DOI : 10.5958/0974-0112.2017.00046.9

Indian J. Hort. 74(2), June 2017: 220-226

Genotype × environmental interactions in ridge gourd genotypes for fruit yield and its contributing traits

B. Varalakshmi* and D. Krishnamurthy**

Division of Vegetable Crops, ICAR-Indian Institute of Horticultural Research, Bengaluru 560 089, Karnataka

ABSTRACT

Phenotypic stability of 51 ridge gourd (*Luffa acutangula* Roxb.) genotypes was studied during *Rabi*-summer seasons of 2011-14. Pooled analysis of variance revealed highly significant differences among the genotypes for all the traits except for yield/ vine suggesting enough genetic variability. Mean squares for environments and genotype × environment (G × E) interactions were significant suggesting that the environments under study are diverse enough and the traits responded to the environments differently. Among the genotypes, RGGP-12 recorded the highest mean yield (37.93 t/ha) followed by RGGP-41 (37.05 t/ha). Genotypes RGG-12, RGGP-41, RGGP-3 and RGGP-7 proved to be most stable genotypes for mean fruit yield/ ha, RGGP-48 for fruit number/ vine and fruit weight, RGGP-21 for node number for first female flower appearance and fruit number, which can be exploited for these yield contributing traits in the ridge gourd improvement programmes.

Key words: G × E interaction, ridge gourd, stability analysis, regression coefficient.

INTRODUCTION

Ridge gourd is the important cucurbitaceous vegetable grown throughout the country. Immature fruits of ridge gourd are very nutritious and good source of vitamin A, calcium, phosphorus, ascorbic acid and iron. In any breeding programme it is necessary to screen and identify phenotypically stable genotype for yield, which could perform more or less uniformly under different environmental conditions. It is an established fact that yield is a complex character and largely depends upon its components characters, with an interaction with the environments resulting in to the ultimate product, *i.e*. yield. Thereafter, breeding a stable variety, it is necessary to get the information on the extent of genotype × environment (GE) interaction for yield and its component characters. In ridge gourd, yield/ plant depends on number of fruits/ plant, fruit length and fruit weight (Varalakshmi *et al.*, 8; Hanumegowda *et al.*, 3).

To meet the objective of developing varieties with high yield potential a wide collection of germplasm must be available so that the evaluation for desirable traits for yield can be exercised and a breeding programme for an ideal plant type concept can be made accordingly. A phenotype is the product of interplay of genotype and its environment.

A specific genotype does not exhibit the same phenotype under the changing environments and different genotypes respond differently to a specific environment. This variation arising from the lack of correspondence between the genetic and non-genetic effects is known as genotype × environment interaction. G × E interactions are generally considered impediment in plant breeding as it baffles the breeder in judging the real potential of a genotype when grown in different environments. Several workers considered G × E interactions as linear functions of environment and proposed regression of yield of a genotype on the mean yield of all genotypes in each environment to evaluate stability of performance of genotype (Shaikh *et al.*, 6). The main objective of a breeding programme is to develop varieties that perform well over a broad spectrum of environments. The information about phenotypic stability is useful for the selection of crop varieties as well as for breeding programmes. In ridge gourd, only one study is available so far on these aspects by Varalakshmi and Subba Reddy (9). Hence, the objective of the present study was to explore the effect of genotype (G) and genotype × environment (GE) on fruit yield and its attributing traits in ridge gourd.

MATERIAL AND METHODS

The experimental material for the present study comprised of 51 ridge gourd genotypes maintained in the Division of Vegetable Crops, ICAR-IIHR, Bengaluru. These genotypes were grown in simple randomized block design (RBD) in two replications at the Vegetable Farm during *Rabi*-summer seasons of 2011-12, 2012-13 and 2013-14. All the recommended cultural and agronomic practices including pest control measures were adopted to raise good crop.

*Corresponding author's E-mail: bvl@iihr.res.in

**Tierra Seed Science Pvt. Ltd., Khajaguda, Golconda Post, Hyderabad 500 008, Telangana

To ascertain the comparative behaviour of different genotypes under different environments, observations were recorded on five randomly selected plants from each replication for seven parameters such as node number for first female flower appearance, fruit length (cm), fruit girth (cm), fruit weight (g), fruit No./vine, fruit yield/ vine (kg) and fruit yield/ ha (t). In all the experiments, plot means (mean of five plants) were used for environment-wise analysis of variance and pooled analysis of variance for the estimation of G × E interaction effects and stability analysis as suggested by Eberhart and Russell (2).

RESULTS AND DISCUSSION

In the pooled analysis of variance for different traits revealed highly significant differences among the genotypes for all the traits except for yield/ vine suggesting enough genetic variability among the genotypes for all these traits (Table 1). Similar findings were reported by Shaikh *et al.* (6) and Thakur *et al.* (7) for all the yield and yield contributing traits in bottle gourd and bitter gourd respectively. The variances associated with genetic effects were smaller than the variances associated with environmental effects for most of the characters studied, *i.e.* the fruit girth, fruit weight, fruit yield/ vine and fruit yield/ ha. This showed that under the present environmental conditions for determination of such traits, the genotypes need to be evaluated in multi environmental trials. Furthermore, the larger variances associated with genetic effects indicate a greater influence of genetic factors than the interaction of genotype × environment for the expression of these traits in ridge gourd. Similarly, the mean square for environment was also significant for all the traits except fruit length indicting that the environments under study are diverse enough. Further, G×E interactions were also significant for all the traits suggesting that the traits responded to the environments differently. The environments (linear) also differed significantly for all the traits except fruit length, which indicates that the environments selected for testing of genotypes were quite varied in their effect on the performance of genotypes; this helps in identifying a stable genotype over different environments. Similar results were earlier reported for yield and yield contributing traits in ridge gourd (Varalakshmi and Subba Reddy, 9).

The G × E linear component was significant for fruit girth, fruit number/vine, fruit weight and fruit yield/ha suggesting that the variation in performance of different genotypes is due to the regression of genotypes on environments and hence the performance is predictable in nature (Krishna Prasad and Singh, 4; Varalakshmi and Subba Reddy, 9; Agasimani *et al.*, 1; Shaikh *et al.*, 6; Vasanthkumar *et al.*, 10). The mean square due for pooled deviation is significant for all the traits except for fruit number/ vine and fruit yield/ ha suggesting that variation in performance of genotypes is entirely unpredictable.

When stability parameters were studied in 51 genotypes, none of the genotypes were stable for all the seven yield related traits in ridge gourd (Tables 2 & 3). Similar observations were made in bottle gourd by Sheikh *et al*. (6). However, considering the stability parameters of individual traits, many ridge gourd genotypes were stable across the environments tested for that specific trait. Node number for first female flower appearance indicate the earliness in cucurbits and for this character, as many as 14 genotypes recorded lower mean values (advantageous) than the population mean (9.8) (Table 2). Out of which nine genotypes, *viz.*, RGGP-15, RGGP-20, RGGP-22, RGGP-32, RGGP-35, RGGP-25, RGGP-36, RGGP-21 and RGGP-19

Table 1. Variance (mean square) for stability of yield and yield attributing traits in ridge gourd (pooled).

Source of variation	df	Node No. for first female flower appearance	Fruit length (cm)	Fruit girth (cm)	Fruit No./ vine	Fruit weight (g)	Fruit yield/ vine (kg)	Fruit yield (t/ ha)
Genotype (G)	50	27.18**	145.94**	11.30**	95.04**	9139.17**	0.50	125.71**
Environment (E)	2	27.18**	19.39	611.92**	14.95	27861.51**	2.61**	448.35**
G × E	50	3.18**	37.83**	7.18**	17.12**	1358.36**	0.37**	33.81**
E + (G × E)	102	3.45	37.50	19.03**	17.08**	1878.03**	0.41	41.94**
E (Linear)	1	34.08**	38.83	1223.86**	29.91**	55722.85**	5.23**	896.72**
G × E (Linear)	50	3.45	36.15	13.28**	33.36**	1932.26**	0.39	66.12**
Pooled deviation	51	2.85**	38.79**	1.05**	0.87	769.07**	0.34**	1.48
Pooled error	150	0.35	5.71	0.22	0.69	52.11	0.008	1.33

**Significant at P = 0.01

Table 2. Mean performance and stability parameters for yield and yield contributing traits in ridge gourd.

Genotype	Node No. for first female flower appearance			Fruit length (cm)			Fruit girth (cm)			Fruit No./ vine		
	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
RGGP 1	9.92	0.88*	-0.35	19	10.24	166.84**	16.52	3.83	-0.51	16.52	3.83	-0.51
RGGP 2	9.97	-1.00	5.66**	22.7	15.41	266.29**	14.3	1.95	-0.57	14.3	1.95	-0.57
RGGP 3	11.53	1.71	5.36**	26.9	3.13	93.44**	11.73	3.28*	-0.69	11.73	3.28*	-0.69
RGGP 4	17.82	6.40*	-0.25	29.7**	-1.47	-4.63	5.13	1.23	-0.66	5.13	1.23	-0.66
RGGP 5	10.08	-2.30*	-0.33	26.9	-1.01	93.81**	11.25	2.07	-0.37	11.25	2.07	-0.37
RGGP 6	10.13	1.19	4.71**	25.3	1.57	13.43	9.3	-2.87	-0.34	9.3	-2.87	-0.34
RGGP 7	10.72	1.62	-0.35	24.9	-2.3	-2.91	12.58	2.72	-0.53	12.58	2.72	-0.53
RGGP 8	15.27	5.3	3.39**	24	-2.61	-2.46	7.28	1.49	-0.68	7.28	1.49	-0.68
RGGP 9	11.4	-0.77	2.19**	25.6	4.02	19.99*	9.28	-4.06	-0.45	9.28	-4.06	-0.45
RGGP 10	9.57	-1.6	0.92	24.4	-2.9	-1.08	13.25	0.36	-0.37	13.25	0.36	-0.37
RGGP 11	19.97	2.82	46.94**	26.1	-6.41*	-5.7	5.27	1.17	-0.69	5.27	1.17	-0.69
RGGP 12	8.62	0.89	-0.14	27.1**	-0.93	-3.52	14.12	-0.28*	-0.69	14.12	-0.28*	-0.69
RGGP 13	8.65	2.99	3.13**	26.5	-3.16	-3.81	10.77	0.39	-0.66	10.77	0.39	-0.66
RGGP 14	8.2	2.11	0.2	33.5**	7.94*	-5.7	22.9	8.59**	-0.69	22.9	8.59**	-0.69
RGGP 15	5.3	0.94	-0.3	16.8	-6.09	55.88**	17.98	2.9	-0.57	17.98	2.9	-0.57
RGGP 16	7.87	-0.10**	-0.35	17	1.35	12.04	18.5	2.15	-0.29	18.5	2.15	-0.29
RGGP 17	8.77	0	0.58	15.5	-1.43	32.25**	19.03	7.09**	-0.69	19.03	7.09**	-0.69
RGGP 18	8.37	-0.57	1.03*	18.6	1.28	14.9	8.9	-1.41	-0.63	8.9	-1.41	-0.63
RGGP 19	7.72	-1.12	-0.32	17.7	-1.12	3.44	12.92	2.81	-0.62	12.92	2.81	-0.62
RGGP 20	6.03	-0.5	0.37	19.1	-1.67	5.06	15.55	3.45	-0.64	15.55	3.45	-0.64
RGGP 21	7.67	2.63	0.32	17.4	-0.6	1.31	21.63	10.47	0.2	21.63	10.47	0.2
RGGP 22	6.17	-0.44	0.69	19.7	1.8	-2.84	7.82	-4.13	-0.28	7.82	-4.13	-0.28
RGGP 23	7.12	1.56	1.10*	16	-3.65*	-5.67	16.65	8.53	-0.29	16.65	8.53	-0.29
RGGP 24	13.92	1.84	0.85	18.4	1.77	-2.73	9.85	-1.48	-0.61	9.85	-1.48	-0.61
RGGP 25	7.43	-3.86	0.57	18	-3.65	-1.81	16.7	5.11	-0.58	16.7	5.11	-0.58
RGGP 26	6.9	4.2	1.83**	18.8	-2.97	45.20**	24.08	17.79	1.68	24.08	17.79	1.68
RGGP 27	9.17	0.78	0.12	18.7	11.03	0.75	15.38	5.55	-0.52	15.38	5.55	-0.52
RGGP 28	9.07	1.52	-0.33	15.8	-6.3	73.10**	18.75	13.33	2.26*	18.75	13.33	2.26*
RGGP 29	6.95	0.66	1.52*	17	-1.22	44.41**	12.4	-9.16	0.53	12.4	-9.16	0.53
RGGP 30	8.3	2.16	0.68	14	-0.17	5.36	9.97	5.1	0.99	9.97	5.1	0.99
RGGP 31	7.28	3.13	1.27*	16.2	3.53	-5.56	18.17	-17.5	1.16	18.17	-17.5	1.16
RGGP 32	6.35	0.57	0.01	15.2	-3.38	-4.94	15.33	-7.67	5.93**	15.33	-7.67	5.93**
RGGP 33	10.75	2.86	8.82**	12.7	0.9	-5.54	33.83	-31.39	13.65**	33.83	-31.39	13.65**
RGGP 34	8.72	-0.58	0.87	16.2	6.08	171.34**	14.55	8.86	1.25	14.55	8.86	1.25
RGGP 35	6.83	3.59	-0.19	16.7	6.85	-1.92	14.35	5.96	0.18	14.35	5.96	0.18
RGGP 36	7.52	-0.24	-0.11	13.6	-2.1	-2.87	18.12	-8.58	0.38	18.12	-8.58	0.38
RGGP 37	8.13	-1.31	1.96**	15.3	6.09	10.79	9.77	0.42	-0.58	9.77	0.42	-0.58
RGGP 38	8.28	2.18	4.95**	14.9	3.45	1.01	17.52	7.85	1.11	17.52	7.85	1.11
RGGP 39	8.73	-0.42	0.41	20.3	-9.87	123.35**	21.27	-7.95	0.23	21.27	-7.95	0.23

Contd...

Table 2 Contd...

Genotype	Node No. for first female flower appearance			Fruit length (cm)			Fruit girth (cm)			Fruit No./ vine		
	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
RGGP 40	9.83	-3.1	2.77**	12.7	-5.64	-5.13	12.3	3.32**	-0.69	12.3	3.32**	-0.69
RGGP 41	10.3	0.6	1.22*	19.2	22.13*	-5.32	11.72	-0.57	-0.67	11.72	-0.57	-0.67
RGGP 42	12.22	2.11	4.37**	28.7**	-4.2	172.15**	8.7	0.49*	-0.69	8.7	0.49*	-0.69
RGGP 43	9.5	0.65	3.34**	32.4**	3.98	18.26	8.43	-0.39	-0.66	8.43	-0.39	-0.66
RGGP 44	12.58	3.86	9.13**	30.5**	10.26	113.07**	6.25	0.23	-0.69	6.25	0.23	-0.69
RGGP 45	15.62	6.74	-0.03	33.6**	14.42	10.92	5.65	-0.40**	-0.69	5.65	-0.40**	-0.69
RGGP 46	14.93	4.93	2.03**	29.8**	-6.01	75.48**	7.67	3.84	-0.57	7.67	3.84	-0.57
RGGP 47	12.55	-1.95	0.55	39.9**	6.22	22.32*	9.68	-5.64	-0.23	9.68	-5.64	-0.23
RGGP 48	8.5	0.08*	-0.35	32.9**	1.23	88.61**	12.42	2.62	-0.54	12.42	2.62	-0.54
RGGP 49	9.5	-0.14	-0.35	36.5**	-2.33	11.3	13.43	2.52	-0.34	13.43	2.52	-0.34
RGGP 50	12.37	-1.35	1.75**	33.6**	8.88**	-5.7	4.73	-1.14*	-0.68	4.73	-1.14*	-0.68
RGGP 51	9.52	-1.17	5.56**	26.4	-19.4	0.87	18.07	8.16	0.28	18.07	8.16	0.28
Population mean	9.8			22.5			13.6			13.6		
$CD_{0.01}$	2.0			4.6			4.3			4.3		

**P* = 0.05, ***P* = 0.01, bi = regression coefficient, S^2di = deviation from regression coefficient

were found stable due to lower mean values and regression coefficient approaching unit with non-significant deviation from regression (Vasanthkumar *et al*., 10). One genotype, RGGP-16 had significant regression coefficient differing from unity with least deviation, hence suitable for favourable environments only. However four other genotypes, though had lower means values (desirable) with unit regression, their performance was not predictable owing to its significant deviation from regression.

Twelve genotypes showed the highest mean fruit length than the population mean (22.5 cm) (Table 2). Considering high mean performance and stability parameters together, out of the 51 genotypes, two genotypes, *viz*., RGGP-45 and RGGP-43 were found to possess desirable and stable performance across the environments with highest mean, unit regression and least deviation. Genotypes with high mean yield, a regression coefficient equal to the unity (bi = 1) and small deviations from regression (s^2di = 0) are considered stable (Eberhart and Russell, 2). Two other genotypes, RGGP-50 and RGGP-14 had high mean, regression coefficient more than unity and least deviation indicating that these genotypes are suitable for good environments only. Though RGGP-49, RGGP-4 and RGGP-12 had higher mean fruit length and least deviation, they are suitable for poor environments, because of the negative regression coefficient. Five genotypes, namely, RGGP-47, RGGP-48, RGGP-44, RGGP-46 and RGGP-42 in spite of having high mean values than population mean and regression coefficient either unity or negative, their performance is not predictable in view of the significant deviation.

With respect to fruit girth, seven genotypes, namely, RGGP-29, RGGP-30, RGGP-35, RGGP-36, RGGP-37, RGGP-43 and RGGP-50 recorded the highest mean than the population mean (11.8 cm), but none of them were stable across the environments (Table 2). Contrary to this, Sheikh *et al.* (6) reported a stable genotype for fruit girth in bottle gourd. Out of the seven genotypes, which recorded higher mean, two genotypes, RGGP-29 and RGGP-36 were suitable for better environments only with regression coefficient differing least significantly from unity. RGGP-30 and RGGP-50 were suitable for poor environments with less than unity of regression and least deviation. Though the other three genotypes had higher mean and less than unit regression, their performance is not predictable, because of the significant deviation.

Fruit number/ vine is a very important parameter and is directly correlated with fruit yield in ridge gourd (Varalakshmi *et al*., 8). In the present investigation 11 genotypes have recorded higher mean values for this trait compared to the population mean (13.6) (Table 2). Out of these, four genotypes namely, RGGP-16, RGGP-21, RGGP-26 and RGGP-51 were stable across the environments with unit regression coefficient and least deviation. Similar results have been reported by Varalakshmi and Subba

Table 3. Mean performance and stability parameters for yield and yield contributing traits in ridge gourd.

Genotype	Fruit weight (g)			Fruit yield/vine (kg)			Fruit yield (t/ha)		
	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
RGGP 1	185.72	2.98*	-40.24	2.1	1.57	0.06**	27.03	2.86	-0.94
RGGP 2	235.63	1.37	1769.93**	2.3	1.62	0.48**	25.6	1.25	-1.13
RGGP 3	228.65	1.96	849.84**	1.53	-1.27	1.58**	34.78	0.48	-0.81
RGGP 4	214.25	1.37	1384.45**	1.42	2.16	0.24**	12.05	0.5	-1.29
RGGP 5	181.87	3.04*	-44.22	1.82	3.01	-0.01	21.7	0.92	-1.3
RGGP 6	188.92	1.57	12.73	1.8	1.46	0.19**	23.05	1.85	-1.14
RGGP 7	189.32	2.12	2278.35**	1.42	-0.56	0.25**	29.03	0.05	-1.09
RGGP 8	214.77	2.99	671.73**	1.68	4.06	0.01	15.72	0.35*	-1.31
RGGP 9	174.08	3.21*	-48.94	1.65	1.47	0.13**	23.25	2.54*	-1.12
RGGP 10	172.05	2.44	-20.56	1.37	-0.59	0.08**	25.15	1.8	-1.01
RGGP 11	237.47	0.86	39.52	2.35	3.11	0.87**	14.37	-0.16*	-1.2
RGGP 12	219.35	1.92	350.26**	2.4	2.21	0.40**	37.93	1.06	-1.1
RGGP 13	210.33	3.75	802.98**	1.63	-0.34	0	28.2	4.29**	-1.29
RGGP 14	142.70	-1.05	4907.75**	1.25	-0.88	0.22**	23.22	-0.69	0.53
RGGP 15	101.12	0.96	6.36	1.27	-0.14	0.20**	14.1	-0.11	-1.13
RGGP 16	120.35	1.21	1156.62**	1.82	-0.51	0.14**	18.62	-0.32	-1.06
RGGP 17	120.48	0.34	359.39**	1.53	-1.19	0.34**	28.38	-1.43*	-1.16
RGGP 18	141.73	0.16	1145.30**	1.55	0.72	0.08**	16.97	0.39	-0.27
RGGP 19	151.83	0.07	27.23	1.62	0.15	0.01	21.98	-0.06*	-1.23
RGGP 20	123.72	-0.37	211.06*	1.53	-0.94	0.06**	21.78	0.20*	-1.32
RGGP 21	130.07	0.13	12.32	1.02	-1.07	0.81**	26.88	-1.76*	-1.18
RGGP 22	153.12	-1.78	81.20	1.4	0.6	1.14**	8.55	0.23**	-1.33
RGGP 23	112.18	1.06	644.90**	1.82	0.37	0.09**	23.72	-0.71	0.84
RGGP 24	163.18	0.91	-40.58	1.67	-1.06	0.06**	20.93	0.39	-0.78
RGGP 25	143.88	1.04	-47.76	1.83	-0.11	0.01	25.07	-1.23*	-1.11
RGGP 26	100.12	0.13	24.77	2.1	0.7	0.18**	26.22	-0.21**	-1.32
RGGP 27	175.32	0.60	93.57	1.95	-0.91	0.10**	31.45	-0.14	-0.98
RGGP 28	118.82	1.27	-39.75	2.2	0.11	0.28**	23.35	0.05	-1.12
RGGP 29	117.90	1.02	-51.79	1.83	-1.15	0.63**	19.62	3.04	0.24
RGGP 30	154.77	0.92	31.61	1.65	3.88	0.08**	17.88	-0.53*	-1.18
RGGP 31	110.10	-0.80	4020.02**	1.72	1.09	-0.01	22	1.94	33.54**
RGGP 32	121.45	-0.45	5604.20**	1.63	3.64	0.16**	20.97	1.74	19.25**
RGGP 33	80.13	-1.19**	-51.70	1.3	-0.96*	-0.01	23.88	3.05*	-1.03
RGGP 34	116.35	0.83	-35.25	1.58	0.42	0.03*	19.92	-1.31**	-1.32
RGGP 35	149.45	-0.24	168.80*	1.55	3.34	0.29**	25.38	-1.41*	-1.17
RGGP 36	100.63	0.05**	-52.11	1.3	1.24	0.38**	16.4	3.29	-0.43
RGGP 37	168.67	-0.24	260.14**	1.73	0.8	0.03*	20.33	0.05	-1.09
RGGP 38	114.22	0.38	-35.01	1.88	3.97	0.21**	23.7	0.19	0.04
RGGP 39	100.17	0.38**	-52.06	1.3	-0.46	0.23**	21.73	4.95*	-0.54

Contd...

Table 3 Contd...

Genotype	Fruit weight (g)			Fruit yield/vine (kg)			Fruit yield (t/ha)		
	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
RGGP 40	131.13	-0.62	239.02*	2.45	2.18	0.54**	19.98	-1.28*	-1.16
RGGP 41	234.12	0.59*	-51.97	1.87	0.3	1.26**	37.05	0.93	-1.3
RGGP 42	174.47	1.87	171.50*	1.73	2.09	0.27**	17.57	2.15	-0.61
RGGP 43	244.40	1.49	768.31**	1.55	0.63	0.14**	26.4	1.92	-0.36
RGGP 44	224.37	2.04	1032.93**	1.57	2.62**	-0.01	19.83	0.86	-1.14
RGGP 45	300.78	2.78	1480.30**	1.43	1.38	0.02	20.57	2.58*	-1.27
RGGP 46	234.63	4.03	208.42*	2.38	6.31	0.20**	19.55	0.76	-1.25
RGGP 47	241.52	2.17*	-51.35	2.65	4.15	0.17**	31.68	5.53*	-1.23
RGGP 48	267.17	1.50	-33.80	2.9	5.76*	0.01	36.55	5.12*	0.39
RGGP 49	258.88	1.77	-21.85	1.5	-0.67	0.41**	36.95	6.45*	-0.68
RGGP 50	260.80	-0.92	6520.54**	1.67	-0.58	0.76**	15.28	0.7	-1.27
RGGP 51	102.83	-0.60**	-52.02	0.78	-2.73	2.91**	27.13	-2.14*	-1.18
Population Mean	169.8			1.8			23.3		
$CD_{0.01}$	37.5			0.5			6.1		

$^{*}P = 0.05$, $^{**}P = 0.01$, bi = regression coefficient, S^2di = deviation from regression coefficient

Reddy (9) in ridge gourd, by Narayan *et al.* (5) and Agasimani *et al.* (1) in bitter gourd and Vasanthkumar *et al.* (10) in watermelon. Though RGGP-33 and RGGP-28 recorded highest mean fruit number/ vine with unit or negative regression, they are not useful as their performance is not predictable as the deviation from regression is significant. Two other genotypes, RGGP-14 and RGGP-17 were suitable for good environments only with significant regression coefficient (8.59** and 7.09**, respectively) and least deviation (0.69). RGGP-29, RGGP-31 and RGGP-36 are suitable for poor environments with negative regression and least deviation.

Individual fruit weight is another important yield contributing character in ridge gourd (Varalakshmi *et al.*, 8) and 16 genotypes have recorded higher mean than the population mean (169.8 g) over the different environments (Table 3). Out of these three genotypes, namely, RGGP-48, RGGP-49 and RGGP-11 were found to be stable across environments for fruit weight (Varalakshmi and Subba Reddy, 9; Vasanthkumar *et al.*, 10). Genotypes, RGGP-47 and RGGP-41 with the regression coefficients more than unity and least deviation from regression showed below average stability indicating that these genotypes can do better under favourable environments only. However, the stability of the remaining 11 genotypes, it was not predictable though they had higher mean fruit weight with unit regression, as the deviation from regression is significant.

Fruit yield/ vine is the main trait responsible for overall performance of a variety across environments and in the present study; six genotypes have recorded significantly higher mean values over population mean (1.8 kg). Out of these only one genotype's performance is predictable, *i.e.*, G-48, which is suitable for favourable environments only (Table 3). The other five genotypes, *viz*., RGGP-47, RGGP-40, RGGP-12, RGGP-46 and RGGP-11, though had significantly higher mean with unit regression, their stability cannot be predicted because of the significant deviation from regression. However, two other genotypes, RGGP-25 and RGGP-5 were stable with mean performance equal to population mean with regression around unity and least deviation. Such varied response of genotypes for stability parameters have been also reported by Varalakshmi and Subba Reddy (9) in ridge gourd; by Shaikh *et al.* (6) in bottle gourd, Agasimani *et al.* (1) and Krishna Prasad and Singh (4) in bitter gourd and Vasanthkumar *et al.* (10) in watermelon.

For stability analysis of fruit yield per hectare, eight genotypes showed significantly superior performance compared to population mean (23.3 t/ ha) (Table 3). Out of which, the genotypes RGGP-12, RGGP-41, RGGP-3 and RGGP-7 proved to be most stable genotypes exhibiting significantly higher mean fruit yield/ ha compared to population mean and their regression coefficients were near to unity with non-significant deviation from regression (Vasanthkumar *et al.*, 10). Three other genotypes, *viz.*, RGGP-49, RGGP-48 and RGGP-47 with significant regression and least deviation are suitable for good environments. Only one genotype with superior performance, *i.e.*, RGGP-27 is suitable for poor environments *i.e.*, low input supply or unfavourable environmental conditions. Considering the higher mean yield performance than population mean, though not significant, six more genotypes, *viz.*, RGGP-1, RGGP-43, RGGP-2, RGGP-10, RGGP-38 and RGGP-28 possess stability over different environments.

Overall, nine genotypes for node number for first female flower appearance, two each for fruit length and fruit girth, four for fruit number/ vine, three for fruit weight, one for fruit yield/ vine and four for fruit yield/ ha showed higher mean values than population mean in desirable direction, regression coefficient less than unity and non-significant deviation from regression. These genotypes can be cultivated for specific trait(s) of choice under a wide range of agro-climatic conditions. RGGP-48 appeared stable for fruit number/ vine and fruit weight, RGGP-21 was stable for node number for first female flower appearance and fruit number, while RGGP-43 was stable for fruit length and yield/ha. These genotypes can be used for exploitation of these traits or can be used as parents in the hybridization programmes in ridge gourd.

REFERENCES

1. Agasimani, S.C., Salimath, P.M., Dharmatti, P.R., Hanamaratti, N.C. and Laxuman. 2008. Stability for fruit yield and its components in bitter gourd (*Momordica charantia* L.). *Veg. Sci.* **35**: 140-43.
2. Eberhart, S.A. and Russell, W.A. 1966. Stability parameters for comparing varieties. *Crop Sci*. **6**: 36-40.
3. Hanumegowda, K., Shirol, A.M., Mulge, R., Shantappa, T. and Prasadkumar. 2012. Correlation coefficient studies in ridge gourd [*Luffa acutangula* (Roxb) L.]. *Karnataka J. Agric. Sci.* **25**: 160-62.
4. Krishnaprasad, V.S.R. and Singh, D.P. 1992. Phenotypic stability in bitter gourd. *Indian J. Hort.* **49**: 179-82.
5. Narayan, R., Ahmed, N. and Mufti, S. 2006. Evaluation of some bitter gourd genotypes for yield traits and genetic parameters under Kashmir conditions. *Ecol. Env.* **245** (Special 3A): 750-52.
6. Shaikh, J.A., Kathiria, K.B. and Acharya, R.R. 2012. Stability analysis for fruit yield and its component traits in bottle gourd. *Veg. Sci.* **39**: 89-91.
7. Thakur, J.C., Khattra, A.S. and Brar, K.S. 1994. Stability analysis for economic traits and infestation of melon fruit fly (*Dacus cucurbitae*) in bitter gourd (*Mormordica charantia*). *Indian J. Agric. Sci*. **64**: 378-81.
8. Varalakshmi, B., Rao, P.V. and Reddy, Y.N. 1995. Genetic variability and heritability in ridge gourd (*Luffa acutangula*). *Indian J. Agric. Sci.* **65**: 608-10.
9. Varalakshmi, B. and Subba Reddy, B.V. 1998. Stability analysis for some quantitative characters in ridge gourd (*Luffa acutangula* Roxb.). *Indian J. Hort*. **55**: 248-56.
10. Vasanthkumar, A.M., Shirol, Ravindra Mulge, N., Thammaih and Prasadkumar. 2008. Genotype × environmental interaction in watermelon (*Citrullus lanatus* Thunb.) genotypes for yield and quality traits. *Karnataka J. Agric. Sci.* **25**: 248-52.

Received : July, 2015; Revised : January, 2017;
Accepted : March, 2017