

## Stability Analysis For Fruit Yield And Its Related Traits In Okra (*Abelmoschus Esculentus* L. Moench)

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### Abstract

The experimental material comprising 30 genotypes including two checks were evaluated in Randomized Block Design during two crop seasons i.e., Kharif -2022 and Rabi-2022-23 at two locations i.e., Parbhani and Nanded comprising three different environments viz., E1 (Parbhani Kharif-2022), E2 (Nanded Kharif-2022) and E3 (Nanded Rabi-2022-23). Data were recorded on twelve quantitative characters viz., days to 50% flowering, days to first harvest, number of ridges per fruit, number of fruits per plant, fruit length, fruit girth, fruit weight, plant height, number of nodes per plant, internodal length and fruit yield per plant. Analysis of variance pooled over environment also revealed significant differences among genotypes for all the characters indicated significance variation among the genotypes irrespective of environment. Similarly, significant mean sum of squares due to environment was found in the expression of all the traits. Estimates of environmental indices revealed that kharif 2022 at Nanded (E2) was proved to be best environment to realize increase in fruit yield per plant. Similarly, kharif Parbhani 2022 (E1) was also noticed better for expression of number of ridges per fruit, number of fruits per plant, fruit girth, number of nodes per plant and plant height. The study of stability parameters indicated that the genotype IC-9856 were identified as average stable for fruit yield per plant also

found to be average stable for one or more yield contributing traits across the environments. The maximum number of genotypes have shown better environment stability for the characters like number of ridges per fruit, fruit weight, fruit length, fruit girth, number of nodes per plant and number of branches per plant.

**Keywords:** Okra, stability, G x E interaction

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## INTRODUCTION

Vegetables are prime importance in human diet, as they provide cheaper source of nutrients like carbohydrates, minerals, vitamins, proteins and dietary fibres. The fruits of okra are rich source of vitamin A, C and minerals viz.; Ca, Mg and Fe. The seeds of okra are good source of protein (20%) and vegetable oil (14%). The average nutritive value (ANV) of okra is 3.21 per cent, which is higher than tomato, brinjal and cucurbitaceous vegetables (Sharma and Arora, 1993).

Okra is one of the economically important vegetables grown across the world including tropical and subtropical regions. Most popular terms for okra are lady's finger (England), gumbo (United States of America), guino-gombo (Spanish), guibeiro (Portuguese) and bhindi (India). Earlier known as *Hibiscus esculentus*, presently okra is accepted as *Abelmoschus esculentus*, Family Malvaceae, due to presence of distinguished characteristics of the calyx, corolla and staminal column which are fused at the base and fall together after the anthesis (Dhankhar and Mishra, 2004).

Okra is basically self-pollinated crop. However, occurrence of out crossing ranges from 0.34-27.30 per cent (Akenova and Fatokun, 1984) with maximum 42.20 per cent is noticed in insect assisted pollination (Kumar, 2006). This renders considerable amount of genetic diversity. The extent of cross pollination in a particular place will depends upon the cultivar, competitive flora, insect population and season etc. (Bose *et al.*, 1993). Okra plant is a robust erect annual herb of 0.5 to 2 meter tall; stem green or tinged red; leaves simple and alternate; flower solitary and auxiliary, calyx completely fused; petals five, separate and yellow with crimson spot-on claw; staminal column united to base of petals, with Monadelphous staminal tube; ovary superior; stigma small, 5-8 fids, fruit pyramidal capsule; seeds dark green to dark brown rounded and about 5 mm in diameter.

India leads the globe in okra production, accounting for 62.07 per cent of world okra production and producing okra on an area of 544 thousand ha with a production of 6494 thousand tons and a productivity of 11.90 tons per hectare. It is cultivated in states of Gujarat, West Bengal, Bihar, Madhya Pradesh, Orissa, Chhattisgarh, Uttar Pradesh and Haryana. In Maharashtra okra is grown in the districts viz., Solapur, Satara, Pune, Jalgaon, Thane with an area of about 1147.95 thousand ha. and production 7896.27 thousand MT. Okra contributes about 60 percent to the total fresh vegetable export, excluding potato, garlic and onion. The okra occupies an area of 13.98 thousand hectare in Maharashtra state with an annual production of 139.28 thousand tonnes and 2.17 % share with an average productivity of 9.97 tonnes per hectare (NHB 2021-22).

The term *Abelmoschus* is probably derived from Arabian word "abul-l-mosk" which means "source of musk," indicating musky smell of seeds (Charrler, 1984). Maximum cultivation (99%) of okra is being done in the Asian and African countries but productivity is very poor in African countries (2.25 MT ha<sup>-1</sup>) in comparison to other okra growing regions. Global average yield of okra is 5.26 MT ha<sup>-1</sup> from an area of 1.83 M ha with annual productivity of 9.62 MT. 72% of total world production occurs in India, ranking first with 6.3 million MT productivity in 0.5 million ha area (NHB-2022, FAOSTAT, 2022).

The top 3 exporters of Fresh okra are India with 40,568 shipments followed by Honduras with 3,489 and Philippines at the 3<sup>rd</sup> spot with 1,444 shipments (16-May-2023, APEDA). Okra has tremendous export potential as fresh vegetable. It accounts for 70 percent of the 30 percent exchange earnings, other than onion from export of vegetables. Major targets have been our neighbouring countries in the gulf and south east Asia, particularly Singapore, Mauritius, Malaysia, Sri Lanka, Bangladesh and middle east countries which are upcoming potential market for export of vegetables from India. For fresh fruit export, bhindi fruits should be green, tender, 6-9 cm long. Among them the suitable varieties for export are Pusa sawani, Parbhani Kranti, Varsha Uphar and Pusa A-4. Although bhindi is grown for export in different parts of the country, the major exporting area are Nasik, Ozar, Saikheda, Kolhar, Dindori, and Solapur in Maharashtra.

The fluctuations of the yield in Okra could be attributed primarily to poor agronomic management and use of rainfed fallow lands. Over and above, the varietal component being the major contributor for high or low yield seems to be not performing consistently under the fluctuating environmental conditions. Okra is grown in various regions of India and covers practically all agro-ecological zones.

There are various genotypes of okra having varying yielding potential, adaptability different climatic conditions, response to diseases, insects and pests. The performance of genotypes keeps changing in varying environmental conditions. The genotypic and environmental interactions are usually present under all conditions in pure lines, hybrids, synthetics or any other material used for breeding, which complicate the breeding work and forbid the progress of the crop improvement programmes (Eberhart and Russell 1966). It is a common practice in trials involving varieties and breeding lines to grow them in a range of different environments to study the genotypic x environmental interactions (Kang, 2004). In India, where environmental conditions differ within an agro-climatic zone, the development of stable varieties is the only way to stabilize the production. Yield trials at different locations help to identify genotypes with high productivity. Various techniques have been used in assessing, studying and interpreting genotype x environment interaction (Hussein *et al.*, 2000; Sabaghnia *et al.*, 2006). Some models are based on linear regression of genotypic means on environmental index (Eberhart and Russell, 1966; Finlay and Wilkinson, 1963). Identification of superior and stable hybrids/varieties with stability in performance is of utmost importance. It is already established that the adaptability of an improved stable variety alone can increase the yield by about 10-15 per cent. In our country with diverse geographical regions and with variable environmental fluctuations, the stable varieties are very much required for cultivation. A breakthrough in varietal development is highly essential to obtain any improvement in increasing the future production.

Okra [*Abelmoschus esculentus* (L.) Moench] is one of the most important vegetable crops grown extensively throughout the country under diverse agro-climatic conditions, which results in fluctuation in its production, one of the constraints in increasing production is the lack of stability of high yielding and widely adapted varieties/hybrids. Varietal adaptation to environmental fluctuations is important for stabilization of the crop production. The study of G x E interaction leads to meaningful evaluation of individual genotype for fruit yield and its components, which could be used in future breeding programmes. Hence, the present investigation was undertaken to study the stability of genotypes for fruit yield and its component traits in okra

## MATERIALS AND METHOD

The experimental material comprising 30 genotypes including two checks were evaluated in Randomized Block Design during two crop seasons i.e. *Kharif* 2022 and *Rabi* 2022-23 at two locations i.e. Parbhani and Nanded comprising total of three different environment viz., E1-Parbhani *Kharif* 2022, E2- Nanded *Kharif* 2022 and E3- Nanded *Rabi* 2022-23. The sowing was carried out at the spacing of 60 cm and 30 cm between the rows and plants respectively. The method of sowing followed was dibbling. One plant per hill was maintained by thinning 15 days after sowing. All other cultural practices were undertaken as and when required to maintain healthy crop.

## RESULT AND DISCUSSION

Analysis of variance for stability parameter revealed significant differences among the genotypes with response to expression of all the traits across the environments. Significant G x E interaction for all the traits indicated differential response of genotype to varying environmental condition. Significant G x E linear and pooled deviation for different characters implies that genotype differ greatly in their linear response to environment and performance of these genotypes across the environment is unpredictable in nature.

Estimates of environmental indices showed that E1 environment found favourable for the characters viz., number of ridges per fruit, number of fruits per plant, fruit girth, number of nodes per plant, plant height. Whereas E2 environment was found to be good for days to 50% flowering, days to first maturity, fruit weight, fruit length, number of branches per plant and fruit yield per plant and E3 environment found superior for the character internodal length only.

The genotypes IC 9856 was found average stable for fruit yield per plant across the environments. This genotype also showed average stability for one or more yield contributing traits across the environments. The maximum number of genotypes have shown better environment stability for the characters like number of ridges per fruit, fruit weight, fruit length, fruit girth, number of n Based on the stability parameters viz., (i) high mean ( $\mu$ ), (ii) regression coefficient (bi) near to unity and (iii) non-significant deviation from regression (S2di) by consideration of all the quantitative characters, the genotypes are grouped into three groups.

**Group I:** Stable genotype for average environmental conditions

Genotypes with high mean, near to unity regression and least deviation from regression.

**Group II:** Stable genotypes for favourable environmental conditions

Genotypes with high mean, greater than unity regression and least deviation from regression.

**Group III:** Stable genotypes for poor environmental conditions

Genotypes with high mean, less than unity regression and least deviation from regression.

The genotypes are classified into the above groups character-wise, presented in the Table 4.4 nodes per plant, number of branches per plant. More over some of the genotypes shown their suitability for average environment towards days to 50% flowering, days to first maturity, number of fruits per plant. Whereas some genotypes performed better for internodal length, number of branches per plant, plant height and fruit yield in poor environment.

Table 4.1: Analysis of variance for stability in genotypes over three environments in okra

Source of variation	D.F	Days to 50% fl.	Number of Ridge	Days to First Maturity	No. of Fruits/pl	Fruit Weight (g)	Fruit Length (cm)	Fruit Girth (cm)	No of Nodes/pl	Plant Height (cm)	No of Branches/pl	Internodal length (cm)	Fruit yield / plant
M													
Genoty	2	3	0.374	4.68	2.53	1.02	1.70	0.017	1.4	187.9	0.116	0.444	539.40
Env. +	6	9	1.8	9.6	4.3	1.8	2.2	0	1.6	562.	0.08	0.472	35
Environ	2	131.34	44.35*	148.7	105.8	34.93	50.1	0.	34.64	11479.	1.091	6.86	5957.6
Genotyp e. x	5	5.56	0.39	4.88	0.81	0.66*	0.55	0.01	0	185.7	0.049	0.251	163.0
Environment s (Linear)	1	262.68	88.715	297.5	211.	69.8	100.	0.019	69.2	22959.	2.183	13.723	11915.3
Gen. x Env. (Lin.)	2	2.365	0.405	5.33	0.29	1.148	1.01*	0.001	0.213	52.06	0.05	0.259	140.8
Pooled Deviation	3	8.464	0.38	4.29	1.29	0.17	0.0	0.002	0.86	308.7	0.047	0.23	178.9
Pooled Error	8	2	0.05	0.63	0.08	0.06	0.0	0	0.09	7.14	0	0.03	11.0
	7	.	3	2	2	6	74	.	1	5	.	9	34

\* Significant at 5% level. \*\* Significant at 1% level when tested against pooled deviation.

+ Significant at 5% level ++ Significant at 1% level when tested against pooled error

**Table 4.2: Estimates of environmental index for various characters in different environments**

Sr. No.	Characters	Environmental Index		
		E 1	E 2	E 3
1	Days to 50% flowering	0.378	-2.256	1.878
2	Number of Ridges /fruits	1.359	-0.984	-0.376
3	Days to First Maturity	0.856	-2.528	1.672
4	No. of Fruits/plant	1.607	0.457	-2.065
5	Fruit weight (gm)	-0.222	1.173	-0.951
6	Fruit length (cm)	-0.567	1.479	-0.912
7	Fruit girth (cm)	0.012	0.009	-0.021
8	No of Nodes/plant	1.160	-0.198	-0.962
9	Plant Height (cm)	14.673	7.536	-22.209
10	No of Branches/plant	-0.115	0.22	-0.105
11	Internodal length (cm)	0.533	0.141	-0.392
12	Fruit yield (gm)	6.733	9.462	-16.196

**Table 4.3: Estimates of stability parameters for different characters in okra**

Sr. No	Genotype	Days to 50% Flowering			No. of Ridges/Fruit		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
1	IC 1543	40.16	1.67	-2.41	5.76	0.55	0.37*
2	IC 3302	40.16	0.9	-0.99	5.86	1.85	0.31*
3	IC 3340-C	41.33	0.26	4.04	5.8	1.1	2.23**
4	IC 3769	40.66	0.88	-2.16	6.58	1.5	0.67**
5	IC 3769-A	41.16	1.97	-2.01	5.95	1.3	0.77**
6	IC 3759	39.16	1.67	-2.41	5.2	0.97	0.13
7	IC 4507	40.66	0.71	1.22	6.38	1.27	0.15*
8	IC 6376-B	41.66	0.94	0.81	6.41	2.12	0.17*
9	IC 6485	38.83	1.59	4.02	6.51	0.73	0.22*
10	IC 7472	39.83	1.46	-2.52	5.76	1.1	0.05
11	IC 8991	41.16	1.07	4.06	6.91	0.98	0.01
12	IC 9327	41.16	0.26	-2.46	5.88	1.37	0.03
13	IC 9856	40	0.54	-1.57	6.45	0.6	0.58**
14	IC 10252	39.66	1.61	-0.05	5.8	1.02	0.13
15	IC 10256-A	40.16	0.26	-2.46	6.36	0.77	0.24**
16	IC 11533	41.33	0.43	-0.99	5.68	0.82	0.17*
17	EC 305643	40.66	0.92	11.15**	6.58	0.86	0.01
18	EC 305685	41.5	1.24	-2.11	6.28	0.7	0.4*
19	EC 305766	37.16	0.25	175.56**	6.48	0.72	0.04
20	EC 305675	41.16	1.07	4.06**	5.91	1.28	0.0
21	IC 7433	41.33	0.36	-2.54	6.28	0.69	0.07

Sr. No	Genotype	Days to 50% Flowering			No. of Ridges/Fruit		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
22	Desi Okra	40	1.52	10.6**	6.26	0.71	0.35*
23	Sri Okra	41.16	1.82	-2.51	6.41	0.81	0.26*
24	Okra Red	40.83	1.16	-1.63	6.18	0.76	0.28*
25	Green Star	39.5	1.42	-2.1	6.11	1.2	0.5*
26	Double Color	40.33	0.73	2.95	5.91	0.52	0.69**
27	Okra Green	41.16	1.2	-2.52	6	1.11	-0.05
28	Elephant Tusk	42.83	0.99	-2.41	6.03	0.86	0.16*
29	Arka Abhay	40.33	0.6	-2.54	5.95	0.99	0.49*
30	Parbhani Kranti	42.5	0.47	-2.5	6.13	0.75	0.44*
	Mean	40.58			6.13		

Sr. No	Genotype	Days to First Maturity			No. of Fruits/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
1	IC 1543	49.83	0.33	10.94**	10.04	0.79	1.5**
2	IC 3302	50	0.46	18.79**	11.84	1.16	0.44**
3	IC 3340-C	50.66	0.21	5.11**	12.06	1.04	2.35**
4	IC 3769	50.66	0.46	10.44**	12.81	1.11	0.44*
5	IC 3769-A	49.16	1.05	10.51**	12.38	1.19	2.68**
6	IC 3759	52.33	0.72	9.46**	9.70	0.64	2.2**
7	IC 4507	51.66	1.06	-0.62	12.14	0.96	-0.06
8	IC 6376-B	50.5	0.17	-0.41	12.45	0.88	2.81**
9	IC 6485	47.16	1.18	4.13**	13.17	0.92	0.32*
10	IC 7472	48.16	1.36	1.68	12.61	1.19	0.56**
11	IC 8991	50.5	1.19	-0.62	12.04	0.86	0.38*
12	IC 9327	49.33	1.1	-0.54	11.73	0.83	2.23**
13	IC 9856	48.83	1.19	3.95**	12.73	1.11	-0.04
14	IC 10252	50.33	1.02	2.19**	12.78	1.13	3.94**
15	IC 10256-A	48.83	1.87	-0.08	11.41	1.2	0.56**
16	IC 11533	48.5	1.53	0.18	12	1.28	1.86**
17	EC 305643	49.33	1.23	1.46	11.30	0.47	2.25**
18	EC 305685	48.0	1.62	6.93**	11.72	0.99	-0.07
19	EC 305766	48.0	1.49	1.91**	12.53	0.97	1.55**
20	EC 305675	48.83	1.19	0.59	13.48	1.1	2.94**
21	IC 7433	47.5	1.95	-0.44	13.02	1.05	2.15**

Sr. No	Genotype	Days to First Maturity			No. of Fruits/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
22	Desi Okra	48.16	2.08	-0.29	13.74	1.05	0.86**
23	Sri Okra	48.83	0.85	0.86	12.93	1.21	0.18
24	Okra Red	48.0	-0.08	1.31	12.3	1.02	0.55**
25	Green Star	48.0	1.91	0.64	12.32	1.08	-0.01
26	Double Color	48.66	1.32	4.28**	12.68	1.1	0.33*
27	Okra Green	47.66	1.61	-0.28	10.29	0.59	1.3*
28	Elephant Tusk	48.83	1.44	3.5**	12.32	0.69	0.37*
29	Arka Abhay	49.66	-1.1	8.09**	12.05	1.17	0.16
30	Parbhani Kranti	49.83	-0.42	6.3**	11.98	1.24	1.66**
	Mean	49.19			12.15		

Sr. No	Genotype	Fruit Weight			Fruit Length		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
1	IC 1543	12.55	0.98	0.77**	11.45	0.47	-0.07
2	IC 3302	12.13	1.32	-0.06	11.65	-0.09	-0.03
3	IC 3340-C	11.53	-0.37	0.06	10.46	0.79	0.02
4	IC 3769	12.95	0.51	-0.04	12.13	0.32	0.14
5	IC 3769-A	11.36	2.13	-0.05	11.63	1.38	0
6	IC 3759	11.95	1.12	0.0	9.93	-0.56	0.21
7	IC 4507	13.46	0.25	-0.01	11.6	0.59	-0.03
8	IC 6376-B	11.51	1.74	-0.02	11.53	1.56	-0.07
9	IC 6485	11.15	1.34	-0.06	11.53	1.31	0.03
10	IC 7472	12.05	2.09	0.06	11.98	1.38	-0.04
11	IC 8991	11.6	0.64	-0.04	11.6	1.38	-0.07
12	IC 9327	12.21	2.25	0.2*	11.88	1.05	-0.04
13	IC 9856	12.71	1.19	0.41*	11.76	1.2	0.26*
14	IC 10252	12.16	0.41	-0.04	13.4	0.43	0.29*
15	IC 10256-A	12.51	0.46	-0.05	12.8	1.16	-0.01
16	IC 11533	11.63	1.81	-0.02	11.68	1.57	0.22
17	EC 305643	11.41	1.01	0.08	12.08	1.46	-0.07
18	EC 305685	12.31	0.68	0.11	12.73	1.12	0.09
19	EC 305766	12.83	0.09	0.66**	13.08	1.43	0.18

Sr. No	Genotype	Fruit Weight			Fruit Length		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
20	EC 305675	12.21	-0.02	0.45*	13.0	0.77	-0.07
21	IC 7433	12.61	1.13	-0.02	12.58	1.34	0.01
22	Desi Okra	12.43	0.02	0.28*	12.46	1.07	-0.07
23	Sri Okra	12.88	0.36	0.07	12.88	0.77	-0.03
24	Okra Red	12.68	1.2	-0.07	12.7	0.55	-0.05
25	Green Star	12.15	0.82	-0.07	11.51	1.7	0.03
26	Double Color	11.4	2.27	0.17	11.83	1.72	-0.03
27	Okra Green	11.33	1.17	-0.07	11.81	1.74	-0.07
28	Elephant Tusk	12.067	1.19	-0.05	12.06	0.98	0.0
29	Arka Abhay	12.817	0.76	0.4*	12.36	0.55	-0.06
30	Parbhani Kranti	12.28	1.41	0.27*	11.13	0.84	-0.03
	<b>Mean</b>	<b>12.16</b>			<b>11.97</b>		

Sr. No	Genotype	Fruit Girth			No. of Nodes/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
1	IC 1543	1.56	1.44	0.00**	10.12	0.79	1.56**
2	IC 3302	1.54	1.95	0.01**	11.18	1.17	0.07
3	IC 3340-C	1.47	0.3	0.00**	10.95	1.28	1.17**
4	IC 3769	1.62	1.08	0.00	11.84	0.59	0.02
5	IC 3769-A	1.48	2.01	0.00	11.62	1.54	0.07
6	IC 3759	1.45	-0.08	0.00**	9.16	0.59	2.93**
7	IC 4507	1.63	0.14	0.00**	10.91	0.97	0.28*
8	IC 6376-B	1.41	-0.31	0.00**	11.55	0.72	3.97**
9	IC 6485	1.4	1.52	0.00**	12.04	0.47	-0.04
10	IC 7472	1.48	1.23	0.00	11.65	1.03	1.08**
11	IC 8991	1.41	0.23	-0.00	10.79	1.09	0.0
12	IC 9327	1.53	0.9	0.00**	11.127	0.84	0.04
13	IC 9856	1.56	0.17	0.00**	11.37	1.07	0.14
14	IC 10252	1.49	1.77	0.00**	11.01	0.84	0.26
15	IC 10256-A	1.41	0.2	0.00**	10.44	1.41	0.99**
16	IC 11533	1.45	1.29	-0.00	11.18	0.9	0.57**
17	EC 305643	1.35	0.06	0.00**	10.6	0.46	1.98**
18	EC 305685	1.53	1.21	0.00**	10.90	1.07	-0.09
19	EC 305766	1.54	1.05	0.00**	11.60	0.8	0.8*
20	EC 305675	1.56	0.79	0.00	12.33	1.07	2.26**
21	IC 7433	1.53	1.21	0.00**	11.61	1.15	2.38**

Sr. No	Genotype	Fruit Girth			No. of Nodes/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
22	Desi Okra	1.62	0.62	0.00	12.40	0.75	-0.08
23	Sri Okra	1.49	-0.16	0.00**	11.62	1.27	-0.06
24	Okra Red	1.47	1.99	0.01**	11.09	1.15	-0.06
25	Green Star	1.61	1.23	0.00	11.38	1.12	-0.09
26	Double Color	1.62	-0.05	0.00**	11.55	0.99	0.05
27	Okra Green	1.57	2.17	0.00	9.66	1.01	-0.09
28	Elephant Tusk	1.48	1.48	0.00**	11.29	0.7	2.79**
29	Arka Abhay	1.53	-0.27	0.01**	11.01	1.49	0.28
30	Parbhani Kranti	1.60	4.85	0.01**	11.24	1.66	0.00
	Mean	1.51			11.17		

Sr. No.	Genotype	Inter nodal Length			Fruit Yield/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
1	IC 1543	6.76	-0.05	0.13	119.78	0.18	26.57
2	IC 3302	7.2	2.19	0.34*	136.32	1.2	42.79**
3	IC 3340-C	6.3	2.52	-0.01	132.06	-0.09	809.39**
4	IC 3769	7.75	1.77	0.21*	162.44	0.85	-9.85
5	IC 3769-A	7.11	1.35	0.04	141.54	1.91	-10.42
6	IC 3759	6.53	0.12	-0.04	110.75	1.03	355.19**
7	IC 4507	7.38	1.66	0.06	154.41	0.55	155.36**
8	IC 6376-B	7.58	2.86	1.83**	136.46	0.7	8.83
9	IC 6485	7.01	0.77	-0.03	146.23	1.12	14.25
10	IC 7472	7.1	0.15	-0.04	148.19	2.28	314.35**
11	IC 8991	7.31	1.61	-0.03	132.09	0.68	108.45**
12	IC 9327	7.21	0.9	0.2*	135.62	1.2	-10.63
13	IC 9856	6.78	0.43	0.12	155.48	1.11	73.84
14	IC 10252	6.48	1.28	0.05	149.83	1.34	128.08**
15	IC 10256-A	6.71	0.95	0.08	139.74	1.3	53.38**
16	IC 11533	6.18	1	-0.04	136.53	2.18	354.81**
17	EC 305643	7.25	1.1	0.36*	126.18	0.07	170.59**
18	EC 305685	6.61	0.75	0.11	139.18	0.83	66.19**
19	EC 305766	7.1	0.61	-0.03	154.61	0.99	-0.55
20	EC 305675	7.08	0.82	0.67**	155.74	0	962.67**
21	IC 7433	6.78	0.81	0.04	154.68	1.86	368.61**
22	Desi Okra	6.93	0.48	0.13*	166.19	0.49	7.61
23	Sri Okra	7.08	0.76	0.12	160.18	1.14	24.58

Sr. No.	Genotype	Inter nodal Length			Fruit Yield/Plant		
		$\mu$ Mean	$\beta_i$	S <sup>2</sup> di	$\mu$ Mean	$\beta_i$	S <sup>2</sup> di
24	Okra Red	6.85	0.64	0.14*	148.77	1.37	95.97**
25	Green Star	6.78	1.5	-0.04	145.05	0.89	34.42**
26	Double Color	6.58	-0.1	0.1	142.99	1.65	626.68**
27	Okra Green	6.66	1.81	0.34*	113.92	0.7	223.54**
28	Elephant Tusk	7.03	0.77	0.4*	142.73	0.5	4.66
29	Arka Abhay	7.75	-0.3	0.37*	145.81	1.1	36.84**
30	Parbhani Kranti	6.75	0.86	0.13	140.73	0.88	20.75
	<b>Mean</b>	<b>6.95</b>			<b>142.47</b>		

**Table 4.4: Stable genotypes based on different stability parameters in okra.**

Sr. No.	Character	Stable for average environmental condition	Stable for favorable/better environmental condition	Stable for unfavorable/poor environmental condition
1	Days to 50% flowering	IC 6376-B, IC 8991	IC 6485	IC 3340-C IC 4507
2	Number of Ridges /fruit	IC 8991	IC 7472 IC 9327 IC 10252 EC 305675	EC 305643 EC 305766 IC 7433
3	Days to Maturity	IC 7472	EC 305675 Green Star	Sri Okra
4	No. of Fruits/plant	Arka Abhay	Sri Okra	-
5	Fruit weight	EC 305643	IC 3759 Double Color	EC 305685 Sri Okra
6	Fruit length	Elephant Tusk	EC 305685 EC 305766 IC 7433	IC 3340-C IC 3769
7	Fruit girth	IC 3769	IC 3769-A IC 7472 Green Star Okra Green	EC 305675 Desi Okra
8	No of Nodes/plant	IC 9856 Double Color	IC 3302 IC 3769-A Parbhani Kranti	IC 3769 IC 9327
9	Plant Height			IC 3759 and EC 305685
10	No of Branches/plant	IC 4507 IC 9856	IC 6485 Elephant Tusk	IC 3340-C IC 9327 Parbhani Kranti

11	Internodal length	IC 10256-A	IC 3769-A IC 4507	IC 9856 EC 305685 IC 7433 Parbhani Kranti
12	Fruit yield	IC 9856	IC 6485 Sri Okra	IC 1543 IC 6376-B Parbhani Kranti

## CONCLUSION

On the basis of mean performance and stability, the genotype IC 9856 found with high fruit yield and showed wider adaptability.

The genotypes IC 6485 and Sri Okra were found adapted to better environment while IC 1543, IC 6376-B and Parbhani Kranti were found specially adapted to poor environments.

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