



RESEARCH NOTE

Validation of integrated pest management (IPM) module against sucking pest complex of okra (*Abelmoschus esculentus* L.)

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ABSTRACT: Studies on the impact of IPM and non-IPM practices were carried out during *rabi* season 2018-19 at College of Horticulture, Venkataramannagudem, West Godavari district, Andhra Pradesh with an objective of examining their influence on pest complex and determining pesticide residues. The results revealed that the mean population of jassids (*Amrasca devastans devastans*) was 2.82 number per okra leaf in IPM plot, whereas in the non-IPM and control plots it was 5.43 and 8.46 number per leaf. Similarly, the maximum mean population of whitefly (*Bemesia tabaci*) was recorded in okra grown in control plot with 4.54 number per leaf followed by non-IPM plot with 1.17 number per leaf and 0.42 number per okra leaf in IPM plot of okra. The minimum average population of aphids was observed in okra grown in IPM plot with 0.27 number per leaf followed by non-IPM plot with 1.11 number per leaf, whereas in control plot it was 2.79 number per leaf. The average population of two spotted mites per sq.cm leaf area was 0.54 number in IPM plot, whereas it was 1.03 and 4.04 number per sq.cm leaf area in non-IPM and control plots of okra respectively.

Keywords: IPM, non-IPM, okra, sucking pests, validation

Field studies were carried out during 2018-19 to assess the impact of integrated pest management (IPM) modules against sucking pests *viz.*, jassids, (*Amrasca devastans devastans*), whiteflies, (*Bemesia tabaci*), aphid, (*Aphis gossypii*) and red spider mite, (*Tetranychus utricae*) in okra. The experiment was conducted at the college farm, College of Horticulture, Venkataramannagudem to examine the influence of IPM and non-IPM practices on pest complex of okra and pesticide residues during *rabi* season 2018-19. Okra seeds of variety “Arka Anamika” were sown with a spacing of 45 cm between rows and 60 cm between plants. The following IPM components were implemented.

- i. Deep summer ploughing was done thoroughly with a tractor drawn cultivator. Maize was sown as border crop to obstruct the entry of pest into the main crop. Raised seed beds for raising the okra crop were made 10 days after sowing of maize.
- ii. Reflective plastic mulch (sheet gauge) of 25 microns silver black, 4 feet width long bundle was laid on the beds, enhances crop growth and controls weeds. Okra variety, “Arka Anamika” was sown 21 days after sowing of maize in triangular system.
- iii. Phytosanitary measures such as collection and destruction of infested plant parts was done

manually. Marigold seedlings were transplanted with a spacing of 60 x 60 cm as trap crop for spotted boll worm after 10 days of sowing of okra in 1:10 ratio [Marigold : Okra].

- iv. Installation of yellow sticky traps @ 2/500 m² was done at 15 days after sowing of okra against sucking pests *viz.*, jassids, whiteflies and aphids, light trap @ 1/ 500 m² was done at 15 days after sowing of okra against nocturnal pests, 3 feet sex pheromone trap @ 1/500 m² was done at 45 days after sowing against *E. vittella* and *E.insulana*, erection of bird perches @ 1/500 m² was done at 45 days after sowing of okra against lepidopteran caterpillars.
- v. Application of botanicals, bioagents and chemical *viz.*, NSKE 5 per cent @15 DAS, neem oil @ 3 ml l⁻¹ at 30 DAS, Sweet flag aqueous extract 5 per cent @ 45 DAS against sucking pests, *Beauveria bassiana* @ 5 g l⁻¹ at 60 DAS, *Bacillus thuringiensis* @ 1 g l⁻¹ at 75 DAS against lepidopteran pest, imidachloprid 17.8 SL @ 0.3 ml l⁻¹ at 90 DAS was carried out on sequential basis.

The non-IPM schedule consisted mainly the application of chemicals on sequential basis as follows.

Table 1. t- statistical values for testing of significance of sucking pest complex in IPM and non-IPM plots of okra

Treatment	Jassids per leaf	Whiteflies per leaf	Aphids per leaf	Mites per Sq. cm. per leaf
IPM (Mean \pm S.D)	2.82 \pm 0.39	0.42 \pm 0.08	0.27 \pm 0.11	0.54 \pm 0.28
Non-IPM Mean \pm S.D)	5.43 \pm 1.20	1.17 \pm 0.22	1.11 \pm 0.40	1.03 \pm 0.41
t cal.value	9.55**	8.88**	9.13**	9.84**

**significant

A. Sucking pests

1. Spraying of imidachloprid 17.8 SL@ 0.25 ml/l at 15 days after sowing.
2. Spraying of lambda cyhalothrin 5 EC @ 1ml/l at 30 days after sowing.
3. Spraying of thiomethoxam 25WG @ 2ml/l at 45 days after sowing.

B. Borer pests

1. Spraying of flubendiamide 480 SC @ 1ml/l at 60 days after sowing.
2. Spraying of buprofezin 25 SC @ 1ml/l at 75 days after sowing.
3. Spraying of chlorantraniliprole 18.5 % SC @ 0.25ml/l at 90 days after sowing.

All the three plots were monitored strictly following the pest scouting system. Population of sucking pests viz., jassids, whiteflies, aphids and mites were recorded by visual observation on both surfaces of the leaf on three randomly selected leaves from top, middle and bottom canopy of the plant at weekly intervals starting from 15 days after sowing till crop maturity and depicted as population per leaf or unit area. Pest population was compared in the IPM with non - IPM and control plots of okra using paired t-test with SPSS 12.0 version. The data were analyzed by paired t-test.

Jassid, *Amrasca devastans devastans*

The data revealed that the population of jassid (*A. devastans*) on okra grown in IPM plot decreased at much faster level than the non-IPM plot, whereas in the control plots the population level increased with standard meteorological week (SMW). The mean population of jassids was found to be 2.82 \pm 0.39 number per leaf in IPM plot of okra as compared to that of non-IPM plot with 5.43 \pm 1.20 jassids per leaf, which was 53.40 per cent higher than the IPM plots. There was a significant difference in number of jassids per okra leaf between IPM

and non-IPM plots as per the t-statistical value depicted in the table 1. The mean population of jassid was found 8.46 \pm 2.77 number in control plot which was 63.08 per cent more than in IPM plot. Further it was found that the number of jassids per leaf in control plots of okra was 6.08 times more than the IPM plot and significant as per the t-statistical value given in the table 2.

Whitefly, *Bemesia tabaci*

The data indicated that the mean population of whitefly (*B. tabaci*) was low of 0.42 \pm 0.08 number per leaf in IPM plot of okra, while in non-IPM plots it was 1.17 \pm 0.22 number per leaf, which was 39.19 per cent more than IPM plots. However, there exists a significant difference in whitefly population per okra leaf between IPM and non-IPM plots as per the t-statistical value given in the table 1. The mean population of whiteflies was found 4.54 \pm 2.24 number per leaf in control plot which was 82.86 per cent more than that of IPM plot as per the t-statistical value given in the table 2.

Aphid, *Aphis gossypii*

The minimum mean average population of *A. gossypii* was recorded in IPM plots with 0.27 \pm 0.11 number per leaf as compared to that of non-IPM plot (1.11 \pm 0.40 number). However the peak aphid population was noticed in 6th SMW in IPM plot (0.40 aphids/ leaf), non-IPM (1.50 aphids/ leaf) and 4th SMW in control plot (4.15 aphids/ leaf). In comparison to non-IPM plot there was 68.74 per cent reduction of aphid population in IPM plot and found to be significant as per the t-statistical value given in table 1. The mean population of aphids was 2.79 \pm 1.23 number in control plot which was 81.41 per cent more than in IPM plot as per the t-statistical value shown in the table 2.

Red spider mites, *Tetranychus utricae*

The data depicted that the okra crop in IPM plot had lower population levels of two spotted red spider mite (*T. utricae*) than in the non-IPM and control plot. The mean population of two spotted mites was 0.54 \pm 0.28 number per sq.cm. leaf area in IPM plot of okra

Table 2. t- statistical values for testing of significance of sucking pest complex in IPM and control plots of okra

Treatment	Jassids per leaf	Whiteflies per leaf	Aphids per leaf	Mites per Sq. cm. per leaf
IPM (Mean \pm S.D)	2.82 \pm 0.39	0.42 \pm 0.08	0.27 \pm 0.11	0.54 \pm 0.28
Control (Mean \pm S.D)	8.46 \pm 2.77	4.54 \pm 2.24	2.79 \pm 1.23	4.04 \pm 2.71
t cal.value	8.37**	5.95**	7.26**	4.69**

**significant

as compared to that of non-IPM plot with 1.03 ± 0.41 number, which was 46.60 per cent less than in non-IPM plots. There was a significant difference in mites per sq. cm. leaf area as compared to that of IPM and non-IPM plots as per the t-statistical value given in the table 1. The mean population of mites in control plot was found 4.04 ± 2.71 number per sq.cm. leaf area which was 77.97 per cent higher than in IPM plot and significance was found as per the t-statistical value given in the table 2. To sum up, in the present investigation, IPM had played a vital role in the management of sucking pest population of okra viz., jassids, whiteflies, aphids, mites and the reduction of these pests in IPM plot over the non-IPM and control plots (fig. 1) was chiefly contributed by adoption of various IPM inputs namely, border crop, use of plastic mulch, sticky traps, pheromone traps, need based application of botanicals.

The reduction in pest population in IPM plot was mainly attributed to various IPM components such as border crop (maize), yellow sticky traps, light trap, pheromone traps and need based application of botanical pesticides viz., NSKE 5 per cent at 48th SMW, neem oil @ 3ml/l at 50th SMW, 5 per cent sweet flag aqueous extract at 52nd SMW and need based spraying of imidachloprid 17.8 SL @ 0.3 ml/l at 6th SMW. These results are in confirmation with the findings of Ashfaque *et al.* (2016) who reported low incidence of jassids and whiteflies in IPM grown okra plots than in non-IPM and control plots of okra. In the present investigation, the aphid population build up was much lesser in the okra crop grown in IPM plot than in non-IPM and control plots which is in conformity with the reports made by Ashfaque *et al.* (2016) and Zakir *et al.* (2017). Sruthi *et al.* (2018) observed minimum incidence of mites in bio intensive module.

Thus, considering all the aspects of the present study okra crop grown in IPM plot was less infested with sucking pests viz., jassids, whiteflies, aphids and mites as compared to that of non-IPM and control plots of okra. To sum up, okra crop grown in IPM plot was found with minimal pest load and crop damage with

higher marketable yield without any pesticide residues. IPM packages viz., deep ploughing, maize as border crop, reflective plastic mulch (Sheet gauge), marigold as trap crop, installation of yellow sticky, installation of light traps, installation of sex pheromone traps, Erection of bird perch were adopted for okra crop in this study. Hence, IPM is highly essential safe consumption of okra without leaving any pesticide residues and maintaining ecological balance.

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MS Recieved - 24 March 2021

MS Accepted - 20 April 2021