-12-07 × Punjab Chhuhara | 6.145 | 0.072 | -0.074 | -0.935 | 0.003 | 0.267 | -16.796* | 0.009 | -0.100 |
| JTL-16-03 × JT-3 | -1.208 | 0.131 | 0.359 | 0.009 | -0.166 | 0.063 | -2.407 | 0.472 | -0.062 |
| JTL-16-03 × AT-3 | 1.455 | 0.287 | -0.250 | 0.306 | 0.531** | 0.189 | 4.111 | -0.242 | 0.100 |
| JTL-16-03 × DVRT-2 | 4.044 | -0.024 | -0.265 | 0.454 | -0.140 | -0.168 | 11.259 | 0.185 | -0.097 |
| JTL-16-03 × Punjab Chhuhara | -4.292 | -0.394 | 0.156 | -0.769 | -0.225 | -0.085 | -12.963 | -0.415 | 0.060 |
| JTL-16-07 × JT-3 | -7.847 | -0.452 | 0.072 | 0.343 | 0.205 | 0.048 | 5.593 | -0.498 | -0.028 |
| JTL-16-07 × AT-3 | 0.846 | -0.163 | 0.410 | 1.306 | -0.072 | 0.148 | 1.778 | -0.318 | 0.001 |
| JTL-16-07 × DVRT-2 | 1.945 | 0.526 | -0.282 | -0.880 | -0.103 | 0.194 | -7.407 | 0.268 | 0.000 |
| JTL-16-07 × Punjab Chhuhara | 5.506 | 0.089 | -0.201 | -0.769 | -0.030 | -0.390 | 0.037 | 0.549 | 0.027 |
| JTL-15-02 × JT-3 | -2.054 | 1.181** | -0.682* | -1.157 | -0.659** | 0.091 | -12.407 | 0.234 | 0.001 |
| JTL-15-02 × AT-3 | -2.758 | -0.596* | 0.536 | -0.194 | 0.081 | -0.476* | -1.222 | 0.133 | -0.070 |
| JTL-15-02 × DVRT-2 | -0.089 | -0.174 | 0.694* | 0.287 | 0.353* | 0.243 | -3.407 | -0.080 | 0.109 |
| JTL-15-02 × Punjab Chhuhara | 4.901 | -0.411 | -0.548* | 1.065 | 0.225 | 0.142 | 17.037* | -0.286 | -0.040 |
| JTL-12-02 × JT-3 | 4.774 | 0.381 | 0.047 | -0.907 | 0.089 | 0.150 | -5.824 | 0.752 | -0.014 |
| JTL-12-02 × AT-3 | 2.377 | -0.463 | 0.174 | 0.056 | -0.185 | 0.023 | -4.972 | -0.475 | 0.005 |
| JTL-12-02 × DVRT-2 | -6.877 | -0.107 | -0.305 | 0.870 | -0.276 | -0.441 | 2.176 | 0.218 | 0.028 |
| JTL-12-02 × Punjab Chhuhara | -0.274 | 0.189 | 0.084 | -0.019 | 0.373* | 0.268 | 8.620 | -0.495 | -0.019 |
| JTL-16-05 × JT-3 | 19.467** | 0.398 | -0.215 | -0.907 | 0.142 | 0.041 | -1.741 | -0.656 | 0.137* |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| JTL-16-05 × AT-3 | 1.620 | 0.087 | -0.467 | -0.278 | -0.302 | -0.183 | -3.222 | -0.197 | -0.008 |
| JTL-16-05 × DVRT-2 | -7.437 | -0.557 | -0.106 | -0.463 | 0.014 | 0.220 | -3.074 | 0.330 | 0.012 |
| JTL-16-05 × Punjab Chhuhara | -13.650** | 0.072 | 0.789** | 1.648 | 0.146 | -0.078 | 8.037 | 0.524 | -0.141* |
| JTL-16-08 × JT-3 | -0.316 | -0.419 | 0.357 | 2.343** | 0.019 | -0.278 | 9.093 | -0.530 | -0.037 |
| JTL-16-08 × AT-3 | 1.480 | 0.270 | 0.131 | -1.028 | -0.035 | 0.015 | 2.944 | -0.057 | 0.038 |
| JTL-16-08 × DVRT-2 | 3.929 | 0.359 | -0.341 | -1.213 | 0.147 | 0.605** | -7.574 | 0.263 | -0.012 |
| JTL-16-08 × Punjab Chhuhara | -5.094 | -0.211 | -0.146 | -0.102 | -0.130 | -0.342 | -4.463 | 0.324 | 0.011 |
| JTL-17-06 × JT-3 | 0.658 | -0.552 | -0.218 | -1.074 | 0.318 | 0.147 | -0.824 | -0.033 | 0.059 |
| JTL-17-06 × AT-3 | 0.138 | 0.404 | -0.303 | -0.444 | -0.123 | 0.024 | -10.693 | 0.607 | -0.092 |
| JTL-17-06 × DVRT-2 | -0.443 | -0.174 | 0.385 | -0.296 | 0.050 | -0.280 | -4.491 | -.0580 | -0.059 |
| JTL-17-06 × Punjab Chhuhara | -0.353 | 0.322 | 0.136 | 1.815 | -0.245 | 0.109 | 15.954* | 0.007 | 0.091 |
| SE± | 4.492 | 0.287 | 0.274 | 0.852 | 0.161 | 0.222 | 7.504 | 0.398 | 0.058 |
| CD at 5% | 8.958 | 0.572 | 0.546 | 1.699 | 0.321 | 0.444 | 14.966 | 0.794 | 0.117 |

**Table 3:** Correlation coefficient between *per se* performance and GCA effects, *per se* performance and SCA effects as well as *per se* performance and heterobeltiosis in tomato

| Sr. No | Character | *per se* performance and GCA effects | *per se* performance and SCA effects | *per se* performance and heterobeltiosis |
|---|---|---|---|---|
| 1 | Days to 50% flowering | 0.0008 | 0.83** | 0.80** |
| 2 | Plant height (cm) | 0.30 | 0.55** | 0.90** |
| 3 | Number of branches per plant | 0.15 | 0.63** | 0.71** |
| 4 | Number of clusters per plant | 0.44 | 0.78** | 0.69** |
| 5 | Number of fruits per cluster | -0.33 | 0.84** | 0.88** |
| 6 | Total number of fruits per plant | -0.18 | 0.68** | 0.94** |
| 7 | Days to first harvest | 0.18 | 0.74** | 0.67** |
| 8 | Fruit yield per plant (kg) | 0.31 | 0.63** | 0.68** |
| 9 | Average fruit weight (g) | 0.67* | 0.81** | 0.37* |
| 10 | Numbers of locules per fruit | -0.15 | 0.89** | 0.81** |
| 11 | Pericarp thickness (mm) | -0.12 | 0.86** | 0.90** |
| 12 | Total numbers of pickings | -0.14 | 0.68** | 0.93** |
| 13 | Fruit polar diameter (cm) | 0.02 | 0.85** | 0.34** |
| 14 | Fruit equatorial diameter (cm) | -0.13 | 0.84** | 0.75** |
| 15 | Days to last harvest | -0.23 | 0.68** | 0.90** |
| 16 | Total soluble solid (°Brix) | 0.12 | 0.73** | 0.83** |
| 17 | Acidity (%) | 0.45 | 0.81** | 0.71** |

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

**Table 4:** Correlation coefficient between heterobeltiosis and SCA effect as well as standard heterosis and SCA effect in tomato

| Sr. No | Character | Heterobeltiosis and SCA effect | Standard heterosis and SCA effect |
|---|---|---|---|
| 1 | Days to 50% flowering | 0.67** | 0.83** |
| 2 | Plant height (cm) | 0.49** | 0.55** |
| 3 | Number of branches per plant | 0.54** | 0.64** |
| 4 | Number of clusters per plant | 0.72** | 0.78** |
| 5 | Number of fruits per cluster | 0.69** | 0.84** |
| 6 | Total number of fruits per plant | 0.61** | 0.68** |
| 7 | Days to first harvest | 0.59** | 0.74** |
| 8 | Fruit yield per plant (kg) | 0.60** | 0.63** |
| 9 | Average fruit weight (g) | 0.60** | 0.81** |
| 10 | Numbers of locules per fruit | 0.69** | 0.89** |
| 11 | Pericarp thickness (mm) | 0.73** | 0.86** |
| 12 | Total numbers of pickings | 0.66** | 0.68** |
| 13 | Fruit polar diameter (cm) | 0.35** | 0.65** |
| 14 | Fruit equatorial diameter (cm) | 0.56** | 0.84** |
| 15 | Days to last harvest | 0.67** | 0.68** |
| 16 | Total soluble solid (°Brix) | 0.69** | 0.73** |
| 17 | Acidity (%) | 0.49** | 0.81** |

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

## Conclusion

Correlation coefficient with respect to parental line, positive correlation was observed between *per se* performance and GCA effect for ten traits *viz.*, days to 50% flowering, plant height (cm), number of branches per plant, number of clusters per plant, days to first harvest, fruit yield per plant (Kg), average fruit weight (g), fruit polar diameter (cm), total soluble solid (°Brix) and acidity (%). Likewise, the correlation

coefficient with *per se* performance and SCA effects, *per se* performance and heterobeltiosis, heterobeltiosis and standard heterosis, heterobeltiosis and SCA effect and standard heterosis and SCA effect observed that significant and positive correlation for all traits.

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