Research Paper

VARIABILITY AND CHARACTER ASSOCIATION STUDIES IN RIDGE GOURD (*Luffa acutangula* Roxb.) WITH REFERENCE TO YIELD ATTRIBUTES

Koppad, S. B., Chavan, M. L., Hallur, R. H., Rathod, V. and Shantappa, T.

Department of Crop Improvement and Biotechnology
K. R. C. College of Horticulture, Arabhavi 591 218
University of Horticultural Sciences, Bagalkot.

Abstract

Evaluated eighteen genotypes of ridge gourd for growth, earliness, biochemical, yield and fruit quality parameters in the field condition during the period 2012-14. The results revealed that PCV was higher than the GCV for most of the traits. High heritability with moderate to high GCV, PCV and GAM was recorded for chlorophyll and proline during 45 DAS and total yield per vine indicated that these characters could be improved by simple selection. Proline content in the leaf during 45 (r =0.5784) and 90 days after sowing (DAS) (r = 0.8659), average fruit weight (r =0.9298), tendril length (r =0.4955) had positive and significant correlation with the yield but the sex ratio (r = - 0.4606) and days to first female flowering (r= -0.5120) had the negative significant association with the fruit yield per vine.

Key words: Ridge gourd, heritability, genotypic and phenotypic coefficient of variation, genetic advance, earliness.

INTRODUCTION

Crop improvement is largely depends on existence of genetic variability. To know the extent of variability present in a population, evaluation of large number of germplasm lines is the first line of work. This improvement in any crop is based on the extent of genetic variation and magnitude of available beneficial genetic variability. Some of the biometrical parameters include genotypic (GCV) and phenotypic (PCV) coefficients of variation. High value of these coefficients indicates wider diversity. Similarly, narrow difference between GCV and PCV reveals low sensitivity to the environmental effects. Another indicator of variability is heritability, which is the ratio of genetic variance to total variance. This is broad sense heritability and gives an idea about that portion of observed variability which is attributable to genetic differences. Heritability estimates supplemented by genetic variance are more meaningful. Heritability is a component in the computation of expected progress which is most meaningful when accompanied by genetic advance. Genetic advance would be more in cases where the additive genetic variance is more than non-additive genetic variance (Lush, 1949). The present investigation was undertaken with 18 ridge gourd cultivars collected from local places with the objective of obtaining information on variability, heritability and genetic advance.

MATERIAL AND METHODS

The experiment was conducted during the summer seasons of 2012-14 at KRC College of Horticulture, Arabhavi, using completely randomized block design with three replications. Treatment was in a plot of single row in each replication. Recommended cultural practices were followed as per the package of practices of horticultural crops of University of Agricultural Sciences, Dharawad (Anon., 2010). Five randomly selected plants from each genotype were subjected to made observation on vine length, number of branches per vine, number of leaves per vine, tendril length and diameter of the vine at 45 and 90 DAS, days to first male flower initiation, days to first female flowering, days to 50 per cent flowering, days to first harvest, days to last harvest, sex ratio, total chlorophyll content in leaf and proline accumulation in leaf at 45 and 90 DAS, number of fruits per vine, average fruit weight, fruit length, fruit diameter, flesh thickness, rind thickness and total frit yield per vine. Variability for different qualitative characters and expected genetic advance at 5 per cent intensity were calculated as per Burton (1952) and Johnson *et al.,* (1955), respectively.

RESULT AND DISCUSSION

Analysis of variance in these 18 genotypes of ridge gourd showed that highly significant differences for all the quantitative and qualitative traits studied indicating adequate genetic variability among the genotypes studied (Table-1).

Large variation among the genotypes found for the traits, Genetic variability estimates including mean, range, genotypic and phenotypic variances, genotypic and phenotypic coefficient of variances, broad sense heritability, genetic advance and genetic advance over mean for different characters are presented in Table-2.

Phenotypic variability

The *per se* performance of all 18 genotypes for different growth, earliness and yield parameters are presented in Table 2. The mean sum of squares were significant for all characters, indicated the importance of both additive and non-additive genetic components for traits under study. Similar results were reported by Rao *et al,* (1999) and Niyaria and Bhalala (2001). Tyagi *et al.,* (2010) also found significant results for the traits like fruits per vine, fruit length and fruit diameter.

Arabhavi Local expressed significantly higher vine length of 147.97cm and 290.50 cm at 45 and 90 DAS respectively. Whereas, Chintamani Local exhibited minimum vine length of 74.83 cm at 45 DAS and Ghataprabha Local was 199.50 cm at 90 DAS. The genotypes having longer vine length resulted in higher yield per vine these results are in confirmation with Rao *et al*., (2000).

The number of branches per vine was found to be significantly higher in Arabhavi Local 3.83 and 6.17 and minimum numbers of branches were in Mandya Local 1.83 and 2.33 at 45 and 90 DAS respectively. Number of leaves is an important character since it is a photosynthetic part and directly involve in the yield of the vine. Higher numbers of leaves were recorded in Arabhavi Local 40.33 and 73.67 at 45 and 90 DAS respectively. Whereas, minimum leaves per vine were noticed in Srinivasapur Local 20.33 and Ghataprabha Local 48.67 at 45 and 90 DAS respectively. Higher the vine length might have lead to the production of more number of branches and bears the more number of leaves. Similar findings were reported by Singh *et al.,* (2013) and Reddy *et al*., (2013) in ridge gourd.

Arabhavi Local recorded higher tendril length 26cm and 30.83cm at 45 and 90 DAS respectively but AHRG-1 and Dalasanur Local (18.67 cm and 24.17 cm) were having the minimum tendril length at 45 and 90 DAS respectively. The genotypes having longer tendril length resulted in strong support to vines and higher yield per vine and this observation is first time in ridge gourd.

The earliness or lateness is dependent on the number of days taken for its first female flower. The genotype Arabhavi Local was earliest to open its first female flower (46.33 days) and the genotype Jaipur Long took maximum number of days (54 days) for female flower appearance. The range for this attribute being 46.33 days to 54 days with mean of 49.78 days was observed. The same observation was with Anand (2012) in ridge gourd and Rathod (2007)

in bitter gourd. Arabhavi Local took minimum days to bloom 50 per cent female flower (54.00 days) and the genotype Srinivaspur Local took maximum number of days (59.66 days). The mean days were 56.17. The same results were conformity the results of Hegade *et al.,.* (2009) in ridge gourd. For the days to first harvesting, Arabhavi Local given its first fruit at 58.33 days and Ghataprabha Local took maximum number of days (71.33 days). The same local variety Arabhavi Local took minimum number of days (87.33 days) for last harvest and the genotype Jaipur Long took maximum number of days (94.83 days). Days to last harvest varied from 87.33 to days to 94.83 days with the mean of 90.69 days. Minimum sex ratio (Male: female) was observed in Arabhavi Local (18.33) and maximum was observed in Green long (28.83). Sex ratio (male flowers for one female flower) ranged from 18.33 to 28.83 with mean of 24.99. Earliness is desirable character and breeder's preference trait.

Some genotypes recorded lesser values than those of checks in days to first female flower appearance and days to 50 per cent flowering where, negative values shows early maturity. Early appearance of male and female flowers on the vine is an indication of crop earliness. Similar findings were reported by Rao *et al*. (2000), Rathod *et al*., 2007, Tyagi *et al*., 2010 and Reddy *et al*., 2013.

The chlorophyll content was high in the leaves of the genotype Arabhavi Local 2.47 and 2.39 mg.g^{-1}fresh weight at 45 and 90 DAS respectively. Whereas, the lines Chintamani Local and Arka Sujata (0.30 and 0.46 mg.g^{-1}fresh weight) at 45 and 90 DAS respectively. The amino acid, proline content of leaf was highest in the line Arabhavi Local (23.53 and 56.71 µg.g^{-1}fresh weight) at 45 and 90 DAS respectively. Whereas lowest was recorded in the line Deepthi and selection 4-12 (2.32 and 12.08µg.g^{-1}fresh weight) at 45 and 90 DAS respectively. Higher the number of leaves might have lead to the more amount of chlorophyll accumulation in the particular genotype and lead to the more yield. The chlorophyll content in the leaf directly proportional to the yield of the plant. These findings are compliance with earlier worker Hiscox and Israelstom (1979), Bates *et al.,.* (1973) and Simuzu *et al.,.* (2005) in sunflower.

Number of fruits per vine is one of the yield contributing trait, the genotype Arabhavi Local (9.66) bred more number of fruits whereas lowest was recorded in the line Pusa Nasadar (5.50) with range (5.50 - 9.66). Tyagi *et al*. (2010) also reported that number of fruits per vine had a high positive relationship to the total yield.

The genotype Arabhavi Local having long fruits (33.03 cm), whereas the line Deepthi having shorter fruits (19.70 cm) among all genotypes with range (19.7-33.03). Fruit diameter was significantly higher in the genotype Dalasanur Local (31.92 mm) which was on par with Arabhavi Local (30.49). Whereas, lowest was recorded in the line Srinivasapur Local (22.29 mm) with range (22.29 - 30.69 mm). The rind thickness was maximum in Arabhavi Local (2.28 mm) and minimum was recorded in Srinivasapur Local (1.38 mm). Mean flesh thickness was maximum in Arabhavi Local (2.68 cm) and minimum flesh thickness was recorded in Jaipur Long (1.87 cm). Mean fruit yield was maximum in Arabhavi Local (1760.63 g) and minimum was recorded in Jaipur Long (695.98 g). The final yield and yield attributing characters are basically governed by vegetative growth as dry matter production and its distribution. Yield is the function of many yield contributing characters like number of fruits and average fruit weight. These results are in accordance with. Rathod (2007) and Islam *et al.,* (2009) in bitter gourd. Anand (2012) and Reddy et al., (2013) in ridge gourd.

Genetic variability

Highly significant genotypic effects indicated that the present set of genotypes differed appreciably for number of branches at 90 DAS, total chlorophyll content in the leaves (45 and 90 DAS), total proline content in the leaves (45 and 90 DAS), rind thickness and fruit yield per vine. Further, the components like number of fruits per vine, average fruit weight, fruit length, fruit diameter, flesh thickness rind thickness and fruit yield per vine were indicated the moderate phenotypic and genotypic coefficient of variation. The range of phenotypic and genotypic coefficient of variation was 2.66 per cent - 52.24 per cent and 2.62 per cent - 51.82 per cent for days to 50 per cent flowering and proline at 45 DAS respectively (Table 2). The PCV and GCV >20 per cent, 10-20 per cent and >10per cent were classified as high, moderate and low (Johnson *et al.,.*, 1955). The number of branches, total chlorophyll content in the leaves , the

proline content of leaf determined the growth and development of the crop, had high genetic variability except vine length at 45 and 90 DAS, number of leaves, tendril length, sex ratio which had moderate genetic variability (Table 2). The PCV invariably increased for all the traits and the genetic variability did not show any consistent pattern of change suggesting that non heritable factors contributed to the increased phenotypic variability and large genotypes x environment interactions play an important role in the expression of these characters. Tendril length at 45 and 90 DAS, number of leaves at 90 DAS, days to first female flowering, days to 50 per cent flowering, days to first harvest and days to last harvest had low PCV and GCV.

Number of leaves at 90 DAS, fruit diameter and flesh thickness had moderate PCV and GCV. Rind thickness and number of branches at 45 DAS had high PCV and moderate GCV. High variability availability for biochemical characters, number of branches at 90 DAS and fruit yield per vine in the present materials could be quite useful for selection.

Heritability and genetic advance

The heritability estimates >70, 50-70 and <50 per cent were classified as high, moderate and low respectively. The genetic advance was categorized as high (>50per cent), moderate (25-50per cent) and low (<25per cent). High differences in the large environmental influence and consequently the lower estimates of heritability.

The estimates of heritability varied substantially from 7 per cent for number of branches at 45 DAS to 100 per cent for the days to 50 per cent flowering. The genetic advance (GA) was the highest (515.39 per cent) for fruit yield per vine and the lowest (0.23 per cent) for flesh thickness (Table 2).

The heritability was low for tendril at 45 DAS (47 per cent), number of branches at 45 DAS (7 per cent). High heritability for the characters like number of fruits per vine (73 per cent), days to 50 per cent flowering (100 per cent), days to first harvest (87 per cent), number of leaves (76 per cent), vine length (88 per cent) number of branches at 90 DAS (90 per cent), tendril at 90 DAS (73 per cent) and biochemical traits. The yield components had moderate heritability and the biochemical traits had the high heritability. The yield components like fruit yield per vine (62 per cent), average fruit weight (58 per cent), rind thickness (66 per cent), days to last harvest (56 per cent) and fruit length (67 per cent) had moderate heritability. the traits like number of fruits per vine, days to 50 per cent flowering, days to first harvest, tendril length, number of leaves at 90 DAS and biochemical characters had high heritability and low genetic advance indicating the characters were under the control of non additive gene action. The biochemical traits were had the high heritability and genetic advance expressing the characters are under the control of additive gene action. Moderate heritability with moderate genetic advance for fruit length, fruit diameter, flesh thickness, rind thickness, average fruit weight, days to first female flowering, days to last harvest and tendril length at 90 DAS indicated the involvement of both additive and non additive effects in the genetic control of these characters. Although, heritability estimates of biochemical and earliness characters did not show consistent pattern of change.

Variability studies provide information on the extent of improvement in different characters, but they do not throw light on the extent and nature of relationship existing between various characters. Therefore, for rational approach towards the improvement of yield, selection has to be made for the components of yield, since there may not be genes for yield *per se*, but only for various yield components (Grafius, 1959). Genetic correlations between two characters arise because of linkage, pleiotrophy or development induced functional relationship (Harland, 1939). Fruit yield per vine had positive and significant correlation with the vine length at 45 DAS (0.5129), number of leaves at 45 DAS (0.6707), number of leaves at 90 DAS (0.4706), number of branches at 45 DAS (0.5745), number of branches at 90 DAS (0.5605), tendril length at 45 DAS (0.4955), proline content in leaf at 45 DAS (0.5784), proline content in leaf at 90 DAS (0.8659), number of fruits per vine (0.9658), average fruit weight (0.9298), fruit length (0.7422), fruit diameter (0.6288), flesh thickness (0.7656), rind thickness (0.6700). Negatively correlated with days to first female flowering (-5120), days to 50 per cent flowering (-0.4733) and sex ratio (-0.4606). Hence, correlation study has greater significance and could be effectively utilized in formulating an effective selection scheme. Many of these yield contributing

characters are interact in desirable and undesirable direction. Therefore, knowledge of association between the traits can greatly help in avoiding inversely related compensation effects during selection (Table 3). Results of this study indicated that for increasing fruit yield, selection might be directed towards plants having higher number of fruits with large fruit size. These results agree with the findings of Choudhary *et al.* (2008) and Hanumegowda *et al.* (2012) in ridge gourd.

It can be concluded that, those genotypes which has ability to maintain better vine length, more amount of leaf chlorophyll, leaf proline under the stress condition and better yield attributing traits can be used for breeding programme for development of high yielding genotypes.

Table.1: Analysis of variance (mean sum of squares) for growth, earliness, biochemical, yield and fruit quality parameters in Ridge gourd.

Sl. No	Character	Replication	Genotypes	Error	S.Em ±	C.D. @ 5 %
	Df	2	17	17		
A.	**Growth parameters**					
	Vine length (cm) 45 DAS	111.73	1115.04*	56.63	4.34	12.49
	Vine length (cm) 90DAS	207.35	2431.53*	104.76	0.15	0.46
	No. of branches 45 DAS	0.26	0.75*	0.11	0.18	0.54
	No. of branches 90 DAS	0.33	2.89*	0.07	0.14	0.43
	Number of leaves 45 DAS	19.64	79.60*	7.66	1.60	4.59
	Number of leaves 90 DAS	12.62	116.28*	9.71	1.80	5.17
	Tendril length (cm) 45 DAS	2.00	8.34*	2.25	0.87	2.49
	Tendril length (cm) 90DAS	3.24	8.75*	0.95	0.56	1.62
	Diameter of vine (cm) 45 DAS	0.09	0.06	0.03	0.11	NS
	Diameter of vine (cm) 90 DAS	0.00	0.01	0.01	0.05	NS
B.	**Earliness parameters**					
	Days to first male flower	47.53	4.76 NS	6.56	1.48	4.25
	Days to first female flower	0.54	17.88*	3.45	1.07	3.08
	Days to 50 per cent flowering	7.68	14.18*	6.68	1.48	4.25
	Days to first harvest	1.14	66.99*	3.14	1.02	2.94
	Days to last harvest	10.19	15.37*	3.16	1.03	2.95
	Sex ratio	0.29	28.04*	3.04	1.01	2.89
C.	**Yield parameters**					
	Number of fruits per plant	0.73	3.17*	0.33	0.33	0.99
	Fruit yield per plant (g)	21208.75	242637.36*	15747.00	72.45	208.20
	Average fruit weight (g)	2836.98	1059.29*	204.75	9.68	28.42
	Fruit length (cm)	29.91	54.22*	7.52	1.2	3.44
	Fruit diameter ((mm)	86.88	22.08*	8.93	1.7	5.12

D.	**Fruit quality parameters**							
	Rind thickness (mm)		0.16	0.28*	0.04	0.17	0.53
	Flesh thickness (cm)		0.04	0.11*	0.03	0.13	0.39
E.	**Biochemical parameters**							
	Total chlorophyll (mg / g. fresh weight)	**45 DAS**	0.05	1.28*	0.03	0.03	0.09
		90 DAS	0.18	1.33*	0.02	0.06	0.18
	Proline (µg/g fresh weight)	**45 DAS**	1.06	127.39*	0.72	0.49	1.41
		90 DAS	3.24	556.95*	8.35	1.67	4.80

* Significant at 5 per cent   **Df**: Degrees of freedom   **DAS**: Days after sowing,

Table. 2: Phenotypic and genetic variability for various parameters among the different ridge   gourd genotypes.

Sl. No.	Particulars	Vine length (cm)		No. of branches		No. of leaves		Tendril length (cm)	
		Days after sowing							
		45	**90**	**45**	**90**	**45**	**90**	**45**	**90**
1	**Deepthi**	93.83	265.50	2.50	4.50	30.50	57.50	22.33	26.67
2	**Pusa Nasadar**	93.73	254.33	1.83	5.00	23.33	61.00	20.17	28.83
3	**Mudigere Local**	139.33	280.17	3.33	5.67	36.67	69.17	25.17	29.67
4	**Jaipur Long**	125.19	245.00	2.33	4.83	30.50	66.00	21.33	28.50
5	**Khanapur Local**	96.73	232.33	2.00	5.00	22.33	63.00	22.50	27.33
6	**Mandya Local**	84.80	206.33	1.83	2.33	27.00	55.83	22.00	25.50
7	**Gadag Local**	126.07	210.83	2.67	3.17	30.17	50.83	23.50	28.17
8	**Chintamani Local**	74.83	224.67	2.50	5.17	22.67	59.17	23.50	25.83
9	**Srinivasapur Local**	120.13	251.50	2.00	4.83	20.33	61.33	22.33	26.50
10	**Ghataprabha Local**	120.77	199.50	2.67	3.00	29.50	48.67	22.00	26.50
11	**Green Long**	119.67	277.33	2.83	3.83	32.33	67.17	23.83	26.83
12	**Arka Sujata**	104.53	206.50	2.83	5.17	28.33	61.17	21.83	24.83
13	**Dalasanur Local**	130.13	272.67	2.50	5.17	25.67	63.83	23.17	24.17
14	**Selection 4-12**	111.00	235.17	2.67	5.17	25.50	62.17	23.17	29.00
15	**AHRG-1**	130.0	217.0	2.67	5.00	28.33	67.50	18.67	27.50

		3	0						
16	Arabhavi Local	147.97	290.50	3.83	6.17	40.33	73.67	26.00	30.83
17	Kolar Local	110.53	264.17	2.83	5.33	33.83	64.50	21.67	28.17
18	Arka Sumeet	110.08	255.00	2.67	5.00	31.00	66.17	22.33	27.00
S.Em±		**4.34**	**0.15**	**0.19**	**0.15**	**1.60**	**1.80**	**0.87**	**0.56**
C.D. @ 5per cent		**12.49**	**0.43**	**0.54**	**0.43**	**4.59**	**5.17**	**2.49**	**1.62**
Genetic variability in growth parameters of different genotypes									
Mean		113.29	243.80	2.58	4.68	28.79	62.15	22.52	27.32
Range		74.83 - 147.97	199.50 - 290.50	1.83 - 3.83	2.33 - 6.17	20.33 - 40.33	48.6 - 73.67	18.6 - 26.00	24.17 - 30.83
GV		352.80	775.59	0.21	0.88	23.98	35.52	2.03	2.60
PV		409.44	880.35	0.32	0.98	31.65	45.24	4.28	3.55
PCV (per cent)		17.86	12.17	21.92	21.42	19.54	10.82	9.18	6.90
GCV (per cent)		16.58	11.42	17.89	20.34	17.00	9.59	6.32	5.90
h^2 (per cent)		86.00	88.00	7.00	90.00	76.00	79.00	47.00	73.00
GA		35.92	53.85	78.00	18.40	88.07	10.88	2.02	2.84
GAM		31.70	22.09	30.07	39.80	30.49	17.51	8.97	10.40

GCV = Genotypic coefficient of variation   GA = Expected genetic advance

$h2$ = Heritability (broad sense)   PCV = Phenotypic coefficient of variation

PV= Phenotypic variance   GV= Genotypic variance

GAM = Genetic advance (per cent mean)   DAS = Days after sowing

Table 2. Continued....

Sl. No.	Particulars	Days to first female flowering	Days to 50per cent flowering	Days to first harvest	Days to last harvest	Sex ratio (M:F)	Total Chlorophyll (mg.g^{-1} fresh wt)		Proline (µg.g^{-1} fresh wt)	
							45 DAS	90 DAS	45 DAS	90 DAS
1	Deepthi	46.83	57.00	63.50	89.67	28.33	2.36	2.30	2.32	13.14
2	Pusa Nasadar	50.83	55.50	59.83	88.83	22.67	1.21	1.88	13.82	22.56
3	Mudigere Local	47.00	58.33	69.83	92.50	19.17	2.38	2.23	22.37	51.01
4	Jaipur Long	54.00	57.00	70.67	94.83	22.50	0.42	1.23	4.64	26.13
5	Khanapur Local	49.83	59.33	66.50	92.17	28.83	1.62	2.17	6.23	17.63
6	Mandya Local	47.83	57.00	58.83	88.33	25.00	1.03	1.15	10.10	39.13
7	Selection 4-12	53.33	55.50	60.17	89.17	25.50	1.61	0.94	7.34	12.08
8	Gadag Local	49.33	57.00	65.83	90.83	24.00	0.52	0.64	9.95	37.78
9	Chintamani Local	46.67	55.83	68.67	90.50	25.17	0.30	0.63	10.29	37.00
10	Srinivasapur Local	49.67	59.66	69.33	89.50	26.67	1.04	0.99	20.58	22.46
11	Ghataprabha Local	51.33	59.00	71.33	92.50	27.50	1.61	2.09	20.68	17.49

Sl.No	Particulars									
12	Green Long	50.50	54.83	60.00	94.17	28.83	2.12	1.40	7.34	29.52
13	Arka Sujata	49.17	55.16	59.00	88.17	22.83	1.27	0.46	9.71	32.75
14	Dalasanur Local	53.33	58.50	60.17	87.50	25.67	0.84	0.67	11.79	22.95
15	AHRG-1	50.50	57.66	69.33	91.33	24.67	1.52	2.18	12.46	28.21
16	Arabhavi Local	46.33	54.00	58.33	87.33	18.33	2.47	2.39	23.53	56.71
17	Kolar Local	49.83	54.33	63.50	93.00	25.67	1.31	1.19	11.01	21.35
18	Arka Sumeet	47.67	54.33	58.83	92.00	28.50	1.29	1.41	21.64	55.12
S.Em±		1.48	1.07	1.02	1.03	1.01	0.03	0.06	0.49	1.67
C.D. @ 5per cent		4.25	3.08	2.94	2.95	2.89	0.08	0.18	1.41	4.80
Mean		49.78	56.17	64.07	90.69	24.99	1.38	1.44	9.42	30.16
Range		46.33 - 54.00	54.00 - 59.66	58.33 - 71.33	87.3-94.83	18.33 - 28.83	0.30-2.47	0.46-2.39	2.32-23.53	12.08-56.71
GV		4.81	2.22	21.28	4.07	8.33	0.43	0.44	42.22	182.86
PV		8.26	2.23	24.43	7.23	11.37	0.43	0.45	42.94	191.22
PCV (per cent)		5.77	2.66	7.71	2.97	13.49	47.38	46.42	52.24	45.84
GCV (per cent)		4.41	2.65	7.20	2.22	11.55	47.24	45.80	51.80	44.83
h² (per cent)		58.00	100	87.00	56.00	73.00	99.00	97.00	98.00	96.00
GA		3.45	3.07	8.87	3.12	05.09	1.34	1.34	13.27	27.24
GAM		6.93	5.47	13.85	3.44	20.37	97.03	93.09	105.82	90.30

GCV = Genotypic coefficient of variation

GA = Expected genetic advance

h² = Heritability (broad sense)

PCV = Phenotypic coefficient of variation

PV= Phenotypic variance

GV= Genotypic variance

GAM = Genetic advance (per cent mean)

DAS = Days after sowing

Table 2. Continued……..

Sl. No	Particulars	Number of fruits per vine	Average fruit weight (g)	Fruit length (cm)	Fruit diameter (mm)	Flesh thickness (cm)	Rind thickness (mm)	Fruit yield per vine (g)
1	Deepthi	5.50	126.54	19.70	26.55	2.12	1.86	695.98
2	Pusa Nasadar	5.50	132.35	21.40	25.92	2.19	1.82	727.93
3	Mudigere Local	7.83	179.83	25.48	31.70	2.54	2.23	1408.06
4	Jaipur Long	6.50	144.43	29.38	25.73	1.87	1.45	938.41
5	Khanapur Local	6.16	130.28	21.68	25.65	2.18	1.58	802.28
6	Mandya Local	6.50	139.79	22.27	27.73	2.30	1.59	908.57
7	Gadag Local	6.16	144.87	19.92	27.80	2.11	1.59	892.45
8	Chintamani Local	6.33	150.67	23.77	22.30	2.34	1.39	953.83
9	Srinivasapur	7.00	158.08	23.40	24.76	2.11	1.38	1106.92

	Local							
10	**GPB Local**	6.50	131.08	22.62	29.03	2.31	1.60	852.68
11	**Green Long**	6.50	125.03	27.27	24.68	2.13	1.75	812.72
12	**Arka Sujata**	7.50	163.80	32.27	31.92	2.39	1.93	1228.67
13	**Dalasanur Local**	6.83	133.68	26.07	28.41	2.33	2.02	913.02
14	**Selection 4-12**	6.00	125.70	22.07	27.30	2.24	1.46	754.20
15	**AHRG-1**	6.16	156.48	26.35	24.92	2.25	1.47	963.48
16	**Arabhavi Local**	9.66	182.25	33.03	30.50	2.69	2.29	1760.53
17	**Kolar Local**	6.00	151.27	27.02	25.36	2.12	1.49	907.62
18	**Arka Sumeet**	8.16	175.54	32.53	31.05	2.53	2.29	1432.40
	S.Em±	**0.35**	**9.89**	**1.20**	**1.70**	**0.13**	**0.18**	**70.45**
	C.D. @ 5per cent	**0.99**	**28.42**	**3.44**	**4.88**	**0.37**	**0.53**	**208.22**
Mean		6.71	147.31	25.34	27.29	2.26	1.73	1004.48
Range		5.50 - 9.66	125.03 - 182.25	19.70 - 33.03	22.29 - 31.92	1.87 - 2.68	1.38 - 2.28	695.98 - 1760.53
GV		0.94	284.84	15.56	4.38	0.03	0.08	75630.00
PV		1.28	489.60	23.09	26.46	0.06	0.12	91377.28
PCV (per cent)		16.86	15.02	18.95	18.85	10.53	20.17	30.09
GCV (per cent)		14.49	11.45	15.56	7.66	7.31	16.47	27.37
h² (per cent)		73.00	58.00	67.00	16.00	48.00	66.00	62.00
GA		1.72	0.26	6.67	1.75	0.23	0.48	515.39
GAM		25.66	18.00	26.33	6.42	10.46	27.72	51.30

GCV = Genotypic coefficient of variation

GA = Expected genetic advance

h2 = Heritability (broad sense)

PCV = Phenotypic coefficient of variation

PV= Phenotypic variance

GV= Genotypic variance

GAM = Genetic advance (per cent mean)

DAS = Days after sowing

Table 3. Correlation for earliness, biochemical and yield contributing traits in ridge gourd.

	Fruit yield per vine (g)	**Significance level**
Fruit yield per vine (g)	1.0000	
Vine length at 45 DAS	0.5129	*
Vine length at 90 DAS	0.3434	
Number of leaves at 45 DAS	0.6707	***
Number of leaves at 90 DAS	0.4706	*
Number of branches at 45 DAS	0.5745	**
Number of branches at 90 DAS	0.5605	**
Tendril length at 45 DAS	0.4955	*
Tendril length at 90 DAS	0.3259	
Days to first female flowering	-0.5120	*
Days to 50per cent flowering	-0.4733	*
Days to first harvest	-0.1873	
Days to last harvest	0.0707	
Sex ratio (M:F)	-0.4606	*
Total Chlorophyll (mg.g⁻¹ fresh wt) at 45 DAS	0.3838	
Total Chlorophyll	0.2372	

(mg.g⁻¹ fresh wt) at 90 DAS		
Proline **(μg.g⁻¹ fresh wt) at 45 DAS**	0.5784	**
Proline **(μg.g⁻¹ fresh wt) at 90 DAS**	0.8659	***
Number of fruits per vine	0.9658	***
Average fruit weight (g)	0.9298	***
Fruit length (cm)	0.7422	***
Fruit diameter (mm)	0.6288	**
Flesh thickness (cm)	0.7656	***
Rind thickness (mm)	0.6700	***

* Significance at   5per cent   r = 425
** Significance at   1per cent   r = 541
 *** Significance at 0.1per cent r = 659

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