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Studies on the Performance and Morphological Characterization of Okra (*Abelmoschus esculentus* L. Moench) Genotypes for Yield and Yellow Vein Mosaic Viruses

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A B S T R A C T

Studies were conducted on the performance and morphological characterization of okra for yield and YVMV disease. None of the genotypes found complete free from YVMV infection. However, on scoring test few of them got resistant mark for YVMV like IIHR 129, IIHR-123, and IIHR 120. The characters like plant height, plant canopy, fruit yield per plant, PDI and CI have found wide variation. The character's association revealed that the association of traits is not only due to genes but also due to the favorable impact of environment.

Introduction

The cultivated okra [*Abelmoschus esculentus* (L.) Moench], is an important fruit vegetable crop cultivated in tropical, sub-tropical and mild temperate parts of the world. Okra belongs to the family Malvaceae and there is a significant variation in chromosome number and ploidy level in different species under the genus *Abelmoschus*. It is one of the most important vegetable crops cultivated during summer and rainy seasons. It is an annual crop propagated from seed, grown for its tender pod, which are cooked and consumed as a vegetable purpose (Chattopadhyay *et al.*, 2011). It is also rich source of nutrient, *i.e.* carbohydrates, fat, fibers, oil, minerals and vitamins *viz.*, B_1, A and C (Rashawn, 2011). It contains good amount of Vitamin-C (30 mg 100 g-1), calcium (90 mg100 g-1), iron (1.5 mg 100 g-1) and iodine (97 mg100 g-1) in the edible fruit (Pal *et al.*, 1952).

In India, the major growing area of okra is Gujarat, Maharashtra, Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, Haryana, and Punjab. Okra occupies an area of 0.53 million hectares with an annual production and productivity of 6.34million tones green pod and 11.9 mt/ha, respectively (NHB-2013-14).But lower than that of Ghana (20.00 t /ha). While in Bihar okra occupies an area of

0.058 m ha with an annual production of 0.78 mt. and productivity of 13.5 t/ha higher than the national productivity.

The okra in Bihar condition can be grown throughout the year, but main season is rainy season of cultivation. During this period the white fly population becomes large consequently helps in viral disease transmission and resultantly plant becomes infected to this disease (Kumar *et al.,* 2015). Depending upon the infection time at different growth stage yield losses occurs in the range of 50-94% (Solankey *et al.,* 2014). Finally, it is utmost important to check the performance of different indigenous lines and cultivar for yellow vein mosaic disease and yield.

Materials and Methods

The field experiment was conducted on the vegetable research farm at Bihar agricultural university sabour Bhagalpur during the rainy season 2014. The 30 different okra genotypes collected from different source station (NBPGR, and IIHR) are listed in table 1. They were evaluated in a randomized completely block design with three replications.

Recommended plant protection measures and cultivation practices were followed during the course of experimentation to raise a good crop. Observation were recorded for 14 quantitative characters viz., Days to first flowering, Days to 50% flowering, first flowering node, Days to first picking, fruit length (cm), fruit diameter (cm), plant height (cm), number of branches/plant, plant canopy width, number of fruits per plant, average fruit weight (g), fruit yield per plant (g), per cent YVMV disease incidence, YVMV coefficient of infection. The disease scoring of YVMV incidence were calculated as per the procedure given by Banerjee and Kaloo (1987). The analysis of variance for the design of experiment was carried out according to the procedure outlined by Panse and Sukhatme (1967).The scale for disease scoring has been given in table 2.

Results and Discussion

The analysis of variance for different characters is presented in table 3. The ANOVA table revealed that the variation due to treatments was highly significant for all the characters except for fruit length. From the mean table it was observed that the wide range of variation exist among the genotypes to be studied. The genotypes IIHR 129 (33.67days) flower earliest, compare to the line IIHR-112 (54.33 days). The similar variation was found for the character days to 50 % flowering. For the character first flowering node it was found less variation among the genotypes. This may be due the genetic property of the genotypes. The genotypes IIHR 112 also take more time to first fruit harvest (60.33 days) but in spite of that produced good fruit yield per plant (216.58 g) due direct correlation to plant height (134.27 cm) and plant canopy width (105.67 cm). The similar trends have also been observed by Ramya and Senthilkumar (2009). In addition to the genotypes IIHR129, line IC-14600 (45.33 days), IC-18073 A (47.33 days), IC-31037 A (49.67 days) were early pod picking genotypes. This was due to the early flowering. The characters like plant height, plant canopy fruit yield per plant PDI and CI have found wide variation. The mean table showed that there is a direct correlation between the character's plant height, plant canopy width, number of fruit per plants and average fruit weight to the fruit yield per plant. The character's association revealed that the association of traits is not only due to genes but also due to the favorable impact of environment. The genotypes VRO-6, Arka

Anamika, IIHR 112, IC-90298, and IIHR 129 showed good results in relation to the PH, PCW, NFPP and AFW. The similar trends were also observed by Solankey *et al.*, (2014). The highest disease incidence was expressed in the genotypes IC- 90298 (96.67%) followed by Pusa Sawani (95.00%) and IC-128065 (87.67%) due to the favourable environmental condition for the vector whitefly (Das *et. al.* 2013).

Table.1 Scale for disease scoring of OYVMV disease in okra

Symptoms	Severity grade	Response value	Coefficient of infection	Reaction
Symptoms absent	0	0	0 – 4	HR
Very mild symptoms up to 25% leaves	1	0.25	4.1 – 9	R
Appearance of disease between 26-50% leaves	2	0.50	9.1 – 19	MR
Symptom between 51-75% leaves	3	0.75	19.1 – 39	MS
Severe disease infection at 75% leaves	4	1.00	39.1 – 69	S
Above 75% leaves	>4	>1.00	69.1 – 100	HS

Table.2 Analysis of variance (mean sum of squares) for 14 characters in okra

Characters	Source of variation		
	Replication	Treatments	Error
Df	2	29	58
Days to 50% flowering	5.03	45.31**	5.86
First flowering node	1.34	1.93**	0.62
Days to first picking	0.34	52.91**	3.52
Fruit length	3.85	1.39*	0.74
Fruit diameter	0.11	0.09**	0.02
Plant height	8.56	552.81**	40.05
Number of branch	0.01	2.11**	0.04
Plant canopy width	8.10	283.37**	23.58
Number of fruit/plant	1.05	25.51**	1.88
Average fruit weight	2.2	2.47**	1.20
Percent disease incidence	51.81	1927.14**	18.13
Coefficient of infection	36.81	2585.43**	10.13
Fruit yield per plant	326.73	5852.88**	409.46

*, ** - Significant at 5 % and 1 % probability level, respectively.

Table.3 Mean performances for 14 characters in okra

S. No	Characters	DFF	D50% F	FFN	DFP	FL	FD	PH	NOB	PCW	NFPP	AFW	PDI	COI	FYPP (g)
1.	**IC 43750**	45.67	51.67	7.00	51.33	10.61	1.51	104.17	3.23	86.67	13.77	11.33	76.33	76.33	154.55
2.	**IC14600**	39.00	47.00	6.00	45.33	10.60	1.46	104.33	4.30	105.00	17.50	11.57	83.33	83.33	201.36
3.	**IIHR-129**	33.67	40.33	7.33	38.33	10.58	1.72	114.83	3.22	99.33	21.20	13.77	10.00	2.50	293.16
4.	**IIHR-53**	52.67	59.33	9.00	58.00	9.86	1.59	83.27	2.37	64.00	10.53	11.49	21.00	5.25	121.94
5.	**IC-43742**	46.67	55.00	8.67	54.00	10.25	1.30	127.87	3.27	101.67	13.25	12.24	72.33	54.25	162.98
6.	**IIHR-120**	46.33	53.00	8.33	53.00	10.71	1.57	96.07	3.10	98.00	14.00	10.89	20.00	5.00	152.68
7.	**IIHR-123**	46.00	53.33	9.00	51.67	11.63	1.94	92.43	3.21	102.67	17.80	11.47	11.00	2.75	204.89
8.	**IIHR-128**	46.33	53.00	8.00	52.33	12.05	1.60	115.33	3.07	97.33	16.50	11.92	32.00	16.00	197.59
9.	**Arka Anamika**	48.00	54.67	7.33	53.67	10.22	1.47	138.67	3.20	107.00	19.73	13.73	22.67	5.67	270.52
10.	**IIHR-43**	50.67	57.67	8.33	56.00	9.07	1.42	110.00	3.37	97.00	10.27	13.45	60.00	45.00	138.89
11.	**Pusa Sawani**	54.00	59.67	6.67	59.33	9.04	1.60	107.17	1.14	92.33	12.47	11.99	95.00	95.00	149.94
12.	**IC-15537**	48.00	55.67	8.00	55.00	10.41	1.44	101.80	2.18	94.67	16.07	11.59	72.00	54.00	185.79
13.	**IIHR-113**	49.33	56.67	9.67	56.33	9.93	1.69	106.93	3.51	101.33	15.67	12.45	22.33	5.58	194.63
14.	**IIHR-110**	49.67	57.67	7.67	56.00	10.17	1.39	117.73	3.55	99.00	11.60	11.33	70.33	52.75	130.60
15.	**ArkaAbhay**	46.67	54.33	7.33	51.67	10.13	1.65	118.47	3.29	94.00	15.40	10.35	31.67	15.83	159.01
16.	**IIHR-112**	54.33	60.33	8.33	60.33	9.24	1.96	134.27	2.23	105.67	18.13	11.90	44.33	22.17	216.58
17.	**IC-128065**	48.33	55.67	8.67	54.00	9.85	1.58	119.00	2.15	103.00	14.20	11.43	87.67	87.67	161.89
18.	**IC-90298**	44.33	56.33	8.33	50.67	9.48	1.82	132.27	3.28	110.00	11.43	11.38	96.67	96.67	129.43
19.	**IC-128071**	47.00	57.00	8.00	53.00	10.15	1.47	114.53	3.14	98.33	15.80	10.98	77.67	77.67	172.92
20.	**IC-90219**	47.00	54.33	8.00	53.00	10.58	1.49	112.77	1.12	84.67	15.07	12.46	65.33	49.00	187.24
21.	**IC-18073 A**	40.00	54.00	8.00	47.33	9.13	1.46	100.03	3.15	84.00	9.43	12.80	64.33	48.25	121.65
22.	**IC-128037**	46.00	53.00	8.67	51.67	10.79	1.36	118.33	1.33	100.67	13.33	11.21	79.00	79.00	148.48
23.	**IC-99709**	48.00	56.00	7.33	54.33	10.12	1.37	111.67	3.48	105.67	15.45	12.15	72.33	54.25	188.03
24.	**IC-128035**	48.33	55.67	8.67	53.67	9.49	1.65	106.13	3.32	90.00	12.25	10.45	65.67	49.25	127.28
25.	**IC14845B**	50.67	57.67	8.00	57.00	9.71	1.29	94.10	3.16	80.67	16.37	12.43	57.00	42.75	202.92
26.	**IC-111520**	46.33	54.33	7.33	52.00	10.70	1.44	114.67	1.21	104.67	14.67	12.59	55.33	41.50	184.41
27.	**IC-43741**	47.00	54.33	8.67	53.33	10.25	1.40	105.30	3.42	90.67	13.50	12.11	67.67	50.75	164.11
28.	**IC-31037A**	43.67	50.67	7.33	49.67	10.52	1.84	124.67	3.16	98.67	16.45	12.08	71.33	53.50	198.45
29.	**IC-16262A**	46.33	54.00	8.00	52.33	10.21	1.53	117.63	4.26	106.33	15.08	12.11	55.67	41.75	183.66
30.	**VRO-6**	44.00	50.67	6.67	50.33	10.45	1.60	140.70	2.43	105.00	20.50	13.86	34.67	17.33	283.44
Grand Mean		46.80	54.43	7.94	52.82	10.20	1.55	112.84	2.89	96.93	14.91	11.98	56.49	44.36	44.36
S.E.		1.47	1.40	0.45	1.08	0.50	0.08	3.65	0.11	2.80	0.79	0.63	2.46	1.84	1.84
C.D. 5%		4.22	3.99	1.30	3.09	1.42	0.23	10.44	0.32	8.01	2.27	1.81	7.03	5.25	5.25

DFF-days to first flowering, D50%F –days to 50% flowering, FFN-first flowering node, DFP- days to first picking, FL- fruit length, FD-fruit diameter, PH- plant height. NOB-number of branch, PCW- plant canopy width, NFPP- number of fruit per plant, AFW-average fruit weight, PDI- per cent disease incidence, CI- coefficient of infection. FYPP - fruit yield per plant.

Though the genotypes Pusa Sawani founded highly susceptible to YVMV, but it was reported that the incidence of disease occurred lately in Pusa Sawani ultimately yielded some good yields. The genotypes IIHR 129, IIHR-123, IIHR 120 were found least infection to the YVMV disease. None of the genotypes were found without YVMV infection or zero infection.

It may be concluded that there was high variation found for all the characters to be studied. The genotypes IIHR 129 was the best performer for most of the desirable traits followed by check variety VRO- 6. Moreover, IIHR-123, IIHR-112 and IC-14600 were also better performing genotypes. Further these genotypes may be useful in hybrid breeding programme as parent material for improvement in yield and YVMV resistance in okra

References

Anonymous 2014. Indian Horticulture Database. National Horticulture Board, Okra, Ministry of Agriculture, Government of India, pp.155.

Banerjee M. K. and Kalloo. G. 1987. Sources and inheritance of resistance to leaf curl virus in *Lycopersicon* spp. *Theor. Appl. Genet*. 73: 707-710.

Chattopadhyay A, Dutta S, Chatterjee S. 2011. Seed yield and quality of okra as influenced by sowing dates. *Afr. J. Biotechnol*. 10(28):5461-5467.

Das S, Chattopadhyay A, Dutta S, Chattopadhyay S B, Hazra P. 2013. Breeding okra for higher productivity and yellow vein mosaic tolerance. *Int. J. Veg. Sci.* 19: 58-77.

Kumar, A., Verma, R.B., Solankey, S.S., Adarsh, A. 2015. Evaluation of okra (*Abelmoschus esculentus*) genotypes for yield and yellow vein mosaic disease. *Ind Phytol* 68(2): 201-206.

Pal, B.P., Singh, H.B., Swarup, V. 1952. Taxonomic relationships and breeding possibilities of species [*Abelmoschus esculentus* (L.) Moench]. *Bot. Gazz*. 113: 455-464.

Panse, V. G. and Sukhatme, P. V. 1967. Statistical methods for agricultural workers, ICAR, New Delhi, pp: 152-161.

Ramya, K. and Senthilkumar, N. 2009. Genetic divergence, correlation and path analysis in Okra (*Abelmoschus esculentus* L. Moench.). *Madras Agric. J*. 96: 296-299.

Rashwan, A.M.A. 2011. Study of genotypic and phenotypic correlation for some agro-economic traits in okra (*Abelmoschus esculentus* (L.) Moench). *Asian J Crop Sci* DOI: 10.3923/ajcs.2011.

Solankey, S.S., Akhtar, S., Kumar. R., Verma. R.B and Sahajanand. K. 2014. Seasonal response of okra (*Abelmoschus esculentus* L. Moench) genotypes for okra yellow vein mosaic virus incidence. *Afr. J. Biotechnology*.13 (12): 1336-1342.

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