



RESEARCH PAPER

In vitro screening of okra *Abelmoschus esculentus* L. germplasm collections against sucking pests

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Abstract : Studies on “*In vitro* screening of okra germplasm/ accessions against sucking pests” were undertaken at Agricultural College and Research Institute, Madurai. Thirty okra accessions were screened against sucking pests’ viz., aphids, jassids, and whiteflies. The results showed that accessions IC 15027 showed resistant level, IC 90202, IC 90203, IC 90213, IC 90214 found to be moderately resistant to sucking pests.

Key Words : Screening, Okra, Sucking pests, Germplasm, Resistance

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INTRODUCTION

Okra (*Abelmoschus esculentus* L.) commonly known as okra or lady’s finger belongs to the Malvaceae family and is an important vegetable crop grown across different states of the country throughout the year. Among the different species of genus, *Abelmoschus*, the most popularly grown species is *Abelmoschus esculentus* in Asia and has great commercial demand due to its nutritional value. The major production constraint for okra is yellow vein mosaic disease, causing losses with regard to quality and as well as the yield wherever the crop is grown. The yellow vein mosaic disease of okra (YVMD) is caused by Okra yellow vein mosaic virus (BYVMV) and was first reported in 1924 from the erstwhile Bombay Presidency (Kulkarni, 1924). The virus belongs to the genus Begomovirus, family:

Geminiviridae (Fauquet and Stanley, 2005). This virus is being transferred by one of the sucking pests white fly, *Bemisia tabaci* Gennadius. The other sucking pests causing the yield loss are of aphids, *Aphis gossypii* (Glover), the leaf hopper, *Amrasca biguttula biguttula* (Ishida). These are the serious pests infesting okra crop (Uthamsamy and Balasubramanian, 1978). The plant protection measures to overcome the pest problem in general include the application of insecticides. As the marketable fruits are needed to be tender for better price the harvest is regular. Coherently the usage of insecticides increases and becomes a menace for their higher level of residues and toxicity while consuming the fruits.

Considering the residual and toxic nature of pesticides, an eco - friendly method of using the natural plant resistance to the pest attack is followed as one of the solution to manage the pest problem. Keeping this in

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view, the present study was undertaken to screen some of the germplasm/accessions of okra against sucking pests.

MATERIAL AND METHODS

The experiment was conducted at Agricultural College and Research Institute, Madurai district during February, 2015 to screen the okra accessions under natural infection condition. For this 20 germplasm accessions and 10 popular varieties were sown for screening. The experimental materials comprised 3 rows of each accession of 3 m length with a row to row distance 60 cm and plant to plant distance of 45 cm. All the recommended cultural practices were followed to raise the crop and no plant protection measures were followed.

Accession/varieties used :

IC 90202, IC 90203, IC 90213, IC 90214, IC 90218, IC 90219, IC 90223, IC 90285, IC 90269, IC 90270, IC 90284, IC 15438, IC 15537, IC 15027, IC 45827, IC 45828, IC 48281, IC 48948, IC14909, IC 52301, Arka Anamika, VRO 104, Kashi Pragathi, Punjab 8, Pusa Sawani, Kashi Vibhuti, Varsha Uphar, VRO 106, PUSA A4.

Observation of the incidence of sucking pests :

The observation on sucking pests like aphids, jassids and white fly were recorded with their occurrence in field and continued till harvesting with an interval of seven days at vegetative, flowering and fruiting stages on five randomly selected plants. The intensity of the incidence of each was calculated.

Aphids :

The aphid population was recorded on five plants during seedling stage, while it was recorded on three leaves (top, middle and bottom) of each selected plants at random during the flowering and fruiting stages. The data was converted into average aphid population per plant.

Jassids :

The aphid population was recorded on five plants during seedling stage, while it was recorded on three leaves (top, middle and bottom) of each selected plants at random during the flowering and fruiting stages. The data was converted into average population per plant.

White flies :

Whitefly population was recorded on five randomly selected plants during the seedling stage, and during the flowering and fruiting stage while it was recorded on three leaves (top, middle and bottom) of each selected plants at random during the flowering and fruiting stages. The data was converted into average population per plant.

Statistical analysis :

The population of the sucking pest complex during the crop period was converted to mean population per plant. These values were subjected to statistical analysis. Based on the standard deviation values, the germplasm lines were categorized as Highly Resistant, Resistant, Moderately resistant, moderately susceptible, and susceptible, highly susceptible (Based on the scaling of Bag *et al.*, 2012).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Screening against aphids :

Based on the mean aphid population of all the 30 accessions were categorized to highly resistant, resistant, moderately resistant, moderately susceptible, susceptible, and highly susceptible.

Among the 30 accessions, the following 11 accessions, IC 90202 (32.02), IC 90203(37.34), IC 90213(29.25), IC 90214(32.87), IC 90218(34.89), IC 90285(33.99), IC 90269(39.64), IC 90270(31.05), IC 45828(34.19), IC 48281(39.88), and Kashi Vibhuti (31.23) were categorized as moderately resistant for the aphid (Values in Paranthesis are mean % level of population).

The accessions of IC 90219 (75.43), IC 90223 (72.87), IC 90284 (70.76), IC 15438 (82.53), IC 15537 (64.64), IC 45827 (72.64), IC 48948 (73.48), IC 52301 (85.70) and Arkaanamika (67.12) were categorized as the moderately susceptible for the level of incidence.

The susceptible accession was Pusasawani (92.46), the resistant sources are VRO-104 (20.16), Kashimanghali (23.52), Kashipragathi 918.42, Punjab – 8 (20.70), Varshauphar (13.95), VRO 106 (16.27), Pusa A4 (12.74), and IC 15027, IC 14909 were categorized as resistant for the values of (4.15), (4.34). This is study is in conformity with Jalgaonkar *et al.*, 2002.

Screening against jassids :

For screening of jassids the classification of the accessions are with the mean population level of incidence in the following accessions are IC 90202 (19.23), IC 90203 (22.43), IC 90213 (17.56), IC 90214 (19.74), IC

90218 (17.83), IC 90285 (20.79), IC 90269 (16.28), IC 90270 (18.30), IC 45828 (16.74), IC 48281 (19.52) and Kashi Vibhuti (15.29) were categorized as moderately resistant for the aphid (Values in Paranthesis are mean per cent population).

Table 1 : Scale for screening for their reactions against the sucking pests

Symptoms	Severity grade	Response value	Co-efficient of infection	Reaction
Symptoms absent	0	0.0	0-4	Highly resistant
Very mild upto 25% leaves	1	0.25	5-9	Resistant
Appearance of symptom in 26 – 50% of leaves	2	0.50	10-19	Moderately resistant
Appearance of symptom in 51-75% of leaves	3	0.75	20-39	Moderately susceptible
Severe disease infection in more than 75 % of leaves	4	1.00	40-69	Susceptible
			70- 100	Highly susceptible

Table 2 : *In vitro* screening of Okra germplasm for sucking pests

Sr. No.	Accessions	Aphids		Leaf hopper		Whitefly	
		Mean population	Level of resistance	Mean population	Level of resistance	Mean population	Level of resistance
1.	IC90202	29.32	MR	13.51	MR	21.76	MR
2.	IC90203	27.11	MR	15.76	MR	25.38	MR
3.	IC90213	29.31	MR	12.34	MR	19.88	MR
4.	IC90214	28.74	MR	13.87	MR	22.34	MR
5.	IC90218	30.32	MR	12.44	MR	23.16	MR
6.	IC90219	65.43	MS	19.89	MS	21.34	MS
7.	IC90223	62.61	MS	19.14	MS	16.71	MS
8.	IC90285	28.77	MR	14.51	MR	23.78	MR
9.	IC90269	34.70	MR	11.36	MR	27.02	MR
10.	IC90270	31.03	MR	12.77	MR	21.16	MR
11.	IC90284	67.38	MS	17.97	MS	19.05	MS
12.	IC15438	78.31	MS	20.96	MS	22.22	MS
13.	IC15537	59.18	MS	16.42	MS	17.40	MS
14.	IC15027	1.70	R	1.23	R	3.26	R
15.	IC45827	67.41	MS	18.45	MS	19.56	MS
16.	IC45828	27.20	MR	12.86	MR	23.58	MR
17.	IC48281	33.49	MR	15.00	MR	27.50	MR
18.	IC48948	64.27	MS	19.37	MS	18.29	MS
19.	IC14909	2.19	R	1.50	R	3.30	R
20.	Arkaanamika	61.90	MS	17.70	MS	18.78	MS
21.	VRO-104	10.87	R	6.14	R	15.10	R
22.	Kashimangali	13.49	R	7.16	R	17.61	R
23.	Kashipragathi	10.91	R	5.61	R	13.79	R
24.	Punjab-8	9.43	R	6.30	R	15.50	R
25.	Pusasawani	82.81	S	27.47	S	34.87	S
26.	Kashivibuthi	27.34	MR	11.75	MR	21.54	MR
27.	varshaupar	8.77	R	5.75	R	13.40	R
28.	VRO 106	6.54	R	6.70	R	15.63	R
29.	PUSA A4	9.39	R	5.25	R	12.24	R
30.	IC52301	79.50	MS	22.60	MS	18.18	MS

MPP: Mean population per plant, LR: Level of resistance, HR: Highly resistant, R: Resistant, MR: Moderately resistant, MS: Moderately susceptible, S: Susceptible, HS: Highly susceptible

The accessions of IC 90219 (20.23), IC 90223 (22.74), IC 90284 (23.27), IC 15438 (27.14), IC 15537 (21.26), IC 45827 (23.89), IC 48948 (22.14), IC 52301 (25.83), and Arkaanamika (22.15) were categorized as the moderately susceptible for the level of incidence.

The susceptible accession was Pusasawani (88.43), the resistant sources are VRO-104 (7.7), Kashimanghali (8.92), Kashipragathi (7.03), Punjab – 8 (7.90), Varshauphar (6.8), VRO 106 (7.93), Pusa A4 (6.21), and IC 15027 (5.10), IC 14909 (5.20) were categorized as resistant. This study is in conformity with Jalgaonkar *et al.* (2002).

Screening against whiteflies :

For screening of white flies the classification of the accessions are with the mean population level of incidence in the following accessions are IC 90202 (17.76), IC 90203 (20.71), IC 90213 (16.22), IC 90214 (18.23), IC 90218 (17.04), IC 90285 (17.49), IC 90269 (19.87), IC 90270 (15.56), IC 45828 (17.53), IC 48281 (20.45) and Kashi Vibhuti (16.02) were categorized as moderately resistant.

The accessions of IC 90219 (32.62), IC 90223 (33.89), IC 90284 (28.02), IC 15438 (32.69), IC 15537 (25.60), IC 45827 (28.77), IC 48948 (31.78), IC 52301 (37.06) and Arkaanamika (29.03) were categorized as the moderately susceptible which is at par with the results of Bag *et al.* (2012). The susceptible accession was Pusasawani (41.43), the resistant sources are VRO-104 (12.54), Kashimanghali (14.62), Kashipragathi (11.45), Punjab – 8 (12.87), Varshauphar (10.81), VRO 106 (12.67), Pusa A4 (9.88) and IC 15027 (7.89), IC 14909 (8.78) were categorized as resistant. This study is in close conformity with the study of Patel *et al.* (2009) and Gonde *et al.* (2012) the variety Pusasawani is susceptible to white flies and the VRO 104, VRO 106 proved to be resistant. Significantly the accessions having the low population of aphids, jassids and white flies IC 15027, IC 14909 reveals them as the resistant source. Similar work related to the present investigation was also done by Amaranatha Reddy and

Sridevi (2014) and Mali and Shah (2013).

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