

Original Research Article

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**Screening of Different Genotypes of Okra (*Abelmoschus esculentus* L.)
against Leafhopper (*Amrasca biguttula biguttula* I.) and Whitefly (*Bemisia
tabaci* G.) under New Gangetic Alluvial Zone of West Bengal**

Puja Chatterjee¹, Shanowly Mondal^{2*} and Ayan Das¹

¹Department of Agriculture Entomology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur,
Nadia- 741252, West Bengal, India

²AICRP on Nematodes, Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya,
Kalyani, Nadia- 741235, West Bengal, India

**Corresponding author*

A B S T R A C T

An experiment was conducted in the Field & Laboratory, Department of Agricultural Entomology, (BCKV), Nadia on the varietal preference of Whitefly *Bemisia tabaci* (Genn.) and Jassid *Amrasca biguttula biguttula* (Ishida) on okra *Abelmoschus esculentus* (L.) during the *Kharif* season of the year 2017. Among the Fifteen varieties considered none of the variety was found completely free from the infestation of leaf hopper and whitefly, although they differed significantly in their degree of damage and pest number to harbour. The varieties OH0, 5308, 1601 and Japanija were found as least susceptible, while variety Samrat was found to be highly susceptible to Whitefly and Jassid. Maximum pest population was found during third week of June i.e. 20th standard week of the year. The morphological characters, viz., length of fruit of different varieties of okra had positive significant effect on the infestation of Whitefly (0.54*) and Jassid (0.52*). Hairiness (on shoot, leaf) had negative significant effect on the infestation of whitefly and Jassid. Yield has significantly negative effect upon Whitefly (-0.83**) and Jassid (-0.62*) population build up. The maximum yield was recorded in the variety, OH05 (265q/ha). The YMV % and mean curl leaf/plant has significantly effect upon Whitefly (0.58*) and Jassid (0.78*) population build up.

Keywords

Varieties screening, okra, Whitefly, Jassid, Leaf curl, YMV

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Introduction

Okra (*Abelmoschus esculentus* (L.) Moench) known in many English-speaking countries as lady's finger, bhindi in India is a commercial vegetable crop belongs to family Malvaceae (Chauhan, 1972). It is one of the largely cultivated vegetable in the country throughout the world in summer and rainy seasons due to

its nutritional, industrial and medicinal values grown extensively. It plays an important role in human diet and is a good source of vitamin A, B, and C and also rich in protein, minerals and iodine (Singh *et al.*, 2014). Okra is mainly cultivated for its fruits. The fruits are rich in dietary fibre, protein and vitamin C (Candlish *et al.*, 1987). One of the important limiting factors in the cultivation of okra is its

insect pests (Mandal *et al.*, 2006). As high as 72 species of insects pests have been recorded on the crop of which, leafhopper, aphid, whitefly, spider mite and fruit borer, which are important one (Ghosh *et al.*, 1999). The insect-pests like leafhopper (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius) are known to cause severe damage to the crop by devitalizing the plants from seedling to harvest stage besides transmitting viral disease to the plant (Patel *et al.*, 2009), cause yield loss to a tune of 17.46 to cent per cent in viral disease infestation (Sarkar *et al.*, 1996). Yellow vein mosaic of okra is a virus disease transmitted by whiteflies. If there yellow vein mosaic in the area, whiteflies feeding on the infected plants will carry or transmit the virus through its feeding on healthy plants. If infection is severe, plants become stunted and pods are of low quality. In order to prevent the infestation of the pests and to produce a quality crop, it is essential to manage the pest population with suitable measures. The resistant varieties of crops offer insect pest management at no additional cost. An insect resistant plant offer ideal prevention against insect damage, involved minimum cost of production and are eco-friendly. The use of resistant varieties is one of the most economical and effective methods of control. Keeping this in view, the present studies were undertaken to screen out some okra varieties against major sucking pests i.e. whitefly and jassid.

Materials and Methods

The field experiment with fifteen genotypes were carried out under Randomized Block Design and replicated thrice with plot size 4m x 5m at Central Research Farm of Bidhan Chandra Krishi Viswavidyalaya, Gayeshpur, Nadia, West Bengal. Seeds of fifteen different genotypes of okra *viz.*, 308, 1601, 1011, 111, 1008, All Green, Monikanchan, Mohini, Sonalika, OH05, Samrat, MS10, Japanija

were sown at 50cm x 30cm during summer. All the recommended package of practices were adopted for raising the crop. The plots were kept unsprayed through the experimental period. Observation on adult of jassid population, *A. biguttula biguttula* and whitefly, *Bemisia tabaci* were recorded at weekly interval during morning hours on five plants. The plants were selected randomly and tagged in each plot to record the population from three leaves, each one from top, middle and bottom canopies and mean population per three leaves was worked out. The observation on insect pests was recorded at weekly interval right from their appearance to last picking of fruits of the crop. The observations were made at 30 days after sowing during both the seasons and expressed in numbers per leaves. The yellow vein mosaic virus (YVMV) incidence was calculated in percent by counting the number of plants per plot infected by YVMV upto last picking. While for leaf curl symptom mean number of curl leaf per plant from randomly selected five plant was recorded from each genotype.

YVMV incidence =

$$\frac{\text{Number of plants infected/plot}}{\text{Total Number of plants/plot}} \times 100$$

The data obtained on insect populations from experimental field were subjected to analysis of variance after transforming into $\sqrt{(x+0.5)}$. The mean insect populations of okra varieties recorded during the crop season were categorized to identify tolerant types. The morphological characters of okra varieties *viz.*, plant height, hairiness (leaves, shoots and fruits), length and width of fruits were recorded and correlate to the infestation of sucking insect pests on different okra varieties. Five plants from each replication of each variety were selected at last picking of fruits and the height was measured from the

ground level to the tip of the main stem with the help of meter scale and then averaged out. To observe the hairiness, the discs of 1mm² size were taken from shoots, leaves and fruits of randomly selected five plants in each plot. A binocular microscope was used to observe hairiness on selected discs. The number of hairs (trichomes) counted on each discs and then averaged out (Ramalho *et al.*, 1984) [11]. Days to flower initiation was recorded as the number of days taken from the sowing to flower initiation on randomly selected five plants in each plot and then averaged out. At the time of last picking five fruits of average size from each variety were selected in three replications. The length of fruits was measured from base to tip of the fruits and then averaged out. The width of fruits was measured from two points on each side of middle of fruit with the help of slide callipers and then averaged out. The number of fruits per plant were recorded by counting total number of fruits on randomly selected five plants in each plot and then averaged out. The data on morphological characters were subjected to analysis of simple correlation with peak infestation of sucking insect pests on different okra varieties.

Results and Discussion

To minimize the losses caused by insect pests, growing of resistance varieties is one of the most important tools. Here a number of varieties of okra were screened for their relative susceptibility to sucking insect pests. There were two sucking insect pests, *viz.*, Leaf hopper, *A. biguttula biguttula* and whitefly, *B. tabaci* observed infesting okra varieties.

Whitefly, *B. tabaci*

Table 1 revealed that none of the okra varieties were found completely free from the attack of whitefly. The infestation of whitefly

was first observed in the nineteenth standard week of the year (second week of May) i.e. third week after sowing. The mean whitefly population ranged from 0.33 to 1.83/ three leaves. The maximum mean whitefly population was observed on Samrat variety (1.83/ three leaves) followed by 1601 variety which is at par with the variety 308, OH05, 1601, 1011, All Green, Mohini and 1008. The least population was observed in the variety MS10 (0.33/three leaves). During the 20th standard week whitefly population increases slightly where the population ranged 1.16 to 2.67/three leaves. Here maximum infestation was recorded in Namdhari and 1601 varieties with a mean population of 2.67 whitefly/three leaves followed by Japanija (2.63/three leaves) and Mohini (2.59/three leaves) but the least population was recorded in 1001 variety with a mean whitefly population 1.16/three leaves. While during the next week pest population follows the previous trend which ranges from 1.98 to 3.57/three leaves. Gradually pest population load increases among the plants and the maximum population recorded on the 25th standard week of the year i.e. third week of June which ranges from 4.33 to 7.21/three leaves. Where the maximum whitefly population was observed in Samrat (7.21/three leaves) followed by 1011(6.86 /three leaves), Japanija (6.10/three leaves) and 1008(6.00/three leaves) while least population was found in OH05 with a minimum population of 4.33/three leaves and 161 was found to be second best against resistance. Gradually after that population gets lower down. After calculating a mean of twelve standard maximum average whitefly population of 4.56/three leaves was recorded against Samrat variety followed by Monikanchan (4.15/three leaves), 1008 and Mohini (3.85/three leaves). The least population was recorded in MS10 with a minimum number of 2.81 whitefly/three leaves. The overall preference rank of okra Whitefly among the 15 varieties

tested was in the following order: Okra Ms10<1001 <Oh05 <308 <1601 <111 <1011 <All Green < Sonalika < Namdhari (Ns812) <Japanija <1008< Mohini < Monikanchan< Samrat.

Jassid, *Amrasca biguttula biguttula*

Table 2 revealed that none of the okra varieties were found completely free from the attack of jassid. The initiation of jassid infestation was first observed in the nineteenth standard week of the year (second week of May) i.e. third week after sowing. The mean jassid population ranged from 4.00 to 7.00/ three leaves. The maximum mean jassid population was observed on Samrat variety (7.00/ three leaves) followed by Japanija variety which is at par with the variety Mohini, Sonalika. The least population was observed in the variety 1008 with a population of 4.00/three leaves). During the 20th standard week jassid population increases slightly where the population ranged 4.33 to 9.67/three leaves. Here maximum infestation was recorded in Samrat and variety Monikanchan followed by it with a mean population of 8.00 jassid/three leaves which is at par with Mohini, Japanija and All Green whereas the least population was recorded in 1008 with a mean jassid population 4.33/three leaves. While during the next week pest population follows the previous trend which ranges from 10.33-5.00/three leaves. Gradually pest population load increases among the plants and the maximum population recorded on the 25th standard week of the year i.e. third week of June which ranges from 7.33 to 15.33/three leaves. Where the maximum jassid population was observed in Samrat (15.33/three leaves) followed by Mohini(13.33 /three leaves) and Japanija (12.67/three leaves) while least population was found in 1008 with a minimum population of 7.67/three leaves and 1001 was found to be second best for

resistance which is at par with 1011, 1001 and 308. Gradually after that population gets lower down. After calculating a mean of twelve standard maximum average jassid population of 11.87/three leaves was recorded against Samrat variety followed by Monikanchan (9.83/three leaves), Mohini (9.03/three leaves) and Japanija. The least population was recorded in 1008 with a minimum number of 6.30 jassid/three leaves. The Overall Preference Rank Of Okra Jassid Among The 15 Varieties Tested Was In The Following Order: Okra 1008< 1001< 308< 1011< Oh05< 7.93< Ms10< 1001< Namdhari< Sonalika< Japanija< Mohini< All Green <Monikanchan <Samrat.

From the Table 1 and 2 it was observed that the least performance was obtained from Samrat which was mostly preferred by both whitefly and jassid population in field condition.

Morphological characters of okra varieties

The data presented in the table 3 showed that the plant height of different okra varieties varied from 0.96 m (OH05) to 1.34m (Sonalika). The plant height does not provide any significant effect on the infestation of whitefly and jassid population build up. Hairiness on leaves varied from 12 /mm² (Samrat) to 21/mm² (MS10) which has highly significant on population build up of whitefly (-0.89**) and jassid (-0.56*) population inversely. On shoot it varied from 14 /mm² (Monikanchan) to 22 /mm² (1008) where the jassid population have highly negative significant (-0.85**) effect on it and on fruits varied from 6/mm² (Monikanchan) to 16 /mm² (Namdhari) on okra varieties where none of whitefly and jassid population proved to be significant. Whereas the length of fruits varied from 13.30 cm (1601) to 19.20 cm (Namdhari) and width of fruits varied from 1.80cm (OH10) to 2.36 cm (1008).

Table.1 Weekly distribution of Whitefly (*Bemisia tabaci*) with their corresponding genotypes of okra

SL NO.	OKRA GENOTYPES	Weekly distribution of Whitefly (Adult) population / three leaves among various Okra genotypes during the year 2017											
		19 th SW	20 th SW	21 st SW	22 nd SW	23 rd SW	24 th SW	25 th SW	26 th SW	27 th SW	28 th SW	29 th SW	MEAN
1	308	1.67 (1.47)	2.00 (1.58)	2.33 (1.68)	2.67 (1.78)	3.33 (1.96)	3.33 (1.96)	5.33 (2.41)	3.33 (1.96)	4.67 (2.27)	3.67 (2.04)	3.33 (1.960)	3.24 (1.93)
2	OH05	1.33 (1.35)	1.67 (1.47)	2.00 (1.58)	2.33 (1.68)	2.67 (1.78)	3.67 (2.04)	4.33 (2.20)	3.00 (1.87)	4.33 (2.20)	4.00 (2.12)	3.00 (1.87)	2.94 (1.85)
3	1601	1.67 (1.47)	2.67 (1.78)	3.00 (1.87)	3.00 (1.87)	3.67 (2.04)	3.33 (1.96)	4.5 (2.24)	3.33 (1.96)	4.00 (2.12)	3.67 (2.04)	3.33 (1.96)	3.29 (1.95)
4	SAMRAT	1.83 (1.53)	2.33 (1.68)	3.57 (2.02)	4.33 (2.20)	5.89 (2.53)	6.33 (2.61)	7.21 (2.78)	4.32 (2.20)	6.11 (2.57)	4.26 (2.18)	3.98 (2.12)	4.56 (2.25)
5	1011	1.43 (1.39)	2.00 (1.58)	2.59 (1.76)	3.33 (1.96)	3.82 (2.08)	4.11 (2.15)	6.86 (2.71)	3.44 (1.98)	4.21 (2.17)	3.76 (2.06)	3.21 (1.93)	3.52 (2.00)
6	MS10	0.33 (1.53)	1.67 (1.47)	1.98 (1.57)	2.33 (1.68)	3.34 (1.96)	3.76 (2.06)	4.67 (2.27)	2.4 (1.70)	4.81 (2.30)	3.48 (1.99)	2.11 (1.62)	2.81 (1.82)
7	ALL GREEN	1.43 (1.39)	1.88 (1.54)	2.38 (1.70)	3.21 (1.93)	3.87 (2.09)	4.65 (2.27)	5.88 (2.53)	3.25 (1.94)	5.65 (2.48)	3.54 (2.01)	3.12 (1.90)	3.53 (2.01)
8	NAMDHARI (NS812)	1.33 (1.35)	2.67 (1.78)	3.00 (1.87)	3.33 (1.96)	3.58 (2.02)	4.00 (2.12)	5.32 (2.41)	3.34 (1.96)	5.92 (2.53)	3.75 (2.06)	3.33 (1.96)	3.60 (2.02)
9	MONIKANCHAN	1.12 (1.27)	2.26 (1.66)	3.67 (2.04)	4.54 (2.24)	4.87 (2.32)	5.08 (2.36)	5.88 (2.53)	4.43 (2.22)	5.48 (2.45)	4.46 (2.23)	3.86 (2.09)	4.15 (2.16)
10	1001	0.67 (1.08)	1.16 (1.29)	2.00 (1.58)	2.52 (1.74)	3.41 (1.98)	3.88 (2.09)	4.65 (2.27)	2.42 (1.71)	4.54 (2.24)	3.67 (2.04)	2.33 (1.68)	2.84 (1.83)
11	MOHINI	1.48 (1.41)	2.59 (1.76)	3.33 (1.96)	3.67 (2.04)	4.67 (2.27)	4.86 (2.32)	5.58 (2.47)	2.86 (1.83)	6.21 (2.59)	4.33 (2.20)	2.8 (1.82)	3.85 (2.09)
12	JAPANIJA	1.2 (1.30)	2.63 (1.77)	2.86 (1.83)	4.21 (2.17)	5.33 (2.41)	5.86 (2.52)	6.102.81 (2.57)	3.00 (1.87)	5.2 (2.39)	3.33 (1.96)	2.12 (1.62)	3.80 (2.07)
13	SONALIKA	0.67 (1.08)	1.28 (1.33)	2.67 (1.78)	3.75 (2.06)	4.00 (2.12)	5.33 (2.41)	5.67 (2.48)	3.54 (2.01)	5.67 (2.48)	3.11 (1.90)	2.98 (1.87)	3.52 (2.00)
14	1008	1.40 (1.38)	2.65 (1.77)	3.22 (1.93)	4.26 (2.18)	5.31 (2.41)	5.67 (2.48)	6.00 (2.55)	3.41 (1.98)	5.2 (2.39)	3.42 (1.98)	1.8 (1.52)	3.85 (2.09)
15	111	0.55 (1.02)	1.57 (1.44)	2.39 (1.70)	3.00 (1.87)	4.66 (2.27)	5.28 (2.40)	5.86 (2.52)	2.49 (1.73)	4.85 (2.31)	3.54 (2.01)	3.1 (1.90)	3.39 (1.97)
S.E. m ±		0.12	0.13	0.14	0.19	0.24	0.25	0.21	0.15	0.18	0.10	0.16	0.12
CD at 5%		0.36	0.4	0.42	0.57	0.72	0.75	0.64	0.45	0.54	0.3	0.48	0.36

Table.2 Weekly distribution of Jassid (*Amrasca biguttula biguttula*) with their corresponding genotypes of okra

SL NO.	OKRA GENOTYPES	Weekly distribution of Jassid (Adult) population / three leaves among various Okra Genotypes during the year 2017											
		19 th SW	20 th SW	21 st SW	22 nd SW	23 rd SW	24 th SW	25 th SW	26 th SW	27 th SW	28 th SW	29 th SW	Mean
1	308	4.33 (2.20)	5.67 (2.48)	7.00 (2.74)	7.67 (2.86)	8.33 (2.97)	8.67 (3.03)	9.33 (3.14)	6.33 (2.61)	8.33 (2.97)	8.00 (2.92)	8.33 (2.97)	7.33 2.80
2	OH05	5.67 (2.48)	6.33 (2.61)	6.67 (2.68)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	10.67 (3.34)	7.33 (2.80)	8.33 (2.97)	8.33 (2.97)	8.67 (3.03)	7.87 2.89
3	1601	5.67 (2.48)	6.33 (2.61)	7.67 (2.86)	8.33 (2.97)	7.67 (2.86)	9.00 (3.08)	10.67 (3.34)	8.33 (2.97)	8.67 (3.03)	8.33 (2.97)	9.33 (3.14)	8.10 2.93
4	SAMRAT	7.00 (2.74)	9.67 (3.19)	10.33 (3.29)	11.67 (3.49)	12.67 (3.63)	14.33 (3.85)	15.33 (3.98)	12.33 (3.58)	11.33 (3.44)	13.67 (3.76)	14.67 (3.89)	11.87 3.52
5	1011	5.67 (2.48)	6.33 (2.61)	6.67 (2.68)	8.00 (2.92)	8.67 (3.03)	8.67 (3.03)	9.33 (3.14)	7.33 (2.80)	8.33 (2.97)	8.67 (3.03)	9.00 (3.08)	7.80 2.88
6	MS10	5.67 (2.48)	6.00 (2.55)	7.00 (2.74)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	11.00 (3.39)	8.33 (2.97)	8.33 (2.97)	8.33 (2.97)	8.67 (3.03)	8.00 2.92
7	ALL GREEN	6.67 (2.68)	7.67 (2.86)	8.33 (2.97)	9.67 (3.19)	10.33 (3.29)	11.00 (3.39)	11.33 (3.44)	13.33 (3.72)	9.33 (3.14)	10.33 (3.29)	11.33 (3.44)	9.83 3.21
8	NAMDHARI (NS812)	5.67 (2.48)	6.33 (2.61)	6.67 (2.68)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	12.33 (3.58)	7.33 (2.80)	9.00 (3.08)	8.33 (2.97)	8.67 (3.03)	8.10 2.93
9	MONIKANCHAN	6.33 (2.61)	8.00 (2.92)	8.33 (2.97)	9.33 (3.14)	10.33 (3.29)	11.33 (3.44)	12.33 (3.58)	13.67 (3.76)	8.67 (3.03)	10.67 (3.34)	12.00 (3.54)	9.97 3.24
10	1001	4.33 (2.20)	6.00 (2.55)	7.00 (2.74)	7.33 (2.80)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	6.33 (2.61)	7.33 (2.80)	7.67 (2.86)	8.00 (2.92)	7.13 2.76
11	MOHINI	6.33 (2.61)	7.33 (2.80)	7.67 (2.86)	8.33 (2.97)	9.33 (3.14)	10.33 (3.29)	13.33 (3.72)	8.33 (2.97)	9.67 (3.19)	9.67 (3.19)	10.33 (3.29)	9.03 3.08
12	JAPANIJA	6.67 (2.68)	7.33 (2.80)	7.33 (2.80)	8.00 (2.92)	8.33 (2.97)	9.33 (3.14)	12.67 (3.63)	8.00 (2.92)	8.33 (2.97)	9.00 (3.08)	8.67 (3.03)	8.43 2.99
13	SONALIKA	6.33 (2.61)	7.33 (2.80)	7.67 (2.86)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	11.33 (3.44)	7.33 (2.80)	8.33 (2.97)	8.67 (3.03)	9.00 (3.08)	8.27 2.97
14	1008	4.00 (2.12)	4.33 (2.20)	5.00 (2.35)	5.33 (2.41)	5.67 (2.48)	7.33 (2.80)	7.67 (2.86)	8.33 (2.97)	7.00 (2.74)	7.33 (2.80)	8.33 (2.97)	6.30 2.61
15	111	5.67 (2.48)	6.33 (2.61)	6.67 (2.68)	8.00 (2.92)	8.67 (3.03)	9.33 (3.14)	10.67 (3.34)	7.33 (2.80)	8.33 (2.97)	8.33 (2.97)	9.33 (3.14)	7.93 2.90
	S.E m+	0.23	0.32	0.30	0.35	0.39	0.42	0.49	0.62	0.26	0.41	0.46	0.36
	CD at 5%	0.70	0.95	0.90	1.04	1.17	1.25	1.47	1.86	0.77	1.22	1.39	1.08

Table.3 Morphological characters of different okra varieties with disease incidence and yield

SL NO	Cultivars	Mean population		Plant Height (m)	Hairiness (mm ²)			Length Of fruits (cm)	Width Of Fruit (cm)	Yield of crop (q /ha)	Mean no curl leaf/plant	YMV (%)
		Whitefly	Jassid		Leaf	Shoot	Fruit					
1	308	3.24	7.33	1.01	16	18	15	15.50	2.00	248	4.8	6.40
2	OH05	2.94	7.87	0.96	18	17	16	14.25	1.80	265	5.0	4.20
3	1601	3.29	8.20	1.07	16	16	13	13.30	1.98	243	5.4	5.20
4	SAMRAT	4.56	11.87	1.10	12	13	11	19.00	2.20	186	6.8	7.20
5	1011	3.52	7.80	1.05	15	17	15	15.00	2.24	240	5.2	7.60
6	MS10	2.81	8.00	1.02	21	16	10	16.25	2.35	235	5.6	6.40
7	ALL GREEN	3.53	9.83	1.05	15	15	9	18.33	2.13	216	5.8	7.70
8	NAMDHARI(NS812)	3.6	8.10	1.08	15	16	10	19.20	2.32	226	6.2	6.48
9	MONIKANCHAN	4.15	9.97	1.20	13	14	6	18.54	2.00	192	5.8	6.48
10	1001	2.84	7.13	1.15	19	21	14	15.00	1.85	258	5.2	3.80
11	MOHINI	3.85	9.03	1.26	14	15	11	14.50	1.98	214	5.2	6.32
12	JAPANIJA	3.8	8.43	1.12	16	16	12	14.60	2.30	236	4.8	6.25
13	SONALIKA	3.52	8.27	1.34	14	17	14	15.80	2.20	248	4.6	6.28
14	1008	3.85	6.30	1.05	13	22	9	16.80	2.36	208	3.8	6.34
15	111	3.39	7.93	1.06	18	16	10	14.70	1.95	215	4.8	5.80
Correlation coefficient with mean Whitefly population				0.36	-0.89**	-0.46	-0.49	0.54*	0.44	-0.83**		0.58*
Correlation coefficient with mean Jassid population				0.24	-0.56*	-0.85**	-0.36	0.52*	0.19	-0.62*	0.78*	

** Significant at 1% level of significance

* Significant at 5% level of significance

The length had significant positive effect on the infestation of whitefly and jassid population (0.54* and 0.52*), while, non significant positive effect over width of fruit which vary from 1.80 cm (OH05) to 2.36 cm (1008).

Disease incidence and yield estimation

The Yellow Vein Mosaic Virus incidence (%) as influenced by different varieties during the crop growing season summarized in Table 3 revealed that, least Yellow Vein Mosaic Virus incidence (3.80 %) was observed with variety 1001 which was followed by the varieties OH05(4.20%), 1601(5.20%), Japanija (6.25%) and Sonalika (6.28%) respectively. While maximum YMV infestation was observed in All Green variety (7.70%) followed by 1011(7.60%) and Samrat (7.20%). The YMV incidence has a positive significant relationship with whitefly population build up ($r=0.58^*$) although it was observed that the variety with maximum infestation of white fly did not get maximum severity from virus infection.

The mean number of curl leaf per plant was observed among 15 varieties at 70 DAS with onset of peak jassid population in field. Table 3 reveals that the mean number of curl leaf per plant varies from 3.8 to 6.8/plant. The lowest leaf curl was observed in case of variety 1008 (3.8 leaf/plant) followed by Sonalika (4.8 leaf/plant) and 308,111, Japanija (4.8 leaf/plant each). The highest number of curl leaf per plant was found in the variety Samrat (6.80 leaf/plant) followed by Namdhari (6.2 leaf/plant), Monikanchan All Green (5.8 leaf/plant each) MS10 (5.6 leaf/plant). Here the leaf curl/plant proved to be significant positive relationship ($r = 0.78^*$) with the Jassid population build up. Unlike before here it was observed that the variety where maximum infestation of jassid recorded gets maximum severity from curl leaf symptom.

The yield of the crop varies from 186 qt/ha to 265 qt/ha (Table 3). The maximum yield was obtained from OH05 (2.65) followed by 1001 while the lowest yield recorded from Samrat variety (186). The yield has highly significant positive relation with whitefly (-0.83^{**}) population build-up while significantly positive relationship with Jassid (-0.62^*) population build-up. It was also observed that whitefly population proved to be maximum contribution over yield of okra.

In conclusion, okra is a one of the most important vegetable crop which is grown all over the world including India. There are so many varieties used to grow in West Bengal but very few of them are suitable for the climate of this region. Many insect pests and disease attack on okra but major pests are *Amrasca biguttula biguttula*, *Bemisia tabaci*, *Aphis gossypii*, *Earias vittella* and mite. In the present research, out of 15 genotypes only the variety, OH05 showed highest yield besides proved to be resistance against Jassid and Whitefly while the variety, Samrat performed least. Apart from those varieties 1001, 308, 1601 and Japanija also performed well besides providing moderately resistance against whitefly and jassid. So the varieties, OH05, 308, 1601 and Japanija may be suitable for the new gangetic alluvial zone of West Bengal.

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References

- Candlish, J.K., Gourley, L. and Lee, H.P., 1987. Dietary fiber and starch contents of some South east Asian vegetables.

- Journal Agriculture Food Chemistry, 35: 319-321.
- Chauhan, DVS. Vegetable Production in India, 3rd ed. Ram Prasad and Sons, Agra, 1972.
- Ghosh, J., Ghosh, S.K., Chatterjee, H. and Senapati, S.K., 1999, Pest constraints of okra under Terai region of West Bengal. Indian Journal of Entomology, 63:362-371.
- Mandal, S. K., Sah, S. B. and Gupta S. C., 2006, Screening of okra varieties against *E. vittella*. Annals of Plant Protection Sciences, 14 (1): 248-249.
- Patel, P.S., Patel, G.M., Shukla, N.P., 2009, Screening of various okra varieties against important pests, Pestology, 33(2):30-35.
- Pawar, Y.D., And Varma, L.R.,2014, Performance of different okra varieties against pests and diseases during different seasons. Journal of Industrial Pollution Control, 30(2): 235-237.
- Sarkar, P.K., Mukherjee, A.B. and Ghosh, J. (1996), Assessment of loss of bhendi against red spider mite. Environment Ecology, 14: 480-481.
- Singh P, Chauhan, V., Tiwari, B.K., Chauhan, S.S., Simon, S., Bilal. S.,and Abidi, A.B., 2014, An overview on okra (*Abelmoschus esculentus*) and its importance as a nutritive vegetable in the World. International Journal of Pharmacy and Biological Sciences. 4(2):227-233.

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