Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2020; 8(1): 1458-1462

Received: 01-11-2019
Accepted: 04-12-2019

Priyanka
Department of Entomology, SKN College of Agriculture (SKNAU) Jobner, Rajasthan, India

Akhter Hussain
Department of Entomology, SKN College of Agriculture (SKNAU) Jobner, Rajasthan, India

Suman Kumari
Department of Entomology, SKN College of Agriculture (SKNAU) Jobner, Rajasthan, India

Yogendra Singh Ranawat
Department of Entomology, SKN College of Agriculture (SKNAU) Jobner, Rajasthan, India

Corresponding Author:
Priyanka
Department of Entomology, SKN College of Agriculture (SKNAU) Jobner, Rajasthan, India

Screening of okra varieties resistance against sucking pests

Priyanka, Akhter Hussain, Suman Kumari and Yogendra Singh Ranawat

Abstract
Screening experiment was conducted at Horticulture farm S.K.N. College of Agriculture, Jobner, (Rajasthan) during *Kharif*, 2017 to identify the infestation of okra against sucking pests. Out of ten varieties of Okra, *Abelmoschus esculentus* (L.) Moench screened for relative resistance against sucking pests (leaf hopper, whitefly), none was found immune. The grading is done as least, moderately and highly susceptible. Among the ten varieties variety IIVR-11 and VRO-4 were categorized as least susceptible (harboured< 5.18 leaf hoppers/ three leaves and 5.04 whiteflies/ three leaves); Pusa Makhmali, Arka Abhay, VRO-5, VRO-6, Arka Anamika, and Pusa-A-GR as moderately susceptible, whereas, Kashi Satdhari and Parbhani Kranti as highly susceptible against leaf hopper, *Amrasca biguttula biguttula* and whitefly, *Bamisia tabaci*.

Keywords: Screening, okra, sucking pests, susceptible

Introduction
Okra [*Abelmoschus esculentus* (L.) Moench] is an important vegetable crop grown in tropical and subtropical region. It is very delicious food and a popular fruit vegetable crop due to its high nutritional and medicinal values. The okra crop is attacked by a number of insect pests right from germination to harvesting, *viz.*, leaf hopper, *Amrasca biguttula biguttula* (Ishida); aphid, *Aphis gossypii* (Glover); whitefly, *Bemisia tabaci* (Genn.); shoot and fruit borer, *Earias insulana* (Boisd.) and *E. vittella* (Fab.); leaf roller, *Sylepta derogata* (Fab.); red cotton bug, *Dysdercus koenigii* (Fab.); mite, *Tetranychus cinnabarinus* (Boisd.); green plant bug, *Nezara viridula* (Linn.); blister beetle, *Mylabris pustulata* (Thunb.); and green semilooper, *Anomis flava* (Fab.). Among these pests, leaf hopper, *A. biguttula biguttula* and whitefly, *B. tabaci* are most important sucking insect pests of okra in Rajasthan (Meena and Kanwat, 2005) [4]. The leaf hopper, *A. biguttula biguttula* sucks the cell sap from lower surface of the leaves and injects toxic substance in it, resulting in yellowing and curling of leaf margins and stunted plant growth. The severe infestation causes burning of leaves which fall down later and results 40-60 per cent decrease in yield (Narke and Suryawanshi, 1987) [7]. The whitefly *B. tabaci* also sucks the cell sap from the leaves which lowered vitality of the plants. 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 Bombay Presidency (Kulkarni, 1924) [3]. This virus is being transferred by whitefly, *Bemisia tabaci*. 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. An insect resistant plant provide source of resistance 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 sucking insect pests.

Materials and Methods
The experiment was conducted at Horticulture farm S.K.N. College of Agriculture, Jobner (Rajasthan) during *Kharif*, 2017 to screen the okra varieties i.e. Kashi satdhari, Pusa A-GR, Pusa mukhmali, Arka Abhay, IIVR-11, VRO-4, Prabhani Kranti, VRO-5, VRO-6, Arka anamika. The crop was grown in a simple Randomized Block Design (RBD) with ten varieties as treatments, each replicated thrice. Each variety was sown in individual plot of size 2.7 x 2.1m^2. The population of insect pests was recorded at weekly interval right from germination.

to harvesting of the crop. The populations of sucking insect pests (leaf hopper and whitefly) were counted in early morning hours of the day (before 8 AM) when they remained less active. Five plants were randomly selected and tagged in each plot and the populations of leaf hopper and whitefly were counted visually (absolute counting) (Thakkar and Rote, 2001; Sharma and Sinha, 2009) [9, 8]. The observations were recorded on three leaves, *i.e*. one each from top, middle and bottom of every tagged plant. All the stages of nymphs and adults of these pests were taken into account while counting. The leaf hopper and whitefly on upper surface of leaves were counted first and then on lower surface by gentle turning, taking all possible care not to disturb them.

Interpretation of data

The data obtained on insect pest populations from experimental field were transformed into log $(\sqrt{x+0.5})$ and subjected to statistical analysis (Analysis of variance). The mean insect populations of okra varieties recorded during the crop season were categorized on the basis of formula given below:

$$\overline{X} \pm \sigma$$

Where,

$\overline{X}$ = Mean of peak insect population

σ = Standard deviation of peak insect population.

Table 1: Mean insect population per plant Category

Mean insect population per plant/ shoot / three leaves	Category
Below $\overline{X}$ - σ	Least susceptible
$\overline{X}$ - σ to $\overline{X}$+ σ	Moderately susceptible
Above $\overline{X}$ + σ	Highly susceptible

Results and Discussion

In the present study leaf hopper and whitefly observed from 2nd week of august. To minimize the losses caused by insect pests, growing of resistance varieties is one of the most important tools currently employed in the investigation. Ten varieties of okra were screened for their relative susceptibility to sucking insect pests (leaf hopper and whitefly).

Leaf hopper

The population of leaf hopper in different okra varieties in different meteorological weeks presented in table no. 4 and fig. No. 1. The leaf hopper population started to build up from second week of August (9th August, 2017). All the varieties were found infested with leaf hopper, which ranged from 0.66 to 3.40 per three leaves. The minimum mean leaf hopper population was observed on variety IIVR-11 followed by VRO-4 and Pusa Mukhmali, these were found at par with each other. The variety VRO-5 and Arka Abhay was found at par with variety Pusa Makhmali. The maximum mean leaf hopper population was observed on variety Parbhani Kranti followed by Kashi Satdhari and Pusa-A-GR, these were found at par with each other. The peak population of leaf hopper in all the varieties on 13rd September. The population was found to be in the range of 9.30 to 20.30 leaf hoppers/three leaves, the minimum being on IIVR-11and maximum on variety Parbhani Kranti. Varieties VRO-4, Pusa Makhmali and Arka Abhay were found at par with variety IIVR-11. The varieties VRO-5, VRO-6, Arka Anamika and Pusa-A-GR were found at par with variety Arka Abhay. The varieties Parbhani Kranti, Kashi Satdhari, Pusa-A-GR and Arka Anamika were found non-significant difference with respect to leaf hopper incidence. All the varieties showed, a gradual decrease in leaf hopper population was evident in the observation taken on 11th October, though differed in numbers. It was minimum on variety IIVR-11 (2.13 leaf hoppers/ three leaves) followed by VRO-4 and Pusa Makhmali these were found at par with each other. The variety Pusa-A-GR was found at par with Kashi Satdhari. The maximum population was evident on Parbhani Kranti (5.40 leaf hoppers/ three leaves) and Kashi Satdhari which were found at par with each other. Based on overall mean population of the season on different varieties of okra, the ascending order of leaf hopper infestation in different varieties of okra was found in order: IIVR-11< VRO-4< Pusa Makhmali< Arka Abhay< VRO-5< VRO-6< Arka Anamika< Pusa-A-GR< Kashi Satdhari< Parbhani Kranti. Based on the statistical categorization (X + σ) the variety categorize as least, moderately and highly susceptible presented in table no. 2. The mean leaf hopper population was found to be below 5.18 per three leaves, these varieties were categorized least susceptible to *A. biguttula biguttula*. The population of leaf hopper was in the range of 5.18-9.98 per three leaves, therefore, categorized as moderately susceptible. The population of leaf hopper was above 9.98 per three leaves; these were categorized as highly susceptible. The results are in conformity with the results obtained by Nagar *et al.*, (2017) [6] who reported variety IIVR-11 as least susceptible. The results also got support of Bhat *et al.*, (2007) [1] who reported the variety Arka Abhay as moderately susceptible and Parbhani Kranti was more preferred by leaf hopper.

Table 2: Categorization of okra varieties into degree of susceptibility against leaf hopper, *Amrasca biguttula biguttula* (Ishida).

S. No.	Mean leaf hopper population per three leaves	Name of Varieties	Category
1.	Below 5.18	IIVR-11, VRO-4	Least susceptible
2.	5.18 to 9.98	Pusa Makhmali, Arka Abhay, VRO-5, VRO-6, Arka Anamika, Pusa-A-GR	Moderately susceptible
3.	Above 9.98	Kashi Satdhari, Parbhani Kranti	Highly susceptible

Whitefly

The population of whitefly in different okra varieties in different meteorological weeks presented in table no. 3 and fig no. 2. The whitefly population started to build up from second week of August (9th August, 2017). It was negligible on VRO-4 (0.50), Pusa Makhmali, Arka Abhay, VRO-5, VRO-6 Arka Anamika Pusa-A-GR, Kashi Satdhari and Parbhani Kranti which harboured 0.50, 0.73, 1.60, 1.60, 1.93, 2.00, 2.13, 2.80 and 2.80 whiteflies/ three leaves respectively. In the first observation, variety IIVR-11 was found practically free from whitefly infestation. The peak population of whitefly in all the varieties on 20th September in which the population of whitefly ranged from 8.73 to 21.95 per three leaves. The minimum population was recorded on variety IIVR-11 followed by VRO-4 and Pusa Makhmali these were found at par with each other. The varieties Arka Abhay and

VRO-5 were found at par with variety Pusa Makhmali. The maximum population was recorded on variety Parbhani Kranti, Kashi Satdhari and Pusa-A-GR were found non-significant with each other with respect to whitefly incidence. All the varieties showed, a gradual decrease in whitefly population was evident in the observation taken on 11th October, though differed in numbers. It was minimum on variety IIVR-11 followed by VRO-4 and Pusa Makhmali these were found at par with each other. The variety Arka Abhay and VRO-5 were found at par with variety Pusa Makhmali. The maximum population was evident on Parbhani Kranti and Kashi Satdhari which were found at par with each other. Based on overall mean population of the season on different varieties of okra, the ascending order of whitefly infestation in different varieties of okra was found in order: IIVR-11< VRO-4< Pusa Makhmali< Arka Abhay< VRO-5< VRO-6< Arka Anamika< Pusa-A-GR< Kashi Satdhari< Parbhani Kranti. Based on the statistical categorization (X + σ) the variety categorize as least, moderately and highly susceptible presented in table no. 5. The mean whitefly population was found to be below 5.04 per three leaves, these varieties were categorized as least susceptible to *B. tabaci*. The population of whitefly was in the range of 5.04-10.05 per three leaves therefore, categorized as moderately susceptible. The population of whitefly was above 10.05 per three leaves; these were categorized as highly susceptible. The results are agreement with the results obtained by Nagar *et al.,* (2017) [6] who reported variety IIVR-11 as least susceptible. Meena (2004) [5] also reported that the varieties Arka Anamika and Parbhani Kranti were moderately susceptible to whitefly infestation partially corroborates the present findings. Variety VRO- 4 had minimum infestation of whitefly on okra crop as this is in similar conformity with that of Gonde (2013) [2].

Table 3: Categorization of okra varieties into degree of susceptibility against whitefly, *Bemisia tabaci* (Genn.)

S. No.	Mean whitefly population per three leaves	Name of varieties	Category
1.	Below 5.04	IIVR-11, VRO-4	Least susceptible
2.	5.04 to 10.05	Pusa Makhmali, Arka Abhay, VRO-5, VRO-6, Arka Anamika, Pusa-A-GR	Moderately susceptible
3.	Above 10.05	Kashi Satdhari, Parbhani Kranti	Highly susceptible

Table 4: Preference of okra varieties by leaf hopper, *Amrasca biguttula biguttula* (Ishida)

S. No	Varieties	Mean leaf hopper population / three leaves*										Mean
		09.08.2017	16.08.2017	23.08.2017	30.08.2017	06.09.2017	13.09.2017**	20.09.2017	27.09.2017	04.10.2017	11.10.2017	
1	Kashi satdhari	3.00	7.00	12.73	14.20	16.33	19.00	16.00	10.60	7.06	5.26	11.12
		(1.87)	(2.74)	(3.64)	(3.83)	(4.10)	(4.42)	(4.06)	(3.33)	(2.75)	(2.40)	(3.41)
2	Pusa A-GR	2.53	5.33	8.40	10.73	12.16	15.50	11.13	8.60	6.20	3.80	8.44
		(1.74)	(2.41)	(2.98)	(3.35)	(3.56)	(4.00)	(3.41)	(3.02)	(2.59)	(2.07)	(2.99)
3	Pusa Mukhmali	1.00	2.66	5.53	7.33	9.40	10.27	6.26	4.80	3.60	2.33	5.32
		(1.22)	(1.78)	(2.46)	(2.80)	(3.15)	(3.28)	(2.60)	(2.30)	(2.02)	(1.68)	(2.41)
4	Arka Abhay	1.60	3.80	7.00	9.00	10.00	13.62	8.66	7.00	5.13	3.60	6.94
		(1.45)	(2.07)	(2.74)	(3.08)	(3.24)	(3.76)	(3.03)	(2.74)	(2.37)	(2.02)	(2.73)
5	Arka Anamika	2.40	4.93	7.40	10.13	12.13	15.10	10.20	8.00	6.00	3.66	7.99
		(1.70)	(2.33)	(2.81)	(3.26)	(3.55)	(3.95)	(3.27)	(2.92)	(2.55)	(2.04)	(2.91)
6	IIVR-11	0.66	2.33	4.46	6.46	7.13	9.30	5.00	4.33	3.46	2.13	4.52
		(1.08)	(1.68)	(2.23)	(2.64)	(2.76)	(3.13)	(2.35)	(2.20)	(1.99)	(1.62)	(2.24)
7	VRO-4	0.80	2.46	5.13	7.00	8.20	10.00	6.06	4.80	3.53	2.26	5.03
		(1.14)	(1.72)	(2.37)	(2.74)	(2.95)	(3.24)	(2.56)	(2.30)	(2.01)	(1.66)	(2.35)
8	Parbhani Kranti	3.40	7.33	12.53	14.66	16.40	20.30	17.33	12.40	7.33	5.40	11.71
		(1.97)	(2.80)	(3.61)	(3.89)	(4.11)	(4.56)	(4.22)	(3.59)	(2.80)	(2.43)	(3.49)
9	VRO-6	2.00	4.00	7.20	9.66	11.33	14.70	9.80	7.53	5.53	3.66	7.54
		(1.58)	(2.12)	(2.77)	(3.19)	(3.44)	(3.90)	(3.21)	(2.83)	(2.46)	(2.04)	(2.84)
10	VRO-5	1.60	4.00	7.13	9.33	10.33	14.10	9.26	7.06	5.20	3.60	7.16
		(1.45)	(2.12)	(2.76)	(3.14)	(3.29)	(3.82)	(3.12)	(2.75)	(2.39)	(2.02)	(2.77)
S.E.m +		0.09	0.12	0.16	0.18	0.19	0.22	0.18	0.16	0.14	0.11	0.15
CD at 5%		0.26	0.36	0.47	0.53	0.57	0.64	0.54	0.47	0.40	0.34	0.44

* Mean of three replications,
** peak population of leaf hopper,
Figures in the parentheses are $\sqrt{x + 0.5}$ values

Table 5: Preference of okra varieties by whitefly, *Bemisia tabaci* (Genn.)

S. No.	Varieties	Mean whitefly population / three leaves*										Mean
		09.08.2017	16.08.2017	23.08.2017	30.08.2017	06.09.2017	13.09.2017	20.09.2017**	27.09.2017	04.10.2017	11.10.2017	
1	Kashi Satdhari	2.80	5.80	8.40	11.43	13.33	16.73	21.95	14.60	8.00	6.00	10.90
		(1.82)	(2.51)	(2.98)	(3.45)	(3.72)	(4.15)	(4.74)	(3.89)	(2.92)	(2.55)	(3.38)
2	Pusa A-GR	2.13	3.93	6.30	10.13	11.20	14.30	19.40	11.40	6.00	4.53	8.93
		(1.62)	(2.10)	(2.61)	(3.26)	(3.42)	(3.85)	(4.46)	(3.45)	(2.55)	(2.24)	(3.07)
3	Pusa Mukhmali	0.73	1.53	4.00	6.20	7.00	9.20	10.53	6.00	3.13	2.53	5.09
		(1.11)	(1.42)	(2.12)	(2.59)	(2.74)	(3.11)	(3.32)	(2.55)	(1.91)	(1.74)	(2.36)
4	Arka Abhay	1.60	3.10	5.47	8.20	9.16	12.48	14.60	8.40	4.40	3.20	7.06
		(1.45)	(1.90)	(2.44)	(2.95)	(3.11)	(3.60)	(3.89)	(2.98)	(2.21)	(1.92)	(2.75)

5	Arka Anamika	2.00	3.40	6.00	10.00	10.40	14.00	16.40	10.13	5.46	4.00	7.47
		(1.58)	(1.97)	(2.55)	(3.24)	(3.30)	(3.81)	(4.11)	(3.26)	(2.44)	(2.12)	(2.82)
6	IIVR-11	0.00	0.80	2.80	5.16	6.00	8.10	8.73	5.06	2.00	1.53	4.02
		(0.71)	(1.14)	(1.82)	(2.38)	(2.55)	(2.93)	(3.04)	(2.36)	(1.58)	(1.42)	(2.13)
7	VRO-4	0.50	1.40	3.10	6.00	6.20	8.73	9.40	5.40	(2.80	2.00	4.55
		(1.00)	(1.38)	(1.90)	(2.55)	(2.59)	(3.04)	(3.15)	(2.43)	(1.82)	(1.58)	(2.25)
8	Parbhani Kranti	2.80	6.33	8.93	11.53	14.40	17.10	23.13	15.13	9.13	6.13	11.46
		(1.82)	(2.61)	(3.07)	(3.47)	(3.86)	(4.20)	(4.86)	(3.95)	(3.10)	(2.57)	(3.46)
9	VRO-6	1.93	3.40	5.73	9.43	10.00	13.10	16.66	9.60	5.33	3.93	7.91
		(1.56)	(1.97)	(2.50)	(3.15)	(3.24)	(3.69)	(4.14)	(3.18)	(2.41)	(2.10)	(2.90)
10	VRO-5	1.60	3.33	5.60	8.33	9.73	12.50	15.20	9.13	5.20	3.73	6.94
		(1.45)	(1.96)	(2.47)	(2.97)	(3.18)	(3.61)	(3.96)	(3.10)	(2.39)	(2.06)	(2.73)
S.E.m +		0.08	0.11	0.14	0.17	0.17	0.20	0.23	0.18	0.13	0.11	0.16
CD at 5%		0.24	0.33	0.42	0.51	0.51	0.61	0.67	0.52	0.40	0.34	0.47

* Mean of three replications
** peak population of whitefly
Figures in the parentheses are $\sqrt{x + 0.5}$ values

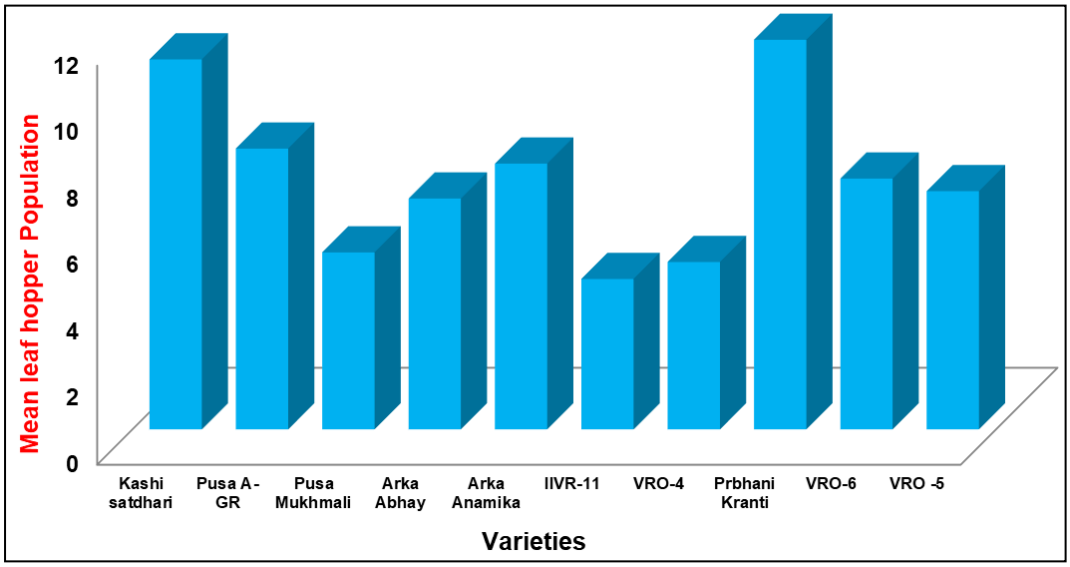

Fig 1: Preference of okra varieties by leaf hopper, *Amrasca biguttula biguttula* (Ishida).

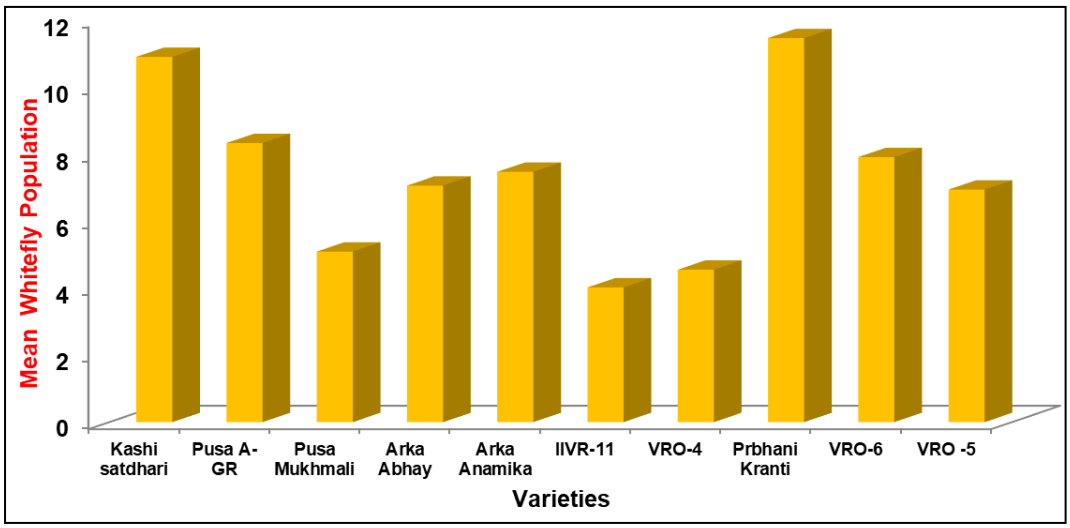

Fig 2: Preference of okra varieties by whitefly, *Bemisia tabaci* (Genn.).

Conclusion

Ten varieties of okra, screened against leaf hopper, A. biguttula biguttula and whitefly B. tabaci for relative resistance showed that variety IIVR-11 and VRO-4 was found to be least susceptible while, the varieties Parbhani Kranti and Kashi Satdhari were found to be highly susceptible. The moderately susceptible varieties were Pusa Makhmali, Arka Abhay, VRO-5, VRO-6, Arka Anamika and Pusa-A-GR.

References

1. Bhat OK, Bhagat KC, Gupta A, Vijay KK. Screening of okra genotypes against *Amrasca biguttula biguttula* (Ishida) and Earias vittella. Environment and Ecology. 2007; 25(2):434-439.
2. Gonde AD, Kumar A, Raut AH, Wargantiwar RK, Phuke DP. Screening of varieties of okra *Abelmoschus esculentus* (L.) Monech against important insect pests

under agroclimatic condition of Allahabad (UP). Trends in Biosciences. 2013; 6(5):645-647.
3. Kulkarni CS. Mosaic and other related diseases of crops in the Bombay Presidency. Poona Agriculture College Magazine, Pune, 1924, 16.
4. Meena NK, Kanwat PM. Broad reconnaissance of insect pests of okra in semi–arid region of Rajasthan, pp. 261262. National Conference on Applied Entomology, September 26-28, 2005, Rajasthan College of Agriculture, Udaipur, India, 2005.
5. Meena NK. Management of key insect pests of okra [*Abelmoschus esculentus* (L.) Moench]. Ph.D. Thesis, submitted to Rajasthan Agricultural University, Bikaner, 2004.
6. Nagar J, Khinchi SK, Kumawat KC, Sharma A. Screening different varieties of okra against sucking insect pests. Journal of Pharmacognosy and Phytochemistry. 2017; 6(3):30-34.
7. Narke CG, Suryawanshi DS. Chemical control of major pests of okra. Pesticides. 1987; 21(1):37-42.
8. Sharma RK, Sinha SR. Insect pest management in okra with baby corn as border crop and ecofriendly insecticides. Journal of Insect Science. 2009; 22(3):254-258.
9. Thakkar SK, Rote NB. Studies on integrated pest management in okra, *Abelmoschus esculentus* (L.) Moench. Indian Journal of Applied Entomology. 2001; 15(2):35-39.