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SEASONAL INCIDENCE OF MAJOR INSECT PESTS AND THEIR NATURAL ENEMIES IN SUMMER SESAME

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ABSTRACT

A field experiment was conducted during the summer season at the Agricultural Research Station, Adilabad, Telangana, to study the seasonal incidence of major insect pests and their natural enemies in sesame (*Sesamum indicum* L.) in relation to weather parameters. Whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), thrips (*Thrips tabaci*), and leafhopper (*Orosius albicinctus*) occurred from the 6th to 16th SMW, while leaf webber and capsule borer (*Antigastra catalaunalis*), sesame gall fly (*Asphondylia sesami*), coccinellids, and spiders were active from the 7th to 15th SMW. Peak populations were recorded for aphid (21.7 per three leaves), thrips (7.0), whitefly (6.0), leafhopper (5.6), *A. catalaunalis* (2.5 larvae/plant), and gall fly (7.6% flower bud infestation) b*et.*ween the 10th and 12th SMW. Coccinellids and spiders peaked at 1.4 and 2.0 per plant, respectively. Correlation analysis revealed significant positive associations of aphids (r = 0.622*), thrips (r = 0.839**), capsule borer (r = 0.578*), and coccinellids (r = 0.713**) with maximum temperature, and of leafhopper (r = 0.635*) and gall fly (r = 0.697*) with evening relative humidity. The findings highlight the strong influence of temperature and evening humidity on pest dynamics and provide region-specific information for weather-based forecasting and integrated pest management in sesame.

***Keywords*:** Sesame, Seasonal incidence, Insect pests, Natural enemies, Weather parameters, Correlation, Standard Meteorological Week (SMW), *Antigastra catalaunalis*, *Asphondylia sesami*.

Introduction

Sesame (*Sesamum indicum* L.; Pedaliaceae), popularly known as the "Queen of Oilseeds," is one of the oldest cultivated oilseed crops, valued for its high oil (50–55 %) and protein (20–25 %) content, essential fatty acids, antioxidants, vitamins, and minerals (Bedigian, 2010; Wei *et al.*, 2022). It is widely grown under rainfed conditions in tropical and subtropical regions, including India since ancient times (Yadav *et al.*, 2022). Globally, sesame occupies 14.4 million hectares with annual production of 6.68 million tonnes; India ranks among the top producers with 1.7–1.8 million hectares and ≈0.8 million tonnes. In Telangana, it is mainly cultivated during the *kharif* and summer seasons under rainfed conditions (FAOSTAT, 2025; Directorate of Economics and Statistics, 2025).

Despite its economic importance, sesame productivity remains low due to biotic constraints, particularly insect pests. About 67 insect pest species have been reported on sesame, although only a few occur regularly and cause economic damage (Dilipsundar *et al.*, 2019). The leaf webber and capsule borer, *Antigastra catalaunalis* (Duponchel), is the most destructive, causing severe damage by webbing leaves, feeding on flowers, and boring into capsules (Naveen *et al.*, 2019). Other key pests include whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), thrips (*Thrips tabaci*), leafhopper (*Orosius albicinctus*), sesame gall fly

(*Asphondylia sesami*), and hairy caterpillars. These pests reduce plant vigour, transmit diseases such as sesame phyllody, and can cause substantial yield losses under favourable conditions (Revathi *et al.*, 2022).

Natural enemies, particularly coccinellid beetles and spiders, play a vital role in regulating pest populations. The abundance and activity of both pests and their natural enemies are strongly influenced by weather parameters such as temperature, relative humidity, and rainfall. However, region-specific information on the seasonal incidence and population dynamics of major insect pests and their natural enemies in relation to meteorological factors remains limited under the rainfed agro-climatic conditions of Telangana. Therefore, the present study was undertaken at the Agricultural Research Station, Adilabad, to generate region-specific data on the seasonal incidence of major insect pests and their associated natural enemies in sesame and to determine their relationship with prevailing weather parameters.

Materials and Methods

Study Site

The experiment was conducted during the summer season (January–April) of 2026 at the Agricultural Research Station (ARS), Mavala, Adilabad, located in the Northern Telangana Zone of Telangana, India. The study was carried out in a 100 m² plot having well-drained black soil. Sesame variety JCS-1020 was sown on 29 January 2026 at a spacing of 30×15 cm using a seed rate of 2 kg acre^{-1}. Farmyard manure was applied at 0.5 t ha^{-1} during land preparation, and a fertilizer dose of 50:20:20 kg N:P_2O_5:K_2O ha^{-1} was applied as per recommendation dose. The plot was divided into three replications.

Method of Data Collection

The crop was maintained free from insecticidal applications throughout the experimental period. Weekly observations on major insect pests and their natural enemies were recorded from germination until harvest. Ten plants were randomly selected from each replication. The population of sucking pests viz., *Bemisia tabaci*, *Aphis gossypii*, *Thrips tabaci*, and *Orosius albicinctus* was recorded on three leaves (one each from upper, middle and lower canopy) per plant and expressed as mean population per three leaves. The larval population of leaf webber and capsule borer (*Antigastra catalaunalis*) was recorded as number of larvae per plant. Incidence of sesame gall fly (*Asphondylia sesami*) was recorded from flower bud initiation stage by counting healthy and infested flower buds, and per cent flower bud infestation was calculated. Populations of natural enemies (coccinellids and spiders) were recorded by counting the number of individuals on the whole plant and expressed as mean population per plant. Meteorological data comprising maximum and minimum temperature, morning and evening relative humidity, bright sunshine hours, rainfall and wind speed were collected from the Agrometeorological Observatory, Agricultural Research Station, Adilabad. The relationship between seasonal incidence of insect pests and natural enemies with weather parameters was analyzed using Pearson's correlation coefficient

Results and Discussion

Whitefly (*Bemisia tabaci*)

The whitefly population was first noticed during the 2nd week after sowing (6th SMW, second week of February) and remained active until the 15th SMW. The population ranged from 0.0 to 6.0 whiteflies per three leaves. It gradually increased and reached its peak of 6.0 whiteflies per three leaves during the 10th SMW (second week of March). Thereafter, the population declined sharply and reached a minimum of 0.2 whiteflies per three leaves during the 15th SMW, with complete absence in the 16th SMW. Correlation analysis revealed positive but non-significant associations of whitefly population with maximum temperature (r = 0.236), minimum temperature (r = 0.005), morning relative humidity (r = 0.503), evening relative humidity (r = 0.544), bright sunshine hours (r = 0.173), and rainfall (r = 0.064).

The present findings are in agreement with Pensiya (2021), who recorded a peak population of 6.85 whiteflies per three leaves. However, the peak incidence was observed earlier than that reported by Saritha *et al.* (2020) and Divya *et al.* (2024). The non-significant correlation of whitefly population with all the weather parameters corroborates the earlier reports of Neeraj Kumar *et al.* (2023), Saritha *et al.* (2020), and Bhura *et al.* (2020).

Aphid (*Aphis gossypii*)

The aphid population was first recorded during the 6th SMW with a mean of 2.50 aphids per three leaves and reached a peak of 21.70 aphids per three leaves during the 12th SMW. Correlation analysis revealed a significant positive correlation with maximum temperature (r = 0.622*). Other weather parameters showed positive but non-significant correlations.

The present findings are partly in agreement with Saritha *et al.* (2020) and Ram *et al.* (2025), who reported that relative humidity and rainfall had a non-significant influence on the aphid population in

sesame. However, the significant positive correlation with maximum temperature observed in this study contrasts with the findings of Ahirwar *et al.* (2010).

Thrips (*Thrips tabaci*)

Thrips population was first recorded during the 6th SMW (second week of February) with a mean of 1.0 thrips per three leaves. The population increased gradually and reached a peak of 7.0 thrips per three leaves during the 12th SMW (fourth week of March). Thereafter, it declined steadily to 3.0 thrips per three leaves by the 16th SMW. The population ranged from 1.0 to 7.0 per three leaves during the crop season. Correlation analysis revealed significant positive correlations with maximum temperature (r = 0.839**) and minimum temperature (r = 0.681*). Other weather parameters showed non-significant correlations.

The present findings are in close agreement with Ram *et al.* (2019), who reported thrips incidence from the 10th SMW with a peak population of 6.82 per three leaves. However, the peak incidence in the present study occurred earlier than that reported by Trivedi *et al.* (2025). The significant positive correlation with both maximum and minimum temperature supports the observations of Ram *et al.* (2019).

Leafhopper (*Orosius albicinctus*)

Leafhopper population appeared during the 6th SMW and persisted up to the 14th SMW, with no incidence thereafter. The population ranged from 0.3 to 5.6 leafhoppers per three leaves, reaching a peak of 5.6 per three leaves during the 11th SMW, followed by a gradual decline. Correlation analysis revealed a significant positive correlation with evening relative humidity (r = 0.635*). Other weather parameters showed non-significant correlations.

The present findings are in agreement with Neeraj Kumar *et al.* (2023) and Saravanan and Selvanarayanan (2024), who reported a significant positive correlation between leafhopper population and evening relative humidity. However, the peak incidence was recorded earlier than that reported by Pensiya (2021) and Trivedi *et al.* (2025). These differences may be attributed to variations in sowing time, climatic conditions, and varieties.

Table 1 : Seasonal incidence of sesame pests at ARS, Adilabad during the summer, 2026

SMW	Sucking pests (No./3 leaves)				*Antigastra catalaunalis* (No. of Larvae / plant)	Gall fly (% flower bud infestation/plant)	Natural Enemies (No./plant)	
	Whiteflies	Aphids	Thrips	Leafhoppers			Coccinellids	Spiders
5	0.0	0.0	0	0	0.0	0.0	0.0	0.0
6	1.4	2.5	1.0	0.3	0.0	0.0	0.0	0.0
7	2.2	6.8	2.1	1.7	0.3	0.0	0.0	0.4
8	4.3	12.5	3.3	3.0	1.4	1.2	0.2	1.2
9	5.7	15.8	4.6	4.4	1.9	4.0	0.5	1.8
10	6.0	17.2	5.1	5.2	2.0	6.8	0.7	2.0
11	5.2	18.6	6.2	5.6	2.3	7.6	0.8	1.7
12	4.6	21.7	7.0	4.8	2.5	5.1	1.4	1.2
13	3.4	16.4	6.8	2.1	1.9	3.2	1.1	1.0
14	1.8	12.2	5.9	1.6	1.2	1.2	0.9	0.6
15	0.2	7.4	4.3	0.0	0.7	0.0	0.6	0.2
16	0.0	3.8	3.0	0.0	0.0	0.0	0.0	0.0
mean	2.90	11.24	4.10	2.39	1.18	2.42	0.51	0.84

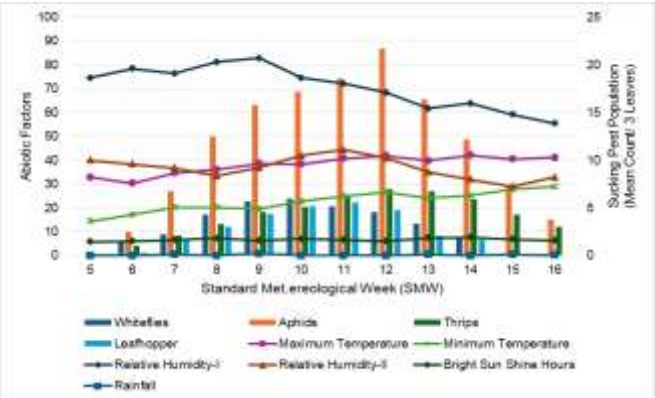

Fig. 1 : Seasonal incidence of sucking pests on sesame in relation to abiotic factors during the summer season 2026.

Leaf Webber and Capsule Borer (*Antigastra catalaunalis*)

The initial incidence of *A. catalaunalis* was recorded during the 7th SMW with a population of 0.3 larva per plant. The population increased gradually and reached a peak of 2.5 larvae per plant during the 12th SMW, followed by a steady decline to 0.7 larva per plant during the 15th SMW. No larvae were observed during the 16th SMW. The population ranged from 0.3 to 2.5 larvae per plant, with a mean seasonal incidence of 1.23 larvae per plant. Correlation analysis revealed a significant positive correlation with maximum

temperature (r = 0.578*). Other weather parameters showed non-significant correlations.

Similar findings were reported by Vijay Kumar *et al.* (2020), who observed incidence from the 4th SMW with peak activity during the 10th SMW. Omprakash *et al.* (2021) recorded occurrence from the 6th SMW and peak incidence during the 13th SMW. The significant positive correlation with maximum temperature is consistent with the findings of Saravanan and Selvanarayanan (2024) and Divya *et al.* (2024).

Sesame Gall Fly (*Asphondylia sesami*)

Gall fly incidence was first observed during the 8th SMW with 1.2% flower bud infestation, which increased steadily and reached a peak of 7.6% during the 11th SMW, followed by a gradual decline to 1.2% by the 14th SMW. No infestation was recorded during the 15th and 16th SMWs. The infestation ranged from 1.2 to 7.6%, with a mean seasonal incidence of 2.43%.Correlation analysis revealed a significant positive correlation with evening relative humidity (r = 0.697*). Other weather parameters showed non-significant correlation.

Similar trends were reported by Omprakash *et al.* (2021), who observed peak infestation during the 11th SMW, and Saravanan and Selvanarayanan (2024), who also recorded maximum activity around the 11th SMW. The significant influence of evening relative humidity corroborates the findings of Ahuja and Kalyan (2001). Similar non-significant associations with temperature and relative humidity were reported by Omprakash *et al.* (2024).

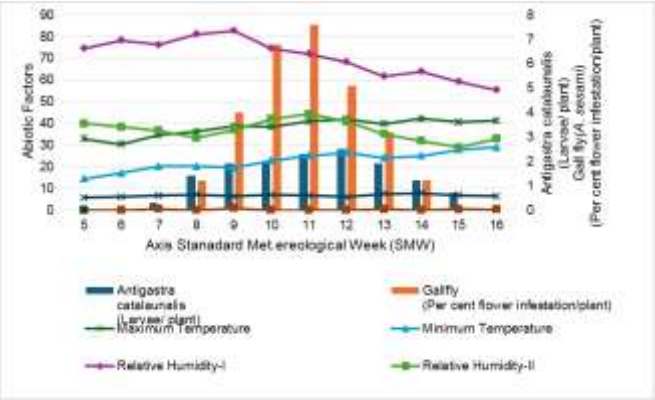

Fig. 2 : Seasonal incidence of *A. catalaunalis* and *A. Sesami* on sesame in relation to abiotic factors during the summer season 2026.

Natural Enemies

Coccinellids

Coccinellid population was first recorded during the 8th SMW with a mean of 0.2 per plant. The population increased gradually and reached a peak of 1.4 per plant during the 12th SMW. It then declined to 0.6 per plant by the 15th SMW. The population ranged from 0.2 to 1.4 per plant, with a seasonal mean of 0.52 per plant. Correlation analysis revealed a significant positive correlation with maximum temperature (r = 0.713**). Other weather parameters showed non-significant correlations.

The present findings are in agreement with Kalatiya and Chandaragi (2025), who reported positive associations of coccinellids with maximum and minimum temperature. However, the population appeared and peaked earlier (8th and 12th SMW) than that reported by Akbari *et al.* (2025) (peak at 14th SMW). The results are also consistent with Kiran Thakur *et al.* (2023), who observed non-significant negative correlations with morning relative humidity.

Spiders

Spider population was first recorded during the 7th SMW with a mean of 0.4 per plant. The population increased gradually and reached a peak of 2.0 per plant during the 10th SMW (second week of March). It then declined steadily to 0.2 per plant by the 15th SMW and was absent in the 16th SMW. The seasonal mean population was 0.84 spiders per plant. Correlation analysis revealed positive but non-significant correlations with all the weather parameters studied.

The present findings are in agreement with Akbari *et al.* (2025), who recorded peak spider abundance during the 15th SMW. However, spider activity commenced and peaked earlier in the present study (7th and 10th SMW respectively). The non-significant positive correlations with weather parameters are consistent with the observations of Kiran Thakur *et al.* (2023) and Jyothsna and Panday (2026).

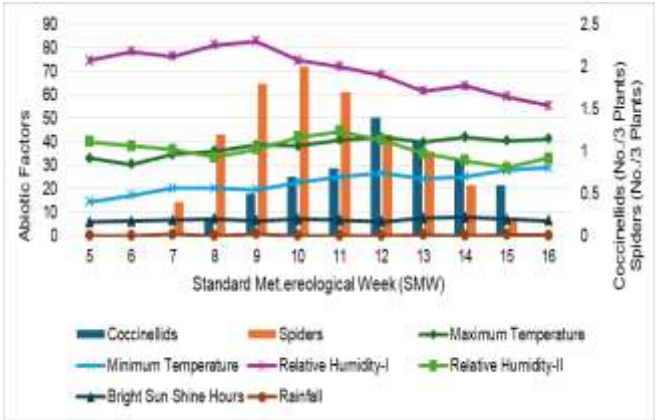

Fig. 3 : Seasonal incidence of natural enemies coccinellids and spiders on sesame in relation to abiotic factors during the summer season 2026.

Table 2 : Meteorological data during the crop season of summer 2026 at A.R.S, Adialabad, T.S

SMW	Date of observation	Maximum Temperature (ºC)	Minimum Temperature (ºC)	Morning Relative Humidit RH-I (%)	Evening Relative Humidity RH-II (%)	Sun Shine Hours (hrs)	Rainfall (mm)
5	04-02-2026	32.9	14.3	74.6	40	5.8	0
6	11-02-2026	30.4	17.1	78.4	38.3	6.1	0
7	18-02-2026	34.6	20.2	76.4	36.7	6.6	0.5
8	25-02-2026	36.1	20.2	81.2	33.4	7.2	0
9	04-03-2026	38.7	19.5	82.8	36.9	6.3	0.8
10	11-03-2026	38.3	22.8	74.6	42	7	0
11	18-03-2026	40.8	25	72.1	44.4	6.6	0
12	25-03-2026	41.9	26.6	68.4	40.9	6	0
13	01-04-2026	39.8	24.1	61.7	35	7.4	0.4
14	08-04-2026	42.1	25.1	63.9	31.9	7.7	0
15	15-04-2026	40.5	27.8	59.2	29	6.9	0.4
16	22-04-2026	41.2	28.9	55.4	32.9	6.3	0.2

Table 3 : Pearson's correlation coefficients (r) between weather parameters and major insect pests and natural enemies of sesame during the summer season, 2026.

Weather parameters	Sucking pests (No./3 leaves)				*Antigastra catalaunalis* (No. of larvae /plant)	%flower bud infestation by A. *sesami*	Coccinellids	Spiders
	Whiteflies	Aphids	Thrips	Leafhoppers				
Maximum temperature	0.236^{NS}	0.622^{*}	0.839^{**}	0.361^{NS}	0.578^{*}	0.432^{NS}	0.713^{**}	0.365^{NS}
Minimum temperature	0.005^{NS}	0.405^{NS}	0.681^{*}	0.126^{NS}	0.322^{NS}	0.227^{NS}	0.528^{NS}	0.098^{NS}
Morning relative humidity	0.503^{NS}	0.067^{NS}	-0.337^{NS}	0.393^{NS}	0.118^{NS}	0.175^{NS}	-0.301^{NS}	0.389^{NS}
Evening relative humidity	0.544^{NS}	0.347^{NS}	0.064^{NS}	0.635^{*}	0.398^{NS}	0.697^{*}	0.160^{NS}	0.487^{NS}
Sunshine hours	0.173^{NS}	0.331^{NS}	0.499^{NS}	0.092^{NS}	0.290^{NS}	0.074^{NS}	0.350^{NS}	0.246^{NS}
Rainfall	0.064^{NS}	0.022^{NS}	0.047^{NS}	-0.045^{NS}	-0.004^{NS}	-0.130^{NS}	-0.075^{NS}	0.083^{NS}

Conclusion

The study revealed that aphids, thrips, and leafhoppers peaked during mid-crop stages in summer, with aphids emerging as the most dominant pest, reaching 21.7 per three leaves during the 12th SMW. This was followed by thrips (7.0), whitefly (6.0), and leafhopper (5.6). Capsule borer and gall fly recorded peak incidences of 2.5 larvae per plant and 7.6% flower bud infestation during the 11th–12th SMW. Coccinellids and spiders peaked at 1.4 and 2.0 per plant, respectively. Maximum temperature significantly influenced aphids, thrips, capsule borer, and coccinellids, whereas evening relative humidity affected leafhopper and gall fly populations.

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