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Correlation and path analysis to ascertain interrelationships among yield and yield contributing traits in ridge gourd (*Luffa acutangula* L)

H. Huq[1*], M.S. Haque[2], M.E. Hoque[1], M.S. Ahmed[3], M.S.A. Sarker[4], M.H. Sazid[1]

[1]*Department of Biotechnology, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka*
[2]*Department of Biotechnology, Faculty of Agriculture, Bangladesh Agricultural University, Mymensingh*
[3]*Bangabandhu Academy for Poverty Alleviation and Rural Development, Gopalganj*
[4]*School of Agriculture and Rural Development, Bangladesh Open University, Gazipur*

ABSTRACT

A study evaluating the correlation coefficient and path analysis of yield and 15 yield contributing traits of 65 genotypes of ridge gourd (Luffa acutangula L) was carried out at Sher-e-Bangla Agricultural University in Dhaka. Estimation of genotypic correlation coefficient was always higher than corresponding phenotypic correlation coefficient. Correlation analysis revealed links of node of first male flower, male flower per plant, female flower per plant, fruits per plant, fruit weight (g), fruit length (cm), fruit width (cm), and seeds per fruit with yield per plant (kg) as positive and statistically significant at both the genotypic and phenotypic levels. In path analysis, fruits per plant, male flower per plant, fruit weight (g), fruit length (cm), 100 seed weight (g) showed direct positive effect on yield per plant (kg) with highly significant positive correlation at genotypic level. In contrary, male female flower ratio, node of first female flower, days to male flowering, female flower per plant showed negative direct effect on yield per plant. traits male female flower ratio, female flowers per plant, fruits per plant, fruit weight (g), fruit length (cm), node of first female flower, and seeds per fruit had a direct impact on yield per plant (kg) and a high positive correlation. Thus according to correlation coefficient and path analysis, selection based on the traits fruit would be fruitful for an efficient breeding strategy for producing superior hybrids in ridge gourds.

Key words: correlation coefficient, path analysis, ridge gourd, *Luffa acutangula* L

INTRODUCTION

Ridge gourd (*Luffa acutangula* L) of family Cucurbitaceae in Bangladesh is locally called Jhinga or Kalitori. It is an herbaceous vine, with predominant sex form of monoecy, however, hermaphroditism is also evident. Flowers are unisexual, male or staminate flowers in racemes at the apex of peduncle. Female or Pistillate flowers are solitary. Fruits are claviform, with 10 longitudinal ribs, seeds numerous. Its premature fruit contains good amount of fiber, vitamins and minerals including Vitamin B2, Vitamin B3, Vitamin C, carotene, calcium, phosphorus and trace amount of iron (Kandoliya, 2016). In addition to many health benefits, most importantly, it is capable to naturally control blood sugar level due to the presence of insulin like peptides and alkaloids (Kanaka *et al*., 2013). Juice of ridge gourd potentially inhibit protein-tyrosine phosphatase 1β in liver and skeletal muscle (Tiwari *et al*., 2013) an important enzyme responsible for the development of insulin resfirstance, type 2 diabetes mellitus, and obesity (Popov, 2011).Ridge gourd is an important summer vegetable crop being cultivated abundantly during March to August in Bangladesh with low average yield of about 3.83mt per acre (BBS, 2018).

In Bangladesh, more than 106 local landraces of *L. acutangula* had been identified (Rabbani, 2007). Yet, very few varieties namely BARI Jhinga 1 and BARI Jhinga 2 have been released by Bangladesh Agricultural Research Institute (BARI) in Bangladesh. The diversity in morphological features of ridge gourd in Bangladesh represents a wide range of phenotypic variation (Rabbani *et al*., 2012), holding the potentiality for genetic improvement and varietal improvement as well to boost yield and productivity of the crop. Yield being a polygenic trait associated with many agronomic, morphological and physiological traits, so direct selection based on yield is often uncertain. That's why direct selection for yield is no longer successful unless other yield components' direct or indirect effects are taken into account. When selection pressure is applied to improve a character that is closely linked to yield, it has an effect on a variety of other associated traits. Thus, knowledge of the relationship between character and yield provides guidance to plant breeders for making improvements through selection, as well as a clear understanding of the role of genetic and non-genetic factors in determining the relationship. Given that yield is a polygenic trait and does not improve with a simple comparison of the relative importance of each of the causal factors, path coefficient analysis reveals the association between two traits and the partitioning of the relationship into direct and indirect effects showing the relationship between various characters as well as the direction of changes expected during selection (Mihretu *et al*., 2014).

Taking into account the health benefit of ridge gourd, they being cross-pollinated, the high degree of existing variability, the low yield of cultivars, and the significance of choosing the right features for varietal improvement, correlation and path analyses had been done to support future efficient breeding programs in development of new varieties of ridge gourd with high yield potentiality.

* Corresponding author: muna_sau@yahoo.com

MATERIALS & METHODS

Experimental materials and duration

A total of 65 ridge gourd (*Luffa acutangula*) genotypes had been used as experimental materials among which 40 genotypes were from Plant Genetic Resource Centre (PGRC) of Bangladesh Agricultural Research Institute (BARI) and 25 genotypes were locally collected from a private seed company and different locations of Bangladesh in 2020.

Land preparations and cultural operations

A land with 600 m^2 area at the central farm of Sher-e-Bangla Agricultural University was used in a Randomized Complete Block Design (RCBD) with three replications. Each bed was with 15m length and 1.5m width along with 0.75m wide trench in between two beds. The bed was raised up to almost 40 cm. Two long trenches each with of 0.75 cm depth were also made on north and south of the beds to enable smooth drainage of water. Ten pits were prepared in each row of bed. Likewise, a total of 200 pits were made in the land. Pit to pit distance was 1.5 m and pit size was 45cm x 30cm. The pits were left open for one week prior to seedling transplanting to kill harmful microorganisms and insects. Fertilization was done by the recommendation of BARI vegetable production manual. Seeds were soaked in water for 24 hours to ease germination. Polybags with size 15 cm x 20 cm were filled with 50% cow dung and 50% soil were used for sowing of seeds. After 15 days of seed sowing when the seedlings attained 5-6 leaves and were nearly 15 to 20 cm in height, they were transplanted in the main field. Harvesting was done as soon as the fruit got edible maturity.

Data collection and statistical analysis

Data were collected on the basis of descriptor, recommended by Plant Genetic Resources Centre, BARI, Gazipur on days to male flowering, node of first male flower, days to female flowering, node of first female flower, male flowers per plant, female flowers per plant, male and female flower ratio, days to first harvest, fruit per plant, percent fruit set (%), fruit length (cm), fruit width (cm), fruit weight (gm), seeds per fruit, 100 seed weight (gm) and yield per plant (kg). The correlation co-efficient among all possible character combinations at phenotypic (rp) and genotypic (rg) level were estimated employing formula (Al-Jibouri *et al.*, 1958). Path co-efficient analysis suggested by Dewey and Lu (1957) was carried out to know the direct and indirect effect of the morphological traits on plant yield.

RESULTS AND DISCUSSION

Correlation coefficient

Correlation co-efficient analysis (Table 1) revealed that fruit yield per plant (kg) showed positive and highly significant correlation with node of first male flower, male flower per plant, female flower per plant, fruits per plant, fruit weight (g), fruit length (cm), fruit width (cm), and seeds per fruit both at genotypic and phenotypic level. Generally, male flowers in ridge gourd appear before female flower appearance. Thus increase in node number of male flower is associated with delayed appearance of female flower. This means that earliness in ridge gourd enhances with the increase in node number of first male flower. Result of this study is partially confirmed by Kannan *et al*. (2019) who found yield to be significantly and positively correlated with node to first male flower of ridge gourd.

Furthermore, these positive correlations reveals that appearance of more female flowers, increase in fruit length (cm), width (cm), weight (g) and seed per fruit as well leads to increased yield per plant (kg). Positive and highly significant genetic correlation of fruits per plant and fruit weight (g) with yield per plant (kg) indicated that the selection of genotypes with maximum number of fruits and heavier fruits ensures higher yield per plant (kg), regardless of the selection method used. Thus, these associations of characters being positive are in desirable direction and selection based on these traits may contribute in improvement of ridge gourd yield per plant (kg) in future breeding programme. In a similar investigation by Gautam *et al*. (2017) in ridge gourd, fruit yield perceived positive correlation with fruit length, number of fruits per plant and average fruit weight. Chowdhury and Sharma (2002) suggested that in *L. acutangula* cultivars yield per hectare could be improved through selection of fruit length and individual fruit weight. High positive correlation of number of fruit with fruit yield was also found by Rakesh and Todd (2011).

Yield per plant (kg) had negative and highly significant correlation with days to female flower and node of first female flower whereas negative but insignificant association with male female flower ratio. Decrease in duration of female flower appearance at lower node number is an indicator of earliness in ridge gourd plant. Thus negative correlation of these traits with yield per plant is quite desirable as with the earliness in fruiting at lower node number contributes in early harvest and thereby benefits in profitable return. Likewise, decrease in male female flower ratio might increase female flower site and ultimately, yield per plant (kg). Choudhary *et al.* (2014) reported the same.

The correlation studies revealed that in general, an estimate of genotypic correlation coefficient was higher than corresponding phenotypic correlation coefficient, which indicated a strong inherent association among different traits under study. The lower phenotypic values might be due to environmental interactions. Higher genotypic correlations than phenotypic one might be due to modifying or masking effect of environment in the expression of the character under study (Nandpuri *et al.*, 1973). Similar observations were noticed in ridge gourd earlier (Karuppaiah *et al*., 2005).

The positive and highly significant correlations in days to male flowering with node of first male flower, days to female flowering, node of first female flower and days to first harvest, in node of first male flower with node of first female flower, in days to female flowering with days to first harvest, in male flower per plant with male female flower ratio and in female flower per plant with male female flower ratio, fruits per plant and yield per plant (kg), and between fruit width (cm) and fruit weight (g) indicated close association within the characters. Therefore, selection based on any of these traits would improve the associated traits. Similar positive and significant association with days to first female flower and highly significant association with individual fruit weight were reported by Mitu *et al*. (2018) for days to male flowering. The result contradicts with Ananthan and Krishnamoorthy (2017) as they found individual fruit weight as insignificant and positively correlated with first female flowering node. Varalakshmi *et al*. (2015) also reported that number of fruits per plant had significant positive association with fruit yield per plant, and fruit weight per plant.

Table 1. Genotypic (G) and phenotypic (P) correlations among different pairs of traits for different genotypes of ridge gourd.

		DMF	NFMF	DFF	NFFF	MFPP	FFPP	MFFR	DH	FPP	PFS	FL	FD	FW	SPF	HSW
NFMF	G	0.649**														
	P	0.593**														
DFF	G	0.864**	0.390**													
	P	0.740**	0.356**													
NFFF	G	0.698**	0.943**	0.590**												
	P	0.537**	0.805**	0.516**												
MFPP	G	-0.008	-0.021	-0.120	-0.114											
	P	-0.001	-0.033	-0.113	-0.088											
FFPP	G	0.282**	0.545**	0.128*	0.445**	0.125*										
	P	0.172**	0.376**	0.045	0.316**	0.158*										
MFFR	G	-0.091	-0.167**	-0.096	-0.170**	0.882**	-0.171**									
	P	-0.042	-0.169**	-0.062^{NS}	-0.135*	0.783**	-0.285**									
DH	G	0.881**	0.419**	0.986**	0.602**	-0.070	0.133*	-0.074								
	P	0.696**	0.322**	0.896**	0.458**	-0.085	0.061	-0.066								
FPP	G	0.245**	0.550**	0.136*	0.461**	0.096	0.871**	-0.170**	0.121							
	P	0.147*	0.382**	0.052	0.339**	0.154*	0.798**	-0.201**	0.027							
PFS	G	0.085	0.228**	0.136*	0.235**	-0.287**	0.190**	-0.171**	0.105	0.225**						
	P	0.044	0.141*	0.061	0.134*	-0.145*	0.047	-0.048	0.034	0.187**						
FL	G	0.297**	0.173**	0.244**	0.192**	0.054	0.044	0.140*	0.228**	-0.041	-0.021					
	P	0.153*	0.104	0.166**	0.131*	0.062	0.100	0.052	0.152*	-0.118	-0.013					
FD	G	0.353**	0.146*	0.462**	0.280**	-0.045	0.222**	0.009	0.346**	-0.313**	0.011	0.263**				
	P	0.179**	0.095	0.258**	0.173**	-0.037	0.144*	-0.031	0.185**	-0.194**	-0.008	0.204**				
FW	G	0.250**	0.070	0.257**	0.087	0.193**	0.137*	0.220**	0.257**	0.093	-0.344**	0.718**	0.577**			
	P	0.132*	0.034	0.172**	0.055	0.130*	0.133*	0.108	0.169**	0.118	-0.201**	0.569**	0.480**			
SPF	G	0.254**	0.350**	0.171**	0.387**	0.119	0.180**	0.064	0.149*	0.030	-0.353**	0.443**	0.162**	0.447**		
	P	0.167**	0.263**	0.119	0.277**	0.072	0.137*	0.014	0.108	0.020	-0.274**	0.272**	0.124*	0.366**		
HSW	G	0.111	-0.049	0.229**	0.018	0.120	-0.010	0.199**	0.248**	0.012	-0.014	0.164**	0.299**	0.282**	0.078	
	P	0.070	-0.058	0.158*	0.007	0.118	-0.014	0.180**	0.157*	-0.003	0.023	0.114	0.178**	0.210**	0.015	
YPP	G	0.281**	0.394**	-0.195**	-0.313**	0.174**	0.698**	-0.051	0.197**	0.769**	0.079	0.526**	0.491**	0.690**	0.270**	0.189**
	P	0.140*	0.287**	- 0.086	-0.223**	0.179**	0.615**	-0.097	0.081	0.747**	0.005	0.444**	0.355**	0.629**	0.209**	0.130*

DMF: Days to male flowering, NFMF: Node of first male flower, DFF: Days to female flowering, NFFF: Node of first female flower, MFPP: Male flowers per plant, FFPP: Female flowers per plant, MFFR: Male female flower ratio, DH: Days to first harvest, FPP: Fruits per plant, PFS: Percent of fruit set (%), FL: Fruit length (cm), FD: Fruit width (cm), FW: Fruit weight (g), SPF: seeds per fruit, HSW: 100 seed weight (g) and YPP: Yield per plant (kg).

Ultimately, information about the important yield contributing traits and their association with yield and other associated traits would be very useful for developing efficient breeding strategy for evolving superior hybrids and high yielding varieties in ridge gourd.

Path analysis

The correlation co-efficient-based association of characters does not predict an accurate image of the relative importance of direct and indirect effect of each yield contributing component on yield. That's why direct and indirect effects are determined using path analysis at the phenotypic level, which also measures relative importance of each variable representing a clear image of the inter-relationship between yield per plant and other yield attributes.

In this study, yield per plant (kg) is considered as a resultant variable. Rest 15 morphological yield contributing traits are causal (independent) variables in ridge gourd genotypes (Table 2).Overall results of direct effect revealed traits with the highest positive direct effect on yield per plant (kg) which were fruits per plant (0.644) followed by fruit weight (g) (0.566), male flower per plant (0.449), node of first male flower (0.215), fruit length (cm) (0.204) and days to harvest (0.066) suggesting their fair selection potentiality on breeding programme for increased yield. According to Gowda (2020) number of fruits per plant, average fruit weight and fruit yield per plot had high direct positive effect on fruit yield indicating their true positive and significant association with yield. On the contrary, male female flower ratio (-0.508) had the highest negative direct effect followed by days to male flowering, node of first female flower, seed per fruit, and female flower per plant. The results are supported by Varalakshmi *et al*. (2015) in ridge gourd where node-number for first female-flower appearance, days taken to first flower appearance, fruit length and fruit girth showed a negative direct effect on fruit yield/ha. Similar reports were also given by Kannan *et al*. (2019) in ridge gourd.

The highest positive indirect effect of days to male flowering on yield per plant was via fruit per plant (0.158) followed by fruit weight(g) (0.142), node of first male flower (0.139) which are indication of low magnitude and selection on the basis of these parameters would be fairly effective to improve yield. The positive indirect effect of node of first male flower via fruit per plant (0.354) was of high level magnitude (The effects indicated by path coefficients are small, medium, or large as per the recommended values 0.02, 0.15, and 0.35, respectively following Cohen, 1988) suggesting that selection based on this trait would be highly effective. Other positive effects were recorded via days to first female (0.044), male female flower ratio (0.085), days to harvest (0.028), and fruit length (0.035) which were of all negligible. Besides, node of first male flower showed negative indirect effect on yield which was low through days to male flower (-0.165), node of firstfe male flower (-0.165), male flower per plant (-0.009), female flower per plant (-0.034), fruit diameter (0.003), seed per fruit (0.027) and 100 seed weight (0.002). The cumulative effect on yield per plant for this trait was reported to be significantly positive.

The highest positive indirect effect of days to female flowering on yield per plant (kg) was through fruit weight (g) (0.145) followed by fruits per plant (0.088). Moderate negative indirect effect through days to male flower (-0.220) and low negative indirect effect through node of first female flower (-0.103) were observed. Genotypic correlation of this trait through all other traits exhibited highly significant negative genotypic correlation (-0.195) on yield per plant (kg).

Node of first female flower had positive indirect moderate negligible effect on yield per plant (kg) through male female flower ratio (0.086) and moderate with fruits per plant (0.297) and node for first male flower (0.202). Node of first female flower showed low negative effect through days to male flower (-0.178). Here the genotypic correlation with yield per plant (kg) was negatively highly significant (-0.313) for node of first female flower through all other yield contributing traits. The trait male flowers per plant had negative indirect effect on yield through days to female flower (-0.013), female flowers per plant (-0.008), days to first harvest (-0.005), seeds per fruit (-0.009) and the highest effect with male female flower ratio (-0.448). A highly significant positive genotypic correlation (0.174) with yield per plant (kg) was also observed.

Female flowers per plant had high positive indirect effect through fruits per plant (0.055). Its indirect effect through node of first male flower (0.117) was low whereas negligible effect through fruits per plant (0.055), days to female flower (0.014), male flowers per plant (0.056), male female flower ratio (0.087), days to first harvest (0.009) and, fruit length (cm) (0.009) and fruit weight (g) (0.078). The overall effect of genotypic correlation on yield per plant (kg) was highly significant (0.698).

Male female flower ratio had a negative but high genotypic effect on yield per plant (kg) (-0.508) while it showed positive high indirect effect through male flowers per plant (0.396) followed by low through fruit length (cm) (0.029), but negligible effect through percent fruit set (%), fruit weight (g) and 100 seed weight (g). Days to first harvest showed a positive but negligible direct effect on yield per plant (kg). It exhibited positive low indirect effect through days to female flowering (0.110), and negligible effect through fruits per plant, fruit length (cm), fruit weight (g) and 100 seed weight (g). Highly significant positive correlation was noted for this trait on yield per plant (kg) (0.197).

Fruits per plant exhibited positive indirect low effect through node of first male flower (0.118), but negligible effect through days to female flower, male flowers per plant, male female flower ratio, days to first harvest, fruit length (cm), fruit weight (g) and 100 seed weight (g) were observed with this trait on yield per plant (kg). Percent fruit set showed an indirect positive effect only through seeds per fruit (0.027). A positive but indirect effect of fruit length (cm) on yield per plant was observed through fruit weight (g) (0.406) and 100 seed weight (g) (0.008). Apart from these, this trait also showed indirect but negative effect through days to male flower (-0.076), female flowers per plant (-0.003), male female flower ratio (-0.071), fruit width (cm) (-0.005) and seeds per fruit (-0.034). The trait fruit width (cm) demonstrated positive moderate indirect effect on yield only through fruits per plant (0.021), high effect through fruit weight (cm) (0.327) and negligible through days to first harvest (0.023) and 100 seed weight (g) (0.014).

Fruit weight (g) had an indirect low positive effect on yield through fruit length (cm) (0.147) and negligible through node of first male flower (0.015), fruits per plant (0.060), percent fruit set (%) (0.002), 100 seed weight (g) (0.013).Genotypic correlation with yield per plant (kg) was recorded as highly significant and positive (0.690).Seeds per fruit had a negative high direct effect (-0.076) on yield per plant (kg). Its indirect effect through fruit weight (g) was moderate (0.253). Its genotypic correlation with yield per plant (kg) was recorded as a positively significant (0.270). The trait 100 seed weight (g) had high positive effect (0.047) on yield per plant (kg). It showed highly significant positive genotypic correlation (0.189) with yield per plant (kg). On the contrary, it shows negative indirect effect through seeds per fruit (-0.006), male female flower ratio (-0.101). On the contrary, it is positively influencing yield per plant (kg) through fruit weight (g) (0.159) at low level. The residual value (0.024) indicated that the effect of the remaining characters other than those studied had negligible effects.

Table 2. Path coefficient analysis with direct (bold) and indirect effect of different yield and yield contribution traits of ridge gourd.

Traits	DMF	NFMF	DFF	NFFF	MFPP	FFPP	MFFR	DH	FPP	PFS	FL	FD	FW	SPF	HSW	Genotypic correlation with yield
DMF	**-0.254**	0.139	0.097	-0.122	-0.003	-0.018	0.046	0.058	0.158	0.000	0.061	-0.007	0.142	-0.019	0.005	0.281**
NFMF	-0.165	**0.215**	0.044	-0.165	-0.009	-0.034	0.085	0.028	0.354	-0.001	0.035	-0.003	0.040	-0.027	-0.002	0.394**
DFF	-0.220	-0.084	**-0.112**	-0.103	-0.054	-0.008	0.049	0.065	0.088	-0.001	0.050	-0.009	0.145	-0.013	0.011	-0.195**
NFFF	-0.178	0.202	0.066	**-0.175**	-0.051	-0.028	0.086	0.039	0.297	-0.001	0.039	-0.006	0.049	-0.029	0.001	-0.313**
MFPP	0.002	-0.004	-0.013	0.020	**0.449**	-0.008	-0.448	-0.005	0.062	0.001	0.011	0.001	0.109	-0.009	0.006	0.174**
FFPP	-0.072	0.117	0.014	-0.078	0.056	**-0.063**	0.087	0.009	0.561	-0.001	0.009	-0.004	0.078	-0.014	0.000	0.698**
MFFR	0.023	-0.036	-0.011	0.030	0.396	0.011	**-0.508**	-0.005	-0.110	0.001	0.029	0.000	0.125	-0.005	0.009	-0.051
DH	-0.224	0.090	0.110	-0.105	-0.031	-0.008	0.037	**0.066**	0.078	-0.001	0.047	-0.007	0.145	-0.011	0.012	0.197**
FPP	-0.062	0.118	0.015	-0.080	0.043	-0.055	0.087	0.008	**0.644**	-0.001	0.008	-0.006	0.053	-0.002	0.001	0.769**
PFS	-0.022	0.049	0.015	-0.041	-0.129	-0.012	0.087	0.007	0.145	**-0.005**	-0.004	0.000	-0.195	0.027	-0.001	-0.079
FL	-0.076	0.037	0.027	-0.034	0.024	-0.003	-0.071	0.015	0.026	0.000	**0.204**	-0.005	0.406	-0.034	0.008	0.526**
FD	-0.090	0.031	0.052	-0.049	-0.020	-0.014	-0.005	0.023	0.201	0.000	0.054	**-0.020**	0.327	-0.012	0.014	0.491**
FW	-0.064	0.015	0.029	-0.015	0.087	-0.009	-0.112	0.017	0.060	0.002	0.147	-0.012	**0.566**	-0.034	0.013	0.690**
SPF	-0.065	0.075	0.019	-0.067	0.053	-0.011	-0.033	0.010	0.019	0.002	0.090	-0.003	0.253	**-0.076**	0.004	0.270**
HSW	-0.028	-0.011	0.026	-0.003	0.054	0.001	-0.101	0.016	0.008	0.000	0.033	-0.006	0.159	-0.006	**0.047**	0.189**

DMF: Days to male flowering, NFMF: Node of first male flower, DFF: Days to female flowering, NFFF: Node of first female flower, MFPP: Male flowers per plant, FFPP: Female flowers per plant, MFFR: Male female flower ratio, DH: Days to first harvest, FPP: Fruits per plant, PFS: Percent of fruit set (%), FL: Fruit length (cm), FD: Fruit width (cm), FW: Fruit weight (g), SPF: Seeds per fruit, HSW: 100 seed weight (g) and FYPP: Yield per plant (kg).

Residual effect: 0.024

CONCLUSIONS

From the breeder's point of view, the characters with high positive correlation and high direct effects at genotypic level are useful for selection. Thus it can be concluded that female flower per plant, fruits per plant, fruit weight (g), fruit length (cm) and node of first female flower are the most important traits influencing yield through direct effect coupled with high positive correlation. Therefore, direct selection for these traits would be rewarding for improvement of yield per plant in ridge gourd.

REFERENCES

Al-Jibouri, H.A., Miller &Robinson H.F. (1958). Genotypic and environmental variation and correlation in upland cotton cross of interspecies origin. *Agronomy Journal,* 50, 633-637.

Ananthan, M. & Krishnamoorthy, V. (2017). Genetic variability, correlation and path analysis in ridge gourd (*Luffa acutangula* Roxb. L.). *International Journal of Current Microbiology and Applied Science*, 6(6), 3022-3026.

BBS. (2018). Monthly Statistical Bulletin, Bangladesh (August). Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning, Government of Bangladesh, p. 66.

Chowdhury, D. & Sharma, K.C. (2002). Studies on variability, heritability, genetic advance and correlation in ridge gourd (*Luffa acutangula* Roxb.). *Horticulture Journal,* 15(3), 53- 58.

Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York, NY: Routledge Academic.

Dewey, D.R. & Lu, K.H. (1957). A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agronomy Journal,* 51, 515-518.

Gautam, A., Maurya, S.K., Yadav, H., & Pooja. (2017). Genetic divergence and character association studies in indigenous ridge gourd (*Luffa acutangula* (L.) (Roxb.) genotypes. *Journal of Pharmacognosy and Phytochemistry,* 6(4), 1769-1774.

Gowda K.H. (2020).Correlation and path co-efficient analysis in ridge gourd [*Luffa acutangula* (L.) Roxb.]. *International Journal of Current Microbiological and Applied Science*, 9(7), 2965-2974.

Kanaka, R., Narasinga, R., Venkateshwarlu, M., Sammaiah, D., Anitha, U. & Ugandhar T. (2013). Studies on the medicinal plant biodiversity in forest ecosystem of Mahadevpur forest of Karimnagar, India. *Bioscience Discovery,* 4, 82– 88.

Kandoliya, U.K., Marviya, G.V., Bodar, N.P., Bhadja, N.V. & Golakiya, B.A. (2016). Nutritional and antioxidant components of ridge gourd (*Luffa acutangula* L. Roxb) fruits of promising genotypes and varieties. *Scholars Journal of Agriculture and Veterinary Sciences,* 3(5), 397-401.

Kannan, A., Rajamanickam, C., Krishnamoorthy, V. & Arunachalam, P. (2019). Genetic variability, correlation and path analysis in F4 generation of ridge gourd (*Luffa acutangula* (Roxb) L.) *International Journal of Chemical Studies*, 7(3), 208-213.

Mihretu, Y., Weyessa, G. &, Adugna, D. (2014). Variability and association of quantitative characters among okra (*Abelmoschus esculentus* L. Moench) collection in South Western Ethiopia. *Journal of Biological Science,* 14, 336-342.

Mitu, N., Islam M.S., Sharmin, D., Latif, M.A., Methela, N.J. (2018).Correlation and path analysis in some ridge gourd genotypes. *Journal of Agroforestry and Environment,* 12 (1 & 2), 9-12.

Nandpuri, B.S., Singh, S., Lal, T. (1973). Studies on the genetic variability and correlation of some economic characters in tomato*. Journal of Research,* 10, 316-21.

Popov, D. (2011). Novel protein tyrosine phosphatase 1B inhibitors: interaction requirements for improved intracellular efficacy in type 2 diabetes mellitus and obesity control. Biochemical and Biophysical Research Communications, 10(3), 377-81.

Rabbani, M.G. (2007). *Annual report: USDA-Bangladesh collaborative research-CVFB*. Department of Horticulture, Bangladesh Agricultural University, Mymensingh, p. 35

Rabbani, M.G., Naher, M.J. & Hoque, S. (2012). Variability, character association and diversity analysis of ridge gourd (*Luffa acutangula* Roxb.) genotypes of Bangladesh. *SAARC Journal of Agriculture*, 10(2), 01-10.

Rakesh, K. & Todd, C.W. (2011). Inheritance of fruit yield in two watermelon populations in North Carolina*. Euphytica,* 182, 275–283.

Tiwari, B.K., Pandey, K.B., Abidi, A.B., Rizvi, S.I. (2013). Markers of oxidative stress during diabetes mellitus. *Hindawi Publishing Corporation*. *Journal of Biomarkers*, ID 378790, p 8.

Varalakshmi, B., Pitchaimuthu, M., Rao, E.S., Manjunath, K.S.S., Swathi, S.H. (2015). Genetic variability, correlation and path analysis in ridge gourd [*L. acutangula* (Roxb.) L.]. *Journal of Horticultural Sciences,* 10(2), 154-158.