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Screening of Okra Germplasm for Resistance to Yellow Vein Mosaic Virus under Field Conditions

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Abstract: Twelve okra germplasms were screened for resistance to okra yellow vein mosaic virus (YVMV) under field conditions. Lines OK-292 and OK-285 showed resistant to YVMV in both season and OK 315, OK 316 and OK 317 were found tolerant. The highest yield per hectare found in the line OK-292 (18.00 t ha^{-1}) followed by OK-285 (16 t ha^{-1}) and line OK-310 produced the lowest yield (9.85 t ha^{-1}) followed by pusa (9.95 t ha^{-1}).

Key words: Germplasm, okra, resistance, yellow vein mosaic virus

Introduction

Okra (*Hibiscus esculentus* L.) is one of the most popular vegetable crops cultivated throughout Bangladesh. Tender fleshy fruits of okra are very useful for many human diseases. Because of high consumer's demand and thereby better price, farmers grow okra widely during summer season. The crop suffers from a number of diseases (Rangas Wamy, 1979; Richardson, 1997). Okra yellow vein mosaic virus is the most destructive disease, which causes colossal losses in the crop by affecting the quality and yield of the fruits. Attempts had been made by several workers to reduce the disease through the use of insecticides (Sastry and Singh, 1973, 1974; Chakraborty and Mukhopadhyay, 1977; Khan and Mukhopadhyay, 1985a; Ramachandran and Summanwar, 1986; Bhagat *et al.*, 1997), resistant screening (Arora *et al.*, 1992; Sharma *et al.*, 1993; Singh and Gupta, 1991; Bora *et al.*, 1992; Nath and Saikia, 1992) and other cultural control methods (Khan and Mukhopahyay, 1985a,b; Singh and Singh, 1986; Singh *et al.*, 1989). But satisfactory control measure has not been achieved and the disease continues to be a threat to okra cultivation. Emphasis is needed on breeding to develop YVMV resistant variety. This study was under taken to find out the potential source of resistance of okra to yellow vein mosaic virus under natural epiphytic condition.

Materials and Methods

The experiment was conducted at the Olericulture Division of Horticulture Research Centre, Bangladesh Agricultural Research Institute, Gazipur during 1995-96 and 1996-97. Seeds were sown in single 5 m row with 60 cm plant spacing. The experiment was carried out in randomized block design. The incidence of YVMV was calculated and grading was done on the basis of mean percentage plant infection of two years as described by Sharma and Sharma (1984) as followed:

Grade	Percentage	Category
Resistant (R)	0-0	IV
Tolerant (T)	1-30	III
Susceptible (s)	31-70	II
Highly susceptible (HS)	70-100	I

In 1995-96 disease incidence was recorded 60 days after planting and in the next year, disease incidence was recorded at 30 and 60 days after planting. The fruits were picked regularly and weighed separately for each plot. The data obtained with respect to disease incidence and yield were subjected to statistical analysis (Handa and Gupta, 1993).

Results and Discussion

Crop season 1995-96: Twelve var./lines of okra were screened for resistance to infection by YVMV of okra under field condition. It is found that only two-selection i.e., OK-292 and OK-285 were found to be resistant to YVMV infection (Table 1). Besides that, fairly high degree of tolerance was obtained in four-line i.e., OK-308, OK-315, OK-316 and OK-317 under field conditions. These lines showed disease incidence ranging from 10.00 to 21.25%. The rest six lines, OK-307, OK-3010, KO-311, OK-312, OK-314 and pusa showed highly susceptible to this disease and incidence ranged from 80-100%.

Crop season 1996-97: It is found that two-selection i.e., OK-292 and OK-285 were found to be resistant to YVMV infection (Table 1). Besides that, fairly high degree of tolerance was obtained in four-line i.e., OK-308, OK-315, OK-316 and OK-317 under field conditions. These lines showed disease incidence ranging from 03.57 to 27.11%. The rest six lines, OK-307, OK-3010, KO-311, OK-312, OK-314 and pusa showed highly susceptible reaction (92-100%).

Table 1: Incidence of different okra var./lines against okra yellow vein mosaic virus under natural field conditions during 1995-96 and 1996-97

			Disease incidence %		
			1995-96	1996-1997	
Var./lines	Category	Reaction	60 DAP	30 DAP	60 DAP
OK 307	I	Highly susceptible	80.00	20.58	100.00
OK 310	I	-	90.25	45.63	92.75
OK 311	I	-	100.00	37.52	100.00
OK 312	I	-	92.50	24.44	100.00
OK 314	I	-	100.00	22.69	100.00
Pusa	I	-	80.00	40.00	100.00
OK 308	III	Tolerant	20.25	0.00	15.25
OK 315	III	-	21.25	0.00	18.18
OK 316	III	-	10.00	0.00	03.57
OK 317	III	-	20.25	5.08	27.11
OK 292	IV	Resistant	0.00	0.00	0.00
OK 285	IV	-	0.00	0.00	3.08

I = Highly susceptible, III = Tolerant, IV = Resistant, DAP = Days after planting

The yield differed significantly (Table 2). The lowest yield (9.85 t ha^{-1}) was obtained in line OK-310 followed by pusa (9.95 t ha^{-1}), OK-312 (10.50 t ha^{-1}) and OK-311 (11.11 t ha^{-1}). The highest yield 18.00 t ha^{-1} was recorded in OK-292 followed by OK-285 (16.00 t ha^{-1}), OK-316 (15.36 t ha^{-1}) and OK-308 (14.35 t ha^{-1}).

Results of this study indicated that OK-292 and OK-285 were found to be the most promising lines against yellow vein mosaic infestation in the field. These gave higher yield (18, 16 t ha^{-1}) because of their high tolerance to yellow vain mosaic virus in both the years. This could be a useful source of resistant genes which could be exploited in breeding okra cultivars resistant to yellow vain mosaic virus. A number of authors reported that

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Table 2: Yield and yield contributing characters of different okra lines during 1996-97

Var./lines	No. of fruits/plant	Yield/plant (g)	Yield (t ha^{-1})
OK 307	22	372	12.00
OK 310	14	275	9.85
OK 311	14	320	11.11
OK 312	16	280	10.50
OK 314	20	350	12.00
Pusa	15	265	9.95
OK 308	22	397	14.35
OK 315	21	370	12.25
OK 316	23	420	15.36
OK 317	21	400	14.95
OK 292	26	465	18.00
OK 285	24	450	16.00
CV (%)	4.71	1.53	2.69
LSD at 5% level	1.56	9.39	0.6

Abelmoschus manihot subspecies manihot is a good source of resistance to yellow vein mosaic virus (Sharma and Sharma, 1984). Arora *et al*. (1992) evaluated 157 advanced germplasm and 7 cultivars/hybrids of okra for two years and observed that Punjab Padmini and EMS-8 remained free from the yellow vein mosaic virus. Sharma *et al*. (1993) reported that Punjab Padmini and Punjab-7 varieties of okra were found high yielding and resistant to yellow vein mosaic virus after four years of evaluation. Bora *et al*. (1992) exposed 22 genotypes to whiteflies carrying yellow vein mosaic virus and found cv. arka anamika was highly resistant from the disease. It is concluded that OK-292 and OK-285 lines could be used as resistant lines against this virus.

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