International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(3): 208-213

Received: 18-03-2019
Accepted: 22-04-2019

A Kannan
PG Scholar, Agricultural College and Research Institute, Madurai, Tamil Nadu, India

C Rajamanickam
Assistant Professor, Department of Horticulture, Agricultural College and Research Institute, Madurai, Tamil Nadu, India

V Krishnamoorthy
Associate Professor, Horticultural Research Station, Thadiyankudisai, Agricultural College and Research Institute, Madurai, Tamil Nadu, India

P Arunachalam
Assistant Professor, Department of Plant Breeding and Genetics, Agricultural College and Research Institute, Madurai, Tamil Nadu, India

Correspondence
C Rajamanickam
Assistant Professor, Department of Horticulture, Agricultural College and Research Institute, Madurai, Tamil Nadu, India

Genetic variability, correlation and path analysis in f_4 generation of ridge gourd (*Luffa acutangula* (Roxb) L.)

A Kannan, C Rajamanickam, V Krishnamoorthy and P Arunachalam

Abstract
The present investigation on genetic variability, correlation and path analysis in F_4 generation of ridge gourd was carried out to develop medium size, high yielding and good quality variety for Madurai condition. The selected genotypes from two crosses *viz.*, Virudhunagar local x Periyakottai local (L_3xT_1) and Virudhunagar local x Alathur local (L_3xT_2) of ridge gourd along with their parents were evaluated in a randomized block design (RBD) with two replications. The results revealed that both crosses showed low PCV, GCV coupled with high heritability and high genetic advance for the character notes to first male flower. Whereas low PCV, GCV coupled with low heritability and low genetic advance for the character fruit diameter. This indicates selection for these traits will be effective for improving these traits in further generation. Regarding correlation studies, cross L_3xT_1 the trait fruit yield was found to be significantly and positively correlated with node to first male, node to first female flower, fruit weight, fruit length, number of fruits per plant and flesh thickness. Whereas cross L_3xT_2,fruit yield was found to be significantly and positively correlated with node to first male, node to first female flower, fruit weight, fruit diameter and flesh thickness. Path coefficient analysis showed that fruit length in L_3xT_1cross has contributed the maximum positive direct effect. Whereas fruit diameter in L_3xT_2 cross contributed the maximum positive direct effect.

Keywords: Ridge gourd, GCV, PCV, heritability, correlation, path analysis

Introduction
Ridge gourd (*Luffa acutangula* (L.) Roxb.) is one of the most important cucurbitaceous vegetable crop mainly cultivated in India. It is grown all over India in tropical and subtropical climate. It is popularly known as kalitori, ribbed gourd, angled gourd, silky gourd, angled loofah and vegetable gourd. The dried fruits of were used as bathing sponge, doormats, pillows and cleaning utensils (Narasannavar *et al.*, 2014) [10]. Ridge gourd is a monoecious and highly cross pollinated vegetable with a large amount of variations were observed for most of the economically important traits. Variations in shape, size and colour of fruits is found to be most conspicuous. Most of the ridge gourd hybrids released from India have large sized fruits which is not preferred by a consumer and it affects the marketability of ridge gourd as a vegetable. The role of genetic variability in crops is of paramount importance in selecting the best genotypes for making rapid improvement in yield and related characters as well as to select the most potential parents for making the hybridization programme successful. Therefore, the present investigation on genetic variability, correlation and path analysis in F_4 generation of ridge gourd for growth, yield and quality were undertaken during the year 2018.

Materials and Methods
The present study was carried out at Department of Horticulture, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai, Tamil Nadu, India during July 2018 to November 2018. The crosses *viz.*, L_3xT_1 (Virudhunagar Local x Periyakottai Local) and L_3xT_2 (Virudhunagar Local x Alathur Local) were evaluated along with their parents. The present study was laid out is a Randomized Block Design (RBD) with two replications for F_4 generation. The spacing adopted for the study is 2m x 2m. From each replication 99 pits were taken and two plants per pit were maintained in each crosses and their parents and accounted for a total population of 212 plants in F_4 generation.
The observations on vine length, days to first male flowering, days to first female flowering, node to first male flower, node to first female flower, number of fruits per plant, sex ratio, days to first harvest, average fruit weight (g), fruit length (cm), fruit diameter (cm), rind thickness (mm), flesh thickness (mm), fruit yield per plant (kg), total soluble solids (TSS) (°Brix),

total crude fibre content (mg) were recorded. The data recorded were statistically analysed for genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability, genetic advance over mean, correlation and path co-efficient analysis (Dewey and Lu, 1959) to partition the genotypic correlation coefficient into measures direct and indirect effects.

Results and Discussion

The extent of variability present in the selected genotype of ridge gourd in F_4 generations from two crosses were measured for variability, heritability, genetic advance are presented in table 1 and 2.

Genotypic and Phenotypic Variability

The results revealed selection for vine length in crosses L_3xT_1 (5.274; 4.761) and L_3xT_2 (7.116; 6.101), days to first female flowering in crosses L_3xT_1 (7.370; 5.352) andL_3xT_2(6.283; 4.263), node to first male flower in crosses L_3xT_1 (9.041; 6.400) andL_3xT_2(9.410; 8.080), sex ratio in crosses L_3xT_1 (5.279; 4.510) andL_3xT_2(3.721; 1.294), days to first harvest in crossesL_3xT_1 (7.854; 6.117) andL_3xT_2(2.183; 1.397), fruit diameter in crosses L_3xT_1 (11.504; 4.377) andL_3xT_2(6.341; 2.800) and rind thickness in crossesL_3xT_2(9.553; 7.099) would not be effective due to low PCV and GCV values. This agrees with the finding of Samadia (2011) [12], Karthick *et al.* (2017) [7] in ridge gourd and Puddan (2000) [11], Dey *et al.* (2009) [3] in bitter gourd. This indicates selection resulted in attaining homozygosity and further selection will not alter this trait.

The traits days to first male flowering in crossesL_3xT_1 (12.569; 10.067) and L_3xT_2 (10.163; 5.751), node to first female flower in crossesL_3xT_1(17.181; 16.785) and L_3xT_2(17.544; 13.802), number of fruits per plant in crosses L_3xT_1 (18.031; 17.408) andL_3xT_2(17.800; 12.291), fruit weight in crosses L_3xT_1 (16.951; 13.003) andL_3xT_2(17.890; 11.127), fruit length in crosses L_3xT_1 (21.018; 18.868) andL_3xT_2(12.597; 12.302), flesh thickness in crosses L_3xT_1 (16.658; 13.985) andL_3xT_2(13.022; 15.883), fruit yield per plant in crosses L_3xT_1 (16.504; 12.144) andL_3xT_2(12.827; 11.994)were exhibited moderate PCV and GCV. This is agrees with the findings of Karthick *et al.* (2017) [7], Ananthan and Krishnamoorthy (2017) [1, 13], Samadia (2011) [12] and Koppad *et al.* (2015) [8] in ridge gourd. This indicates the presence of medium amount of variability and improvement of these traits is possible up to an extent in further generation and attain homozygosity.

In case of rind thickness, L_3xT_1(29.152; 28.241) showed high magnitude of PCV and GCV. Koppad *et al.* (2015) [8] also found that high variability in genotypes of ridge gourd. This confirms the presence of a diverse genotypes in F_4 in these cross and improvement through selection is possible in further selection.

Heritability and genetic advance

The heritability and genetic advance are presented in table 1 and 2, high heritability coupled with high genetic advance was recorded for the traits node to first male flower, node to first female flower, number of fruits per plant, flesh thickness, fruit length in both the crosses and rind thickness and fruit weight in crossL_3xT_1. This confirm the presence of additive gene action and the traits are less influenced by environment and selecting the genotypes based on such characters could be worthwhile which agrees with the findings of Singh *et al.* (2002) [15], Samadia (2011) [12] in ridge gourd, Sharma and Sengupta (2013) [14] in bottle gourd.

High heritability coupled with moderate genetic advance was recorded for the traits days tofirst male flowering and days to first harvest in crossL_3XT_1. This might be due to homozygous line could be developed through continuous selection process and these results are similar to the findings of Kanimozhi *et al.* (2015) [6] in wax gourd.

High heritability coupled with low genetic advance was recorded for the traits vine length in both the crosses and sex ratio in cross L_3xT_1. This indicated the presence of certain degree of non-additive gene effect and was supported by findings of Islam *et al.* (1993) [4] in cucumber and Sampath *et al.* (2017) [13] in pumpkin.

Moderate heritability coupled with moderate genetic advance was recorded for the traitsfruit yield per plant in both the crosses. This indicates transmission of genes related to this trait to further generation possible. Similar results were reported by Islam *et al.* (2009) [5] in bitter gourd.

Correlation coefficient analysis

It was necessary to determine the magnitude and direction of relationship between yield and its components for the improvement of yield in ridge gourd. The sixteen traits in F_4 generation of $L_3xT_1$and L_3xT_2were considered for correlation. Crosses $L_3xT_1$and L_3xT_2had registered correlation coefficients between yield and its components estimated were given in table 3 &4. The cross L_3xT_1, fruit yield was found to be significantly and positively correlated with node first male (0.520) and female flower (0.535), fruit weight (0.704), fruit length (0.741), number of fruits per plant (0.708) and flesh thickness (0.666). Whereas, cross L_3xT_2 is fruit yield was found to be significantly and positively correlated with node to first male (0.874) and female flower (0.679), fruit weight (0.944), fruit diameter (0.710) and flesh thickness (0.944).This indicated that fruit yield can be improved by making selections on the bases of these yield attributing characters. Similar results were reported by Ananthan and Krishnamoorthy (2017) [1, 13] in ridge gourd and Sampath *et al.* (2017) [13] in pumpkin.

Inter correlations among yield attributing components

The present study revealed that days to first male flower was exhibited significant and positive correlation with days to first female flower, node to first male flower, flesh thickness and number of fruits per plant in L_3xT_1 cross and also days to first female flower was exhibited significant and positive correlation with number of fruits per plant and sex ratio. In the crosses L_3xT_1 and L_3xT_2, fruit diameter showed significant and positive correlation with flesh thickness, rind thickness, number of fruits per plant and sex ratio. These results corroborate the findings of positive and significant with Tamilselvi (2010) [16] in pumpkin. Nodes to first male flower showed significant and positive correlation with node to first female flower and fruit weight and also node to first female flower showed significant and positive correlation with days to first harvest and flesh thickness in L_3xT_1 cross. Similar results were reported by Chowdhury and Sharma, (2002) [2] in ridge gourd. The crosses L_3xT_1 and L_3xT_2, fruits weight showed significant and positive correlation with fruit length, fruit diameter and flesh thickness. These results were conformity with Lakshmi *et al.* (2000) [9] in pumpkin.

Table 1: Estimates of mean, components of variance, heritability and genetic advance for growth, flowering, yield and quality parameters in Virudhunagar local x Periyakottai local (L_3xT_1)

S. No	Characters	Mean	PCV (%)	GCV (%)	h^2 (%)	GAM
A.	**Growth traits**					
1.	Vine length(m)	8.089	5.274	4.761	81.402	8.812
B.	**Flowering Traits**					
1.	Days to 1st male flowering	38.363	12.569	10.067	64.152	16.611
2.	Days to 1st female flowering	44.128	7.370	5.352	52.734	8.007
3.	Nodes to 1st male flower	9.001	9.041	6.399	60.659	24.044
4.	Nodes to 1st female flower	19.549	17.781	16.785	84.976	30.457
5.	Sex ratio	5.899	5.279	4.510	72.985	7.937
6.	Days to first harvest	61.166	7.854	6.117	81.864	11.033
C.	**Yield Traits**					
1.	Number of fruits per plant	16.520	18.031	17.408	94.457	35.057
2.	Fruit weight (kg)	0.316	16.951	13.003	60.840	20.546
3.	Fruit length(cm)	34.506	21.018	18.868	80.591	34.893
4.	Fruit diameter (cm)	4.410	11.504	4.377	14.475	3.430
5.	Rind thickness (cm)	0.425	29.152	28.241	93.846	56.358
6.	Flesh thickness (cm)	3.773	16.657	13.985	81.313	25.206
7.	Fruit yield per plant (kg)	5.219	16.504	12.144	54.145	18.408
D.	**Quality Traits**					
1.	Total Soluble Solids (TSS)	3.068	12.313	11.955	94.264	23.910
2.	Total Crude Fibre Content (mg)	0.470	9.120	8.230	78.450	15.450

PCV=Phenotypic coefficient of variance GCV = Genotypic coefficient of variance
h^2 = Heritability (broad sense) GAM = Genetic advance (per cent mean)

Table 2: Estimates of mean, components of variance, heritability and genetic advance for growth, flowering, yield and quality parameters in Virudhunagar local x Alathur local (L_3xT_2)

S. No	Characters	Mean	PCV (%)	GCV (%)	h^2 (%)	GAM
A.	**Growth traits**					
1.	Vine length(m)	7.854	7.116	6.101	73.502	10.775
B.	**Flowering Traits**					
1.	Days to 1st male flowering	38.833	10.163	5.751	32.024	6.705
2.	Days to 1st female flowering	44.895	6.283	4.263	46.044	5.959
3.	Nodes to 1st male flower	9.515	9.410	8.080	69.876	22.700
4.	Nodes to 1st female flower	18.136	17.544	13.802	61.887	22.367
5.	Sex ratio	6.244	3.721	1.294	12.084	0.926
6.	Days to first harvest	64.528	2.183	1.397	40.945	1.842
C.	**Yield Traits**					
1.	Number of fruits per plant	16.531	17.800	12.291	88.625	26.386
2.	Fruit weight (kg)	0.277	17.890	11.127	35.931	8.801
3.	Fruit length(cm)	29.451	12.60	12.302	95.369	24.748
4.	Fruit diameter (cm)	4.263	6.341	2.800	19.499	2.547
5.	Rind thickness (cm)	0.370	9.553	7.099	55.215	10.866
6.	Flesh thickness (cm)	3.601	13.022	15.883	85.917	26.135
7.	Fruit yield per plant (kg)	4.561	12.827	11.994	38.844	10.264
D.	**Quality Traits**					
1.	Total Soluble Solids (TSS)	3.115	11.356	10.276	81.887	19.156
2.	Total Crude Fibre Content (mg)	0.460	6.370	5.240	77.450	10.360

PCV=Phenotypic coefficient of variance GCV = Genotypic coefficient of variance
h 2 = Heritability (broad sense) GAM = Genetic advance (per cent mean)

Table 3: Correlation coefficients of the cross Virudhunagar local x Periyakottai local (L_3xT_1)

	VL	DFMF	DFFF	NFMF	NFFF	DFH	FW	FL	FD	RT	FT	NFPP	SR	TSS	CFC	FY
VL	1.000	-0.919	-0.362	-0.452	0.317	-0.725	-0.153	-0.447	0.129	-0.605	0.227	-0.229	0.277	0.103	-0.094	-0.138
DFMF		1.000	0.963**	0.780**	-0.182	0.289	0.068	0.046	0.270	0.279	0.520*	0.590**	0.228	0.278	-0.081	0.162
DFFF			1.000	0.379	0.242	0.283	0.156	0.233	-0.135	0.490	0.123	0.890**	0.566**	0.117	-0.067	0.243
NFMF				1.000	0.533*	0.053	0.442*	-0.183	0.068	0.115	0.344	-0.643	0.085	-0.178	-0.069	0.520*
NFFF					1.000	0.702**	-0.090	-0.582	-0.268	-0.868	0.520*	-0.962	-0.667	-0.109	-0.103	0.535*
DFH						1.000	-0.201	-0.622	0.263	-0.900	-0.433	0.543 *	0.723**	-1.091	0.056	0.099
FW							1.000	0.931**	-0.108	0.321	0.371	-1.063	0.115	0.215	0.028	0.704**
FL								1.000	-0.064	0.034	-0.047	-0.117	0.145	0.221	0.048	0.741**
FD									1.000	0.707**	0.826**	0.925**	0.951**	-0.687	0.035	0.011
RT										1.000	0.823**	0.388	0.388	-0.320	0.018	0.408
FT											1.000	0.874**	-0.051	0.233	0.074	0.666**
NFPP												1.000	0.646**	-0.736	0.069	0.708**
SR													1.000	-0.390	-0.135	0.214
TSS														1.000	0.019	0.137

CFC															1.000	0.074
FY																0.100

**Correlation is significant at 1% level
*Correlation is significant at 5% level
1. Vine length
2. Days to first male flowering
3. Days to first female flowering
4. Node to first male flowering
5. Node to first female flowering
6. Days to first harvest
7. Average fruit weight
8. Fruit length
9. Fruit diameter
10. Rind Thickness
11. Flesh Thickness
12. No. of fruits per vine
13. Sex Ratio
14. Total Soluble Solids
15. Crude Fibre content
16. Fruit yield

Table 4: Correlation coefficients of the cross Virudhunagar local x Alathur local (L_3xT_2)

	VL	DFMF	DFFF	NFMF	NFFF	DFH	FW	FL	FD	RT	FT	NFPP	SR	TSS	CFC	FY
VL	1.000	-0.081	0.408	-1.003	-0.805	0.102	-0.094	0.088	0.059	-0.207	0.271	0.115	-0.191	0.048	-0.167	-0.010
DFMF		1.000	0.272	0.557*	0.216	-0.522	0.097	0.296	-0.400	-0.391	-0.536	-0.617	-0.140	0.129	0.004	-0.178
DFFF			1.000	0.254	-0.256	-0.219	0.125	0.291	-0.176	-0.389	-0.429	0.450	0.948**	0.078	0.038	0.156
NFMF				1.000	0.870**	0.804**	0.175	-0.279	-0.671	0.305	-0.361	-0.490	-0.269	0.658*	0.030	0.874**
NFFF					1.000	0.340	0.329	-0.238	0.183	-0.206	-0.010	-0.462	-0.878	-0.009	-0.024	0.679**
DFH						1.000	0.728**	0.371	0.838**	-0.858	0.747**	-0.388	0.073	0.319	0.086	0.011
FW							1.000	0.549*	0.769**	-0.646	0.901**	0.123	0.851**	0.131	0.091	0.944**
FL								1.000	-0.182	-0.339	-0.375	-0.374	0.170	-0.656	0.005	0.428
FD									1.000	-0.197	0.866**	0.181	0.500	0.025	-0.059	0.710**
RT										1.000	-0.760	0.620*	-0.187	-0.358	-0.081	-0.416
FT											1.000	0.222	0.780**	0.380	0.079	0.944**
NFPP												1.000	-0.123	-0.118	-0.027	0.438
SR													1.000	0.056	0.086	0.369
TSS														1.000	0.024	0.028
CFC															1.000	-0.058
FY																1.000

**Correlation is significant at 1% level
*Correlation is significant at 5% level
1. Vine length
2. Days to first male flowering
3. Days to first female flowering
4. Node to first male flowering
5. Node to first female flowering
6. Days to first harvest
7. Average fruit weight
8. Fruit length
9. Fruit diameter
10. Rind Thickness
11. Flesh Thickness
12. No. of fruits per vine
13. Sex Ratio
14. Total Soluble Solids
15. Crude Fibre content
16. Fruit yield

Table 5: Genotypic path coefficient analysis indicating direct and indirect effects of component characters on fruit yield in Virudhunagar local x Periyakottai local (L_3xT_1)

	VL	DFMF	DFFF	NFMF	NFFF	DFH	FW	FL	FD	RT	FT	NFPP	SR	TSS	CFC	FY
VL	0.031	0.060	-0.030	-0.029	-0.004	0.013	-0.158	-0.015	-0.003	0.007	0.002	-0.007	0.006	-0.009	-0.003	-0.138
DFMF	-0.027	-0.07	0.080	0.051	0.002	-0.005	0.070	0.002	-0.006	-0.003	0.004	0.079	0.005	-0.024	-0.006	0.162
DFFF	-0.011	-0.063	0.083	0.025	-0.003	-0.022	0.162	0.008	0.003	-0.005	0.008	0.057	0.012	-0.010	-0.005	0.243
NFMF	-0.013	-0.051	0.0315	0.065	-0.006	-0.018	-0.458	-0.006	-0.002	-0.001	0.002	-0.080	0.002	0.015	-0.003	0.520
NFFF	0.009	0.012	0.020	0.035	-0.012	-0.047	-0.094	-0.019	0.006	0.010	0.004	-0.454	-0.014	0.009	0.002	0.535
DFH	-0.021	-0.019	0.107	0.068	-0.032	-0.017	-0.208	-0.020	-0.027	0.010	-0.003	0.153	0.015	0.094	0.001	0.099
FW	-0.005	-0.004	0.013	-0.029	0.001	0.004	1.035	0.036	0.002	-0.004	0.003	-0.032	0.002	-0.019	0.004	0.704
FL	-0.013	-0.003	0.019	-0.012	0.007	0.011	1.132	1.233	0.001	-0.004	-0.003	-0.064	0.003	-0.019	0.003	0.741

FD	0.004	-0.015	-0.011	0.004	0.003	-0.022	-0.112	-0.002	1.121	-0.019	0.007	0.119	0.020	0.059	0.002	0.011
RT	-0.018	-0.018	0.041	0.007	0.010	0.016	0.333	0.001	-0.037	-0.011	0.006	0.042	0.008	0.028	0.001	0.408
FT	0.007	-0.034	0.094	0.022	-0.006	0.008	0.384	-0.002	-0.022	-0.009	0.007	0.239	-0.001	-0.020	0.003	0.666
NFPP	-0.007	-0.169	0.158	-0.172	0.177	-0.088	-1.100	-0.070	-0.084	-0.016	0.054	0.030	0.013	0.063	-0.004	0.708
SR	0.008	-0.015	0.047	0.006	0.008	-0.013	0.119	0.005	-0.020	-0.004	-0.004	0.020	0.021	0.034	0.003	0.214
TSS	0.003	-0.018	0.010	-0.012	0.001	0.019	0.223	0.007	0.015	0.004	0.002	-0.022	-0.008	-0.086	0.002	0.137
CFC	-0.002	-0.007	-0.006	0.013	-0.008	-0.002	0.003	0.043	0.025	-0.003	-0.008	0.020	-0.012	-0.009	0.032	0.074

Residual Effect= 0.089

1. Vine length
2. Days to first male flowering
3. Days to first female flowering
4. Node to first male flowering
5. Node to first female flowering
6. Days to first harvest
7. Average fruit weight
8. Fruit length
9. Fruit diameter
10. Rind Thickness
11. Flesh Thickness
12. No. of fruits per vine
13. Sex Ratio
14. Total Soluble Solids
15. Crude Fibre content
16. Fruit yield

Table 6: Genotypic path coefficient analysis indicating direct and indirect effects of component characters on fruit yield Virudhunagar local x Alathur local (L_3xT_2)

	VL	**DFMF**	**DFFF**	**NFMF**	**NFFF**	**DFH**	**FW**	**FL**	**FD**	**RT**	**FT**	**NFPP**	**SR**	**TSS**	**CFC**	**FY**
VL	0.006	0.002	0.020	0.011	0.002	0.006	-0.094	-0.014	-0.015	-0.012	0.056	0.031	0.002	-0.012	-0.002	-0.010
DFMF	-0.004	-0.023	0.062	-0.006	-0.004	-0.030	0.097	-0.046	0.099	-0.022	-0.111	-0.168	0.001	-0.031	0.001	-0.178
DFFF	0.002	-0.029	0.049	-0.003	0.005	-0.013	0.125	-0.045	0.290	-0.022	-0.295	0.123	-0.008	-0.019	0.001	0.156
NFMF	-0.006	-0.013	0.013	-0.010	-0.002	0.059	1.176	0.043	0.165	0.017	-0.281	-0.132	0.002	-0.156	0.002	0.874
NFFF	-0.004	-0.005	-0.013	-0.009	-0.002	0.020	0.329	0.037	-0.045	-0.011	-0.002	-0.126	0.008	0.002	0.001	0.679
DFH	0.006	0.012	-0.011	-0.010	-0.007	0.758	0.729	-0.058	-0.207	-0.045	0.278	-0.649	-0.009	-0.076	0.002	0.011
FW	-0.005	-0.002	0.006	-0.012	-0.007	0.043	1.001	-0.085	-0.190	-0.036	0.225	0.033	-0.007	-0.031	0.001	0.944
FL	0.005	-0.007	0.014	0.003	0.005	0.022	0.549	1.155	0.045	-0.019	-0.078	-0.102	-0.002	0.156	-0.001	0.428
FD	0.003	0.009	-0.058	0.007	-0.004	0.049	0.770	0.028	1.246	-0.067	0.179	0.049	-0.004	-0.006	0.004	0.710
RT	-0.001	0.009	-0.019	-0.003	0.004	-0.050	-0.647	0.053	0.295	0.056	-0.364	0.169	0.002	0.085	0.003	-0.416
FT	0.002	0.012	-0.070	0.013	0.003	0.079	1.092	0.058	-0.214	-0.098	0.207	0.060	-0.007	-0.091	0.001	0.944
NFPP	0.006	0.014	0.022	0.005	0.009	-0.139	0.123	0.058	-0.045	0.034	0.046	0.272	0.018	0.028	-0.001	0.438
SR	-0.001	0.003	0.047	0.003	0.002	0.063	0.852	-0.026	-0.123	-0.010	0.161	-0.577	-0.009	-0.013	-0.001	0.369
TSS	0.003	-0.003	0.004	-0.007	0.002	0.019	0.131	0.102	-0.006	-0.020	0.079	-0.032	-0.005	-0.238	-0.002	0.028
CFC	-0.009	0.002	-0.003	-0.002	-0.002	0.008	0.006	-0.055	0.008	0.003	-0.004	-0.013	0.008	-0.005	0.008	-0.058

1. Vine length
2. Days to first male flowering
3. Days to first female flowering
4. Node to first male flowering
5. Node to first female flowering
6. Days to first harvest
7. Average fruit weight
8. Fruit length
9. Fruit diameter
10. Rind Thickness
11. Flesh Thickness
12. No. of fruits per vine
13. Sex Ratio
14. Total Soluble Solids
15. Crude Fibre content
16. Fruit yield

Path coefficient analysis

Path analysis (Table 5) revealed that cross L_3xT_1, vine length (0.031), days to first female flower (0.083), node to first male flower (0.065), fruit weight (1.035), fruit length (1.233), fruit diameter (1.121), flesh thickness (0.007), number of fruits per plant (0.030) and sex ratio (0.021) exhibited positive and direct effects on fruit yield at genotypic level indicating their true positive significant association with fruit yield. Among sixteen traits, fruit length contributed the maximum positive direct effect (1.233) followed by fruit diameter (1.121) and fruit weight (1.035). Days to first male flower, nodes to first female flower, days to first harvest, rind thickness and TSS exhibited negative direct effect on fruit yield at genotypic level. Whereas, cross L_3xT_2path analysis (Table 6) revealed that vine length (0.006), days to first female flower (0.049), days to first harvest (0.758), fruit weight (1.001), fruit length (1.155), fruit diameter (1.246), rind thickness (0.056), flesh thickness (0.207), number of fruits per plant (0.272) exhibited

positive and direct effects on fruit yield at genotypic level indicating their true positive significant association with fruit yield. Among sixteen traits, fruit diameter contributed the maximum positive direct effect (1.246) followed by fruit length (1.155) and fruit weight (1.001). Days to first male flower, nodes to first male and female flower, sex ratio and TSS exhibited negative direct effect on fruit yield at genotypic level. Days to first male flower, days to first harvest and rind thickness indirectly and positively influenced by fruit yield. Similar results were reported by Narasannavar *et al.* (2014) [10], Ananthan and Krishnamoorthy (2017) [1, 13] in ridge gourd.

In this study, the residual effects of path coefficient were found to be low in all the crosses indicating that most of the traits have respectable correlation with yield. These results are in conformity with the findings of Dey *et al*. (2009) [3] in bitter gourd.

Conclusion

High PCV and GCV with high heritability and genetic advance were observed forrind thickness and low PCV and GCV with low heritability and genetic advance were observed for fruit diameter. Positively significant associations of fruit yield indicated withnode to first male and female flower, fruit weight and flesh thickness in both crosses.Path analysis revealed that fruit weight, fruit length and fruit diameter exhibitedhigh positive direct effect on fruit yieldin both crosses. The crosses Virudhunagar local x Periyakottai local (L_3xT_1) andVirudhunagar local x Alathur local(L_3xT_2) showed higher yield and high heritability for most characters and can be summated that these two crosses are promising in providing better source population for exercising selection.

Reference

1. Ananthan M, Krishnamoorthy V. Genetic Variability, Correlation and Path Analysis in Ridge Gourd (*Luffa acutangula* (Roxb) L.). International Journal of Current Microbiology and Applied Sciences. 2017; 6(6):3022-3026.
2. Chowdhury D, Sharma K. Studies on variability, heritability, genetic advance and correlation in ridge gourd (*Luffa acutangula* Roxb.). Horticulture Journal. 2002; 15(3):53-58.
3. Dey S, Behera T, Munshi A, Bhatia R. Genetic variability, genetic advance and heritability in bitter gourd (*Momordica charantia* L.). Indian Agriculturist. 2009; 53(1/2):7-12.
4. Islam M, Khan S, Khanam D, Malek M, Hoque A. Genetic variability and path analysis in cucumber (*Cucumis sativus* L.). Bangladesh Journal of Plant Breeding and Genetics. 1993; (6):45-51.
5. Islam MR, Hossain MS, Buiyan MSR, Husna A, Syed MA. Genetic variability and path coefficient analysis of bittergourd (*Momordica charantia* L.). Intl. J Sustainable Agric. 2009; 1(3):53-57.
6. Kanimozhi R, Yassin GM, Kumar SR. Kanthaswamy V, Thirumeni S. Genetic Analysis in Segregating Generation of Wax Gourd. International Journal of Vegetable Science. 2015; 21(3):281-296.
7. Karthik D, Varalakshmi B, Kumar G, Lakshmipathi N. Genetic Variability Studies of Ridge Gourd Advanced Inbred Lines (*Luffa acutangula* (L.) Roxb.). International Journal of Pure and Applied Biosciences. 2017; 5(6):1223-1228.
8. Koppad S, Chavan M, Hallur R, Rathod V, Shantappa T. Variability and character association studies in ridge gourd (*Luffa acutangula* L. Roxb.) With reference to yield attributes. Journal of Global Biosciences. 2015; 4(5):2332-2342.
9. Lakshmi L, Haribabu K, Reddy G. Character association and path coefficient studies in pumpkin (*Cucurbita moschata* Duch ex. Poir). The Andhra Agricultural Journal. 2000; 49:80-85.
10. Narasannavar A, Gasti V, Shantappa T, Mulge R, Allolli T, Thammaiah N. Heterosis studies in ridge gourd [*Luffa acutangula* (L.) Roxb.]. Karnataka Journal of Agricultural Sciences. 2014; 27(1):126-134.
11. Puddan M. Genetic variability studies in F_2 and F_3 generation of bitter gourd (*Momordica charantia* L.). Thesis. Agricultural College and Research Institute, Madurai, 2000.
12. Samadia D. Genetic variability studies in ridge gourd under arid environment. Indian Journal of Horticulture. 2011; 76(1):96-103.
13. Sampath S, Krishnamoorthy V. Genetic Variability, Correlation and Path Analysis in Pumpkin (Cucurbita moschata Duch. ex. Poir). International Journal of Current Microbiology and Applied Sciences. 2017; 6(6):3027-3035.
14. Sharma A, Sengupta S. Genetic diversity, heritability and morphological characterization in bottle gourd (*Lagenaria siceraria* (Mol.) Stand). The Bioscan. 2013; 8(4):1461-1465.
15. Singh R, Mohan J, Singh D. Studies on genetic variability and heritability in ridge gourd (*Luffa acutangula* L.). Agricultural Science Digest. 2002; 22(4):279-280.
16. Tamilselvi N. Studies on heterosis and combining ability in pumpkin (*Cucurbita moschata* Duch. ex Poir). M.Sc. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore, India, 2010.