**Original Research Article**

**Population Dynamics of Insect Pests on Okra During the *Kharif* Season**

**ABSTRACT**

The "population dynamics of insect pests on okra during the *Kharif* season" field trial was carried out at the Organic Research Farm Karguaji, Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (Uttar Pradesh) during the *Kharif* season (July to October 2022). According to the observations the population results are as follows, the white fly, *Bemisia tabaci* (Genn.), started from the 28th standard meteorological week (the second week of July) with an average of 1.83 white flies per plant and gradually increased with a peak of 25.56 white flies per plant in the 37th standard week (the second week of September). Jassid, *Amrasca biguttula biguttula*, began in the third week of July, the 29th standard week, with an average of 1.45 jassids per plant and gradually increased, peaking at 11.09 jassids/plant during the 34th standard week (the third week of August). Infestations of the red cotton bug, *Dysdercus cingulatus*, began in the 33rd standard week (the third week of August) and gradually increased  peaking at 16.53 adults/plant in the 39th standard week (the fourth week of September). *Earias vitella*, a shoot and fruit borer, was first observed in the 34th standard week (the third week of August), with an average of 0.83 larvae per plant. And gradually increased and peaked at 5.92 larvae per plant during the 37th standard week (September second week).

**Keywords –** shoot and fruit borer, *Earias vitella,* White fly, *Bemisia tabaci***,** okra

1. **Introduction**

Okra (*Abelmoschus esculentus* L.) belongs to the family Malvaceae, which is locally known as Bhendi and Lady's Finger worldwide. It is a very popular summer and *kharif*  vegetable for home gardening, and it is also grown commercially throughout the world, especially in the Indo-Pakistan subcontinent (Yadav *et al.,*2024). Okra is a popular vegetable crop grown widely in India, primarily for its immature fruits, and holds a significant position among other vegetable crops. It is crucial for human nutrition and a good source of total minerals, vitamins, calcium, potassium, enzymes, and other nutrients that are frequently lacking in the diets of developing countries. Okra is a more consistent source of income for farmers, but the crop's ability to be successfully grown and yield restricted by the attack of various insect pests at different stages of its growth. (Choudhary and Sharma 2020).

 Major insects include the jassid (*Amrasca biguttulla bigutulla*; Ishida); aphid (*Aphis gossypii*; Glover); and okra fruit borers (*Earias spp*.); whitefly ( *Bemisia tabaci* )severely damages the okra crop (Genn.),in particular, the fruit borer *Earias vittella* (Fab.). (Rajput and Tayde 2017).The key sucking pests of okra are whiteflies, aphids, jassids, thrips and mites. Among the sucking pests, whitefly, *Bemisia tabaci* Gennadius causes economic damage to okra by feeding on phloem sap, and also transmits the yellow vein mosaic disease. As compared to healthy plants, diseased plants showed a reduction of 24.9% in plant height, a 15.5% decrease in root length, and 32.1% in the number of fruits per plant, whereas stem girth was reduced by 16.3% (Yadav *et al.,*2024). The crop is attacked by several insect pests, among which shoot and fruit borers, *Earias vittella* (Fabricius) and *Earias Insulana,* are the most serious as they take the upper hand by causing direct damage to tender fruits (Yadav *et al.,*2024).

1. **MATERIAL AND METHODS**

The current research was done on "Population dynamics of insect pests on okra crop during *Kharif* season" was carried out at the Karguaji Organic Research Farm Experimental Field, Bundelkhand University, Jhansi (Uttar Pradesh), during the *Kharif* season 2022. The Kashi Lalima variety of okra was planted in plots measuring 3.20 × 2.15 m2 with a row-to-row and plant-to-plant distance of 60 cm and 45 cm, respectively, to record the seasonal abundance of the major insect pests. The information and procedures to be used for the current investigations are listed below.

**2.1** **Monitoring of insect pests**

The numbers of the sucking insects, i.e. Jassids and whiteflies were counted visually (absolute number) in the early morning hours on tagged plant. The population was counted first on the upper surface of the leaves, then by gently turning, taking great care not to disturb them. On the same tagged plants, observations of shoot and fruit borers were made. Fruit infestation was determined by counting the infested fruits at each picking (on a numerical basis), and shoot infestation was determined by counting the total number of damaged shoots at weekly intervals. On the same randomly selected and marked plants, the natural enemy population was counted. For statistical analysis, the information gathered on the main insect pests and meteorological parameters was used. A simple correlation between the insect pest population, their natural enemies, and abiotic parameters, such as maximum and minimum temperatures, relative humidity, and rainfall, was established to infer the results of seasonal incidence.

 **2.2** **The observation of the paper bag on per plant.**

Number of insect pests per plant

 Population dynamic % =  X 100

Total no. of insect pests

1. **RESULTS AND DISCUSSION**

Studies on the population dynamics of okra insect pests with weather parameters given in the table below. The occurrence of white fly, *Bemisia tabaci* (Genn.) in the 2022 *Kharif* season commenced from the 28th standard week (July second week) with an average of 1.83 white flies per plant. The white fly population increased and gradually reached the peak level of 25.56 white flies/plant at the 37th standard week (second week of September). The occurrence of jassid, *Amrasca biguttula biguttula,* in the 2022 *Kharif* season commenced from the 29th standard week (third week of July ) with an average of 1.45 jassids/plant. The jassid population increased and gradually reached the peak level of 11.09 jassids/plant at the 34th standard week (third week of August). The occurrence of red cotton bug, *Dysdercus cingulatus*, in the 2022 *Kharif* season commenced from the 33rd standard week (third week of August ) with an average of 0.75 adults/ plant. The red cotton bug population increased and gradually reached the peak level of 16.53 adults/ plant at the 39th standard week (September fourth week). The occurrence of shoot and fruit borer, *Earias vitella,* in the 2022 *Kharif* season commenced from the 34th standard week (August Third week) with an average of 0.83 larvae per plant. The shoot and fruit borer population increased and gradually reached the peak level of 5.92 larvae per plant at the 37th standard week (September, second week). The present investigation supports the observation of Rawat *et al*. (2019). The incidence of aphid was recorded at 29th SMW (standard meteorological week) to 39 SMW, The result revealed that the peak incidence of aphid population was observed at 29.70 aphids/3 leaves in the 36th standard week, followed by whitefly 12.13 whitefly/ 3 leaves in the 37th SMW, and leaf hoppers 11.13 leaf hoppers/ 3 leaves.

**Table 1. Population dynamics of insect pests on okra during the *kharif* season in 2022.**

|  |
| --- |
| **NO OF INSECTS / PLANT ON OKRA** |
| **SMW** | **JASSID** | **WHITE FLY** |  **RED COTTON BUG** | **OSFB** |
| 26 | 0.00 | 0.00 | 0.00 | 0.00 |
| 27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 28 | 0.00 | 1.83 | 0.00 | 0.00 |
| 29 | 1.45 | 3.79 | 0.00 | 0.00 |
| 30 | 3.85 | 7.12 | 0.00 | 0.00 |
| 31 | 5.14 | 7.97 | 0.00 | 0.00 |
| 32 | 7.60 | 8.17 | 0.00 | 0.00 |
| 33 | 9.12 | 9.59 | 0.75 | 0.00 |
| 34 | 11.09 | 16.38 | 1.53 | 0.83 |
| 35 | 10.22 | 19 | 4.17 | 1.76 |
| 36 | 8.16 | 23.18 | 8.66 | 3.89 |
| 37 | 6.83 | 25.56 | 12.78 | 5.92 |
| 38 | 4.45 | 19.59 | 15.73 | 5.44 |
| 39 | 2.74 | 14.89 | 16.53 | 4.17 |
| 40 | 2.55 | 8.15 | 12.23 | 3.26 |
| 41 | 1.37 | 5.22 | 9.11 | 2.78 |
| 42 | 1.17 | 3.43 | 5.43 | 1.44 |

**Fig. 1. Graphical representation of population dynamics of insect pests on okra during the *Kharif* season.**

**Table 2. Meteorological data of Organic Research Farm, Karguaji, Bundelkhand University, Jhansi (U.P.) during *Kharif* season.**

|  |  |
| --- | --- |
|  | **METEROLOGICAL DATA** |
| **SMW** |  **Temperature (0C)** |  **RH (%)** | **Total****Rainfall** |
|  | **Max.** |  **Min.** | **Max.** | **Min.** | **(mm)** |
| 23 | 46.5 | 44.0 | 67.0 | 30.0 | 00.0 |
| 24 | 45.0 | 40.5 | 54.0 | 32.0 | 15.8 |
| 25 | 40.0 | 37.0 | 93.0 | 54.0 | 28.8 |
| 26 | 41.4 | 37.0 | 95.0 | 47.0 | 00.0 |
| 27 | 39.0 | 33.0 | 93.0 | 58.0 | 00.0 |
| 28 | 38.0 | 36.5 | 93.0 | 54.0 | 59.4 |
| 29 | 38.2 | 29.5 | 95.0 | 57.0 | 91.0 |
| 30 | 34.2 | 31.8 | 97.0 | 79.0 | 51.4 |
| 31 | 34.5 | 31.0 | 97.0 | 79.0 | 3.6 |
| 32 | 36.5 | 32.0 | 95.0 | 41.1 | 24.3 |
| 33 | 34.0 | 30.0 | 100.0 | 78.0 | 55.8 |
| 34 | 35.0 | 29.0 | 94.2 | 73.0 | 120.0 |
| 35 | 37.0 | 34.0 | 100.0 | 73.0 | 100.6 |
| 36 | 34.5 | 29.0 | 100.0 | 73.0 | 00.0 |
| 37 | 34.5 | 26.0 | 100.0 | 72.0 | 164.0 |
| 38 | 36.5 | 29.0 | 100.0 | 62.0 | 59.0 |
| 39 | 36.0 | 25.0 | 97.0 | 60.0 | 24.0 |
| 40 | 36.2 | 20.0 | 94.0 | 57.0 | 18.0 |
| 41 | 33.0 | 19.0 | 93.0 | 56.0 | 48.4 |
| 42 | 34.0 | 18.0 | 80.0 | 60.0 | 00.0 |
|  **Total rainfall (mm) = 864.1** |

Source of meteorological data KVK Jhansi (U. P.)

**Fig. 2. Graphical Representation of Meteorological data at Organic Research Farm, Karguaji Bundelkhand University, Jhansi (U.P.) during *Kharif* season.**

1. **CONCLUSION**

 The findings of this study provide valuable insights into the population dynamics of major insect pests affecting okra during the 2022 *Kharif* season. The investigation reveals that the population of key pests, including *Bemisia tabaci* (Whitefly), *Amrasca biguttula biguttula* (jassid), *Dysdercus cingulatus* (Red cotton bug), and *Earias vitella* (Shoot and fruit borer), followed distinct seasonal patterns, with peak incidences observed at different stages of the season. Whitefly populations began to rise in the second week of July, reaching their peak in the second week of September. Similarly, the jassid population increased from late July, with their highest recorded population in mid-August. The red cotton bug and shoot, and fruit borer all showed a delayed onset, with peaks in their populations recorded towards the end of August and early September. These findings are consistent with previous studies, such as Rawat *et al*. (2019), which noted similar trends in aphid, whitefly, and hopper populations, confirming the significant influence of environmental factors on pest dynamics.

The correlation between pest population peaks and specific meteorological weeks highlights the importance of monitoring weather parameters for better prediction and management of pest outbreaks. This study emphasises the need for timely pest control interventions, particularly during the peak population periods, to minimise crop damage and optimise yields. Future research should focus on integrating pest management strategies with weather forecasting models to enhance the effectiveness of pest control in okra cultivation.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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