



Research Article

Genetic variability studies in F₂ and F₃ generations of ridge gourd for yield and yield components [*Luffa acutangula* (L.) Roxb.]

Gautham Suresh S.P.* and T.N. Balamohan

Department of Horticulture, Agricultural College and Research Institute (TNAU), Madurai-625104, Tamil Nadu, India.

Received: 14-06-2018; Revised: 23-06-2018; Accepted: 19-07-2018

Abstract: Ridge gourd (*Luffa acutangula* (L.) Roxb.) is the fruit of a sub-tropical vine that belongs to the Cucurbitaceae family and is native to central and eastern Asia, including the Indian subcontinent. In this study, four crosses of ridge gourd were evaluated in the F₂ generation and two crosses were advanced to F₃ segregating generation for investigating the variability, heritability and genetic advance of ridge gourd. Among the crosses studied, L₃xT₁ (Virudhunagar Local x Periyakottai Local) and L₃xT₂ (Virudhunagar Local x Alathur Local), exhibited superior per se performance in both F₂ and F₃ generations for almost all the yield contributing characters. The F₂ and F₃ populations of cross L₃xT₁ and L₃xT₂ showed moderate to high PCV, GCV coupled with high heritability estimates and high genetic advance as percentage of mean for node to first male flower, node to first female flower, sex ratio, number of fruits per vine, fruit length, fruit diameter, rind thickness, flesh thickness, number of seeds per fruit and fruit yield per vine.

Keywords: GCV, Genetic advance as percentage of mean, Heritability, PCV, Ridge gourd, Variability

Introduction

The essence of Indian ethos is intermingled with many factors such as civilization, India's rich believes and tradition and this have its much influence in her food culture too. Nowadays the major component of our diet is vegetables. Of these, Cucurbitaceous vegetables form the major part of these vegetables, namely cucumber (*Cucumis sativus* L.), ridge gourd (*Luffa acutangula* (L.) Roxb.), smooth gourd (*Luffa cylindrica* M.J. Roem.), snake gourd (*Trichosanthes anguina* L.), pointed gourd (*Trichosanthes dioica* L.) etc. Ridge gourd [*Luffa acutangula* (L.) Roxb.] is one of the most important cucurbitaceous vegetable crops with old world origin in the subtropical Asian region, mainly India (Kalloo, 1993). It has a chromosome number of 2n=2x=26. It is grown all over India in tropical and subtropical climate, both as spring-summer and rainy season crop. Kalitori, ribbed gourd or angled gourd or silky gourd or angled loofah or vegetable gourd are some of its other names. The genus derived its name from the product "Loofah" which is used in bathing sponge, doormats, pillows and cleaning utensils (Narasannavar *et al.*, 2014).

Genetic variability present in the population is inevitable for the selection process. The heritable variations could be divided into additive and non-additive components. The heritable variations are also divided into dominant and inter-allelic interaction (Falconer, 1981). The broad sense heritability is the ratio of genotypic variance to the total variance in the non-segregating population.

The genotypic variance includes non-additive components which are not transmitted to the next generation. Hence high heritability coupled with high genetic advance was reported to be more useful in practicing selection in a population (Johnson *et al.*, 1955).

Materials and Methods

The study was carried out at Department of Horticulture, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai, Tamil Nadu, India during September 2017 to April 2018. The crosses *viz.*, L₂xT₁ (CO-1 x Periyakottai local), L₃xT₁ (Virudhunagar Local x Periyakottai Local), L₃xT₂ (Virudhunagar Local x Alathur Local), L₄xT₃ (Serantham Local x Batlagundu Local) were evaluated along with their parents in Randomized Block Design without replication. A spacing of 2 x 2 m was provided. For each cross, 75 pits were taken and two plants were accommodated in each pit which accounted for a total population of 600 plants. In the F₃ generation, two superior crosses were selected based on the mean performance and were raised as single progeny rows.

The observations were recorded for days taken for first male flowering, days taken for first female flowering, first male flower node, first female flower node, sex ratio, number of fruits per vine, average fruit weight (g), length of fruit (cm), diameter of fruit (cm), rind thickness (mm), flesh thickness

*Corresponding Author:

Mr. Gautham Suresh S.P.,
M.Sc (Hort) Vegetable Science,
Department of Horticulture,
AC&RI, TNAU, Madurai, Tamil Nadu, India.
E-mail: gautham360@gmail.com



(cm), number of seeds per fruit and fruit yield per vine (kg). The data recorded were statistically analyzed for genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), broad sense heritability and genetic advance over mean.

Results and Discussion

The extent of variability present in the four crosses of ridge gourd in F₂ and F₃ generations were measured in terms of phenotypic variance, phenotypic coefficient of variation (PCV), genotypic variance, genotypic coefficient of variation (GCV), broad sense heritability and genetic advance percentage over mean. Considerable amount of variability was observed for all the characters under study and this proves that there is ample scope for selection in the subsequent generations. Segregation and recombination are found maximum in the F₂ generation; therefore, it is the ideal generation for imposing selection. Even though variability is found to decrease in the F₃ generation, there is opportunity for selection. The extent of recombination potential mainly rests on the genetic diversity present in the parents. High

mean along with high variability shows that the population is superior.

In the case of node to first male flower, three crosses viz., L₂xT₁ (16.38 and 14.51), L₃xT₁ (19.23 and 15.23) and L₃xT₂ (15.80 and 12.97) in the F₂ generation and all crosses in F₃ exhibited moderate PCV and GCV; L₃xT₁ (17.99 and 15.65), L₃xT₂ (19.50 and 17.99). Improvement of this trait is possible up to an extent. Rajawat and Collis (2017) reported similar results in cucumber. However, the cross L₄xT₃ (23.50 and 20.19) manifested high PCV and GCV values which were similar to the study conducted by Khan *et al.*, (2016) in snake gourd (Table 1). The character, node to first female flowering showed high values of PCV and GCV in two crosses viz., L₃xT₂ (23.26 and 20.79) and L₄xT₃ (21.55 and 20.25) in the F₂ generation. So, the presence of additive gene action was confirmed. These findings were supported by Singh *et al.*, (2014). Moderate PCV and GCV exhibited in the F₂ crosses L₂xT₁ (17.86 and 16.39) and L₃xT₁ (19.12 and 18.03) and also in the F₃ generation; L₃xT₁ (17.85 and 17.28), L₃xT₂ (18.32 and 16.74) and this corroborated with the reports of Ananthan and Krishnamoorthy (2017) in ridge gourd (Table 2).

Table 1. Mean, variance and other genetic parameters of different crosses for node to first male flower

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	6.65	6.54	6.38	5.97	6.06	5.80
PCV (%)	16.38	19.23	15.80	23.50	17.99	19.50
GCV (%)	14.51	15.23	12.97	20.19	15.65	17.99
Heritability (%)	78.48	62.77	67.40	73.82	75.69	85.07
GA	1.76	1.63	1.40	2.13	1.70	1.98
GA % of mean	26.48	24.86	21.93	35.73	28.04	34.18

Table 2. Mean, variance and other genetic parameters of different crosses for node to first female flower

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	17.14	16.87	14.17	13.55	16.56	16.94
PCV (%)	17.86	19.12	23.26	21.55	17.85	18.32
GCV (%)	16.39	18.03	20.79	20.25	17.28	16.74
Heritability (%)	84.23	88.89	79.86	88.33	93.64	83.50
GA	5.31	5.91	5.42	5.31	5.70	5.34
GA % of mean	30.98	35.02	38.27	39.21	34.44	31.51

Table 3. Mean, variance and other genetic parameters of different crosses for sex ratio

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	4.97	5.40	6.23	5.78	5.18	6.05
PCV (%)	31.46	36.96	27.01	37.47	40.64	27.23
GCV (%)	29.97	36.00	25.86	36.77	39.70	25.38
Heritability (%)	90.73	94.90	91.65	96.31	95.42	86.86
GA	2.92	3.90	3.18	4.30	4.14	2.95
GA % of mean	58.80	72.25	50.99	74.35	79.88	48.73

Node to first male flower and node to first female flower exhibited high values for heritability and genetic advance as percentage of mean in both generations and this confirms 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 studies of Sharma and Sengupta (2013) in bottle gourd. High

genotypic and phenotypic coefficient of variations were observed for sex ratio in F₂ crosses viz., L₂xT₁ (31.46 and 29.97), L₃xT₁ (36.96 and 36.00), L₃xT₂ (27.01 and 25.86), L₄xT₃ (37.47 and 36.77) and F₃ crosses, L₃xT₁ (40.64 and 39.70) and L₃xT₂ (27.23 and 25.38). This indicates that there was less environmental effect on this trait and scope for selection is more. This agrees with the findings of Rabbani *et al.*, (2014) (Table 3). High values of

genetic advance as percentage of mean coupled with high estimates of heritability was observed in all the crosses for the character sex ratio. Above information suggests that selection based on phenotypic expression could be relied upon as major role of genetic constitution in the expression of these characters. It was similar as that of previous studies in muskmelon by Rakhi and Rajamony (2006). In respect of number of fruits per

vine, all the crosses in F₂ and F₃ generation exhibited moderate PCV and GCV, which ranged from 14.12 and 13.19 (L₄X T₃) to 18.02 and 17.51 (L₃X T₁) in the F₂ generation. In the F₃ generation, the highest PCV and GCV were 16.59 and 15.92 (L₃X T₁). So, this character is amenable for selection. This was in line with the earlier findings of Rajawat and Collis (2017) and Ananthan and Krishnamoorthy (2017) (Table 4).

Table 4. Mean, variance and other genetic parameters of different crosses for number of fruits per vine

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	14.02	16.41	16.05	13.89	15.94	16.24
PCV (%)	15.60	18.02	15.21	14.12	16.59	13.05
GCV (%)	14.52	17.51	14.62	13.19	15.92	12.47
Heritability (%)	86.67	94.34	92.35	87.29	92.06	91.20
GA	3.91	5.75	4.64	3.53	5.02	3.98
GA % of mean	27.85	35.02	28.94	25.39	31.47	24.52

Table 5. Mean, variance and other genetic parameters of different crosses for average fruit weight

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	168.81	181.06	173.78	161.18	192.38	181.89
PCV (%)	20.76	21.09	16.52	23.47	17.64	15.69
GCV (%)	20.19	20.30	15.42	22.58	16.88	14.97
Heritability (%)	94.55	92.69	87.17	92.55	91.52	90.95
GA	68.27	72.91	51.54	72.12	63.98	53.48
GA % of mean	40.44	40.27	29.66	44.75	33.26	29.40

Table 6. Mean, variance and other genetic parameters of different crosses for fruit length

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	25.21	32.41	28.52	27.60	36.17	28.64
PCV (%)	23.73	18.65	21.48	24.86	18.52	19.11
GCV (%)	22.76	18.16	20.67	23.51	18.02	18.18
Heritability (%)	91.95	94.82	92.67	89.50	94.67	90.48
GA	11.33	11.81	11.69	12.65	13.06	10.20
GA % of mean	44.95	36.43	41.00	45.82	36.12	35.62

The magnitude of heritability and genetic advance as percentage of mean was high in both generations which is an indicative of greater proportion of additive genetic variance and consequence a high genetic gain from selection and this was in line with the findings of Sharma and Sengupta (2013) in bottle gourd. High estimates of PCV and GCV were found for all crosses for average fruit weight in F₂ generation except L₃X T₂ (16.52 and 15.42). In the F₃ generation moderate PCV and GCV were observed in L₃X T₁ (17.64 and 16.88) and L₃X T₂ (15.69 and 14.97). This was in contrast to the findings of Karthik *et al.*, (2017) and Hanumegowda *et al.*, (2012) in ridge gourd, Devi and Mariappan (2013) in snake gourd (Table 5). High heritability coupled with genetic advance as percentage of mean was recorded by all crosses in F₂ and F₃ generations for average fruit weight and this trait has a great scope to be exploited. The results were similar to the findings of Kanimozhi *et al.*, (2015) in ash gourd and Naik and Prasad (2015) in pumpkin.

In F₂ generation, high PCV and GCV was exhibited by the crosses L₂X T₁ (23.73 and 22.76), L₃X T₂ (21.48 and 20.67) and L₄X T₃ (24.86 and 23.51) for the trait fruit length which revealed the occurrence of broad

genetic base, which would help in further selection or indicating minor environmental influence. This was in accordance with the studies conducted by Chowdhury and Sharma (2002) in ridge gourd. But the cross L₃X T₁ (18.65 and 18.16) in F₂ generation and all crosses in F₃ generation *i.e.*, L₃X T₁ (18.52 and 18.02) and L₃X T₂ (19.11 and 18.18) exhibited moderate PCV and GCV, suggesting average genetic base compared to the other crosses and this finding is in contrast with the works done by Sampath and Krishnamoorthy (2017) in pumpkin (Table 6). Fruit length also showed high heritability coupled with high genetic advance as percentage of mean and inheritance of additive gene action could be confirmed. The results are in line with the studies conducted by Sharma and Sengupta (2013) in bottle gourd and Karthik *et al.*, (2017) in ridge gourd.

PCV and GCV for fruit diameter were found moderate in both generations and ranged from 14.14 and 10.86 (L₃X T₁) to 18.41 and 14.20 (L₂X T₁) in the F₂ generation. In F₃, L₃X T₁ (16.56 and 13.36) recorded the maximum PCV and GCV. This implies that variability observed in genotype is modest. So, this trait could be soberly exploited in

the future selection programs. These findings were in accordance with Ananthan and Krishnamoorthy (2017) in ridge gourd (Table 7).

In the case of fruit diameter, moderate heritability was exhibited by the crosses $L_2 \times T_1$ and $L_3 \times T_1$, in the F_2 generation whereas, high heritability was shown by all other crosses. However, the genetic advance as percentage of mean was moderate in $L_3 \times T_1$, $L_3 \times T_2$ in the F_2 generation and $L_3 \times T_2$ in F_3 generation which corroborates with the findings of Singh *et al.*, (2014). All other crosses manifested high genetic advance over mean and this is in line with the findings of Sampath and Krishnamoorthy (2017) in pumpkin.

In case of rind thickness, two crosses in F_2 generation, *i.e.*, $L_3 \times T_2$ (25.64 and 22.97) and $L_4 \times T_3$ (23.06 and 21.04) and $L_3 \times T_2$ (21.24 and 18.74) in F_3

generation showed high magnitude of PCV and GCV. This confirms the presence of a diverse gene pool and improvement through selection is possible. Koppad *et al.*, (2015) in ridge gourd recorded similar observations. Remaining crosses showed moderate observations (Table 8). Rind thickness showed high heritability combined with high genetic advance as percentage of mean for all the crosses. Transmission of genes related to this trait to further generation is possible. Chowdhury and Sharma (2002) and Koppad *et al.*, (2015) opined the same for this trait in ridge gourd. For the trait flesh thickness, all the crosses showed moderate PCV and GCV estimates except $L_4 \times T_3$ in both the generations. Similar results were obtained by Rahman *et al.*, (2015). However, high PCV and moderate GCV was found for the cross $L_4 \times T_3$ (21.36 and 19.78) in F_2 generation (Table 9).

Table 7. Mean, variance and other genetic parameters of different crosses for fruit diameter

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	13.20	16.43	15.29	14.32	15.88	14.66
PCV (%)	18.41	14.14	14.78	18.22	16.56	14.56
GCV (%)	14.20	10.86	11.59	14.57	13.36	11.60
Heritability (%)	59.45	59.07	61.53	64.02	65.16	63.45
GA	2.98	2.83	2.87	3.44	3.53	2.79
GA % of mean	22.55	17.20	18.74	24.02	22.22	19.04

Table 8. Mean, variance and other genetic parameters of different crosses for rind thickness

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	2.65	2.35	2.44	2.80	2.84	2.78
PCV (%)	15.27	16.76	25.64	23.06	15.90	21.24
GCV (%)	13.12	14.65	22.97	21.04	14.41	18.74
Heritability (%)	73.86	76.40	80.24	83.22	82.06	77.85
GA	0.62	0.62	1.03	1.11	0.76	0.95
GA % of mean	23.23	26.38	42.38	39.53	26.88	34.07

Table 9. Mean, variance and other genetic parameters of different crosses for flesh thickness

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	2.43	2.78	2.74	2.62	2.74	2.93
PCV (%)	15.93	17.74	17.55	21.36	17.19	14.23
GCV (%)	14.38	16.05	16.82	19.78	15.89	13.44
Heritability (%)	81.42	81.80	91.90	85.82	85.47	89.22
GA	0.65	0.83	0.91	0.99	0.83	0.77
GA % of mean	26.72	29.89	33.22	37.76	30.27	26.16

Table 10. Mean, variance and other genetic parameters of different crosses for number of seeds per fruit

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	145.36	171.23	163.83	129.81	161.84	158.76
PCV (%)	25.58	23.89	24.46	22.08	23.83	24.53
GCV (%)	25.05	22.90	23.79	21.26	22.68	22.69
Heritability (%)	95.93	91.88	94.56	92.74	90.53	85.53
GA	73.48	77.44	78.08	54.75	71.93	68.62
GA % of mean	50.55	45.23	47.66	42.17	44.45	43.22

Table 11. Mean, variance and other genetic parameters of different crosses for fruit yield per vine

Particulars	F ₂ Generation			F ₃ Generation		
	L ₂ X T ₁	L ₃ X T ₁	L ₃ X T ₂	L ₄ X T ₃	L ₃ X T ₁	L ₃ X T ₂
Mean	2.37	2.97	2.79	2.24	3.07	2.95
PCV (%)	27.88	20.64	30.23	26.03	18.59	25.99
GCV (%)	25.37	18.61	29.02	24.87	17.39	24.78
Heritability (%)	82.76	81.28	92.17	91.28	87.55	90.90
GA	1.13	1.03	1.60	1.10	1.03	1.44
GA % of mean	47.54	34.57	57.39	48.95	33.53	48.67

High values of genetic advance as percentage of mean coupled with high estimates of heritability was observed for flesh thickness in all the crosses and results were similar to the findings of Sampath and Krishnamoorthy (2017) in ridge gourd and Naik and Prasad (2015) in pumpkin. All the crosses in both the generations exhibited high PCV and GCV in the case of number of seeds per fruit. These findings were in line with that of Singh *et al.*, (2002) (Table 10).

All the crosses in both the generations had registered high heritability for days to first harvest with high genetic advance as percentage of mean which suggest that there is scope for improvement. This was supported by Yadav *et al.*, (2010) and Kumar *et al.*, (2007) in bottle gourd.

Fruit yield per vine manifested high phenotypic and genotypic coefficient of variation in all the crosses of F₂ generation except L₃xT₁ in which moderate GCV of 18.61 was observed. The results obtained were L₂xT₁ (27.88 and 25.37), L₃xT₁ (20.64 and 18.61), L₃xT₂ (30.23 and 29.02) and L₄xT₃ (26.03 and 24.87). In the F₃ generation, high PCV and GCV was exhibited by the cross L₃xT₂ (25.99 and 24.78), but moderate PCV and GCV were observed in the cross L₃xT₁ (18.59 and 17.39). These findings are in close conformity with findings of Rabbani *et al.*, (2014) in ridge gourd, Dey *et al.*, (2009) in bitter gourd, Ullah *et al.*, (2012) in cucumber (Table 11).

Fruit yield per vine exhibited high heritability accompanied with high genetic advance as percentage of mean. This trait being the most important, could effectively undergo selection and can achieve progress through selection. High degree of additive gene effect implies less control by environment on the trait. Similar to the result obtained were reported by Chakraborty *et al.*, (2013) in bitter gourd, Sharma and Sengupta (2013), Khan *et al.*, (2016) in bottle gourd and Karthik *et al.*, (2017) in ridge gourd.

Conclusion

High GCV and PCV were observed for node to first female flower, sex ratio, fruit yield per plant, fruit length, rind thickness, fruit yield per hectare, average fruit weigh and number of seeds per fruit. Characters with high PCV and GCV indicate maximum amount of variability in nature, can be used in further crop improvement programme. Evaluation of promising crosses over generations and locations should be done, so that they can achieve homozygosity and can be recommended for commercial cultivation. The crosses L₃xT₁ and L₃xT₂ showed higher yield and high heritability for most characters under study and can be summated that these two crosses are promising in providing better source population for exercising selection.

References

1. Ananthan M, and Krishnamoorthy V. Genetic Variability, Correlation and Path Analysis in Ridge Gourd (*Luffa acutangula* (Roxb) L.). *International Journal of Current Microbiology and Applied Sciences* 6.6 (2017): 3022-3026. Print
2. Chakraborty L, Acharyya P, and Raychaudhuri S. Diversity analysis of *Momordica charantia* L. accessions from eastern and north eastern India based on morphological, yield related traits and molecular marker. *Proceedings of FVHH, Thailand* (2013): 179-193. Print
3. Chowdhury D, and Sharma K. Studies on variability, heritability, genetic advance and correlation in ridge gourd (*Luffa acutangula* Roxb.). *Horticulture Journal*, 15.3 (2002): 53-58. Print
4. Devi ND, and Mariappan S. Genetic variability, heritability and genetic advance for yield and its components snake gourd (*Trichosanthes anguina* L.). *African Journal of Agricultural Research* 8.28 (2013): 3857-3859. Print
5. Dey S, Behera T, Munshi A, and Bhatia R. Genetic variability, genetic advance and heritability in bitter gourd (*Momordica charantia* L.). *Indian Agriculturist* 53.1/2 (2009): 7-12. Print
6. Falconer DS. Introduction to quantitative genetics. *Longman Harlow*, 1981, 340. Print
7. Hanumegowda K, Shirol A, Mulge R, Shantappa T, and Prasadkumar. Correlation co-efficients studies in ridge gourd (*Luffa acutangula* (L.) Roxb). *Karnataka Journal of Agricultural Sciences* 25.1 (2012): 196-200. Print
8. Johnson HW, Robinson H, and Comstock R. Estimates of Genetic and Environmental Variability in Soybeans, *Agronomy journal* 47.7 (1955): 314-318. Print
9. Kalloo G. Loofah: *Luffa* spp. In Genetic Improvement of Vegetable Crops. Elsevier, (1993): 265-266. Print
10. Kanimozhi R, Yassin GM, Kumar SR, Kanthaswamy V, and Thirumeni S. Genetic Analysis in Segregating Generation of Wax Gourd. *International Journal of Vegetable Science* 21.3 (2015): 281-296. Print.
11. Karthik D, Varalakshmi B, Kumar G, and Lakshmi N. Genetic Variability Studies of Ridge Gourd Advanced Inbred Lines (*Luffa acutangula* (L.) Roxb.). *International Journal of Pure and Applied Bioscience* 5.6 (2017): 1223-1228. Online.
12. Khan AMR, Eyasmin R, Rashid MH, Ishtiaque S, and Chaki AK. Variability, heritability, character association, path analysis and morphological diversity in snake gourd. *Agriculture and Natural Resources* 50.6 (2016): 483-489. Print.
13. Koppad S, Chavan M, Hallur R, Rathod V, and Shantappa T. Variability and character association studies in ridge gourd (*Luffa acutangula* Roxb.) With

- reference to yield attributes. *Journal of Global Biosciences* 4.5 (2015): 2332-2342. Print.
14. Kumar S, Singh R, and Pal A. Genetic variability, heritability, genetic advance, correlation coefficient and path analysis in bottle gourd. *Indian Journal of Horticulture* 64.2 (2007): 163-168. Print.
 15. Naik ML, and Prasad V. Studies on genetic divergence in pumpkin. *Electronic Journal of Plant Breeding* 6.4 (2015): 1088-1094. Online.
 16. Narasannavar A, Gasti V, Shantappa T, Mulge R, Allolli T, and Thammaiah N. Heterosis studies in ridge gourd [*Luffa acutangula* (L.) Roxb.]. *Global Journal of Horticulture* 27.1 (2014): 2249-4626. Print.
 17. Rabbani M, Naher M, and Hoque S. Variability, character association and diversity analysis of ridge gourd (*Luffa acutangula* Roxb.) genotypes of Bangladesh. *SAARC Journal of Agriculture* 10.2 (2014): 1-10. Print.
 18. Rahman M, Hossain M, Islam M, Biswas D, and Ahiduzzaman M. Genetic variability, heritability and path analysis in snake gourd (*Trichosanthes anguina* L.). *Pakistan Journal of Biological Sciences* 5.3 (2002): 284-286. Print.
 19. Rajawat K, and Collis J. Genetic variability, Heritability and Genetic advances analysis for quantitative and qualitative traits in Cucumber (*Cucumis sativus* L.). *Journal of Pharmacognosy and Phytochemistry* 6.4 (2017): 882-885. Print.
 20. Rakhi R, and Rajamony L. Variability, heritability and genetic advance in landraces of culinary melon (*Cucumis melo* L.). *Journal of Tropical Agriculture* 43 (2006): 79-82. Print.
 21. Sampath S, and Krishnamoorthy V. Genetic Variability, Correlation and Path Analysis in Pumpkin (*Cucurbita moschata* Duch. ex. Poir). *International Journal of Current Microbiology and Applied Sciences* 6.6 (2017): 3027-3035. Print.
 22. Sharma A, and Sengupta S. Genetic diversity, heritability and morphological characterization in bottle gourd (*Lagenaria siceraria* (mol.) stand). *The Bioscan* 8.4 (2013): 1461-1465. Print.
 23. Singh MK, Bhardwaj D, and Upadhyay D. Genetic architecture and association analysis in bitter gourd (*Momordica charantia* L.) landraces. *The Bioscan* 9.2 (2014): 707-711. Print.
 24. Singh, RP, Mohan J, and Singh D. Studies on genetic variability and heritability in ridge gourd (*Luffa acutangula* L.). *Agricultural Science Digest* 22.4 (2002): 279-280. Print.
 25. Ullah M, Hasan M, Chowdhury A, Saki A, and Rahman A. Genetic variability and correlation in exotic cucumber (*Cucumis sativus* L.) varieties. *Bangladesh Journal of Plant Breeding and Genetics* 2.1 (2012): 17-23. Print.
 26. Yadav YC, Sanjay K, Adesh K, Raghvendra S, and Rekha S. Path coefficient studies and character association in bottle gourd (*Lagenaria siceraria* (Molina) Standl.). *Annals of Horticulture* 3.1 (2010): 84-88. Print.

Cite this article as:

Gautham Suresh S.P. and T.N. Balamohan. Genetic variability studies in F2 and F3 generations of ridge gourd for yield and yield components [*Luffa acutangula* (L.) Roxb.]. *Annals of Plant Sciences* 7.8 (2018) pp. 2385-2390.



<http://dx.doi.org/10.21746/aps.2018.7.8.3>

Source of support: Nil; Conflict of interest: Nil.