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Assessment of Genetic Variability and Character Association in Yield and Yield-attributing Traits in Spine Gourd (*Momordica dioica* Roxb.)

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ABSTRACT: Spine gourd is a highly nutritious and lucrative perennial vegetable crop with a high genetic variability. Association studies on yield and component chararcters can help breeders to understand trait intercorrelation, paving paths for further crop improvement. The present investigation was carried out to evaluate the variability and character association of 20 spine gourd genotypes for thirteen quantitative and quality traits. The high phenotypic and genotypic coefficient of variation were observed for yield per plant, number of fruits per plant, single fruit weight, plant height and acidity. The highest heritability coupled with high GAM was observed for yield per plant, plant height, number of fruits per plant, acidity, single fruit weight, node at 1st female flower appeared, fruit length and diameter, total soluble solid and ascorbic acid which showed that the heritability was most likely due to additive gene effects. Thus direct selection based on these traits would be advantageous in spine gourd yield improvement. The yield per plant exhibits a significant and positive correlation with the number of fruit per plant, days to the last harvest, fruit length, plant height and fruit diameter at both phenotypic and genotypic levels. In contrast, a negative correlation was observed for days to fifty per cent flowering, the nodes at 1st female flower appeared, acidity and fruit pedicel length. The path analysis study found that the highest directs effects on yield per plant were observed for days to the last harvest, fruit pedicel length, number of fruit per plant, ascorbic acid, acidity and total soluble solid while, primary branches per plant, plant height, fruit length and fruit diameter showed a negative direct effect on yield per plant. This study found that simultaneous selection of these traits could help in yield improvement programmes.

Keyword: Spine gourd; genetic variability; correlation; path analysis; yield.

INTRODUCTION

Spine gourd (*Momordica dioica* Roxb.) is an economically valuable underutilised vegetable crop that belongs to the Cucurbitaceae family and has a chromosome number of 2n=28 (Raj *et al.* 1993). This crop is perennial and dioecious, known with different names throughout India as Teasel gourd, Kakrol, Kankad, Kartoli, and Bhat Karala. It is progressively growing to gain popularity as a commercial vegetable crop due to its rich flavour and nutritional content. The fruits have a higher nutritional value in protein, vitamin A, and ascorbic acid (Naik *et al.*, 2012). Spine gourd fruit contains moisture (84.1 %), protein (3.1 %), carbohydrate (7.7 g), fibre (3 g), and ash (1.1 g). Additionally, it contains iron (4 to 6 mg), calcium (33 mg), phosphorus (42 mg), vitamin A (2,700 IU), thiamine (0.05 mg), riboflavin (0.18 mg), niacin (0.06 mg) and ascorbic acid (275.1 mg) per 100g. It is commercially significant and is exported as well as consumed locally. The fruits are spiced and fried, then served with meat and seafood (Ram *et al.* 2004).

Plant genetic resources are critical for assuring future global food security. To acquire elite germplasm, it is crucial to perform phenotypic selection on desired traits with a high phenotypic and genotypic coefficient of variation, heritability, and genetic advance to employ them in subsequent breeding programmes (Gurve *et al.* 2020). Plant breeders need to establish a positive or negative correlation between two qualities to develop new varieties with higher-yielding characteristics. According to Dewey and Lu (1959), path coefficient analysis was employed to discover the cause and effect relationship between traits and dependent variable by Dewey and Lu (1959) employed path coefficient analysis to determine the causal relationship between traits and the dependent variable by dividing the correlation coefficient into direct and indirect effects of attributes on the dependent variable. the correlation coefficient into direct and indirect impacts of attributes on the dependent variable. Understanding the link between yield and other qualities is crucial for crop improvement. However, this crop's research efforts and outcomes have likely fallen short of expectations, as

they have typically remained underutilised and ignored by both researchers and farmers. As a result, the current study was conducted to determine the variability and relationship between yield-related variables in available spine gourd genotypes, which would help in the selection of desirable genotypes for future breeding programmes.

MATERIALS AND METHOD

The current investigation was conducted at the Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, during the *kharif season,* 2018-19. The experiment was conducted in Randomized Block Design (RBD) in three replications with a spacing of 1.0 × 0.90 m^2. The 20 genotypes were used in the experiment, which were gathered from various districts of Maharashtra. All production techniques were implemented as per the crop production guide. There is a total of ten traits recorded in the field from ten randomly selected plants which include Plant height (cm), primary branches per plant, node at which 1st female flower appeared, days to fifty per cent flowering, days to the last harvest, fruit length (cm), fruit diameter (cm), fruit pedicel length (cm), single fruit weight (g), yield per plant (g). Sadasivam and Manickam (1991) technique was used to determine quality traits such as ascorbic acid (mg/100g), total soluble solids (TSS) and titratable acidity.

Scale	Direct and Indirect effects
Very high	> 1.000
High	0.30 – 0.99
Moderate	0.20 – 0.29
Low	0.10 – 0.19
Negligible	0.00 – 0.09

The mean data were analysed statistically using the INDOSTAT software. The analysis of variance (ANOVA) and discriptive statistics was computed according to Panse and Sukathme's (1967). The phenotypic coefficients of variation (PCV) and genotypic coefficients of variation (GCV), as well as heritability (h^2) (in the broad sense), were computed using Burton and Devane (1953); Allard (1961). Genotypic and phenotypic correlations were computed as per Falconer (1981). Heritability (h^2) (in the broad sense) and genetic advance were classified as high, medium, and low according to Johnson *et al.,* (1955). The path coefficient analysis introduced by Wright (1921) and modified by Dewey and Lu (1959) has been used to compute various features' directly and indirectly contributions to yield. Finally, the Lenka and Mishra (1973) scale was utilised to measure the direct and indirect effects.

Scale	GCV and PCV	Heritability (h^2)	Genetic Advance
Low	0 – 10 %	0 – 30 %	0 – 10 %
Moderate	10 – 20 %	30 – 60 %	10 – 20 %
High	> 20 %	> 60%	> 20 %

RESULT AND DISCUSSION

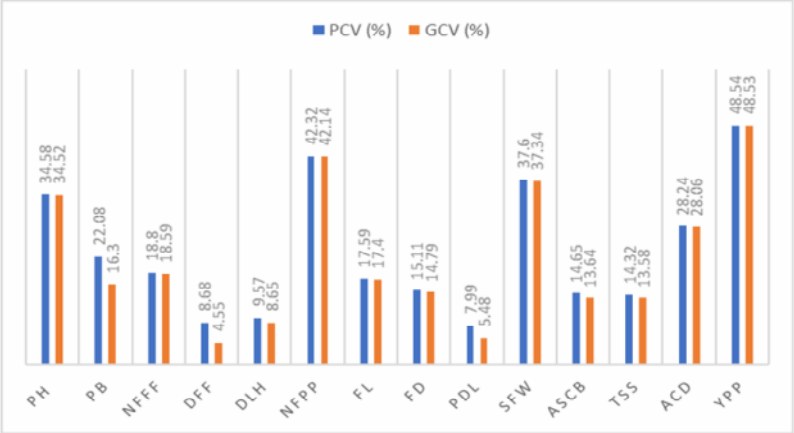
Analysis of variance was performed on the data collected from all 20 genotypes and revealed significant differences in all examined characters between genotypes.

Phenotypic and genotypic coefficient of variation (PCV and GCV). Among all traits examined, the yield per plant had the highest PCV and GCV, followed by the number of fruits per plant, single fruit weight, plant height, and acidity. (Table 1 and Fig. 1). However, moderate PCV and GCV were observed for primary branches per plant, node at which 1st female flower appears, fruit length and diameter, ascorbic acid and total soluble solids. The days to fifty per cent flowering, days to last harvest, and fruit pedicel length had low PCV and GCV. This research reveals that the differences seen between PCV and GCV was minimal for all traits examined, implying that the environment has little effect on the expression of characters and that they can be enhanced through simple selection. A high PCV in combination with a high GCV showed more variation for specific characters in the population (Gurve *et al.,* 2021). Thus, this available variation could be used in the early generation by employing a simple selection approach. These findings are similar to that earlier work of Naik *et al.,* (2012) for the number of fruits in teasle gourd, Kumar *et al.,* (2011) in bottle gourd, Kumar *et al.,* (2013) in sponge gourd, Dora *et al.,* (2003) in a pointed gourd, Pal *et al.,* (2016) in cucumber and Yadav *et al.,* (2018) in spine gourd.

Table 1: Variance estimates of yield and its contributing traits in spine gourd genotypes.

Characters	Range		Mean	PCV (%)	GCV (%)	h^2 (%)	GA	GAM
	Min	Max						
PH	65.08	349.84	171.78	34.58	34.52	99.69	121.98	71.00
PB	2.37	4.60	3.59	16.99	16.30	54.50	0.89	24.79
NFFF	4.67	10.37	7.59	18.80	18.59	97.79	2.87	37.88
DFF	47.33	62.67	53.82	8.68	4.55	27.46	2.64	4.91
DLH	85.00	120.67	101.76	9.57	8.65	81.71	16.40	16.11
NFPP	5.47	103.40	19.49	42.32	42.14	99.68	44.94	80.65
FL	2.90	4.77	4.05	17.59	17.40	97.79	1.44	35.44
FD	1.77	3.17	2.45	15.11	14.79	95.79	0.73	29.81
PDL	1.27	1.57	1.41	7.99	5.48	47.11	0.11	7.75
SFW	7.20	20.53	12.06	37.60	37.34	98.60	9.21	76.37
ASCB	6.44	11.53	9.67	14.65	13.64	86.71	2.53	26.17
TSS	2.21	3.20	2.64	14.32	13.58	90.02	0.70	26.55
ACD	0.36	0.91	0.63	28.24	28.06	98.75	0.35	57.44
YPP	44.87	1796.67	264.82	48.54	48.53	99.98	10.17	85.94

PH- Plant height (cm), PB- Primary branches per plant, NFFF- Nodes at 1st female flower appeared, DFF- Days to fifty per cent flowering, DLH- days to last harvest, NFPP- Number of fruits per plant, FL- Fruit length, FD- Fruit diameter, PDL- Pedicel length, SFW- Single fruit weight, ASCB- Ascorbic acid, TSS- Total soluble solid, ACD- Titratable acidity, YPP- Yield per plant



PH- Plant height (cm), PB- Primary branches per plant, NFFF- Nodes at 1st female flower appeared, DFF- Days to fifty per cent flowering, DLH- days to last harvest, NFPP- Number of fruits per plant, FL- Fruit length, FD- Fruit diameter, PDL- Pedicel length, SFW- Single fruit weight, ASCB- Ascorbic acid, TSS- Total soluble solid, ACD- Titratable acidity, YPP- Yield per plant

Fig. 1. Phenotypic and genotypic coefficient of variation for thirteen quantitative and quality traits in spine gourd.

Heritability and genetic advance (h^2 and GA). In the current investigation, heritability for different attributes range from 99.98 (yield per plant) to 27.46 (days to fifty per cent flowering) per cent (Table 1). The yield per plant had the highest heritability, followed by plant height, number of fruit per plant, acidity, single fruit weight, node at which the 1st female flower appeared, fruit length and diameter, total soluble solids, ascorbic acid, and days to last harvest. The pedicel length and the primary branches per plant recorded moderate heritability. However, it was recorded lowest for days to fifty per cent flowering.

In conjunction with the heritability estimate, the genetic advance enables a breeder to make a more conclusive judgement than a heritability estimate alone. In the current study, highest genetic advance as per cent mean (GAM) was recorded for several traits like yield per plant, number of fruits per plant, single fruit weight, plant height, acidity, node at which 1st female flower appeared, fruit length and diameter, total soluble solid, ascorbic acid and primary branches per plant. The days to last harvest observed moderate GAM whereas days to fifty per cent flowering and pedicel length recorded low GAM. Among all traits studied, most traits exhibits high heritability and high genetic advance (GA), suggesting that heritability was due to additive gene effects. Considering the above facts, selection will be efficient for all characteristics investigated. As a result, direct selection based on these characteristics will effectively improve spine gourd, particularly for developing a genotype with a high yield. A similar result of high heritability coupled with high GAM was observed for days to 1st male and female flower apperared, TSS, weight of fruit by Muralidharan (2017), yield per plant and fruit length by Singh *et al.*, (2015), number of fruits per plant reported by Mandal *et al.*, (2015); Sanwal *et al.*, (2007). In bitter gourd reported by Dey *et al.*, (2007); Rambabu *et al.*, (2017) in bottle gourd.

Phenotypic and genotypic correlation. In general, yield and yield components traits are polygenic and are subject to different amounts of nonheritable variation. In spine gourd, yield per plant results from the interaction of several associated characters. As a result, selection should be made based on component characters after determining their correlation with yield per plant. A high positive correlation between character and yield could be attributed by linkage and pleiotropy (Sparque, 1966). In the current investigation, yield per plant exhibited a significant and positive genotypic as well as phenotypic correlation with the number of fruits per plant, days to last harvest, fruit length, plant height and fruit diameter at both phenotypic and genotypic levels (Table 2). However, a negative correlation was observed for fifty per cent flowering, nodes at 1st female flower appeared, acidity, and fruit pedicel length. Similar investigation for the significant positive correlation between yield per plant and fruit length at both phenotypic and genotypic level in spine gourd reported by Reddy *et al.*, (2014), also by Choudhury *et al.*, (2014) in ridge gourd and Dora *et al.*, (2003) in bottle gourd. Kumar *et al.*, (2013) showed a positive and substantial correlation between total yield per vine and the number of fruits per vine in sponge gourd. The study showed that selecting those characters positively related to yield would effectively get a high yield per plant. Similarly, positively related characters to days to the last harvest effectively select lengthy fruiting span varieties. These findings indicated that selecting these component traits will increase fruit yield effectively.

Table 2: Genotypic and phenotypic correlation coefficient for different fruit yield contributing traits in spine gourd.

		PH	PB	NFFF	DFF	DLH	NFP	FL	FD	PDL	ASCB	TSS%	ACIDITY	YPP
PH	**rg**	**1.0000**	0.2855*	-0.1047	-0.5624**	0.5920**	0.2980*	0.5488**	0.3273*	0.1299	0.3767**	0.0874	-0.0001	0.2645*
	rp	**1.0000**	0.2078	-0.1044	-0.2882*	0.5338**	0.2968*	0.5403**	0.3193*	0.0871	0.3415**	0.0827	0.0012	0.2637*
PB	**rg**		**1.0000**	0.2532	0.0956	0.3378**	0.2866*	0.0128	0.0632	0.4281**	0.2728*	0.3248*	0.0303	0.2995*
	rp		**1.0000**	0.1947	-0.0447	0.1653	0.2065	-0.0158	0.0322	0.2312	0.1969	0.2039	0.0103	0.2214
NFFF	**rg**			**1.0000**	-0.4642**	-0.0158	-0.3241*	0.0273	0.3270*	-0.0556	0.3518**	-0.0182	0.1138	-0.2059
	rp			**1.0000**	-0.2379	-0.0113	-0.3195*	0.0328	0.3193*	-0.0543	0.3438**	-0.0177	0.1095	-0.2035
DFF	**rg**				**1.0000**	-0.6306**	-0.1501	-0.7891**	-1.1225**	0.6576**	-0.9415**	0.1950	-0.1328	-0.2292
	rp				**1.0000**	-0.4000**	-0.0757	-0.3710**	-0.5432**	0.3171*	-0.4842**	0.1537	-0.0896	-0.1188
DLH	**rg**					**1.0000**	0.6830**	0.6659**	0.5350**	-0.3049*	0.3865**	-0.0490	0.1207	0.6922**
	rp					**1.0000**	0.6206**	0.5962**	0.4759**	-0.1418	0.2954*	-0.0532	0.1125	0.6260**
NFPP	**rg**						**1.0000**	0.3330**	0.1634	0.0141	0.1998	0.2240	-0.0896	0.9854**
	rp						**1.0000**	0.3314**	0.1571	0.0149	0.1884	0.2120	-0.0885	0.9836**
FL	**rg**							**1.0000**	0.5231**	-0.2754*	0.2670*	-0.1520	-0.0358	0.3324**
	rp							**1.0000**	0.5015**	-0.1718	0.2512	-0.1420	-0.0382	0.3290*
FD	**rg**								**1.0000**	-0.4566**	0.5797**	-0.0584	0.1087	0.2653*
	rp								**1.0000**	-0.2919*	0.5470**	-0.0608	0.0998	0.2595*
PDL	**rg**									**1.0000**	-0.2124	0.3971**	-0.3671**	-0.0552
	rp									**1.0000**	-0.1285	0.3065*	-0.2544*	-0.0376
ASCB	**rg**										**1.0000**	0.2104	0.1323	0.2289
	rp										**1.0000**	0.1587	-0.1258	0.2138
TSS %	**rg**											**1.0000**	-0.6433**	0.2276
	rp											**1.0000**	-0.6054**	0.2164
ACD	**rg**												**1.0000**	-0.0611
	rp												**1.0000**	-0.0610
YPP	**rg**													**1.0000**
	rp													**1.0000**

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

PH- Plant height (cm), PB- Primary branches per plant, NFFF- Nodes at 1st female flower appeared, DFF- Days to fifty per cent flowering, DLH- days to last harvest, NFPP- Number of fruits per plant, FL- Fruit length, FD- Fruit diameter, PDL- Pedicel length, SFW- Single fruit weight, ASCB- Ascorbic acid, TSS- Total soluble solid, ACD- Titratable acidity, YPP- Yield per plant

Path analysis (Direct and indirect effects). The path coefficient analysis (Table 3 and Fig. 2) is a powerful tool for splitting the correlation coefficient into direct and indirect effects, which helps explain the relative importance of each trait and its selection reliability. The results of the genotypic path coefficient showed that traits *viz.*, days to last harvest, fruit pedicel length, number of fruits per plant, ascorbic acid, acidity and total soluble solids were exhibited the highest positive direct effects on yield per plant whereas, the primary branches per plant, plant height, fruit length and diameter showed a negative direct effect on yield per plant. This indicated that direct selection for these characteristics would be advantageous for crop yield improvement. These findings are consistent with those of Chakraborty *et al.*, (2013), who discovered that traits such as fruit number per vine had the greatest direct effect on yield per vine, followed by fruit weight, in bitter gourd, and Sundaram *et al.*, (2008), who discovered the same thing in bitter gourd. Khule *et al.*, (2011) found that the number of fruits per plant, the number of days until the first female flower appears, the length of the fruit, the diameter of the fruit, the number of seeds per fruit, and the weight of 100 seeds per fruit all had a direct positive effect on the marketable yield per plant in sponge gourd. Kumar *et al.*, (2013) discovered that fruit diameter, primary branch count, fruit number per vine, fruit average weight, and total soluble solids all had a positive direct effect on total yield per vine.

Table 3: Direct and indirect effects of components characters on yield per plant in spine gourd.

	PH	PB	NFFF	DFF	DLH	NFP	FL	FD	PDL	ASCB	TSS	ACD	YPP
PH	**-0.0564**	-0.0161	0.0059	0.0317	-0.0334	-0.0168	-0.0309	-0.0184	-0.0073	-0.0212	-0.0049	0.0000	0.2645
PB	-0.0231	**-0.0809**	-0.0205	-0.0077	-0.0273	-0.0232	-0.0010	-0.0051	-0.0346	-0.0221	-0.0263	-0.0024	0.2995
NFFF	-0.0002	0.0005	**0.0018**	-0.0008	0.0000	-0.0006	0.0000	0.0006	-0.0001	0.0006	0.0000	0.0002	-0.2059
DFF	0.0050	-0.0008	0.0041	**-0.0089**	0.0056	0.0013	0.0070	0.0099	-0.0058	0.0083	0.0017	0.0012	-0.2292
DLH	0.0503	0.0287	-0.0013	-0.0536	**0.0850**	0.0580	0.0566	0.0455	-0.0259	0.0328	-0.0042	0.0103	0.6922
NFPP	0.0167	0.0161	-0.0182	-0.0084	0.0384	**0.0562**	0.0187	0.0092	0.0008	0.0112	0.0126	-0.0050	0.9854
FL	-0.0221	-0.0005	-0.0011	0.0318	-0.0268	-0.0134	**-0.0403**	-0.0211	0.0111	-0.0107	0.0061	0.0014	0.3324
FD	-0.0061	-0.0012	-0.0061	0.0210	-0.0100	-0.0031	-0.0098	**-0.0187**	0.0085	-0.0108	0.0011	-0.0020	0.2653
PDL	0.0086	0.0283	-0.0037	0.0434	-0.0201	0.0009	-0.0182	-0.0301	**0.0660**	-0.0140	0.0262	-0.0242	-0.0552
ASCB	0.0188	0.0136	0.0176	-0.0471	0.0193	0.0100	0.0134	0.0290	-0.0106	**0.0500**	0.0105	-0.0066	0.2289
TSS	0.0034	0.0127	-0.0007	0.0076	-0.0019	0.0088	-0.0059	-0.0023	0.0155	0.0082	**0.0391**	-0.0251	0.2276
ACD	0.0000	0.0015	0.0056	-0.0065	0.0059	-0.0044	-0.0018	0.0053	-0.0180	-0.0065	-0.0316	**0.0491**	-0.0611

Residual effect – 0.31

PH- Plant height (cm), PB- Primary branches per plant, NNFFF- Nodes at 1st female flower appeared, DFF- Days to fifty per cent flowering, DLH- days to last harvest, NFPP- Number of fruits per plant, FL- Fruit length, FD- Fruit diameter, PDL- Pedicel length, SFW- Single fruit weight, ASCB- Ascorbic acid, TSS- Total soluble solid, ACD- Titratable acidity, YPP- Yield per plant

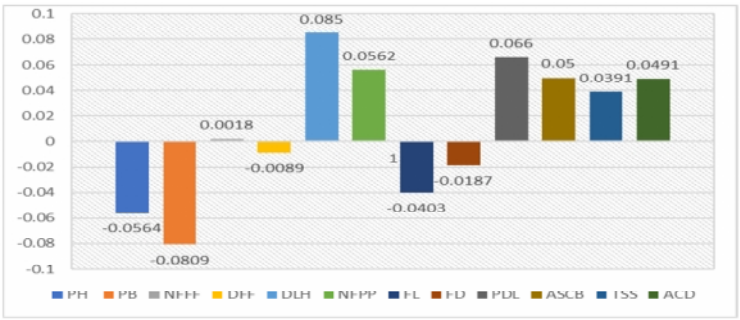


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Fig. 2. Correlation coefficient of each trait showing positive and negative direct effects on yield per plant for thirteen quantitative and quality traits of spine gourd.

CONCLUSION

From the present investigation, among all traits studied, high PCV and GCV were observed for yield per plant, followed by the number of fruits per plant, single fruit weight, plant height and acidity. The highest heritability coupled with high GAM was observed for yield per plant, plant height, fruit per plant, acidity, single fruit weight, node at which 1st female flower appeared, fruit length and diameter, total soluble solid and ascorbic acid. The yield per plant exhibited a significant and positive correlation with the number of fruit per plants, days to the last harvest, the fruit length, the plant height and the fruit diameter at both phenotypic and genotypic levels. On the other hand, a negative correlation was observed for fifty per cent flowering, the nodes at 1st female flower appeared, acidity, and fruit pedicel length. The path analysis study found that the highest directs effects on yield per plant were observed for days to the last harvest, the fruit pedicel length, the number of fruits per plant, ascorbic acid, acidity and total soluble solid while, primary branches per plant, plant height, fruit length and diameter showed a negative direct effect on yield per plant. This study found that simultaneous selection of these traits could help in improving crop yield.

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Conflict of Interest. None.

REFERENCES

Allard, R. W. (1961). Principles of plant Breeding. Soil Science. *John Wiley & Sons, Inc*, *91*(6): 485.

Burton, G. W., & Devane, E. H. (1953). Estimating heritability in tall fescue (*Festuca arundinacea*) from replicated clonal material. *Agronomy Journal*, *45*(10): 478–481.

Chakraborty, L., Acharya, P., & Raychaudhuri, S. (2013). Diversity analysis of Momordica charantia L. accessions from eastern and north eastern India based on morphological, yield related traits and molecular marker. *Proceedings of the FVHH, Thailand* (*pp.* 179–193).

Choudhury, B. R., Pandey, S., Singh, P. K., & Pandey, V. (2014). Genetic diversity analysis for quantitative traits in hermaphrodite ridge gourd [*Luffa acutangula* (Roxb.) L.]. *Indian Journal of Horticulture*, *71*(2): 284–287.

Dewey, D. R., & Lu, K. H. (1959). A correlation and path-coefficient analysis of components of crested Wheatgrass seed production. *Agronomy Journal*, *51*(9): 515–518.

Dey, S. S., Behera, T. K., Munshi, A. D., & Sirohi, P. S. (2007). Studies on genetic divergence in bitter gourd (*Momordica charantia* L.). *Indian Journal of Horticulture, 64*(1): 53–57.

Dora, D. K., Behera, T. K., Acharya, G. C., Mohapatra, P., & Mishra, B. (2003). Genetic variability and character associated in pointed gourd. *Indian Journal of Horticulture, 60*(2): 163–166.

Falconer, D. S. (1981). Introduction to quantitative genetics (2nd ed). Longman.

Gurve, V. R., Swarna Priya, R., Pugalendhi, L., Karthikeyan, G., Gnanam, R., & Kalaiyarasi, R. (2021). Assessment of genetic variability and character association in yield-related traits and yellow vein mosaic virus disease resistance in okra (*Abelmoschus esculentus* L. Moench). *Madras Agricultural Journal*, *107*(10–12): 1–7.

Gurve, V. R., Waskar, D. P., Khandare, V. S., Mehtre, S. P., & More, D. G. (2020). Studies on correlation and path analysis for yield and its contributing traits in brinjal (*Solanum melongena* L.). *International Journal of Current Microbiology and Applied Sciences, 9*(10): 179–188.

Johnson, H. W., Robinson, H. F., & Comstock, R. E. (1955). Estimates of genetic and environmental variability in soybeans. *Agronomy Journal, 47*(7): 314–318.

Khule, A. A., Tikka, B. S., Jadhav, D. J., & Kajale, D. B. (2011). Correlation and path coefficient analysis in sponge gourd [*Luffa cylindrica* (Linn.) M. Roem.]. *International Journal of Plant Sciences, 6*(2): 277–279.

Kumar, A., Singh, B., Kumar, M., & Naresh, R. K. (2011). Genetic variability, heritability and genetic advance for yield and its components in bottle gourd (*Lagenaria siceraria* M.). *Annals of Horticulture, 4*(1): 101–103.

Kumar, R., Ameta, K. D., Dubey, R. B., & Pareek, S. (2013). Genetic variability, correlation and path analysis in sponge gourd (*Luffa cylindrica* Roem.). *African Journal of Biotechnology*, *12*(6): 539–543.

Lenka, D., & Mishra, B. (1973). Path coefficient analysis of yield in rice varieties. *Indian Journal of Agricultural Sciences, 43*(4): 376.

Mandal, J., Tirumalesh, M., & Dhangrah, V. K. (2015). Studies on genetic variability and trait interrelationship in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.). *Hortic. Flora Res. Spectrum, 4*(1): 34–38.

Muralidharan, B. (2017). Correlation and path analysis for quantitative and qualitative traits in bottle gourd [Lagenaria siceraria (Molina) standl]. *Journal of Pharmacognosy and Phytochemistry*, *6*(5): 2280–2283.

Naik, A., Akhtar, S., Chattopadhyay, A., & Hazra (2012). Study of genetic variability, heritability and genetic advance for fruit quality characters in Teasle gourd (*Momordica subangulata* blume. subsp. *renigera*) *African Journal of Agricultural Research*, *7*(49): 6550–6552.

Pal, S., Sharma, H., Kumar, A., & Bhardwaj, R. (2016). genetic variability, heritability and genetic gain for yield and quality traits in cucumber (*Cucumis sativus* l.) *The BioScan*, *11*(3): 1985–1990.

Panse, V. G., & Sukathme, P. V. (1967). Statistical method for agricultural workers *p.* 381. *Indian Council of Agricultural Research*.

Raj, D., Prasnna, K., & Peter, K. V. (1993). Momordica spp. In G. Kallo & B. Bo (Eds.), Genetic imrovement of vegetables crops (*pp*. 239–234). *Pergamon Press*.

Rambabu, E., Mandal, A. R., Hazra, P., Senapati, B. K., & Thapa, U. (2017). Morphological characterisationion and genetic variability studies in Bottle gourd [*Lagenaria siceraria* (Mol.) Standley.]. *International Journal of Current Microbiology and Applied Sciences, 6*(9): 3585–3592.

Reddy, A. B. F., H., Sivaraj, M. T., Pandravada, & Narshimulu, G. (2014). Correlation and path coefficient analysis of quantitative characters in spine guard (*Momodica dioica* Roxb.). *Pakistan Journals Biological Science, 17*(5), 1–8.

Sadasivam, S., & Manickam, A. (1991). Biochemical methods for agricultural science. Willey eastern limited.

Sanwal, S. K., Yadav, R. K., Rai, N., Yadav, D. S., & Singh, P. K. (2007). Genetic diversity and inter-relation analysis in sweet gourd (*Momordica cochinchinensis*) genotypes of north-east India. *Vegetable Science*, *34*(1): 64–66.

Singh, H. K., Singh, V. B., Kumar, R., Barnawal, D. K., & Ray, P. K. (2014). Assessment of genetic diversity based on cluster and principal component analysis for yield and its contributing characters in bitter gourd. *Indian Journal of Horticulture*, *71*(1): 55–60.

Sparque, G. F. (1966). Quantitative genetics in plant improvement in plant Breeding. *K. J. Frey Edition*, 315–354.

Sundaram, V. (2008). Genetic diversity studies for parental selection in bitter gourd (Momordica charantia). *Asian J. of Horticulture*, *3*(2): 333–335.

Wright, S. (1921). Correlation and causation. *Journal of Agricultural Research, 20*: 557–587.

Yadav, R. K. (2018). Study of genetic variability, heritability and genetic advance for yield and its components in Spine gourd (Momordica dioica Roxb.). *International Journal of Chemical Studies*, *6*(6): 681–682.

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