



Seasonal Incidence of Major Insect Pests of Okra (*Abelmoschus esculentus* L.) under Tarai Region of Eastern Uttar Pradesh Conditions

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(Received: 16 July 2025; Revised: 27 August 2025; Accepted: 29 September 2025; Published online: 12 October 2025)

(Published by Research Trend)

DOI: <https://doi.org/10.65041/BiologicalForum.2025.17.10.13>

ABSTRACT: Okra (*Abelmoschus esculentus* L.), is also commonly known as Lady's finger, which an important vegetable crop belonging to the family Malvaceae, cultivating under tropical and subtropical regions. It is a favourite vegetable in India, and grown in almost all the states in the country. It is an important Zaid (Summer) and Kharif (Winter) season vegetable crop grown throughout the world. Okra fruit is nutritionally very rich with vitamins, minerals, and dietary fiber. The present investigation was carried out during the Kharif season 2021-23 at the Research Farm of B.R.D.P.G. College, Deoria (U.P.) affiliated to D.D.U. Gorakhpur University, Gorakhpur, India. The study was designed to analyse the seasonal incidence patterns of major insect pests infesting okra, on the variety 'Arka Anamika' under Large Plot Technique, grown on a 10 m × 10 m (100 m²) plot, with a spacing of 60 cm × 30 cm rows and plants with weekly observations. Seasonal pest monitoring revealed that Okra shoot and fruit borer (*Earias vittella* F.), Jassid (*Amrasca biguttula biguttula* L.) and Whitefly (*Bemisia tabaci* G.), were the predominant insect pests observed. Okra shoot and fruit borer damage reached highest to 14.75% for shoot infestation in the 31st SMW (Standard Meteorological Week) and 19.47% for fruit infestation in the 35th SMW, Jassid showed a maximum count of 7.02 per 3 leaves in the 36th SMW, while Whitefly populations reached highest to 22.83 per 3 leaves in the 32nd SMW respectively. Okra shoot and fruit borer and Whitefly populations were strongly positively correlated with weather parameters *i.e.*, relative humidity and rainfall, while Jassid was strongly positively correlated with weather parameter, minimum temperature.

Keywords: Okra (*Abelmoschus esculentus* L.), Major Insect Pests, Seasonal Incidence, Tarai Region, Uttar Pradesh, India.

INTRODUCTION

Okra (*Abelmoschus esculentus* L.), is also commonly known as Lady's finger, which an important vegetable crop belonging to the family Malvaceae, cultivating under tropical and subtropical regions. It is a famous vegetable in India, and grown in almost all the states in the country. It is an important Zaid (Summer) and Kharif (Winter) season vegetable crop grown throughout the world. Okra fruit is nutritionally very rich with vitamins, minerals and dietary fiber. In the 2024-25 fiscal year, India's total vegetable crop area is estimated at 12,024 million hectares and production is estimated at 214.56 million tons, a 3.6% increase compared to 2023-24. In Uttar Pradesh, a significant portion of land is dedicated to vegetable production. The area under vegetable cultivation was estimated at 1.4 million hectares according to financial year 2023. This accounts for a substantial 17% of India's total vegetable production and Uttar Pradesh was the largest vegetable-producing state in India during that year.

West Bengal (15 %) is the second-largest vegetable producer. In India, the crop losses to the approximately 30–40% have been reported in vegetable crops (Sharma *et al.*, 2017). One of the major problems in agriculture is the control of insect pests that cause about 34% of loss crops. Okra plants are highly vulnerable to insect pests throughout their growth stages, from seedling to harvest. Both the vegetative and fruiting phases face considerable damage from a wide variety of pests (Pareek *et al.*, 1986; Boopathi *et al.*, 2011; Venkanna & Balikai, 2016; Singh *et al.*, 2021). Over 72 insect species have been documented infesting okra during different growth stages (Ewete, 1978). According to Nair *et al.* (2017), 28 insect pest species belonging to six orders and 20 families were identified as major threats to okra. Okra is highly vulnerable to insect pests throughout its growing period, with several species causing significant yield loss (Anjana *et al.*, 2022; Lakshmikantha *et al.*, 2023; Pawar *et al.*, 2023). Among them, the okra shoot and fruit borer (*Earias vittella* F.) is the most destructive, with fruit infestation rates ranging from

30% to 60%, depending on environmental conditions and crop stage. (Rakshith & Kumar, 2017; Reddy *et al.*, 2019). MahaLakshmi, *et al.*, 2015 have reported the Whitefly (*Bemisia tabaci* G.), a common sap-sucking insect and vector of Yellow Vein Mosaic Virus (YVMV), has been reported with an infestation incidence of 20% to 40%. Jassid (*Amrasca biguttula biguttula* I.) and aphid (*Aphis gossypii* G.) also occur frequently, with incidence ranging between 15% and 30%, affecting plant vigour and yield.

The present investigation was designed to bridge the knowledge gap regarding incidence and management of insect pests of okra, especially in the Tarai region where climatic conditions favour pest proliferation. The information on incidence of major insect pest of okra, particularly under Tarai region, is meager and hence in view of the importance of okra fruits as favourite vegetables and seriousness of these pests it becomes absolutely necessary to have a comprehensive information on these aspects. During the field experiment, quantitative observations for seasonal incidence of all major insect pests affecting okra were recorded from sowing to harvest, across various stages of crop growth. This was done to establish a strong foundation for pest management in relation to key weather parameters such as maximum and minimum temperatures, relative humidity, and rainfall under the existing agro-climatic conditions.

MATERIALS AND METHODS

The present investigation on seasonal incidence of major insect pests of okra (*Abelmoschus esculentus* L.) was carried out during the Kharif season 2021-23 at the Research Farm of B.R.D.P.G. College, Deoria (U.P.) affiliated to D.D.U. Gorakhpur University, Gorakhpur, India. This college is located in the fertile Gangetic plain near the Indo-Nepal border, making the region agriculturally productive due to its rich alluvial soil at 26.5013° N latitude and 83.7798° E longitude. The Deoria district climatic condition is a subtropical climate with hot summers, a monsoon period from June to September, and mild winters. Average annual rainfall ranges from 1000 to 1200 mm, with humidity between 73% and 86%. These climatic conditions, particularly during the Kharif season, support the cultivation of several crops, including okra and vegetables, making the region suitable for crop production and research. The study was designed to analyse the seasonal incidence patterns of major insect pests infesting okra, on the variety 'Arka Anamika' under Large Plot Technique, grown on a 10 m × 10 m (100 m²) plot, with a spacing of 60 cm × 30 cm rows and plants with weekly observations.

Populations of insect pests were recorded at weekly interval throughout the crop growing period starting from first appearance of insect pests. The incidence pattern and population buildup of sucking pests viz. Jassid (*Amrasca biguttula biguttula* I.), and Whitefly (*Bemisia tabaci* G.), were recorded from randomly selected 5 plants from upper, middle and lower leaves

in each plot at weekly interval starting from first appearance of the pests. The percent shoot and fruit damage caused by okra shoot and fruit borer (*Earias vittella* F.) will be recorded separately with the help of following formula (Birah *et al.*, 2012):

$$\text{Shoot/Fruit damage \%} = \frac{\text{Total number of damaged shoots/fruits} \times 100}{\text{Total number of examined shoots/fruits}}$$

Weather parameters i.e., maximum and minimum temperature, relative humidity and rainfall will be collected throughout the crop period from and this data has to be correlated with the pest population. The influence of meteorological parameters on the pest incidence will be worked out with simple correlation. Weekly meteorological data during crop period will be collected from meteorological observatory of B.R.D.P.G. College, Deoria, U.P., India.

RESULTS AND DISCUSSION

A. Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2021-22 and 2022-23.

Shoot damage. The seasonal incidence of initial infestation of okra shoot & fruit borer (*Earias vittella* F.) on the shoot damage percentage was observed during the first week of July Kharif season, with damage levels of 1.93% in 2021-22 and 3.13% in 2022-23. The damage increased steadily with crop growth and favourable weather factors like high humidity and rainfall. Peak infestation occurred during 5-11 August, where maximum shoot damage of 15.2% was recorded in 2021-22, while 14.4% was observed in 2022-23. The correlation analysis between weather factors and seasonal incidence of okra shoot & borer in 2021-22, shoot damage showed a strong positive correlation with relative humidity (0.6047) and rainfall (0.6047), suggesting that moist and rainy conditions favoured pest activity. Minimum temperature had a negative correlation (0.1738), while maximum temperature showed a negligible positive effect (0.0149). In 2022-23, shoot damage correlated positively with maximum temperature (0.2947) and correlated slightly with minimum temperature (0.0070), while relative humidity (0.0649) and rainfall (-0.0372) had weaker associations, indicating different climatic influences across years (Table 1 and Fig. 1 & 2).

Similar observations were also reported by Kumar and Singh (2021) reported indicating early establishment of pests under favourable conditions. shoot infestation initiated from 29th standard metrological week (SW) (3.84%) and reached its peak (14.75 %) during 31st SMW (Standard Meteorological Week). Almost similar comparable findings have also been documented by several researchers, including Sabyasachi *et al.* (2013) documented a comparable shoot damage ranging from 4.99 to 8.66% during the 14th SMW at the vegetative phase in Visva-Bharti, West Bengal. However, Siddartha *et al.* (2017) recorded 4.61 ± 0.11% shoot damage caused by *Earias vittella* during the rabi season in Bagalkot, Karnataka.

Table 1: Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2021-22 and 2022-23.

| Sr. No. | Date | S.M.W. | Temperature (°C) | | | | Relative Humidity (%) | | Rainfall (mm) | | Shoot Damage (%) | |
|---------|--------------------|--------|------------------|------|---------|------|-----------------------|---------|---------------|---------|------------------|---------|
| | | | 2021-2022 | | 2022-23 | | 2021-22 | 2022-23 | 2021-22 | 2022-23 | 2021-22 | 2022-23 |
| | | | Max. | Min. | Max. | Min. | | | | | | |
| 1. | 1-7 July | 27 | 33 | 24.8 | 31.7 | 27.3 | 78 | 80 | 63.2 | 8.5 | 1.93 | 3.13 |
| 2. | 8-14 July | 28 | 33.8 | 26.2 | 33.1 | 28.1 | 74 | 82 | 18.4 | 5.2 | 4.06 | 4.36 |
| 3. | 15-21 July | 29 | 32.6 | 25.1 | 32.6 | 27.7 | 83 | 82 | 54.1 | 10.2 | 7.76 | 7.16 |
| 4. | 22-28 July | 30 | 32.8 | 25.8 | 32.2 | 25.1 | 81 | 83 | 56.2 | 83.6 | 10.5 | 9.63 |
| 5. | 29 July-4 August | 31 | 33 | 25.2 | 32.8 | 25.7 | 79 | 83 | 119.8 | 21.2 | 12.3 | 11.90 |
| 6. | 5-11 August | 32 | 32.4 | 24.7 | 33.6 | 26.2 | 87 | 81 | 268.4 | 8.2 | 15.2 | 14.43 |
| 7. | 12-18 August | 33 | 32.8 | 25.4 | 32.5 | 25.4 | 79 | 84 | 52.0 | 31.8 | 12.9 | 12.13 |
| 8. | 19-25 August | 34 | 31.8 | 25.6 | 32.5 | 25.5 | 84 | 83 | 67.9 | 65.2 | 10.4 | 9.60 |
| 9. | 26 Aug-1 September | 35 | 32.3 | 26.6 | 33.7 | 25.5 | 81 | 78 | 6.7 | 18.8 | 8.60 | 7.80 |
| 10. | 2-8 September | 36 | 32.7 | 27.1 | 34.8 | 24.1 | 71 | 74 | 63.2 | 8.5 | 7.63 | 6.56 |
| 11. | 9-15 September | 37 | 32.4 | 25.5 | 31.5 | 24.4 | 75 | 85 | 18.4 | 5.2 | 4.33 | 5.33 |
| 12. | 16-22 September | 38 | 31.4 | 25.5 | 31.9 | 24.7 | 83 | 83 | 54.1 | 10.2 | 3.20 | 4.30 |
| 13. | 23-29 September | 39 | 32.3 | 25.8 | 32.5 | 23.9 | 77 | 84 | 56.2 | 83.6 | 2.46 | 3.23 |

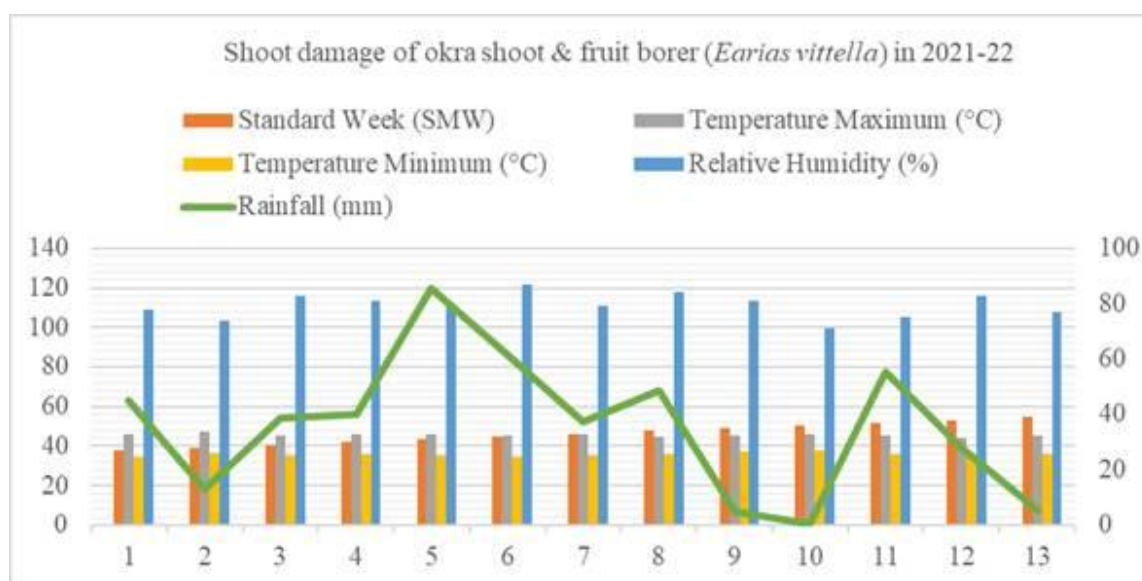


Fig. 1. Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2021-22.

Fruit damage. The seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) during 2021-22 and 2022-23 indicated that no fruit damage was recorded up to the 30th SMW in both years. The first incidence appeared in the 31st SMW with 2.06% damage in 2021-22, while infestation was absent in 2022-23. The pest population gradually increased, recording 5.36% and 1.66% fruit damage in the 32nd SMW during 2021-22 and 2022-23, respectively. Peak infestation occurred between the 34th and 36th SMW, with maximum fruit damage of 19.4% in 2021-22 and 17.5% in 2022-23. Thereafter, a gradual decline was observed, with moderate levels (7.23-12.8%) persisting up to the

39th SMW. The incidence trend was closely linked with prevailing weather parameters. The correlation analysis revealed that during 2021-22, fruit damage by *Earias vittella* showed a negative association with maximum (-0.5939) and minimum (-0.1738) temperatures, while relative humidity (0.4815) and rainfall (0.6047) exhibited a positive influence on pest incidence. In contrast, during 2022-23, fruit damage was positively correlated with maximum temperature (0.2487) but negatively correlated with minimum temperature (-0.7348), relative humidity (-0.3429), and rainfall (-0.3429), indicating variable seasonal responses (Table 2 and Fig. 3 & 4).

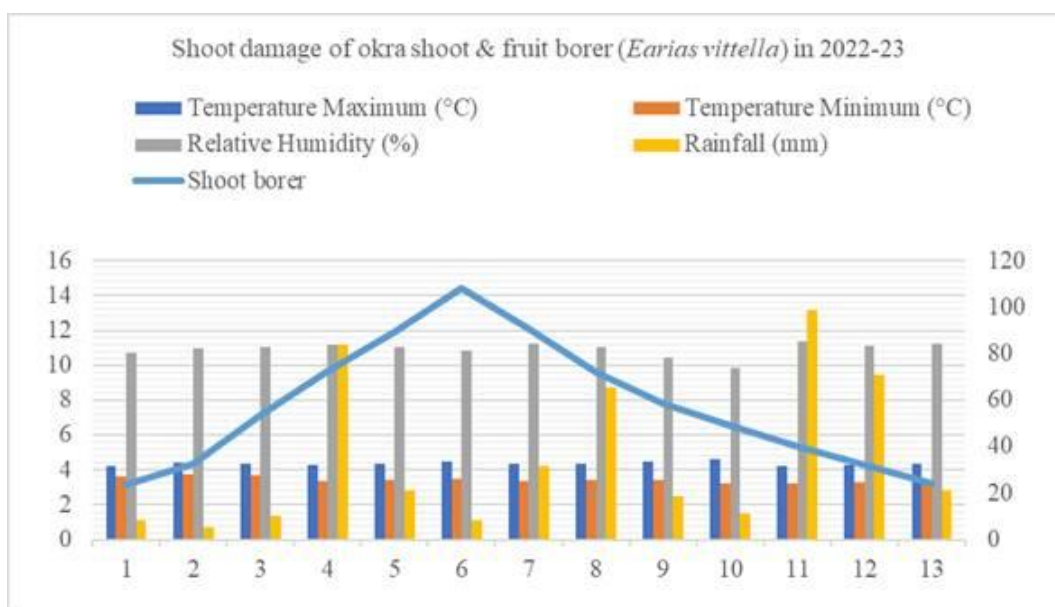


Fig. 2. Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2022-23.

Table 2: Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2021-22 and 2022-23.

| Sr. No. | Date | S.M.W. | Temperature (°C) | | | | Relative Humidity (%) | | Rainfall (mm) | | Fruit Damage (%) | |
|---------|--------------------|--------|------------------|------|---------|------|-----------------------|---------|---------------|---------|------------------|---------|
| | | | 2021-2022 | | 2022-23 | | 2021-22 | 2022-23 | 2021-22 | 2022-23 | 2021-22 | 2022-23 |
| | | | Max. | Min. | Max. | Min. | | | | | | |
| 1. | 1-7 July | 27 | 33.0 | 24.8 | 31.7 | 27.3 | 78 | 80.2 | 63.2 | 8.5 | 0 | 0 |
| 2. | 8-14 July | 28 | 33.8 | 26.2 | 33.1 | 28.1 | 74 | 82.0 | 18.4 | 5.2 | 0 | 0 |
| 3. | 15-21 July | 29 | 32.6 | 25.1 | 32.6 | 27.7 | 83 | 82.0 | 54.1 | 10.2 | 0 | 0 |
| 4. | 22-28 July | 30 | 32.8 | 25.8 | 32.2 | 25.1 | 81 | 83.6 | 56.2 | 83.6 | 0 | 0 |
| 5. | 29 July-4 August | 31 | 33.0 | 25.2 | 32.8 | 25.7 | 79 | 83.0 | 119.8 | 21.2 | 2.06 | 0 |
| 6. | 5-11 August | 32 | 32.4 | 24.7 | 33.6 | 26.2 | 87 | 81.5 | 268.4 | 8.2 | 5.36 | 1.66 |
| 7. | 12-18 August | 33 | 32.8 | 25.4 | 32.5 | 25.4 | 79 | 84.0 | 52.0 | 31.8 | 9.3 | 5.76 |
| 8. | 19-25 August | 34 | 31.8 | 25.6 | 32.5 | 25.5 | 84 | 83.0 | 67.9 | 65.2 | 14.2 | 9.66 |
| 9. | 26 Aug-1 September | 35 | 32.3 | 26.6 | 33.7 | 25.5 | 81 | 78.0 | 6.7 | 18.8 | 19.47 | 12.4 |
| 10. | 2-8 September | 36 | 32.7 | 27.1 | 34.8 | 24.1 | 71 | 74.1 | 63.2 | 8.5 | 17.3 | 17.5 |
| 11. | 9-15 September | 37 | 32.4 | 25.5 | 31.5 | 24.4 | 75 | 85.4 | 18.4 | 5.2 | 15.0 | 14.43 |
| 12. | 16-22 September | 38 | 31.4 | 25.5 | 31.9 | 24.7 | 83 | 83.0 | 54.1 | 10.2 | 12.8 | 11.7 |
| 13. | 23-29 September | 39 | 32.3 | 25.8 | 32.5 | 23.9 | 77 | 84.0 | 56.2 | 83.6 | 7.23 | 8.50 |

Similar observations were also reported by Singh *et al.* (2015) recorded the seasonal incidence of the okra shoot & fruit borer (*Earias vittella*) showed the highest population in the third week of September during the kharif season, with 17-19% fruit damage. Almost similar comparable findings have also been documented by several researchers, including Kumar and Singh

(2021) recorded fruit damage commenced from 31st SMW and persisted till 41st SMW; pooled data revealed maximum damage during 34th SMW (29.30%). These observations corroborate with those of Showkat *et al.* (2010) at Udheywalla, Jammu, India that it was first observed at 32nd SMW.

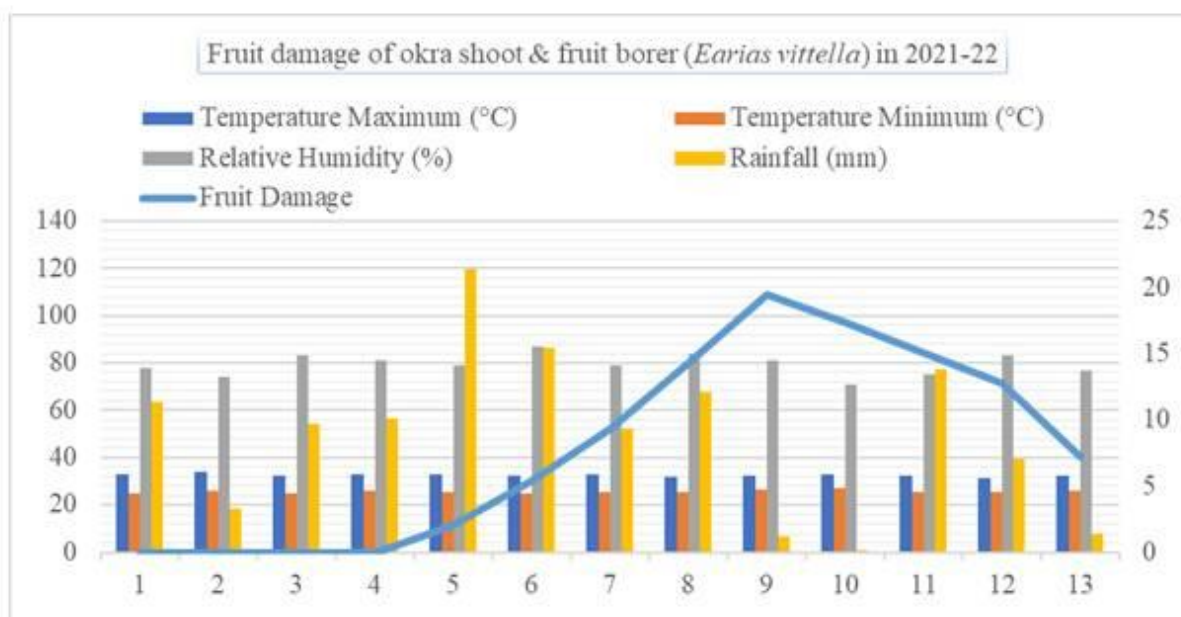


Fig. 3. Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2021-22.

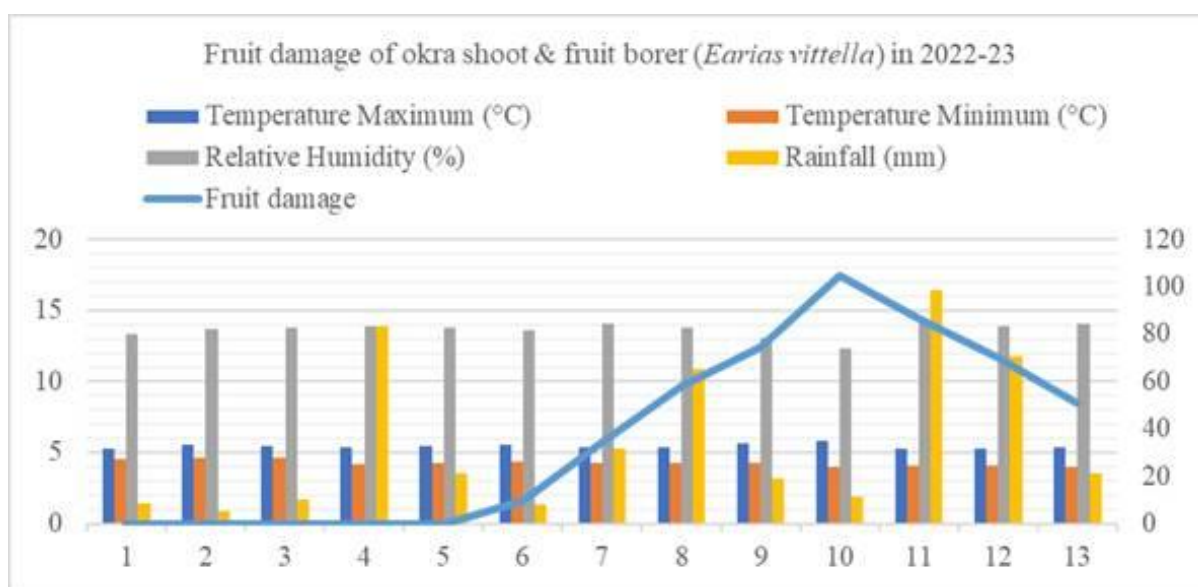


Fig. 4. Seasonal incidence of okra shoot & fruit borer (*Earias vittella* F.) in 2022-2023.

B. Seasonal incidence of okra jassid (*Amrasca biguttula biguttula* L.) in 2021-22 and 2022-23

The seasonal incidence of initial infestation okra jassid (*Amrasca biguttula biguttula* L.) during 2021–22 and 2022–23 indicated that the pest appeared from the 27th SMW with a low population (0.46 nymphs/3 leaves) in 2021-22, while no incidence was noted in 2022–23. The population gradually increased, reaching 2.87 nymphs/3 leaves in the 30th SMW during 2021–22 and 1.42 nymphs/3 leaf in 2022–23. The peak infestation was observed in the 36th SMW, recording 6.92 nymphs/3 leaves in 2021–22 and 7.02 nymphs/3 leaf in 2022–23, indicating peak activity during this period. Subsequently, a declining trend was noted, with moderate populations persisting until the 39th SMW.

The incidence pattern was influenced by temperature, humidity, and rainfall conditions. The correlation study revealed that during 2021–22, okra jassid population showed a negative correlation with maximum temperature (-0.2425), rainfall (-0.369), and relative humidity (-0.4810), while minimum temperature (0.7183) exhibited a strong positive influence. In contrast, during 2022–23, jassid incidence was positively correlated with maximum temperature (0.7184), whereas minimum temperature (-0.4918), relative humidity (-0.6277), and rainfall (-0.0437) showed negative associations, indicating variability in seasonal dependence on weather factors. (Table 3 and Fig. 5 & 6).

Table 3: Seasonal incidence of okra Jassid (*Amrasca biguttula biguttula* L.) in 2021-22 and 2022-23.

| Sr. No. | Date | S.M.W. | Temperature (°C) | | | | Relative Humidity (%) | | Rainfall (mm) | | Population per 3 leaves | |
|---------|-----------------|--------|------------------|------|---------|------|-----------------------|---------|---------------|---------|-------------------------|---------|
| | | | 2021-2022 | | 2022-23 | | 2021-22 | 2022-23 | 2021-22 | 2022-23 | 2021-22 | 2022-23 |
| | | | Max. | Min. | Max. | Min. | | | | | | |
| 1. | 1–7 July | 27 | 33.0 | 24.8 | 31.7 | 27.3 | 78 | 80 | 63.2 | 8.5 | 0.46 | 0 |
| 2. | 8–14 July | 28 | 33.8 | 26.2 | 33.1 | 28.1 | 74 | 82 | 18.4 | 5.2 | 1.16 | 0 |
| 3. | 15–21 July | 29 | 32.6 | 25.1 | 32.6 | 27.7 | 83 | 82 | 54.1 | 10.2 | 2.26 | 0.46 |
| 4. | 22–28 July | 30 | 32.8 | 25.8 | 32.2 | 25.1 | 81 | 83 | 56.2 | 83.6 | 2.87 | 1.42 |
| 5. | 29 Jul–4 Aug | 31 | 33.0 | 25.2 | 32.8 | 25.7 | 79 | 83 | 119.8 | 21.2 | 2.25 | 2.25 |
| 6. | 5–11 August | 32 | 32.4 | 24.7 | 33.6 | 26.2 | 87 | 81 | 268.4 | 8.2 | 1.32 | 3.96 |
| 7. | 12–18 August | 33 | 32.8 | 25.4 | 32.5 | 25.4 | 79 | 84 | 52.0 | 31.8 | 3.12 | 3.54 |
| 8. | 19–25 August | 34 | 31.8 | 25.6 | 32.5 | 25.5 | 84 | 83 | 67.9 | 65.2 | 2.32 | 3.18 |
| 9. | 26 Aug–1 Sept | 35 | 32.3 | 26.6 | 33.7 | 25.5 | 81 | 78 | 6.7 | 18.8 | 4.28 | 4.21 |
| 10. | 2–8 September | 36 | 32.7 | 27.1 | 34.8 | 24.1 | 71 | 74 | 63.2 | 8.5 | 6.92 | 7.02 |
| 11. | 9–15 September | 37 | 32.4 | 25.5 | 31.5 | 24.4 | 75 | 85 | 18.4 | 5.2 | 4.15 | 2.34 |
| 12. | 16–22 September | 38 | 31.4 | 25.5 | 31.9 | 24.7 | 83 | 83 | 54.1 | 10.2 | 3.32 | 1.46 |
| 13. | 23–29 September | 39 | 32.3 | 25.8 | 32.5 | 23.9 | 77 | 84 | 56.2 | 83.6 | 2.28 | 0.56 |

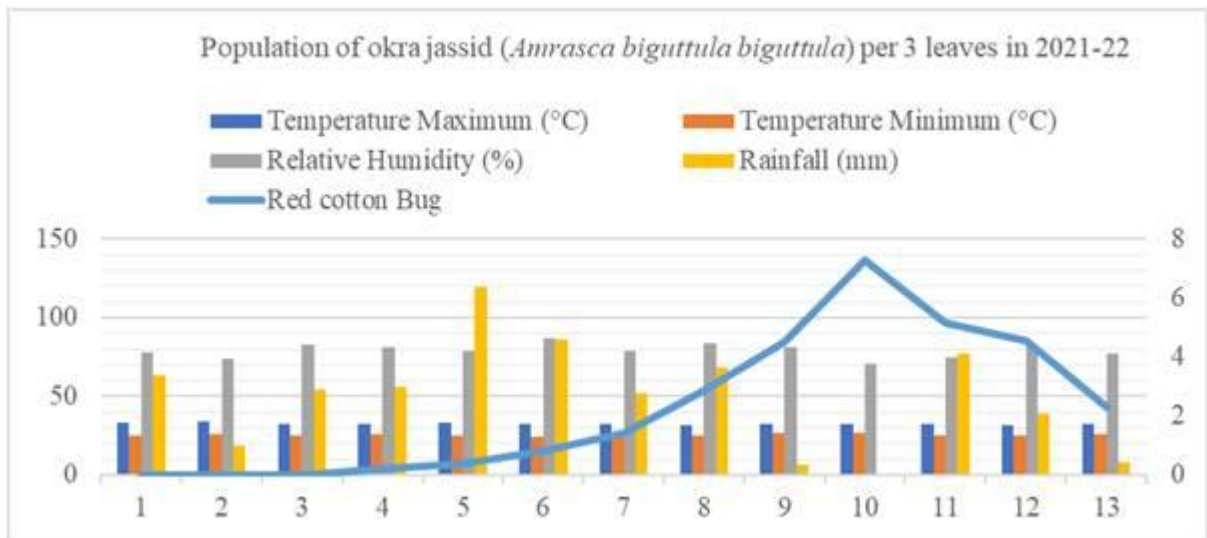


Fig. 5. Seasonal incidence of okra jassid (*Amrasca biguttula biguttula* L.) in 2021-22.

Similar observations were also reported by Mohapatra (2023) reported jassid in okra crop initial incidence 0.38 jassid per 3 leaves in 29 SMW and peak incidence 7.98 in 39th SMW. Almost similar comparable findings have also been documented by several researchers, including Subba *et al.* (2022) reported 6.60 ± 0.52 jassids per 3 leaves, Nemade *et al.* (2018) reported 11 jassids per 3 leaves; Saroj *et al.* (2017) reported 12.70 jassids/leaf; Dabhi *et al.* (2014) reported 7.29 jassids/leaf.

C. Seasonal incidence of okra whitefly (Bemisia tabaci G.) in 2021-2022 and 2022-23

The seasonal incidence of whitefly (*Bemisia tabaci* G.) on okra during 2021-22 and 2022-23 revealed variations in population dynamics under different weather conditions. In 2021-22, the population started with 2.02 adults per three leaves in the 27th SMW and gradually increased, peaking at 22.83 adults in the 32nd SMW under high relative humidity (87%) and heavy rainfall (268.4 mm).

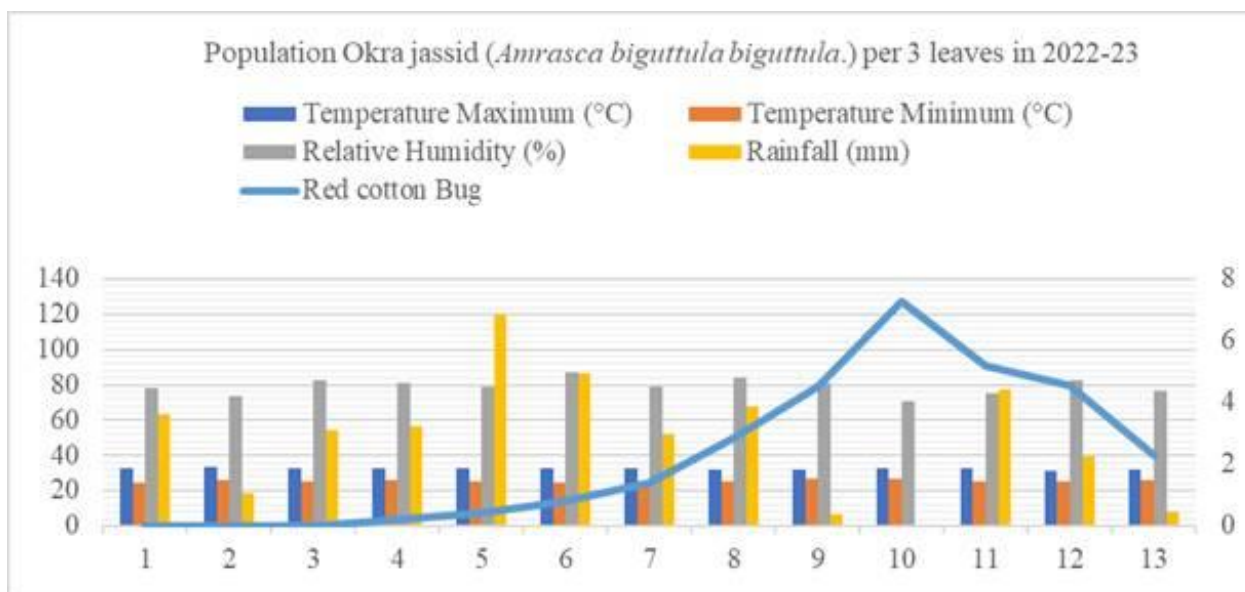


Fig. 6. Seasonal incidence of okra jassid (*Amrasca biguttula biguttula* L.) in 2022-23.

Thereafter, the population declined, reaching 5.18 adults by the 39th SMW. In 2022–23, the population began higher at 6.12 adults in the 27th SMW, showing a steady rise with a peak of 21.66 adults in the 33rd SMW when humidity was 84% with 31.8 mm rainfall. Later, a gradual decrease was noted, with 7.02 adults in the 39th SMW. Overall, whitefly incidence was higher during humid and rainy weeks, while unfavourable dry or cooler conditions suppressed their population. (Table 4 and Fig. 7 & 8).

Similar observations were also reported by Verma (2020) and Bakas (2020) reported 22 adult whiteflies in 31 SMW.

Almost similar comparable findings have also been documented by several researchers, including Uttam (2024); Yadav *et al.* (2024); Chauhan *et al.* (2023); Kumar *et al.* (2023); Mohapatra, (2023); Yadav & Singh (2022); Mondal *et al.* (2019) and Nagar *et al.* (2017).

Table 4: Seasonal incidence of okra whitefly (*Bemisia tabaci* G.) in 2021-2022 and 2022-23.

| Sr. No. | Date | S.M.W. | Temperature (°C) | | | | Relative Humidity (%) | | Rainfall (mm) | | Population per 3 leaves | |
|---------|--------------------|--------|------------------|------|---------|------|-----------------------|---------|---------------|---------|-------------------------|---------|
| | | | 2021-2022 | | 2022-23 | | 2021-22 | 2022-23 | 2021-22 | 2022-23 | 2021-22 | 2022-23 |
| | | | Max. | Min. | Max. | Min. | | | | | | |
| 1. | 1–7 July | 27 | 33.0 | 24.8 | 31.7 | 27.3 | 78 | 80 | 63.2 | 8.5 | 2.02 | 6.12 |
| 2. | 8–14 July | 28 | 33.8 | 26.2 | 33.1 | 28.1 | 74 | 82 | 18.4 | 5.2 | 5.36 | 9.25 |
| 3. | 15–21 July | 29 | 32.6 | 25.1 | 32.6 | 27.7 | 83 | 82 | 54.1 | 10.2 | 10.76 | 13.05 |
| 4. | 22–28 July | 30 | 32.8 | 25.8 | 32.2 | 25.1 | 81 | 83 | 56.2 | 83.6 | 12.16 | 16.25 |
| 5. | 29 July–4 August | 31 | 33.0 | 25.2 | 32.8 | 25.7 | 79 | 83 | 119.8 | 21.2 | 15.33 | 12.53 |
| 6. | 5–11 August | 32 | 32.4 | 24.7 | 33.6 | 26.2 | 87 | 81 | 268.4 | 8.2 | 22.83 | 20.03 |
| 7. | 12–18 August | 33 | 32.8 | 25.4 | 32.5 | 25.4 | 79 | 84 | 52 | 31.8 | 12.66 | 21.66 |
| 8. | 19–25 August | 34 | 31.8 | 25.6 | 32.5 | 25.5 | 84 | 83 | 67.9 | 65.2 | 16.83 | 15.83 |
| 9. | 26 Aug–1 September | 35 | 32.3 | 26.6 | 33.7 | 25.5 | 81 | 78 | 6.7 | 18.8 | 15.64 | 14.04 |
| 10. | 2–8 September | 36 | 32.7 | 27.1 | 34.8 | 24.1 | 71 | 74 | 63.2 | 8.5 | 12.05 | 11.15 |
| 11. | 9–15 September | 37 | 32.4 | 25.5 | 31.5 | 24.4 | 75 | 85 | 18.4 | 5.2 | 15.25 | 8.56 |
| 12. | 16–22 September | 38 | 31.4 | 25.5 | 31.9 | 24.7 | 83 | 83 | 54.1 | 10.2 | 8.33 | 7.42 |
| 13. | 23–29 September | 39 | 32.3 | 25.8 | 32.5 | 23.9 | 77 | 84 | 56.2 | 83.6 | 5.18 | 7.02 |

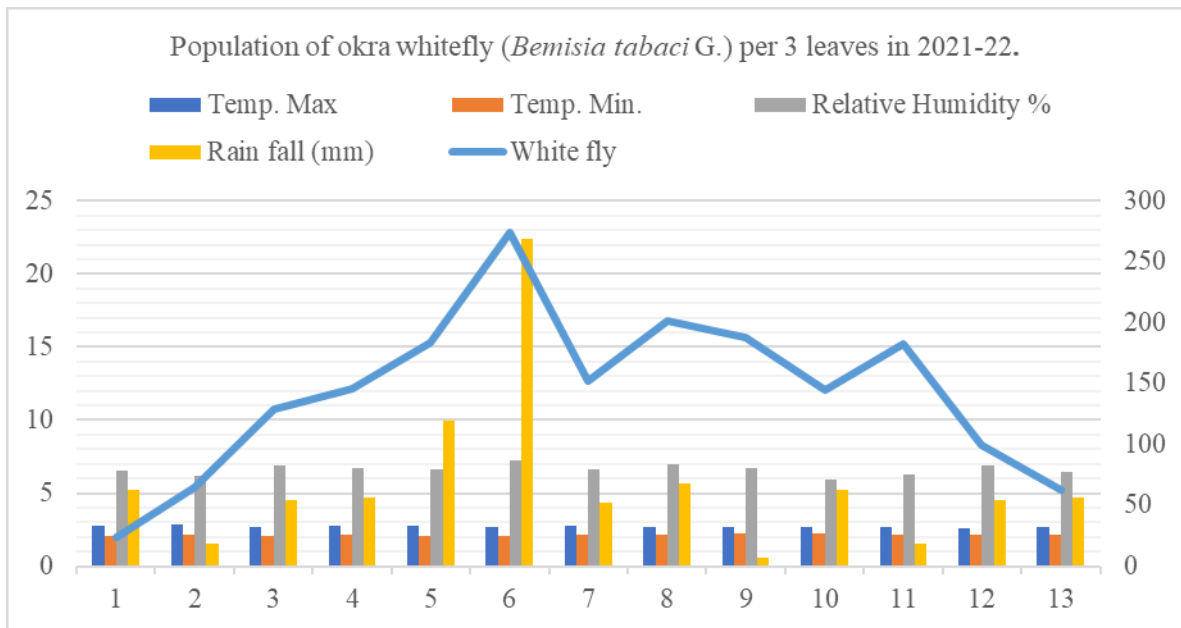


Fig. 7. Seasonal incidence of okra whitefly (*Bemisia tabaci* G.) in 2021-22.

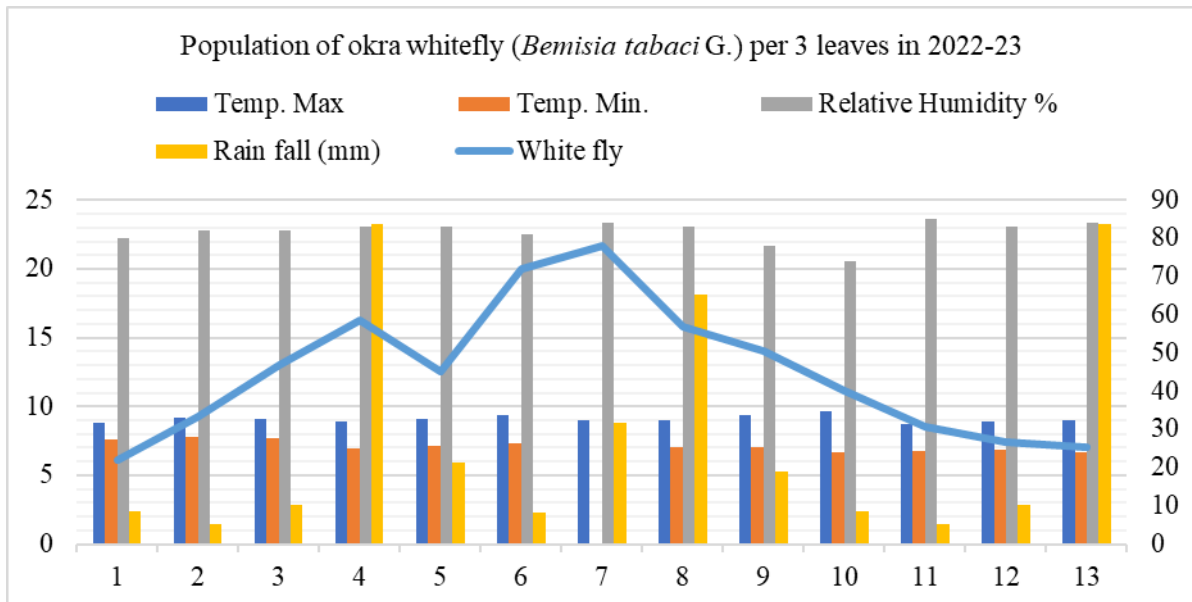


Fig. 8. Seasonal incidence of okra whitefly (*Bemisia tabaci* G.) in 2022-23.

CONCLUSION

Studies on the seasonal prevalence of major insect pests of okra revealed that their incidence follows a predictable trend across different Tarai regions of Uttar Pradesh and growing periods in *Kharif* season 2021-22, 2022-23. The investigation emphasized the predominance of a few major pests responsible for considerable yield losses in okra. The Okra Shoot and Fruit Borer (*Earias vittella* F.) emerged as the most destructive pest, inflicting serious damage to both shoots and fruits. Alongside, sucking pests like Jassid (*Amrasca bigutulla bigutulla* L.) and Whitefly (*Bemisia tabaci* G.) were frequently recorded, highlighting their economic importance. These observations corroborate earlier research findings reported by Gupta *et al.* (2024); Yadav Kumar *et al.*,

et al. (2024); Kumar *et al.* (2022) and Yadav & Singh (2022) validating their role in okra pest complexes.

FUTURE SCOPE OF THE STUDY

The present investigation will be establishing a strong foundation for pest management in relation to key weather parameters such as maximum and minimum temperatures, relative humidity, and rainfall under the existing agro-climatic conditions.

Acknowledgment. The authors are thankful to Department of Entomology, B.R.D.P.G. College, Deoria (U.P.), India for providing facilities.

Conflict of Interest. I hereby declare that; I have no any conflict of interest.

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How to cite this article: Dilip Kumar, Rajnish Kumar, Devendra Kumar Yadav and Gyan Prakash Morya (2025). Seasonal Incidence of Major Insect Pests of Okra (*Abelmoschus esculentus* L.) under Tarai Region of Eastern Uttar Pradesh Conditions. *Biological Forum*, 17(10): 87-96.