*Journal of Cell and Tissue Research Vol. 22(2) 7199 - 7202 (2022)* **Original Article**
*(Available online at www.tcrjournals.com)*
***ISSN: 0973-0028; E-ISSN: 0974-0910***

# ASSESSMENT OF CROP LOSSES DUE TO MAJOR INSECT PESTS OF OKRA, *ABELMOSCHUS ESCULENTUS* (L.) MOENCH. UNDER SEMI ARID REGI ON OF RAJASTHAN

**JAT, S. M.**

Department of Entomology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur, Rajasthan, India. E. mail: sanwar.1249@gmail.com, Cell: 8104375893

Received: April 10, 2022; Accepted: May 10, 2022

***Abstract: Investigations on assessment of crop loss in okra was carried out at the Department of Entomology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur during kharif 2016 and 2017. The major insect pests infesting okra observed during two consecutive seasons were leafhopper, A. biguttula biguttula; whitefly, B. tabaci and okra shoot and fruit borer and E. vittella. The experimental crop was treated with imidacloprid. The mean pooled yield in treated and untreated plots was 83.96 and 55.39 q ha$^{-1}$, respectively during 2016 and 2017. The increase in mean yield in treated plots over untreated plots was 28.56 q ha$^{-1}$. Per cent increase in yield over untreated plots was 55.66 and 47.81 per cent during kharif 2016 and kharif 2017, respectively and pooled data of both the year showed 51.56 per cent increase in yield over untreated plots. During kharif 2016 and 2017, the per cent avoidable losses recorded were 35.76 and 32.34 in treated and untreated plots, respectively. The pooled data of both the years showed 34.02 per cent avoidable loss.***

**Keywords:** Okra, assessment of crop loss, avoidable losses and insect pests

## INTRODUCTION

India is the second largest producer of vegetables in the world (surpassed only by China) accounting for about 10 per cent of the world production. Okra, *Abelmoschus esculentus* (L.) Moench commonly known as *bhindi* or lady's finger (family: Malvaceae) is a popular fruit vegetable crop. In the plains of northern India, it is grown in summer as well as during the rainy season; whereas, in central and south India, the crop can be grown throughout the year. It is cultivated in 528.4 thousand hectares with a total production of 6146.0 thousand metric tonnes with productivity of 11.6 tonnes per hectare in India [1]. Okra fruit is nutritionally very rich with a caloric value

Dr. Sanwar mal jat did his M.Sc. Entomology from SKRAU Bikaner and completed Ph. D. in 2018 from SKNAU Jobner at RARI Durgapura, Jaipur. Now working as an Assistant Agriculture Officer in department of Agriculture, Govt. of Rajasthan

of 35. The fruits of okra contain carbohydrate (6.4%), protein (1.9%), fat (0.2%), fiber (1.2%), minerals (0.7%) and moisture (89.6%) [2]. One of the important limiting factors in the cultivation of okra is insect pests. As high as 72 species of insects have been recorded on okra [3], of which, the sucking pests comprising of Aphids (*Aphis gossypii* Glover), leafhopper (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius) and mite (*Tetranychus cinnabarinus* Boisduval) causes significant damage to the crop, while at later stage fruit borers like *Earias spp* and *Helicoverpa armigera* (Hb.) cause considerable losses to the crop to the tune of 91.6 per cent [4]. Jassids and aphids suck the cell sap from the lower surface of the leaves and the former also inject some toxic substances resulting in curling of leaves, as a result, the plant growth is retarded [5]. Okra shoot and fruit borer (OSFB), *Earias vittella* is the most serious pest which cause direct damage to tender shoots and fruits. About 69 % losses is reported in marketable yield due to attack of this insect pest. Thus, keeping these thematic areas in view, the present investigation' Assessment of crop loss due to major insect pest of okra, *Abelmoschus esculentus* (L.) Moench under Semi Arid region of Rajasthan' was undertaken.

## MATERIALS AND METHODS

**Observation methodology:** The crop was sown in a paired plot with two treatments and each replicated ten times. The plot size was 3.0 x 2.25 m with row to row and plant to plant distance of 45 and 30 cm, respectively. The plots were treated with alternate spray of imidacloprid and acephate, respectively at weekly interval. The fruit yield of treated and untreated plots were recorded at each picking of fruits and finally converted into per hectare.

**Statistical analysis:** To interpret the results of crop losses inflicted by incidence of insect pests on okra, the data obtained on fruit yield per hectare were subjected to paired 't' test. The paired 't' test was calculated using the following formula.

$$t = \frac{\sum D}{\sqrt{\frac{n\sum D^2 - (\sum D)^2}{n-1}}} \sim t_{(n-1)} \quad \text{d.f.}$$

The avoidable losses and increase in yield of fruits over control (untreated) were calculated for each treatment by using following formulae.

$$\text{Avoidable loss (\%)} = \frac{\text{Yield in treated plot} - \text{Yield in control}}{\text{Yield in treated plot}} \text{ X } 100$$

$$\text{Increase in yield (\%)} = \frac{\text{Yield in treatment} - \text{Yield in control}}{\text{Yield in control}} \text{ X } 100$$

## RESULTS

**Assessment of crop losses due to insect pests of okra:** The mean fruit yield obtained in treated plots was 82.49 and 85.42 q $ha^{-1}$ during 2016 and 2017, respectively and in untreated plots the obtained yield was 52.99 and 57.79 q $ha^{-1}$ during 2016 and 2017, respectively (Table 1, Fig. 1). The calculated 't' value during both the years of study was greater than 't' tabulated value (2.26, d.f. 9) at 5.00 per cent level of significance and was proved to be significant. Therefore, the yield obtained in two treatments (treated and untreated) during the study differed from each other significantly. In present investigation, the difference between the mean fruit yield of treated and untreated (increase in yield over untreated) during *kharif*, 2016 and 2017 were 29.50 and 27.63 q $ha^{-1}$, respectively. The per cent increase in yield over control was recorded to be 55.66 and 47.81 during both the years, respectively. During the course of study, the calculated avoidable loss in yield of okra was 35.76 percent in the year 2016 and 32.34 percent in the year 2017.

The pooled data of both the years (2016 and 2017) indicated that the mean yield in treated and untreated plots were 83.96 and 55.39 q $ha^{-1}$, respectively. The increase in mean yield in treated plots over untreated plots was 88.56 q $ha^{-1}$ and per cent increase in yield over untreated plots was 51.56 per cent. The pooled data of two consecutive years showed 34.02 per cent avoidable losses, hence the losses due to insect pest could be avoided by pest control measures the production can be appreciably increased. The paired 't' test to interpret the crop loss revealed that their exhibited a significant difference in crop yield in both treated and untreated plots during both the year of study.

## DISCUSSION

During the present investigation the mean pooled yield in treated and untreated plots was 83.96 and 55.39 q $ha^{-1}$, respectively during 2016 and 2017. The increase

**Table 1:** Assessment of crop loss due to insect pests of okra (*kharif* 2016, 2017 and pooled). *Value in parenthesis shows transformed value of average yield in quintals per hectare. *Data significant at 5 per cent level of significance

| Plot No. | Yield (Kg/ plot) *kharif* 2016 | | Yield (Kg/ plot) *kharif* 2017 | |
|---|---|---|---|---|
| | Treated plot (T1) | Untreated plot (T2) | Treated plot (T1) | Untreated plot (T2) |
| 1 | 4.31 | 2.71 | 7.84 | 3.90 |
| 2 | 5.62 | 3.81 | 4.96 | 1.79 |
| 3 | 7.89 | 2.25 | 5.19 | 3.41 |
| 4 | 8.54 | 1.98 | 4.05 | 4.67 |
| 5 | 7.56 | 4.88 | 6.58 | 5.50 |
| 6 | 3.20 | 4.35 | 5.79 | 4.37 |
| 7 | 4.77 | 3.31 | 4.69 | 2.98 |
| 8 | 2.84 | 3.88 | 6.72 | 5.34 |
| 9 | 5.46 | 2.99 | 7.26 | 3.90 |
| 10 | 5.49 | 5.61 | 4.58 | 3.15 |
| Average | 5.57 (82.49) | 3.58 (52.99) | 5.77 (85.42) | 3.90 (57.79) |

| Treatment | Yield (q $ha^{-1}$) | | | Avoidable loss (%) | | | Increase in yield over untreated plots (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled |
| Treated plots (T1) | 82.49 | 85.42 | 83.96 | 35.76 | 32.34 | 34.02 | 55.66 | 47.81 | 51.56 |
| Untreated plots (T2) | 52.99 | 57.79 | 55.39 | | | | | | |
| Increase in yield (q $ha^{-1}$) | 29.50 | 27.63 | 28.56 | | | | | | |
| T cal. | 2.46* | 4.47* | 4.84* | | | | | | |

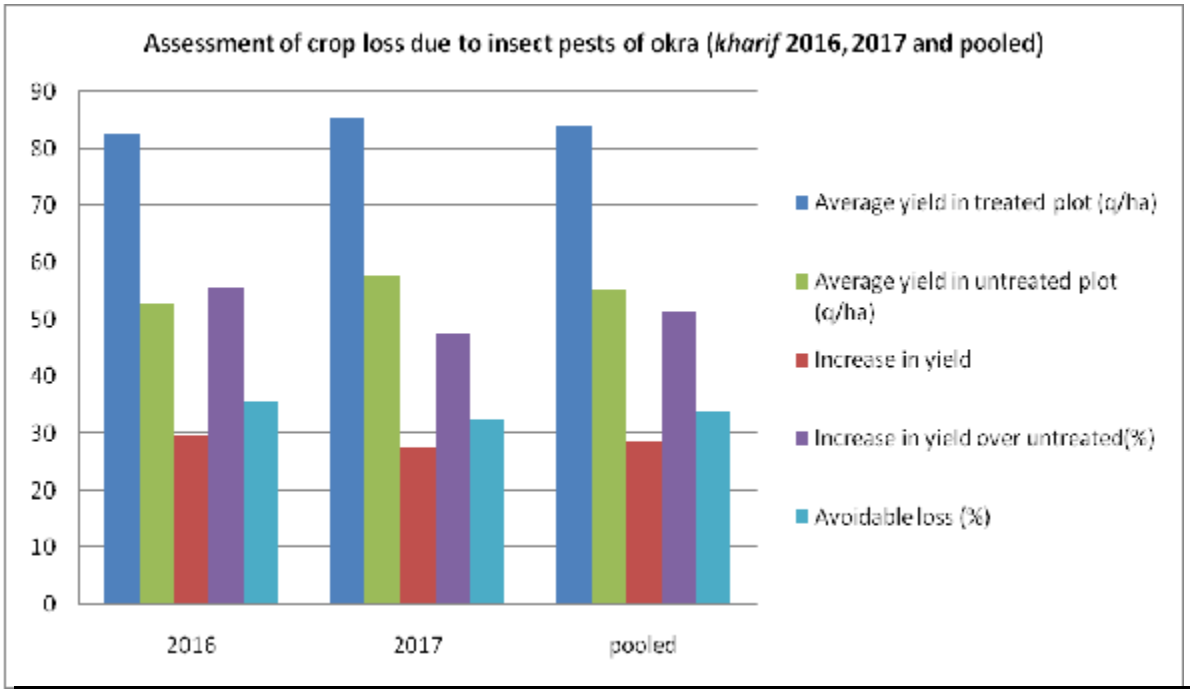


**Fig.1:** Assessment of crop loss due to insect pests of okra (*kharif* 2016, 2017 and pooled)

in mean yield in treated plots over untreated plots was 28.56 q $ha^{-1}$. Per cent increase in yield over untreated plots was 55.66 and 47.81per cent during *kharif* 2016 and *kharif* 2017, respectively and pooled data of both the year showed 51.56 per cent increase in yield over untreated plots. During *kharif* 2016 and 2017, the per cent avoidable losses recorded were 35.76 and 32.34 in treated and untreated plots, respectively. The pooled data of both the years showed 34.02 per cent avoidable loss. Similarly, [6] studied the fruit yield avoidable losses caused by pest complex of okra in treated plots (86.80 q $ha^{-1}$) and untreated plots (48.15 q $ha^{-1}$), respectively during 2013 and 2014. The increase in mean yield in treated plots over untreated plots was 38.65 q $ha^{-1}$ and per cent increase in yield over untreated plots was 80.35 per cent. During *kharif* 2013 and 2014, the per cent avoidable losses recorded were 45.32 and 43.76 in treated and untreated plots, respectively. The pooled data of both the years showed 44.54 per cent avoidable loss. The result obtained by [7] was in close conformity with present study. He reported that the mean yield in treated and untreated plots of okra were 81.70 and 62.50 q $ha^{-1}$, respectively. The increase in mean yield in treated plots over untreated plots was 19.20 q $ha^{-1}$ and per cent increase in yield over untreated plots was 30.72 per cent. The per cent avoidable loss recorded was 23.50 q $ha^{-1}$.

**Acknowledgement:** The authors are sincerely thankful to the Department of Entomology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur for making available the facilities to conduct the research programme.

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