Vegetable Science (2012) 39 (1) : 89-91

Stabilty analysis for fruit yield and its component traits in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)

JA Shaikh, KB Kathiria and RR Acharya

Received : July, 2011 / Accepted : April, 2012

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] commonly known as Lauki or Ghiya in India is one of the most important member of the family *Cucurbitaceae* and believed to be originated in Africa (Whitaker, 1971). It is commercially grown in all the states of India in both rainy and summer seasons. The immature fruits contain good amount of vitamins and have good medicinal values. Though bottle gourd hybrids are high yielder, the influence of G x E interaction is more on their performance. A specific difference in environment may have a great effect on some genotypes than others. Development of a bottle gourd hybrid with stable fruit yield under various environmental conditions will be highly useful to farming community to get consistent yield. Therefore, it is of prime importance to isolate genotypes manifesting low genotype x environment interaction in respect of important characters. So in present investigation, 50 bottle gourd hybrids were evaluated under three environments.

The experimental material for the present investigation comprised of 50 hybrids with their 15 parents. These genotypes were grown over three environments *viz.; Kharif*-2008 (E_1), Summer-2009 (E_2) and *Kharif*-2009 (E_3) in a randomized block design at Main Vegetable Research Station, Anand Agricultural University, Anand. Each genotype was planted in a single row of ten dibbles keeping row to row distance at two metres and plant to plant distance at one metre. The recommended agronomical practices were adopted to raise the crop. Observation was recorded on five competitive plants in respect of 13 traits namely, days to open first male flower, days to open first female flower, first female flowering node, primary branches per plant, days to first picking, main vine length, fruit length, fruit girth, fruits per plant, fruit weight, fruit yield per plant, seeds per fruit and 100 seeds weight. The mean data of five plants in each replication for each genotype were utilized for statistical analysis. Eberhart and Russell (1966) method was followed to estimate the three parameters of stability namely mean, regression coefficient (b_i) and mean squared deviation (S d_i=0) for each genotype.

The analysis of variance for different traits under study are presented in Table1. The analysis of variance over three environments showed that the mean sum of squares due to genotypes were significant when tested against G x E interaction for all the characters except for days to first picking and fruit weight indicating the considerable influence of environments on the expression of genotypes. The values of genotypes x environments interaction were significant for first female flowering node, main vine length, fruit length, fruit weight, fruits per plant, fruit yield per plant and 100 seed weight revealed that the genotypes interacted differently with environmental variations for these characters.

The G x E (linear) was significant for first female flowering node, main vine length, fruit length, fruit girth, fruit weight, fruits per plant, fruit yield per plant and 100 seed weight. This result confirms that the environments were random and different and they exercised influence on the expression of the trait and this variation could have arisen due to linear response of the cultivar to the environment. The values of genotypes x environments interaction were significant for first female flowering node, main vine length, fruit length, fruit weight, fruits per plant, fruit yield per plant and 100 seed weight which revealed that genotypes interacted differently with environmental variations for these characters. The results of stability analysis revealed that genotypic expression for mean performance and stability differed for various traits.

When stability parameters were studied for 50 hybrids and its 15 parents separately, it was found that none was ideal genotype with stability over environments for all the 13 characters. Among the parents, NDBG-132

JA Shaikh, KB Kathiria and RR Acharya
Main Vegetable Research Station, Anand Agricultural University, Anand-388 110. (Gujarat), India

Table 1. Mean squares of stability analysis in bottle gourd

Source of variation	Mean squares							
	Genotypes (G)	Environ. (E)	Génotypes x Environ. (G x E)	E + (G x E)	Environ. (linear)	G x E (linear)	Pooled deviation	Pooled error
D.F.	64	2	128	130	1	64	65	384
Days to open first male flower	24.27**	848.62**	8.30	21.23**	1697.23**	9.17	7.32**	2.70
Days to open first female flower	24.54**	458.80**	10.35	17.25*	917.60**	10.16	10.39**	2.39
First female flowering node	13.91**	16.51	8.01*	8.14*	33.01*	10.51**	5.44**	1.2
Days to first picking	10.98	5505.63**	8.63	93.20**	11011.26**	7.63	9.47**	2.92
Primary branches/ plant	1.90**	55.85**	1.12	1.96	111.70**	0.56	1.66**	0.25
Main vine length	5.57**	14.72**	1.21*	1.42**	29.44**	2.34**	0.07	0.34
Fruit length	102.94**	296.32**	13.38**	17.73**	592.63**	18.92**	7.71**	2.20
Fruit girth	26.07**	6.78*	1.56	1.64	13.55**	1.90*	1.19**	0.71
Fruit weight	7202.72	35853.66**	6571.02**	7021.52**	71707.31**	9212.90**	3868.69**	1356.51
Fruits/ plant	1.46*	2.84	0.96**	0.99**	5.68**	1.37**	0.55**	0.11
Fruit yield /plant	1.33**	16.58**	0.72**	0.96**	33.16**	1.02**	0.42**	0.06
Seeds/ fruit	27057.63**	134232.30**	8327.49	10264.49	268464.70**	6888.3	9616.43**	1254.5
100 seed weight	5.03*	69.8**	3.39*	4.41**	139.60**	4.45**	2.29**	0.43

*, ** Significant at 5 and 1 percent, respectively

and Pusa Naveen were found to be ideal cultivar for fruit yield per plant due to high mean yield, unit regression and least deviation. The hybrid Arka Bahar x DBG-6 would be stable over environments owing to the non-significant deviation from regression value associated with unit regression and high mean performance. Similar findings have also been reported by Prasad et *al.* (1987) and Parmar (2000). The early genotypes hybrids *viz.,* Samrat, NDBG-517, Arka Bahar, NDBG-104 x Thar Samruddhi, ABG-1 x DBG-6, NDBG-104 x DBG-5,Pusa Naveen x DBG-5, DBG-6, DBG-5 and NDBG-104 x Punjab Komal were also found stable over environments (Table 2) for various earliness traits. For the character primary branches per plant, the parents Arka Bahar and NDBG-132 and hybrids NDBG-104 x DBG-5, Arka Bahar x Narendra Rashmi and NDBG-104 x Punjab Komal; for main vine length, the hybrid NDBG-104 x NDBG-132; for fruit length, the cross Punjab Long x DBG-5; for fruit girth, the cross ABG-1 x

NDBG-132; for fruit yield per plant, the parent NDBG-132 and Pusa Naveen and hybrid Arka Bahar x DBG-6; for seeds per fruit, the hybrid Pusa Naveen x DBG-6 and for 100 seed weight cross Pusa Naveen x Samrat were found to possess stability over different environments.

Among the hybrids studied the stable and adaptable hybrids with high mean performance for fruit yield per plant identified for wider environment and specific (favourable) environment are presented in Table 3. The cross Pusa Naveen x NDBG-517 had the highest fruit yield per plant followed by Pusa Naveen x NDBG-132, NDBG-104 x DBG-6 and ABG-1 x NDBG-132 along

Table 2. Stable genotypes as per the Eberhart and Russell (1966) Model for various characters in bottle gourd

Stable genotypes	Mean	b_i	$S^2 d_i$
Days to open first male flower			
Samrat	42.03	0.95	-1.26
NDBG-517	44.59	0.96	-2.65
Arka Bahar	46.33	1.07	-2.45
NDBG-104 x Thar Samruddhi	44.20	1.09	-2.70
ABG-1 x DBG-6	45.86	1.10	0.78
Days to open first female flower			
NDBG-104 x DBG-5	49.33	0.96	-1.61
First female flowering node			
Pusa Naveen x DBG-5	14.04	1.39	0.73
Days to first picking			
DBG-6	57.44	0.94	0.91
DBG-5	58.33	1.04	-2.48
NDBG-104 x Punjab Komal	56.33	0.99	-1.23
Primary branches per plant			
Arka Bahar	7.44	0.96	0.01
NDBG-132	6.97	0.98	-0.09
NDBG-104 x DBG-5	8.30	1.10	1.02
Arka Bahar x Narendra Rashmi	8.00	0.96	0.00
NDBG-104 x Punjab Komal	7.04	1.04	0.14
Main vine length			
NDBG-104 x NDBG-132	9.33	1.23	-0.31
Fruit length			
Punjab Long x DBG-5	31.16	1.01	-0.26
Fruit girth			
ABG-1 x NDBG-132	18.76	0.95	-0.39
Fruit yield per plant			
NDBG-132	3.47	1.23	0.30
Pusa Naveen	3.24	1.16	0.04
Arka Bahar x DBG-6	3.18	1.12	-0.02
Seeds per fruit			
Pusa Naveen x DBG-6	706.76	1.01	-1254.33
100 seed weight			
Pusa Naveen x Samrat	17.52	1.02	0.25

Table 3. Ideal hybrids identified for fruit yield per plant in different environmental condition.

Environments	Hybrids identified
Wider environment	Arka Bahar x DBG-6
Better environment	Pusa Naveen x NDBG-517
	Pusa Naveen x NDBG-132
	NDBG-104 x DBG-6
	ABG-1 x NDBG-132
Poor environment	Punjab Long x PSPL
	ABG-1 x Samrat
	Arka Bahar x NDBG-517
	Arka Bahar x Samrat

with above unit estimates of regression coefficient leading to below average stability hence found to be well adapted to better environment. The hybrids Punjab Long x PSPL had high mean yield followed by ABG-1 x Samrat, Arka Bahar x NDBG-517 and Arka Bahar x Samrat which are adaptable to poor environments.

Looking to the overall performance female parent Pusa Naveen was most stable genotype for fruit yield per plant among the parents studied. The cross Arka Bahar x DBG-6 were comparatively high yielder with desirable stability over wider environments.

References

Eberhart SA and Russell WA (1966) Stability parameters for comparing varieties. Crop Sci 6 : 36-40.

Parmar AR (2000) Heterosis, combining ability and stability parameters in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]. Ph. D. (Agri.) Thesis. Gujarat Agricultural University, Sardar Krushinagar.

Prasad ID, Singh RK and Mandal G (1987) Evaluation of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] in Diara area of Bihar. Prog. Hort., 19 (1-2): 27-30.

Whitaker TW (1971) Men across the sea. Kelley JC, Pennington CW and Rauds RL (Eds.) pp. 320-27.