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Screening of genotypes of okra against major sucking pests infesting okra (*Abelmoschus esculentus* L. Moench)

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Abstract
The present investigation entitled "Screening of different genotypes of okra against major sucking pests infesting okra (*Abelmoschus esculentus* L. Moench)" was carried during *kharif* season of 2019-2020 at Central Experimental Station, Wakawali. Forty genotypes were screened against leaf hoppers, aphids and whiteflies under field condition. The genotypes showed different responses for different sucking pests. The highest mean population of leaf hoppers was recorded on the genotype Pusa Sawani (8.08), while lowest was observed on Kashi Pragati (3.93) per three leaves. In aphids, the most promising genotype was Kashi Pragati (4.90) mean population per three leaves, while genotype Pusa Sawani was most infested by aphid (7.55) per three leaves. Highest whiteflies infestation was recorded on genotype Parbhani Kranti (4.97) and lowest was noticed on genotype Kashi Pragati (2.95).

Keywords: Screening, okra, genotypes, *Amarasca biguttula biguttula* (ishida), whitefly, aphid etc.

Introduction
Okra (*Abelmoschus esculentus* L. Moench) belonging to family Malvaceae is an important vegetable in India and cultivated for its immature fruits. The 25 ºC to 35 ºC is the optimum range of temperature for successful cultivation of okra. Soil with good moisture holding capacity, well drained and pH should be 5.8 to 7.0 is ideal for its successful cultivation. It has good nutritional value. Per 100 g of edible portion of okra contain calories 35.0, Moisture 89.6 gm, Carbohydrates 6.4 gm, Protein 1.9 gm, Fat 0.2 gm, Fibre 1.2 gm, Minerals 0.7 gm, Phosphorus 56.0 mg, Sodium 6.9 mg, Sulphur 30.0 mg, Calcium 66.0 mg, Iron 1.5 mg, Potassium 103 mg, Magnesium 53 mg, Copper 0.19 mg, Riboflavin 0.01 mg, Thiamine 0.07 mg, Nicotinic acid 0.06 mg, Vitamin C 13.10 mg, Oxalic acid 8.0 mg (Gopalan *et al*., 2007) [2]. Okra has vital role in curing of health problems as it possesses many antidiabetic, antipyretic, diuretic & antispasmodic properties etc. (Roy *et al.*, 2014) [4].

India ranks second in terms of vegetable production in the world with the production of about 169.1million tonnes with an area of 10.1 million hectares, while it occupies the first position in okra production which is about 67% of the total world's production (Anonymous, 2015-16a). In India, the total area under okra is 5.09 lakh hectares with an annual production of 60.94 lakh tons with productivity of 11.97 tons' ha^{-1} (Anonymous, 2017-18 [1] Although okra is a rich source of nutrients but in addition to this, it also serves as the house of pest and diseases. As high as 72 species of insects has been recorded on okra (Srinivasa and Rajendra, 2003) of which among the sucking pest complex, leaf hopper *Amrasca biguttula biguttula* (Ishida) is a major concern and cause havoc damage. Leafhopper alone had caused 59.79 per cent losses in okra fruit yield (Atwal & Singh, 1994) [5]. The sucking pests suck the cell sap from the ventral surface of the leaves and in addition inject the toxic saliva into the plant tissues leading to yellowing and curling of leaves (Singh et al, 2013). In general, overall damage due to insect pests amounts to 48.97 per cent loss in pod yield (Kanwar and Ameta, 2007) [3].

Hence, the investigation was undertaken to study the screening of different genotypes against sucking pests infesting okra under field conditions.

Materials and Methods

The field experiment was conducted at Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during the *kharif* season of 2019-20. The Seeds of the okra genotypes were sown in the well prepared field. All the recommended package of practices was followed. The genotypes were kept unsprayed throughout the crop season. The details of the experiment are given below in table.

Table 1: Details of the field experiment to screen genotypes against sucking pests infesting okra

1)	**Season/Year**	**:**	***Kharif*, 2019**
2)	Design	:	Randomized Block Design
3)	Size of plot	:	0.9 m × 3.0 m
4)	Method of planting	:	On Ridges
5)	Date of sowing	:	18th June, 2019
6)	Spacing	:	45 cm × 30 cm
7)	No. of Genotypes	:	Forty

Table 2: List of genotypes used for screening against sucking pests infesting okra

1	**NOL-303**	**21**	**Hariya-351**
2	JNDOL-03-1	22	Veldhe local
3	JNDOL-02-2	23	Parbhani kranti
4	BO-13	24	Okra local
5	PB-31-1	25	Kashi pragati
6	Arka abhay	26	Phule utkarsh
7	Bhendi No.10	27	Evergreen
8	OKRAVRES-1	28	Wild okra-2
9	OKRAVRES-2	29	VRO-22
10	OKRAVRES-4	30	Arka anamika
11	OKRAVRES-5	31	Pusa sawani
12	OKRAVRES-6	32	HRB-107-4
13	Mahabeej-333	33	Varsha uphar
14	VRO-6	34	ARO-97-16
15	DSN-1	35	OKRAVRES-9
16	HRB-108-2	36	OKRAVRES-10
17	HRB-108-4	37	OKRAVRES-7
18	PB-236	38	Phule vimukta
19	PB-226	39	Bantivre local
20	PB-266	40	Ok-11-local

Data were recorded from five randomly selected and tagged plants from each genotype for recording observations of infestation of major sucking pest *viz.* Aphid, Whitefly and Leaf hopper. The observations were recorded on three leaves Top, Middle and Bottom of selected plants at weekly interval starting from incidence of sucking pest. The average population per three leaves was worked out.

Result and Discussion

The data on overall mean leaf hopper infestation was in the range of 3.93 to 8.08. The highest mean leaf hopper infestation was recorded on the genotype Pusa sawani (8.08 ± 0.84). The mean leaf hopper infestation recorded in remaining genotypes in descending order was Parbhani Kranti (7.20), Arka Anamika (6.84), Arka Abhay (6.68), NOL-303 (5.84), Okra Local (5.22) OKRAVRES-1 (5.19), JNDOL-03-1 (5.19), OKRAVRES-2 (5.16), JNDOL-02-2 (5.13), OKRAVRES-4 (5.11), OKRAVRES-6 (5.06), OK-11-LOCAL (4.99), DSN-1 (4.99), Mahabeej-333 (4.99), Bhendi No-10 (4.92), OKRAVRES-5 (4.88), HRB-107-4 (4.82), Evergreen (4.81), HRB-108-2 (4.81), OKRAVRES-10 (4.77), OKRAVRES-7 (4.71), PB-31-1 (4.71), OKRAVRES-9 (4.65), HRB-108-4 (4.65), ARO-97-16 (4.64), BO-13 (4.64), Bantivre local (4.63), VRO-22 (4.55), Veldhe local (4.55), VRO-6 (4.50), Hariya-351 (4.48), PB-226 (4.32), PB-266 (4.31), PB-236 (4.30), Phule utkarsh (4.29), Wild okra-2 (4.24), Phule Vimukta (4.21) and Varsha Uphar (4.21). The lowest mean leaf hopper infestation was recorded on the genotype Kashi pragati (4.18 ± 0.84).

The present investigations are inconformity with Jahangir *et al.*, (2007) [9] were reported maximum leaf hopper population on Pusa sawani (6.256 ± 1.978 /leaf) and minimum was on Green wonder (4.937 ± 1.561 per leaf). Also Gadekar *et al*., (2015) [10] were screened ten varieties of okra against sucking pests and found the varieties, Hissar Unnat and Varsha Uphar showed less susceptibility to leaf hopper infestation. Narayan *et al.*, (2016) [8] found that Pusa Sawani (88.43) was susceptible to leafhopper infestation, the resistant sources are VRO-104 (7.7), Kashi manghali (8.92), Kashi pragati (7.03), Punjab – 8 (7.90), Varsha uphar (6.8), VRO 106 (7.93), Pusa A4 (6.21), and IC 15027 (5.10), IC 14909 (5.20) were categorized as resistant.

The data on overall mean population of aphid was in the range of 4.90 to 7.55. The highest mean population was recorded on the genotype Pusa sawani (7.55 ± 0.25) per three leaves. The mean population recorded in remaining genotypes in descending order was Parbhani Kranti (7.41), Arka Anamika (7.30), Arka Abhay (6.91), Okra 11 local (6.75), OKRAVRES-9 (6.55), OKRAVRES-7 (6.49), OKRAVRES-6 (6.42), OKRAVRES-10 (6.36), OKRAVRES-5 (6.33), HRB-108-2 (6.32), JNDOL-02-2 (6.29), HRB-108-4 (6.26), OKRAVRES-2 (6.22), Evergreen (6.21), OKRAVRES-1 (6.21), JNDOL-03-1 (6.20), OKRAVRES-4 (6.19), VRO-6 (6.17), Okra local (6.14), HRB-107-4 (6.13), Veldhe local (6.08), DSN-1 (6.07), Bantivre local (6.05), Bhendi No.10 (6.04), PB-266 (6.00), BO-13 (6.00), PB-236 (5.99), Hariya-351 (5.95), ARO-97-16 (5.91), PB-226 (5.91), NOL-333 (5.88), Mahabeej-333 (5.85), PB-31-1 (5.82), Wild okra-2 (5.79), VRO-22 (5.71), Phule Vimukta (5.13), Phule Utkarsh (5.00) and Varsha Uphar (4.94). The lowest population was recorded on the genotype Kashi pragati (4.90 ± 0.25) per three leaves.

The present investigations are inconformity with Patel *et al.* (2015) [7] reported the highest population of aphid was registered on cultivar Parbhani Kranti and found to be highly susceptible. Also Narayan *et al.* (2016) [8] reported the resistant sources are VRO-104 (20.16), Kashi Manghali (23.52), Kashi pragati (18.42), Punjab – 8 (20.70), Varsha uphar (13.95), VRO 106 (16.27), PusaA4 (12.74), and IC 15027, IC 14909 were categorized as resistant for the values of (4.15), (4.34).

The data on overall mean population of whiteflies was in the range of 2.95 to 4.97. The highest mean population was recorded on the genotype Parbhani Kranti (4.97 ± 0.46) per three leaves. The mean population recorded in remaining genotypes in descending order was Pusa Sawani (4.84), Arka Anamika (4.53), Arka Abhay (4.34), OK-11-local (3.99), OKRAVRES-6 (3.94), HRB-107-4 (3.85), OKRAVRES-4 (3.81), OKRAVRES-2 (3.78), OKRAVRES-1 (3.77), Bantivre local (3.75), OKRAVRES-9 (3.75), OKRAVRES-5 (3.75), ARO-97-16 (3.69), Bhendi No.10 (3.66), NOL-333 (3.59), VRO-22 (3.57), VRO-6 (3.56), Hariya-351 (3.55), OKRAVRES-10 (3.54), OKRAVRES-7 (3.52), Veldhe Local (3.49), HRB-108-4 (3.47), JNDOL-02-2 (3.46), JNDOL-03-1 (3.46), Mahabeej-333 (3.44), HRB-108-2 (3.42), DSN-1 (3.39), Okra local (3.35), Evergreen (3.29), PB-266 (3.28),

BO-13 (3.27), PB-236 (3.23), PB-31-1 (3.20), PB-226 (3.09), Wild Okra (3.00), Varsha Uphar (2.98), Phule Utkarsha (2.98) and Phule Vimukta (2.97). The lowest population was recorded on the genotype kashi pragati (2.95 ± 0.46) per three leaves.

The present investigations are in conformity with the Patel *et al.* (2015) [7] revealed that Parbhani Kranti found to be susceptible against whitefly. Also Narayan *et al.,* (2016) [8] were reported that susceptible accession was Pusa sawani (41.43), the resistant sources are VRO-104 (12.54), Kashi manghali (14.62), Kashi pragati (11.45), Punjab – 8 (12.87), Varsha uphar (10.81), VRO 106 (12.67), Pusa A4 (9.88) and IC 15027 (7.89), IC 14909 (8.78) were categorized as resistant.

Table 3: Overall mean population major sucking pests infesting okra

Sr. No	Genotypes	Mean population of leaf hopper per 3 leaves	Mean population of aphid per 3 leaves	Mean population of whitefly per 3 leaves
1	NOL-303	5.84	5.88	3.59
2	JNDOL-03-1	5.19	6.20	3.46
3	JNDOL-02-2	5.13	6.29	3.46
4	BO-13	4.64	6.00	3.27
5	PB-31-1	4.71	5.82	3.20
6	Arka Abhay	6.68	6.91	4.34
7	Bhendi No. 10	4.92	6.04	3.66
8	OKRAVRES-1	5.19	6.21	3.77
9	OKRAVRES-2	5.16	6.22	3.78
10	OKRAVRES-4	5.11	6.19	3.81
11	OKRAVRES-5	4.88	6.33	3.75
12	OKRAVRES-6	5.06	6.42	3.94
13	Mahabeej-333	4.99	5.85	3.44
14	VRO-6	4.50	6.17	3.56
15	DSN-1	4.99	6.07	3.39
16	HRB-108-2	4.81	6.32	3.42
17	HRB-108-4	4.65	6.26	3.47
18	PB-236	4.30	5.99	3.23
19	PB-226	4.32	5.91	3.09
20	PB-266	4.31	6.00	3.28
21	Hariya-351	4.48	5.95	3.55
22	Veldhe Local	4.55	6.08	3.49
23	Parbhani Kranti	7.20	7.41	4.97
24	Okra Local	5.22	6.14	3.35
25	Kashi Pragati	4.18	4.90	2.95
26	Phule Utkarsh	4.29	5.00	2.98
27	Evergreen	4.81	6.21	3.29
28	Wild Okra-2	4.24	5.79	3.00
29	VRO-22	4.55	5.71	3.57
30	Arka Anamika	6.84	7.30	4.53
31	Pusa Sawani	8.08	7.55	4.84
32	HRB-107-4	4.82	6.13	3.85
33	Varsha Uphar	4.21	4.94	2.98
34	ARO-97-16	4.64	5.91	3.69
35	OKRAVRES-9	4.65	6.55	3.75
36	OKRAVRES-10	4.77	6.36	3.54
37	OKRAVRES-7	4.71	6.49	3.52
38	Phule Vimukta	4.21	5.13	2.97
39	Bantivre Local	4.61	6.05	3.75
40	OK-11-Local	4.99	6.75	3.99

Conclusion

Among different genotypes used for screening, the genotypes show variation in resistance against different sucking pests. The kasha pragati genotype was seen resistant to leaf hopper, aphid and whitefly over remaining genotypes.

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