CORRELATION AND PATH ANALYSIS OF OKRA(*Abelmoschusesculentus* L. Monech) GERMPLASMS FOR FRUIT YIELD AND ITS COMPONENTS

ABSTRACT

Field experiment was conducted at AICRP on Vegetable Crops of OUAT, Bhubaneswar during Kharif, 2018-19 to study the correlation of okra germplasm. Study oncorrelation between several charactersshows that selection for fruit yield based on plant height, stem diameter, nodes plant^{-1}, leaflet length, average fruit weight, fruit length, fruit girth, days to 1st flowering, days to 50% flowering, number of fruits plant^{-1}, PDI at 30DAS, PDI at 45DAS, PDI at 60DAS, PDI at 75DAS. In present study genotypic correlation was observedto be higher than thecorresponding phenotypic correlations for all the charactercombinations andtherefore it shows that the suppression of phenotypic expression under the influence of environmentalfactors. Path coefficient analysis of total fruit yield contributing attributes estimated that like average fruit weight had the highest positive effects followedby number of fruits plant^{-1}, days to 1st flowering, plant height, PDI for YVMV at 60 DAS ,stem diameter, node at 1st flowering, nodes plant^{-1}, whichindicated that these traits have to give much importance in selection programme for yield improvement in okra.

Keywords: Okra,correlationandpathanalysis, germplasms, phenotypic expression, commercial vegetable crop, genetic upliftment.

Introduction

Okra [*Abelmoschusesculentus* (L.) Moench] belongs to the family Malvaceae is one of the most important vegetable crop of world widely cultivated almost throughout India. Tropical Africa was considered as centre of origin (Purseglove, 1984).Okra fruits are a good source of 37 mucilage, fats, fibres, minerals, ascorbic acid, carotene, vitamins [Benchasri, 2012], proteins, carbohydrates [Kumar & Yadav, 2009], 38 and edible oil [Saifullah and Rabbani, 2009; Fajinmi and Fajinmi, 2010]. However, Lamont (1999), suggest that okra has native to South Africa and 1st recorded reference by Egyptian during 1216 A.D. India stands first in okra production producing 6146'000 MT with a productivity of 11.6 MTha^{-1} from an area of 528'000 ha, (NHB, 2019). Okra is commercially grown as annual crop both in kharif and summer season in India. The correlation coefficient between yield and a particular yield component was the net result of direct effect of that attribute and indirect effect through other yield contributing traitsso in order to determine the yieldcomponents of a commercial crop, correlation and path coefficient analysis are the chief biometrical techniques. Thecharacters which are of positively correlated with yield are the most important to plant breederforselectionpurpose.Correlationcoefficientanalysisappraisesthemutualrelationship between two plant characters and establishes the yield components upon which selection is tobe done for improvement in yield (Koundinya and Dhankhar, 2013). Path analysis splits thecorrelationcoefficientsintothemeasureofdirectandindirecteffectsandconsequentlyproviding an understanding of the direct and indirect contribution of each character towardsyield. So, keeping this in view, the present investigation was under taken together with theobjectivein ordertounderstandthecharacterassociationbetweenthevariouscharactersaswell as their direct and indirect effects on yield in okra. The details on corresponding aspectscan be of great help in formulating an appropriate breeding strategy through selection efficiency for genetic upliftment ofthiscommercial vegetable crop (Nbeaa et al. 2023).Genetic

improvement of okra for yield is significant because of the nutritional, economic and health benefits inherent in it and to overcome the low genetic potential of the existing varieties and environmental factors which are the major constraints to okra yield. (Komolafe et al., 2023).

MaterialsandMethods

The field experiment was conducted at All India Co-ordinated Research Project on Vegetable Crops, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India during during*kharif*, 2018-19 to study the performance of okra germplasms for yield and other yield attributing characters along with tolerance to YVMV. The experiment was laid out in Randomized Block Design and replicated twice, with 46 genotypes including four released varieties as check. All the recommended package of practices were adopted uniformly to all the genotypes in order to raise a good crop. Observations on vegetative, flowering, fruit yield and yield attributes were collected from randomly selected plants and were subjected to statistical analysis.Thecorrelationandpathcoefficient was given by using the formula of Dewey and Lu(1959); Singh *etal* (2010).

ResultsandDiscussion

The correlation among fruit yield per plant along with severalyield attributes and among the characteristics were presented(Table 1). The phenotypic and genotypic correlationcomputedamongsixteencharacters.Outofsixteencharacters,fruityieldplant^{-1}hadpositiveandsignificantcorrelation with plant height (0.632 and 0.557), nodes plant^{-1}(0.551and0.506), fruit length (0.227 and 0.209), average fruit weight (0.560 and 0.522), number of fruits plant^{-1} (0.718 & 0.645)atbothgenotypicandphenotypiclevelofsignificanceat1percent. Plant height also showed positive and highly significant correlation at both phenotypic and genotypic level with nodes plant^{-1} (0.666 and0.743), leaflet length (0.241and0.255), fruitlength (0.179 and 0.202), average fruit weight. (0.250 and 0.257) and fruits plant^{-1} (0.662 and 0.737). The traits like nodes plant^{-1}(-0.213 and -0.238), leafletlength (-0.277and-0.286) andfruitsplant^{-1}(-0.176and-0.195)showednegativeandhighlysignificant correlation atboth phenotypic andgenotypic level with stem diameter. But fruit girth showed positive significant correlation only at genotypic level (0.183). In contrast to this, positive and non-significant correlation was also observed by leaflet length (0.037 and 0.035) and average fruit weight (0.077 and 0.082) atboth phenotypicandgenotypiclevels.Correlation studies of 1st fruiting node revealed significantpositive correlation with PDI of YVMV at 60DAS (0.197 and 0.355) and PDI of YVMV at 75 DAS (0.197 and 0.295) at both genotypic and phenotypic levels. But, it exhibited significantnegativecorrelationwithdays to 1st flowering (-0.175), days to 50% flowering (-0.178), leaflet length (-0.188), fruit length (-0.257), fruit girth (-0.243), average fruit weight (-0.171) and PDI of YVMV at 30 DAS (-0.248) onlyatgenotypiclevel. Whereas, PDI of YVMV at 45DAS (0.331) showed significant positive correlation at genotypic level. The results on correlation studies of days to 1st flowering revealed significantpositive correlation with days to 50%flowering (0.961 and 0.984), fruit girth (0.254and 0.286), average fruit weight (0.256 and 0.264) and PDI of YVMV at 30DAS (0.340 and0.485) at both phenotypic and genotypic levels and negative significant correlationwith PDI of YVMV at 30 DAS (-0.262 and -0.294) and PDI of YVMV at 60 DAS (-0.201 and - 0.219) at both thelevels. Positive and significant association ofdays to 50%flowering was found with fruit girth (0.250 and 0.295), average fruit weight (0.273 and 0.281) and PDI of YVMV at 30DAS (0.299 and0.426). But thecharacter like PDI of YVMV at 45DAS (-0.251 and -0.288)

and PDI of YVMV at 60DAS (-0.198 and -0.220) had showednegativeand significant resultatboth phenotypic and genotypic level. Daysto1st floweringregisteredpositiveandhighlysignificantassociationwith days to 50% flowering (0.961 and 0.984),fruit girth(0.254 and 0.286), average fruit weight(0.256 and 0.264) and PDI of YVMV at 30DAS (0.340 and 0.485)both at phenotypic and genotypic level. At both the levels, PDI of YVMV at 45DAS(-0.262 and -294)andPDI of YVMV at 60DAS(-0.201 and -0.219), it wascorrelated significantlyand negatively. Daysto50%floweringconveyedpositiveandhighlysignificantcorrelationswithfruit girth (0.250 and 0.295), average fruit weight (0.273 and 0.281)and PDI of YVMV at 30DAS (0.299 and 0.426) at bothphenotypicandgenotypiclevel,whereas,itexhibitednegativesignificantcorrelationwith PDI of YVMV at 45DAS(-0.251 and -288)andPDI of YVMV at 60DAS(-0.198 and -0.220)atboth thelevels.Thetraitslikenodes at 1st flowering waspositivebutnon-significantly correlated with yield plant^{-1} at both phenotypic and genotypic level. On the other hand in this study, non-significant negative correlation of total yield plant^{-1} withstem diameter,leafletlengthandPDI of YVMV at 60 DASwererecorded.Also for the traits, like days to 1st flowering, days to 50%flowering, fruit girth showed negative and non-significantcorrelation at genotypic level and positive non-significant correlation at phenotypic levelwithyield plant^{-1}. The traits like PDI of YVMV at 30 DAS and PDI of YVMV at 45 DAS showed negative and non-significantcorrelation at phenotypic level withyield plant^{-1}. Amongthosetraitsstudied,stronginherentrelationshipwasestablishingandthusthesefindings were clearlyshowsthatgenotypiccorrelationswereofhighermagnitude to the corresponding phenotypic correlation. It canbeconcludedthattheselectioncriteriabasedonyield per plant^{-1} can provide better results for yield improvement in okra.Similarresultswerealsoobtainedby Singh *et al*.(2017), Singla (2018),Rathava*et al*.(2019) and Temam*et al*.(2020)**.**

At both phenotypic and genotypic level the direct as well asindirect effects of several traits on fruit yield presented (Table3 and 4). In phenotypic path, average fruit weight (0.503)resultedmaximumpositivedirecteffectfollowedbyno. of fruits plant^{-1} (0.429),), days to 1st flowering(0.360) , fruit weight (0.278), plant height (0.251),PDI for YVMV at 60 DAS(0.106),stem diameter (0.091),node at 1st flowering (0.052), nodes plant^{-1}(0.015) showed that these are the mainpioneer to fruit yield which is in consonance with the findingsof Umrao*et al*. (2015) and Singh*et al*. (2018). Whereas, negative effects was recorded in days to 50% flowering (-0.444) followed by leaflet length (-0.132), PDI for YVMV at 45 DAS (-0.199), PDI for YVMV at 30 DAS(-0.159), fruit length (0.061), fruit girth (-0.041),PDI for YVMV at 75DAS (0.026). Number of fruits plant-1(0.429)exhibited second highest positive direct effect on total fruit yield plant-1. It had negligible positive indirect effect via days to first flowering (0.092), fruits plant-1 (0.067), plant height (0.063), and a negative indirect effect via days to 50% flowering (-0.121)ontotalfruityieldplant^{-1}.The remaining character showed negligible positive or negative indirect effect on yield.Negativedirecteffectofplantheightatfinalharvest(-0.623)exhibitedviaindirectpositiveeffectofcharactersofplantheightatpeakfruitingstage(0.728),averagefruitweight(0.062)andfruitlength(0.040).Indirectnegativeeffectwasobservedwithrespecttofruitsplant^{-1}(-0.250).Restothercharacterswereindirectlyassociatedeitherpositivelyornegatively. Stem diameter showed a positive direct effect of 0.091 on total fruit yield plant^{-1}.It had positive indirect effect via days to 1st flowering (0.038) followedby leaflet length (0.036) and a negative indirect effect of (-) 0.068via days to 50% flowering.Theremainingcharactersshowednegligiblepositiveornegativeindirecteffect on

total fruityieldplant^{-1}. Nodes plant^{-1}(0.015) had positivedirect effect on totalfruit yield plant^{-1}via indirect positive effect of characters like fruits plant-1(0.287), plant height at final harvest (0.167), days to 50% flowering (0.047), average fruit weight (0.039), PDI for YVMV at 45 DAS (0.019), PDI for YVMV at 30 DAS (0.017), fruit girth(0.006) and PDI for YVMV at 75 DAS (0.001). All othertraits had indirectnegativeeffecton total fruityieldplant^{-1}. Similarly, node at 1st fruiting recordedlow positive direct effect of 0.052 on yieldplant^{-1}andapositive indirecteffectviadays to 50% flowering(0.052)ontotal fruityield plant^{-1}.Daysto1stflowering(0.360)showedpositivedirecteffectvianegativeindirecteffectofcharacterslikedays to 50% flowering(-0.427), PDI for YVMV at 30 DAS (-0.054) and fruits plant-1(-0.052).Moderate positive indirect effect was observed forcharacter like PDI for YVMV at 45 DAS (0.052). Rest of the characters had negligible effect eitherin positiveornegative direction. Daysto 50% flowering showed negative directeffect(-0.444) on totalyieldplant^{-1}andshowedmoderatepositiveindirecteffectfordays to 1st flowering (0.346). Negative direct effect was observed for leaflet length (-0.132) via higherindirect negative effect with respect to days to 50% flowering (-0.039), stem diameter (-0.025),average fruit weight(-0.022),node at 1st fruiting (-0.006),fruit girth (-0.006) and PDI for YVMV at 60 DAS (-0.006). Moderate positive indirecteffectwasobservedfortraitslikeplantheightatfinal harveststage(0.061). Rest other traits exhibitedindirect effect positively. Fruit length exhibited negative direct effect (-0.061) on totalyield plant^{-1} and moderate positive indirect effect on fruit yield was exhibited by thistrait through average fruit weight (0.258) followed by plant height at final harvest stage (0.045) and no. of fruits plant^{-1} (0.032). Fruit girth (-0.041) had negativedirecteffecton totalyield plant^{-1} and moderate positive indirect effect on fruit yield was observed through the traits like average fruit weight (0.145), days to 1st flowering (0.091), PDI for YVMV at 60 DAS (0.024) and stem diameter (0.013) . Rest other characters were indirectlyassociatedin anegative direction. Positive direct effect (0.503) was recorded in average fruit weight ontotal fruit yield plant-1 and it showed low positive indirect effect on yield via days to 1st flowering (0.092)followedbyno. of fruits plant^{-1}(0.067),plant height (0.063) andPDI of YVMV at 45 DAS (0.013)whereas, othercharacterswereindirectlyassociated inapositiveornegative direction. Fruits plant^{-1} (0.429) exhibited positive direct effect on total yield plant-1whereas, it showed positive indirect effect through plant height at final harvest (0.166) on fruit yield plant-1. Rest other positivecharactershad negligible effect. PDI for YVMV at 30DAS (-0.159) exhibited negative direct effect via highest indirect effect of positive characters like days to1st flowering (0.122), average fruit weight (0.063),PDI for YVMV at 45DAS (0.027) and plant height at final harvest (0.025).Remainingcharactersexhibitednon-significantindirectpositiveornegative effect. PDI for YVMV at 45 DAS (-0.199) showed negative direct effect while the characters showed positive indirect effect through days to 50% flowering (0.111)on fruit yield plant^{-1}. Rest other positive and negativecharactershad negligible effect. PDI for YVMV at 60 DAS exhibited positive direct effect (0.106) on totalyield plant^{-1} and moderate negativeindirect effect on fruit yield was exhibited by thistrait through average fruit weight (-0.173) followed by plant height at final harvest stage (0.045) and no. of fruits plant^{-1} (0.032).Similarly,PDI for YVMV at 75 DAS manifestednegativedirecteffect(-0.026) on fruit yield. It exhibited positive indirect effect on fruit yield through PDI for YVMV at 60 DAS(0.062),days to 50% flowering (0.050), PDI for YVMV at 30 DAS(0.011), leaflet length (0.010),node at 1st fruiting (0.007), stem diameter (0.005) and fruit length (0.004).Rest ofthetraitshad negativeindirect effect.

Conclusion

In present investigation genotypic correlation had observed to be higher than the corresponding phenotypic correlations for all the character combinations, it may due to strong inherent association between various characters and significant G x E interaction. From the present study path coeficient analysis of total fruit yield contributing characters estimated that the average fruit weight showed maximum positive direct effect followed byno. of fruits plant^{-1}, days to 1st flowering, plant height, PDI for YVMV at 60 DAS ,stem diameter, node at 1st flowering, nodes plant^{-1},. The selection based on these characters will results in development of high fruit yield plant^{-1}.

Reference

- Dewey DR, Lu KH, 1959. A correlation and Path -Coefficient analysis of components of crested wheatgrass seed production. Agronomy Journal, 51(9):78.
- Koundinya AVV, Dhankhar SK, Yadav AC. Genetic variability and divergence in okra (*Abelmoschusesculentus*). Indian Journal of Agricultural Science 2013;83(6):685-688.
- National Horticulture Data Base. 2019. National Horticulture Board, Ministry of Agriculture, Government of India .
- Purseglove J W. 1984. Tropical Crops Dicotyledons. Longman, London.
- Rathava D, Patel AI, Chaudhari BN and Vashi JM., 2019. Correlation and path coefficient studies in okra (*Abelmoschusesculentus* L. Moench), International journal of microbiology and applied science, 8(10): 1710-1719.
- Singh, A.P., Kumar, P.P., Kumar, B.A. and Bahadur, V. 2017. Studies on genetic variability, heritability and character association in okra [*Abelmoschusesculentus* (L.) Moench.]. International Journal of Bio-resource and Stress Management, 8(3): 457-462.
- Singla R, Kumari P and Thaneswari, 2018. Evaluation of growth and yield parameters of okra (*Abelmoschusesculentus* L. Moench) genotypes, International journal of pure and applied bioscience, 6(5):84-89.
- Temam N, 2020. Correaltion and path coefficient analysis for pod yield and related traits in okra [*Abelmoschusesculentus* (L.) Monech] genotypes evaluated at Melkassa, Central Ethiopia, International Journal of Engineering Research and Technology, 9(2).
- Umrao V, Sharma S.K, Kumar V, Kumar R, Sharma A and Kumar J, 2015.Correaltion and path coefficient analysis of yield components zin okra [*Abelmoschusesculentus* (L.) Monech], HortFlora Research Spectrum, 4(2):139-143.

Nbeaa RA, Abo-Trabi B, Ahmad E. Phenotypic Correlation and Path Coefficient and Relative Importance Studies in Okra Abelmoschusesculentus (L.) Moench. BasrahJournal of Agricultural Sciences. 2023 Jun 26;36(1):50-9.

Komolafe RJ, Ariyo OJ, Alake CO, Oduwaye OA. Genetic variability, heritability, genetic advance, association between fruit yield and yield components of okra (Abelmoschusesculentus L. Moench) accessions grown in two different years. Israel Journal of Plant Sciences. 2023 May 17;1(aop):1-3.

Benchasri S. 2012. Okra (Abelmoschusesculentus (L.) Moench) as a valuable vegetable of the world," Ratarstvoipovrtarstvo,vol. 49, no. 1, pp.105-112.

Kumar S. and.Yadav Y.C. 2009. Correlation coefficient and path analysis studies in okra [Abelmoschusesculentus (L.) Moench]. Annals of Horticulture, vol. 2, no. 2, pp.166-170.

Saifullah M. and Rabbani M.G.2009. Evaluation and characterization of okra (Abelmoschusesculentus L. Moench.) genotypes. Saarc J. Agric, vol. 7, no.1, pp.92-99.

Fajinmi A.A., and Fajinmi O.B. 2010. Incidence of okra mosaic virus at different growth stages of okra plants (Abelmoschusesculentus (L.) Moench) under tropical condition. Journal of General and Molecular Virology, vol. 2, no.1, pp.028-031.

		SD	NP	FN	DFF	D50F	LL	FL	FG	AFW	F/P	PDI30	PDI45	PDI60	PDI75	Y/P
PH	P	-0.211*	0.666**	-0.089^{NS}	0.069^{NS}	0.103^{NS}	0.241**	0.179*	-0.050^{NS}	0.250**	0.662**	0.100^{NS}	-0.100^{NS}	-0.066^{NS}	-0.137^{NS}	0.557**
	G	-0.232**	0.743**	-0.146^{NS}	0.081^{NS}	0.113^{NS}	0.255**	0.202*	-0.063^{NS}	0.257**	0.737**	0.087^{NS}	-0.109^{NS}	-0.074^{NS}	-0.176*	0.632**
SD	P		-0.213*	-0.069^{NS}	0.106^{NS}	0.154^{NS}	-0.277**	-0.145^{NS}	0.143^{NS}	-0.027^{NS}	-0.176*	0.098^{NS}	0.040^{NS}	0.065^{NS}	0.103^{NS}	-0.059^{NS}
	G		-0.238**	-0.086^{NS}	0.110^{NS}	0.163^{NS}	-0.286**	-0.168*	0.183*	-0.037^{NS}	-0.195*	0.134^{NS}	0.037^{NS}	0.058^{NS}	0.140^{NS}	-0.053^{NS}
NP	P			0.008^{NS}	-0.093^{NS}	-0.106^{NS}	0.037^{NS}	0.113^{NS}	-0.138^{NS}	0.077^{NS}	0.668**	-0.107^{NS}	-0.097^{NS}	-0.062^{NS}	-0.080^{NS}	0.506**
	G			-0.044^{NS}	-0.104^{NS}	-0.115^{NS}	0.035^{NS}	0.135^{NS}	-0.150^{NS}	0.082^{NS}	0.732**	-0.172*	-0.095^{NS}	-0.053^{NS}	-0.127^{NS}	0.551**
FN	P				-0.102^{NS}	-0.117^{NS}	-0.122^{NS}	-0.146^{NS}	-0.131^{NS}	-0.123^{NS}	0.056^{NS}	-0.011^{NS}	0.134^{NS}	0.197*	0.197*	0.013^{NS}
	G				-0.175*	-0.178*	-0.188*	-0.257**	-0.243**	-0.171*	0.061^{NS}	-0.248**	0.331**	0.355**	0.295**	0.014^{NS}
DFF	P					0.961**	0.051^{NS}	0.041^{NS}	0.254**	0.256**	-0.120^{NS}	0.340**	-0.262**	-0.201*	-0.080^{NS}	0.003^{NS}
	G					0.984**	0.050^{NS}	0.037^{NS}	0.286**	0.264**	-0.131^{NS}	0.485**	-0.294**	-0.219**	-0.112^{NS}	-0.022^{NS}
D50F	P						0.088^{NS}	0.093^{NS}	0.250**	0.273**	-0.085^{NS}	0.299**	-0.251**	-0.198*	-0.069^{NS}	0.003^{NS}
	G						0.092^{NS}	0.095^{NS}	0.295**	0.281**	-0.087^{NS}	0.426**	-0.288**	-0.220**	-0.131^{NS}	-0.011^{NS}
LL	P							-0.091^{NS}	0.139^{NS}	-0.044^{NS}	0.238**	-0.075^{NS}	-0.055^{NS}	-0.054^{NS}	-0.001^{NS}	-0.009^{NS}
	G							-0.097^{NS}	0.154^{NS}	-0.044^{NS}	0.253**	-0.110^{NS}	-0.062^{NS}	-0.057^{NS}	0.010^{NS}	-0.013^{NS}
FL	P								0.201*	0.514**	0.075^{NS}	0.109^{NS}	-0.078^{NS}	-0.015^{NS}	-0.049^{NS}	0.209*
	G								0.219**	0.540**	0.103^{NS}	0.195*	-0.090^{NS}	-0.030^{NS}	-0.083^{NS}	0.227**
FG	P									0.288**	-0.088^{NS}	0.057^{NS}	-0.123^{NS}	-0.030^{NS}	0.076^{NS}	0.006^{NS}
	G									0.315**	-0.110^{NS}	0.129^{NS}	-0.123^{NS}	-0.043^{NS}	0.132^{NS}	-0.009^{NS}
AFW	P										0.155^{NS}	0.126^{NS}	-0.063^{NS}	-0.045^{NS}	-0.109^{NS}	0.522**
	G										0.169*	0.190*	-0.082^{NS}	-0.047^{NS}	-0.154^{NS}	0.560**
F/P	P											-0.188*	-0.113^{NS}	-0.089^{NS}	-0.076^{NS}	0.645**
	G											-0.329**	-0.133^{NS}	-0.105^{NS}	-0.119^{NS}	0.718**
PDI30	P												-0.135^{NS}	-0.090^{NS}	0.018^{NS}	-0.132^{NS}
	G												-0.147^{NS}	-0.104^{NS}	0.067^{NS}	-0.178*
PDI45	P													0.869**	0.626**	-0.141^{NS}
	G													0.982**	0.830**	-0.198*
PDI60	P														0.693**	-0.131^{NS}
	G														0.980**	-0.148^{NS}
PDI75	P															-0.187*
	G															-0.308**

PH- Plant height at final harvest(cm), SD- Stem diameter(cm), NP- Nodes plant^{-1}, FN- Nodes at first flowering, DFF- Days to 1st flowering, D50F- Days to 50% flowering,FL- Fruit length (cm), FG- Fruit girth (cm),AFW- Average fruit weight (g), F/P- Fruits plant^{-1}, PDI30 -YVMV% at 30 DAS, PDI45 -YVMV% at 45 DAS, PDI60 -YVMV% at 60 DAS, PDI75 -YVMV% at 75 DAS, Y/P- fruit yield plant^{-1}(g).

TABLE -1 : CORRELATION ANALYSIS IN OKRA GERMPLASMS

TABLE -2 : PATH ANALYSIS IN OKRA GERMPLASMS

	PH	SD	NP	FN	DFF	D50F	LL	FL	FG	AFW	F/P	PDI 30	PDI 45	PDI 60	PDI 75
PH	**0.251**	-0.019	0.010	-0.005	0.025	-0.046	-0.032	-0.011	0.002	0.126	0.284	-0.016	0.020	-0.007	0.004
SD	-0.053	**0.091**	-0.003	-0.004	0.038	-0.068	0.036	0.009	-0.006	-0.014	-0.076	-0.016	-0.008	0.007	-0.001
NP	0.167	-0.019	**0.015**	0.000	-0.033	0.047	-0.005	-0.007	0.006	0.039	0.287	0.017	0.019	-0.007	0.001
FN	-0.022	-0.006	0.000	**0.052**	-0.037	0.052	0.016	0.009	0.005	-0.062	0.024	0.002	-0.027	0.021	-0.004
DFF	0.017	0.010	-0.001	-0.005	**0.360**	-0.427	-0.007	-0.002	-0.010	0.129	-0.052	-0.054	0.052	-0.021	0.003
D50F	0.026	0.014	-0.002	-0.006	0.346	**-0.444**	-0.012	-0.006	-0.010	0.137	-0.036	-0.048	0.050	-0.021	0.003
LL	0.061	-0.025	0.001	-0.006	0.018	-0.039	**-0.132**	0.006	-0.006	-0.022	0.102	0.012	0.011	-0.006	0.002
FL	0.045	-0.013	0.002	-0.008	0.015	-0.041	0.012	**-0.061**	-0.008	0.258	0.032	-0.017	0.016	-0.002	0.002
FG	-0.013	0.013	-0.002	-0.007	0.091	-0.111	-0.018	-0.012	**-0.041**	0.145	-0.038	-0.009	0.024	-0.003	0.000
AFW	0.063	-0.002	0.001	-0.006	0.092	-0.121	0.006	-0.031	-0.012	**0.503**	0.067	-0.020	0.013	-0.005	0.003
F/P	0.166	-0.016	0.010	0.003	-0.043	0.038	-0.031	-0.005	0.004	0.078	**0.429**	0.030	0.022	-0.009	0.003
PDI 30	0.025	0.009	-0.002	-0.001	0.122	-0.133	0.010	-0.007	-0.002	0.063	-0.081	**-0.159**	0.027	-0.010	0.002
PDI 45	-0.025	0.004	-0.001	0.007	-0.094	0.111	0.007	0.005	0.005	-0.032	-0.048	0.022	**-0.199**	0.092	-0.016
PDI 60	-0.017	0.006	-0.001	0.010	-0.072	0.088	0.007	0.001	0.001	-0.023	-0.038	0.014	-0.173	**0.106**	-0.015
PDI 75	-0.040	0.005	-0.001	0.007	-0.045	0.050	0.010	0.004	0.000	-0.051	-0.053	0.011	-0.121	0.062	**-0.026**

PH- Plant height at final harvest(cm), SD- Stem diameter(cm), NP- Nodes plant^{-1}, FN- Nodes at first flowering, DFF- Days to 1st flowering, D50F- Days to 50% flowering,FL- Fruit length (cm), FG- Fruit girth (cm),AFW- Average fruit weight (g), F/P- Fruits plant^{-1}, PDI30 -YVMV% at 30 DAS, PDI45 -YVMV% at 45 DAS, PDI60 -YVMV% at 60 DAS, PDI75 -YVMV% at 75 DAS, Y/P- fruit yield plant^{-1}(g).