International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(6): 662-667

Received: 01-08-2020
Accepted: 08-09-2020

V Krishnamoorthy
Horticulture Research Station, Tamil Nadu Agricultural University, Thadiyankudisai, Perumbarai (PO), Batlagundu (via), Dindigul, Tamil Nadu, India

Corresponding Author:
V Krishnamoorthy
Horticulture Research Station, Tamil Nadu Agricultural University, Thadiyankudisai, Perumbarai (PO), Batlagundu (via), Dindigul, Tamil Nadu, India

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

V Krishnamoorthy

DOI: https://doi.org/10.22271/chemi.2020.v8.i6j.10845

Abstract
An exploration on genetic variability, correlation and path analysis ridge population of F1 generation was accomplished at Department of Horticulture, Agriculture College and Research Institute, Tamil Nadu Agricultural University, Madurai during *kharif* 2018 with the intention to investigate the genetic variability, heritability, genetic advance, correlation and path analysis for yield and yield contributing traits *viz.*, days to first male flower, days to first female flower, node to first male flower, node to first female flower, sex ratio, vine length (m), days to harvest, fruit weight (g), fruit length (cm), fruit girth, rind thickness (mm), flesh thickness (mm), number of fruits per plant, yield per plant (g), yield per hectare (tone), total soluble solids (TSS), dry matter content (%), moisture content (%) and total crude fiber (mg/100g) of 24 F1 hybrids and 10 parent genotypes. The highest genotypic coefficient variation (GCV), phenotypic coefficient variation (PCV), heritability and genetic advance as percent mean were showed for the traits such as dry matter content (50.78, 50.89, 0.99, 104.40), flesh thickness (32.58, 33.19, 0.96, 65.88), yield per plant (30.92, 31.84, 0.92, 61.85), fruit weight (30.17, 30.30, 0.99, 61.91), yield per hectare (29.07,32.13, 0.81, 54.18). The path coefficient analysis shows that fruit weight (0.694), number of fruits per plant (0.534) and yield per plant had highest direct effect on fruit yield per hectare.

Keywords: Ridge gourd, *Luffa acutangula*, correlation, path analysis

Introduction

Ridge gourd (*Luffa acutangula* Roxb. L.) is one of the important vegetable cultivated in tropical regions of India and other Asian and African countries as a source of food, fiber and indigenous medicines. *Luffa acutangula* has high nutritive valus and is often called a nutrition power house of its rich and varied nutrient content. It has vitamin A (410IU), vitamin C (12mg), dietary fiber (0.5mg), riboflavin (60µg), niacin (50µg) and potassium (139mg). The fruit also contains phytin, amino acids, alanine, arginine, cystine, glutamic acid, glycine, hydroxyproline, leucine, serine, tryptophan and pipecolic acid. The charantin and peptide which are present in this vegetable have insulin regulatory properties and thus helps in lowering blood sugar levels as well as urine sugar levels. Its high fiber content helps with healthy digestion and easy movement of food through the bowel. Thus it helps in relieving indigestion and constipation problems (Swetha and Muthukumar, 2016) [17]. It helps in cooling down the body to a large extent, is a natural detoxifier, and thus helps in purifying the blood and it also helps in building immune system. It makes the skin glow. The whole plant is also used for the treatment of ulcers and sores (Arunachalam *et al*. 2012) [4].

The seeds of ridge gourd are an excellent agricultural product and its kernel have been found potentially rich in protein (39%) and fat (44%) which are higher than those contained in many plant seeds. The fat is rich glycerides of oleic and linoleic acid (68%). While cooking the outer skin (rind) is peeled off. But it was found to be good source of fiber (20.6%) and minerals (7.7%). It is rich in carnosine, aspartic acid and aminoadipic acid. It is also rich in antioxidant such as p-coumaric acid (68.64 mg/100 g of dry weight) followed by gallic acid (34.98 mg), protocatechuic acid (30.52 mg) and ferulic acid (13.04 mg) (Swetha and Muthkumar, 2016) [17].These polyphenols are known as a potential source of antioxidants because they protect human beings against both non-communicable and communicable diseases (Katalinic *et al*. 2006) [12]. The peel is also rich in flavonoids, Quercetin and catechin are potent free radical scavengers (Jahan *et al*. 2013) [9].

The national average productivity of gourds in India is 9.0tone per hectare. It is lower than the world average productivity 13.70tone per hectare. The productivity is very lower than developed countries. It is mainly due to lack availability of improved varieties and hybrids, quality seeds and improved production technologies. Among the various traits the yield is complex one which influenced by genetic and environmental factors. The success of any plant breeding programme depends upon the existing genetic variability in the base populations and on the efficiency of selection. For successful selection it is necessary to study the nature of association of the trait of interest with other relevant traits as also the genetic variability available for these. Path coefficient analysis provides a better index for selection that mere correlation coefficient, thereby separating correlation coefficient of the yield and its component into direct and indirect effects. Hence, the present investigation was carried out to assess the nature and magnitude of variability, heritability, correlation coefficient and path analysis for various quantitative parameters in F1 hybrids of ridge gourd for selection of superior hybrids for commercial exploitation.

Materials and methods

The research trail was under taken at Department of Horticulture, Agriculture College and Research Institute, Tamil Nadu Agricultural University, Madurai, Tamil Nadu, India during *Kharif*, 2018. Ten parental genotypes *viz.*L1 (PKM-1), L2 (CO1), L3 (Virdhunagar local), L4 (Seranmadevi Local), L5 (Arka Sujath), L6 (Arka Sumeet) and four male parents *viz.* T1 (Periyakottai Local), T2 (Alathur Local), T3 (Kannapatti Local), T4 (Srirampuaram Local) and twenty four F1 hybrids were used. The experimental land was ploughed and biofertilizer Azophos 2 kg, biocontrol agent *Pseudomonas fluorescens* 2.5kg, neem cake 100kg per hectare was applied in the soil before last ploughing. The pits of one cubic feet were taken at an interval of 2.5m between row and 2m between pits in each row. The pits were stuffed with 10kg organic manure, 12g of urea, 75g of single super phosphate, 125g of muriate of potash and basin were formed around the pits. The seeds were sown in pits and two plants were maintained. Trial was laid out in randomized block design with three replications. Observations recorded on various traits are days to first male flower, days to first female flower, node to first male flower, node to first female flower, sex ratio, vine length (m), days to harvest, fruit weight (g), fruit length (cm), fruit girth, rind thickness (mm), flesh thickness (mm), number of fruits per plant, yield per plant (g), yield per hectare (tone), total soluble solids (TSS), dry matter content (%), moisture content (%) and total crude fiber (mg/100g). The data recorded was analyzed as per Panse and Sukhatme (1984) [14] for analysis of variance (ANOVA). Phenotypic and genotypic coefficient of variation (PCV and GCV), heritability in a broad sense and genetic advance as per cent of mean were calculated as per Burton and De Vane (1953) [5] and Johnson *et al* (1955) [10]. Correlation coefficient among all the possible character combinations at genotypic (rg) and phenotypic (rp) levels were estimated using the formula of Al-Jibouri *et al* (1958) [1] and path coefficient analysis was done as per Dewey and Lu (1959) [6]. Agristat statistical soft ware package was used for analysis of variance and estimation of correlation among traits.

Results and Discussion

Mean, range and estimates of various genetic parameters of nineteen traits in 34 genotypes of ridge gourd studied are presented in Table1. Analysis of variance revealed significant difference among genotypes for all the 19 traits. A wide range of variation was observed for most of the triats like fruit weight (111-295g), moisture content (79.97-97.72), days to harvest (61.01-98.18), days to female flowering (39.40-55.00), sex ratio (3.83-5.98), vine length (6.22-10.18), fruit length (19.70-45.0cm), total soluble solids (TSS) (2.1-5.0), number of fruits (9.0-17.60), yield per hectare (6.3-19.10t). High variability present for these parameters can form basis for effective selection of superior hybrids in ridge gourd. Such wide variability has also been reported by Varalakhsmi *et al* (2015) [18] in ridge gourd. The degree of variability seen in various parameters can be judged by the magnitude of GCV and PCV. GCV indicates the extent of genetic variability present in the population ranged from 0.02 in total crude fiber content to 5146.51 in fruit weight. Similar findings were reported by Manjukumari *et al* (2018) [13] in bitter gourd. Table 1 show that considerable variations exist between PCV and GCV values for all the traits under study. It indicates the presence of less environmental influence on expression of all these traits. Further GCV values were lesser in magnitude compared to PCV values is negligible for all the characters studied. This indicates the direct selection among the hybrids. The estimates of GCV alone are not possible to determine the extent of variation heritable. Thus estimates for heritability indicates the effectiveness with which selection can be expected for exploiting existing genetic variability. Broad sense heritability was high for days to first female flower (>66%), sex ratio (>79%), days to harvest (>94%), vine length (>98%), rind thickness (>97%), flesh thickness (>96%), fruit length (>93), fruit girth (>83%), fruit weight (>99%), moisture content (99%), total soluble solids (>86%), number of fruits per plant (>64%), yield per plant (94%), yield per hectare (>81%), dry matter content (99%) and total crude fiber content (92%).Similar findings were documented by Shailesh *et al* (2019) [16] in sponge gourd. Moderate heritability (40-60%) was observed for days to first male flower (44%) (Table1). Johnson *et al* (1955) [10] opined that heritability along with genetic advance was more useful than heritability alone in predicting the effect of selecting the best individual genotype as it suggest presence of additive gene effects. In this current experiment high heritability along with a high genetic advance was recorded in dry matter content (104.40%), flesh thickness (65.88%), fruit weight (61.91%), yield per plant (61.95%) showing the existence of additive gene effects. Thus selection can be employed for improvement in these traits in ridge gourd. Yield per hectare (54.18), rind thickness (53.77%), fruit length (47.99%) and vine length (43.32) registered moderate levels of heritability and genetic advance. This suggests that environmental effects constitute a major factor for total phenotypic variation and therefore, direct selection for these traits would be less effective. These results are corroborated with the findings of Anburani *et al* (2019) [2] in water melon.

All the correlation coefficients between fruit yield per hectare and its component traits were estimated at the genotypic and phenotypic level (Table 2, 3). It was observed that higher fruit yield per hectare was significantly and positively associated with fruit weight (0.336) and yield per plant (0.996). The correlation between traits showed that the fruits per plant (0.364), yield per plant (0.369), yield per hectare (0.368), moisture content (0.738) and total crude fiber content (0.721) significant positive effect. Number of fruits per plant had significant positive association with fruit weight (0.364), dry matter content (0.366) and negatively associated with fruit girth (-0.601). It implies that indirect selection for all these traits can help to improve fruit yield in ridge gourd. These findings are akin to reports of Anupam *et al* (2019) [3] in bitter gourd.

The correlation analysis quantify the degree of association between any two characters, it does not provide the reasons for such an association. Simple linear correlation coefficient is designed to detect presence of linear association between two variables. This does not imply absence of any functional relationship between the two variables. Path coefficient analysis resolves this mystery by breaking the total correlation into components of direct and indirect effects. Hence path analysis was performed to assess direct and indirect effects of various characters on fruit yield per hectare (Table 4). Fruit weight and number of fruits per plant had the highest direct effect (0.694, 0.534) on fruit yield per hectare, followed by yield per plant (0.305), days to first male flower (0.057), node to first female flower (0.043). Similarly Jagati *et al* (2017) [8] in bitter gourd observed fruit yield per hectare directly influenced by fruit weight. The other parameters such as days to first female flower (0.001), vine length (-0.037), rind thickness (-0.053), fruit length (-0.014) and fruit diameter (-0.043) showed negative direct effect on fruit yield per hectare. Indirect effects via these parameters were also negative for several of the traits (Kalpana *et al*, 2019 and Rajawat *et al*, 2018) [11, 15].

Positive direct and indirect effects of fruit weight, number of fruits per plant and yield per plant lead to the significant and positive correlation for these parameters were contribute to higher fruit yield per hectare in ridge gourd.

This study concluded that for yield improvement in ridge gourd, emphasis has to be given on indirect selection using fruit parameters like fruit weight, number of fruits per plant and fruit yield per plant (Hemant and Ajay, 2018) [7].

Table 1: Mean, variance, coefficient of variation, heritability and genetic advance for various traits in ridge gourd.

	Traits	**Range**	**Mean**	**GV**	**PV**	**GCV**	**PCV**	**Heritability**	**GA (%) of mean**
1	Days to first male flower	32.20-41.80	35.77	3.02	6.79	4.86	7.29	44	6.67
2	Days to first female flower	39.4-55.00	46.01	9.80	14.83	6.80	8.37	66	11.39
3	Node to first male flower	3.8-17.00	9.14	3.71	8.73	21.08	32.34	42	28.31
4	Node to first female flower	15.4-27.80	23.61	3.49	8.48	7.87	12.34	40	10.36
5	Sex ratio	3.83-05.98	4.96	0.35	0.44	11.72	13.11	79	21.60
6	Days to harvest	61.01-98.18	81.03	89.53	94.56	11.67	12.00	94	23.40
7	Vine length (m)	6.22-10.18	7.07	0.80	0.81	21.14	21.24	98	43.32
8	Rind thickness (mm)	0.30-00.70	0.40	0.012	0.012	26.42	26.75	97	53.77
9	Flesh thickness (mm)	2.3-10.00	3.79	1.52	1.58	32.58	33.19	96	65.88
10	Fruit length (cm)	19.70-45.00	29.13	44.86	48.04	24.11	24.94	93	47.99
11	Fruit girth (cm)	3.2-05.50	4.38	0.28	0.32	12.25	13.45	83	23.01
12	Fruit weight (g)	111.0-295.00	223.94	5146.51	5189.41	30.17	30.30	99	61.91
12	Moisture content (%)	79.97-97.72	92.67	13.87	13.93	4.01	4.02	99	8.26
13	TSS (brix)	2.1-05.00	3.20	0.33	0.39	17.39	18.87	86	33.03
14	No. of fruits/ plant	9.0-17.60	13.84	5.56	8.68	16.90	21.11	64	27.88
15	Yield / plant (g)	1.58-04.75	3.10	0.95	1.01	30.92	31.84	94	61.85
16	Yield/ha (t/ha)	6.3-19.01	12.38	14.35	17.53	29.07	32.13	81	54.18
17	Dry matter content (%)	2.28-20.03	7.33	13.87	13.93	50.78	50.89	99	104.40
19	Total crude fiber (mg/100g)	0.39-00.58	0.48	0.002	0.002	9.37	9.73	.92	18.61

Table 2: Genotypic correlation efficient among various traits in ridge gourd

SI. NO.	Days to first male flower	Days to first female flower	Node to first male flower	Node to first female flower	Sex ratio	Days to harvest	Vine length (m)	Rind thickness (cm)	Flesh thickness (cm)	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	TSS (brix)	No. of fruits/ plant	Yield (kg/plant)	Yield /ha (tone)	Dry matter content (%)	Moisture content (%)	Total crude fiber (mg/100g)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1.000	0.359*	0.177	0.475**	0.110	0.127	0.310	-0.312	-0.060	0.103	0.019	0.244	-0.399*	-0.000	0.007	0.002	0.239	0.306	0.306
2		*1.00*	0.276	0.235	0.058	0.115	-0.065	-0.117	0.031	0.015	-0.292	-0.037	-0.062	-0.116	0.167	-0.200	0.110	-0.021.	-0.040
3			1.000	0.047	0.08	0.101	0.184	-0.165	-0.177	-0.026	-0.488**	-0.112	-0.305	-0.214	0.003	-0.056	0.153	-0.033	-0.123
4				1.000	-0.454**	0.054	-0.245	-0.164	0.076	0.169	-0.145	0.113	-0.226	-0.146	0.181	-0.236	0.331	0.205	0.142
5					1.000	-0.179.	0.278	0.002	-0.387*	-0.127	-0.297	-0.237	-0.371*	-0.093	-0.130	0.135	-0.004	0.321	-0.351*
6						1.000	-0.067	0.053	0.260	0.046	0.375*	-0.257	0.147	-0.233	0.206	-0.217	0.271	-0.320	-0.355*
7							1.000	-0.078	0.029	0.159	-0.267	-0.070	-0.216	-0.091	-0.001	0.001	-0.142	-0.176	-0.165
8								1.000	-0.080	0.116	0.100	0.128	0.332	-0.033	-0.138	0.139	-0.094	0.064	0.067
9									1.000	0.018	0.472**	-0.109	0.112	-0.337*	0.518**	-0.530**	-0.205	-0.293	-0.272
10										1.000	0.039	0.236	0.071	-0.093	0.130	0.115	-0.221	0.148	0.171
11											1.000	0.378*	-0.080	-0.601**	0.090	-0.119	-0.281	-0.012	-0.041
12												1.000	0.013	0.364*	0.369*	0.368*	-0.098	0.738**	0.721**
13													1.000	0.058	0.265	-0.292	-0.013	0.089	0.086
14														1.000	0.080	-0.129	0.596**	0.348*	0.366*
15															1.000	-0.904*	-0.088	-0.312	0.254
16																1.000	0.086	0.296	0.227
17																	1.000	0.293	0.326
18																		1.000	0.933**
19																			1.000

* Significant at 5% level (0.334) ** Significant at 1% level (0.430)

Table 3: Phenotypic correlation efficients among various traits in ridge gourd

SI. NO.	Days to first male flower	Days to first female flower	Node to first male flower	Node to first female flower	Sex ratio	Days to harvest	Vine length (m)	Rind thickness (cm)	flesh thickness (cm)	fruit length (cm)	fruit diameter (cm)	fruit weight (g)	TSS (Brix)	No. of fruits/plant	Yield (kg/plant)	Yield /ha (tone)	Dry matter content (%)	Moisture content (%)	Total crude fiber (mg/100g)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1.000	0.187	0.520**	0.192	0.077	0.079	0.222	-0.145	-0.053	0.054	-0.019	0.169	-0.274	-0.047	-0.000	-0.005	0.215	0.180	0.164
2		1.000	0.588**	0.570**	0.081	0.225	-0.053	-0.105	0.104	0.110	-0.047	-0.008	0.114	0.142	0.162	-0.136	0.126	0.082	0.133
3			1.000	0.603**	0.097	0.239	0.119	-0.120	-0.010	0.111	-0.069	-0.044	0.025	0.171	0.037	-0.002	0.147	0.108	0.139
4				1.000	-0.208	0.211	-0.156	-0.118	0.152	0.234	0.140	0.101	0.079	0.213	0.151	-0.115	0.256	0.257	0.297
5					1.000	-0.140	0.239	-0.006	-0.355*	-0.122	-0.275	-0.198	-0.337*	-0.098	-0.121	0.116	-0.014	-0.298	-0.304
6						1.000	-0.065	0.047	0.272	0.082	0.400**	-0.241	0.195	-0.095	0.210	-0.200	-0.239	-0.263	-0.249
7							1.000	-0.071	0.027	0.149	-0.245	-0.069	-0.201	-0.082	-0.001	0.001	-0.129	-0.172	-0.155
8								1.000	0.081	0.104	0.083	0.126	0.295	-0.048	-0.137	0.136	-0.180	0.057	0.048
9									1.000	0.160	0.501**	-0.104	0.175	-0.168	0.520**	-0.507**	-0.187	-0.233	-0.170
10										1.000	0.128	0.230	0.151	0.007	-0.111	0.125	-0.199	0.193	0.259
11											1.000	0.348**	0.093	-0.230	0.108	-0.082	-0.232	0.088	0.121
12												1.000	0.017	-0.285	-0.366*	0.366*	-0.088	0.717**	0.654**
13													1.000	0.239	0.268	-0.243	0.003	0.172	0.217
14														1.000	0.103	-0.071	0.481**	0.391*	0.512**
15															1.000	0.996**	-0.082	0.287	0.205
16																1.000	0.085	0.302	0.229
17																	1.000	0.283	0.296
18																		1.000	0.968**
19																			1.000

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

Table 4: Direct and indirect effect of various traits on fruit yield per hectare at genotypic level in ridge gourd

SI. NO.	Days to first male flower	Days to first female flower	Node to first male flower	Node to first female flower	Sex ratio	Days to harvest	Vine length (m)	Rind thickness (cm)	flesh thickness (cm)	fruit length (cm)	fruit diameter (cm)	Fruit weight (g)	TSS (Birx)	No. of fruits/ plant	Dry matter content (%)	Moisture content (%)	Total crude fiber (mg/100g)	Yield (kg/ plant)	Genotypic correlation coefficient (Yield/ha)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	0.057	-0.002	0.005	0.026	0.002	0.014	-0.013	0.0167	-0.053	-0.014	-0.074	0.169	-0.013	-0.007	-0.029	-0.012	-0.014	0.093	0.002
2	0.020	-0.001	0.013	0.010	0.001	0.013	0.024	0.006	0.027	-0.019	0.015	-0.025	-0.002	-0.061	-0.071	0.080	-0.047	-0.063	-0.200
3	0.067	-0.002	0.005	0.002	0.002	0.011	-0.068	0.088	-0.158	0.035	0.019	-0.077	-0.010	-0.114	-0.013	0.022	-0.066	-0.099	-0.056
4	0.027	-0.018	0.024	0.043	-0.009	0.006	0.090	0.087	0.068	-0.024	0.057	0.078	-0.076	-0.078	-0.075	0.094	-0.014	0.062	-0.236
5	0.006	-0.004	0.041	-0.019	0.014	-0.002	-0.012	-0.001	-0.034	0.017	0.017	-0.164	-0.012	-0.049	0.054	-0.054	0.002	-0.098	0.135
6	0.007	-0.009	0.051	-0.002	-0.005	0.011	0.025	-0.028	0.023	-0.061	-0.017	-0.178	0.049	-0.124	-0.086	0.086	0.018	-0.097	-0.217
7	0.017	0.005	0.093	-0.010	0.005	-0.074	-0.037	.0.042	0.025	-0.021	0.014	-0.048	-0.072	-0.048	0.021	-0.039	0.061	-0.053	0.001
8	-0.017	0.005	-0.083	0.007	0.004	0.059	0.029	-0.053	-0.071	-0.015	-0.039	0.088	0.012	-0.017	0.057	-0.055	0.041	0.019	0.139
9	-0.003	-0.002	-0.089	0.003	-0.008	0.029	-0.011	0.043	0.089	-0.024	-0.185	-0.075	0.037	-0.181	-0.216	0.212	0.089	-0.089	-0.530**
10	0.005	-0.001	-0.013	0.007	-0.003	0.051	-0.058	-0.062	0.015	-0.014	-0.015	0.163	0.024	-0.049	0.054	-0.045	0.096	0.045	0.115
11	0.001	0.002	-0.024	-0.006	-0.058	0.041	0.098	-0.053	0.042	-0.052	-0.039	0.261	-0.026	-0.320	-0.037	0.047	0.022	-0.003	-0.119
12	0.013	0.003	-0.005	0.004	-0.046	0.028	0.025	0.068	0.097	-0.031	-0.015	0.694	0.043	-0.194	0.154	-0.147	0.042	0.225	0.368*
13	-0.028	0.005	-0.001	-0.009	-0.072	0.016	0.079	-0.018	0.099	-0.009	0.031	0.087	0.033	0.030	-0.117	0.117	0.056	0.027	-0.292
14	-0.001	0.009	-0.001	-0.006	-0.018	-0.026	0.033	0.018	-0.030	0.012	0.024	-0.252	0.019	0.534	-0.037	0.021	-0.025	0.106	-0.129
15	0.004	-0.013	0.002	0.007	-0.025	0.023	0.002	0.073	0.046	0.017	-0.035	-0.255	0.089	0.047	-0.418	0.402	0.038	-0.095	-0.904*
16	0.002	0.015	-0.029	-0.010	0.026	-0.024	0.004	-0.074	-0.047	0.015	0.047	0.254	-0.098	-0.069	0.420	-0.401	-0.037	0.090	0.086
17	0.013	-0.008	0.007	0.014	-0.001	-0.029	0.052	0.050	-0.018	0.029	0.011	-0.067	-0.043	0.318	0.036	-0.034	-0.043	0.089	0.296
18	0.017	0.002	0.016	0.008	-0.063	-0.035	0.064	-0.034	-0.026	-0.019	0.048	0.511	0.029	0.185	0.135	-0.118	-0.012	0.305	0.227

* Significant at 5% level ** Significant at 1% level Residual effect: 4.93

Acknowledgement
We sincerely express gratitude to the Division of Vegetable Crops, Indian Institute of Horticulture Research, Bengaluru, India for providing seeds of Arka Sujath and Arka Sumeet.

Reference
1. Al-Jibouri HH, Miller PA, Robinson HF. Genotypic and environmental variances and covariance's in upland cotton crosses of inter specific origin. Agronomy Journal 1958;50:633-637.
2. Anburani A, Kannan P, Muthumanickam K. Genetic variability, heritability and genetic advance for yield and yield components in watermelon (*Citrullus lanatus* Thunb.). World News of Natural Science 2019;25:22-30.
3. Anupam A, Randhir K, Ajay B, Chaudhary HC. Correlation matrix study in bitter gourd for qualitative and quantitative traits. Journal of Pharmacognosy & Phytochemistry 2019;8(3): 3023-3027.
4. Arunachalam A, Selvakumar S, Jeganath S. Toxicological studies on ethanol extracts of *Luffa acutangula* in albino wistar rats. Inter National Journal of Current Pharmacy and Clinical Research 2012;2(1):29-33.
5. Burton GW, De Vane EW. Estimating heritability in tall Fescue (*Festuca arundinacea*) from replicated clonal material. Agronomy Journal 1953;43:478-481.
6. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of wheat grass seed production. Agronomy Journal 1959;51:515-518.
7. Hemant KS, Ajay T. Correlation and path analysis in sponge gourd (*Luffa cylindrical* Roem). Hort Flora Research Spectrum. 2018;7(1):74-77.
8. Jagati Y, Gupta NK, Deeksha T, Sheela V. Genetic variability, correlation studies and path coefficient analysis in bitter gourd (*Momordica charantia* L.). Journal of Pharmacognosy and Phytochemistry 2017; 6(2):63-66.
9. Jahan N, Khalil-ur-rahman AS, Asi RM. Phenolic acid and flavonol contents of gemmo-modified and native extracts of some indigenous medicinal plants. Pakistan Journal of Botany 2013;45(5):1515-1519.
10. Johnson HW, Robinson HF, Comstock RE. Genotypic and phenotypic correlation in soyabeans and their implication in selection. Agronomy Journal 1955;47:477-483.
11. Kalpana K, Pravin KS, Indu S, Bhupendra K. Correlation studies and path analysis in bottle gourd [*Lagenaria siceraria* (Molina) Standl.]. Journal of Pharmacognosy and Phytochemistry 2019;8(1):1554-1556.
12. Katalinic V, Milos M, Kulisic T, Jukic M. Screening of 70 medicinal plant extract for antioxidant capacity and total poly phenols. Food Chemistry 2006;94:550-557.
13. Manjukumari, Jayantkumar, Amritakumari, Vijaykumarsingh, Nisharani, Anandkumar. Genetic variability, correlation and path coefficient analysis for yield and yield attributing traits in bitter gourd (*Momordica charantia* L.). Current Journal of Applied Science and Technology 2018;31(4):1-8.
14. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. ICAR, New Delhi 1984, 134-192.
15. Rajawat KS, Shaktawat SK, Jat SL, Tak JK. Path analysis and characters association of cucumber (*Cucumis sativus* L.). International Journal of Chemical Studies 2018;6(4):2414-2419.
16. Shailesh S, Singh VB, Nidhi Tyagi. Studies on genetic variability of sponge gourd genotypes. Journal of Pharmacognosy and Phytochemistry 2019;8(1):2554-2557.
17. Swetha MP, Muthukumar SP. Characterization of nutrients, amino acids, polyphenols and antioxidant activity of Ridge gourd (*Luffa acutangula*) peel. Journal Food Science and Technology 2016;53(7):3122-3128.
18. Varalakshmi B, Pitchaimuthu M, Sreenivasrao E, Sannamanjunath KS, Swathi SH. Genetic variability, correlation and path analysis in ridge gourd (*Luffa acutangula* Roxb. L.). Journal of Horticultural Science 2015;10(2):154-158.