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SEASONAL INCIDENCE OF MAJOR INSECT PEST COMPLEX OF SUMMER SESAME

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ABSTRACT

The present investigation was carried out at the experimental farm of Project Coordinating Unit Sesame and Niger (ICAR), College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (Madhya Pradesh) during summer season, 2024. The results revealed that the peak period for the incidence of mirid bug was recorded during 22nd standard week however the peak incidence period for leafhopper and whitefly was recorded during 19th and 21st standard week respectively. The peak period for the incidence of hawk moth was recorded during 23rd standard week. Whitefly exhibited a positive and significant correlation with evaporation. Leafhopper and hawk moth did not show any significant correlation with weather factors. mirid bug exhibited a positive and significant correlation with maximum and minimum temperature morning relative humidity, wind speed, morning and evening vapour pressure.

***Key words*:** sesame; whitefly; mirid bug; leafhopper; hawk moth; significant ; correlation ; weather factors

Introduction

Sesame (*Sesamum indicum* L.) is commonly known as gingelly or Til, is one of the most well-known oilseed crop grown in tropical and subtropical regions of the earth and known as the “queen of oil seeds” due to its superior attributes like meal, oil and seed. After mustard, rapeseed and groundnut, it is India’s third-largest oilseed crop. Sesame seeds contain 25 percent protein and 48 to 52 percent oil (Panday *et al.*, 2021). Sesame seeds are an excellent source of mineral nutrients such as copper (1.48 mg), iron (5.24 mg), magnesium (126.36 mg), manganese (0.88 mg), phosphorus (226.44 mg), zinc (2.80 mg), tryptophan (0.12 g), dietary fiber (4.24 g), and thiamine (0.28 mg) (Chakraborthy*et al*., 2008).

Sesame occupies 128.21 lakh hectares’ area worldwide and yielding 65.49 lakh tons of output and 511 kg/ha of productivity. In terms of both area and global sesame production, India comes in fourth with 15.23 lakh hectare area, 8.02 lakh tons of production and 527kg/ha productivity. In Madhya Pradesh the area under sesame cultivation is 2.89 lakh ha with a production of 1.45 lakh tones and productivity is 504 kg/ha (Anonymous 2022-2023).

Sesame crop is attacked by a total of 201 species of insect pests under 55 genera worldwide. Among these, maximum number of species falls under Cicadellidae (15 genera and 20 species) followed by Pentatomidae (17 genera and 19 species), Noctuidae, Pyralidae (8 genera and 14 species) and Miridae (10 genera and 11 species), the minor and storage pests belong to families Anobiidae, Dermistidae, (Dilipsundar *et al*., 2019).

Materials and Methods

The observations were started from one week after germination and continued till the maturity of the crop. The population of insect pests and natural enemies were recorded in each standard week on five plants from ten spots selected randomly. The population of sucking insect pests (leafhopper, whitefly and mirid bug) were recorded by counting the number of nymphs and adults/six leaves/ plant (2 leaves each from top, middle and bottom). The population of hawk moth counting the number of larvae per plant. The population of ladybird beetle was recorded

Table 1: Seasonal incidence of insect pest complex of summer sesame and their predator.

SMW	Periods of observation	Crop older days	Average no. of nymphs and adults/six leaves/plant			No of larvae/plant Hawk moth	No. of predators/plant	
			Whitefly	Leafhopper	Mirid bug		Spider/ plant	Ladybird beetle adults/plant
12	March19 - 25	13 - 19	0.50	0.25	0.85	0.00	0.01	0.00
13	March 26 – 1April	20 - 26	0.83	0.59	1.07	0.00	0.03	0.05
14	April2 - 8	27 - 33	1.54	1.04	1.32	0.00	0.11	0.11
15	April9 – 15	34 - 40	1.86	0.56	1.51	0.00	0.15	0.19
16	April16 - 22	41 - 47	1.11	0.63	1.94	0.00	0.19	0.21
17	April23 - 29	48 - 54	1.50	1.29	2.01	0.00	0.21	0.26
18	30 Apr. - 6 May	55 - 61	2.03	1.77	2.11	0.00	0.24	0.22
19	May 7 - 13	62 - 68	3.00	2.33	2.32	0.00	0.18	0.21
20	May 14 - 20	69 - 75	2.55	0.63	3.15	0.00	0.25	0.29
21	May 21 - 27	76 - 82	3.55	0.52	4.26	0.02	0.29	0.38
22	28 May - 3 June	83 - 89	1.78	0.36	5.55	0.20	0.21	0.15
23	June 4 - 10	90 - 96	1.18	0.27	3.56	1.14	0.26	0.11
24	June 11- 17	97 - 103	0.77	0.19	3.31	0.67	0.04	0.00

by counting the number of adults/plant while the population of spider was recorded by counting the number of spider/ plant. Correlation and regression of the abiotic factors on sucking insect pest population were worked out by using the formula as suggested by Snedecor and Cochran.

Correlation and regression of the abiotic factors on sucking insect pest population were worked out by using the formula given below:

$$\text{Correlation 'r'} = \sum xy - \frac{\frac{\sum x \sum y}{n}}{\sqrt{\{\sum x^2 - \frac{((\sum x^2)}{n}\}\{\sum y^2 - \frac{((\sum y^2)}{n}\}}}$$

$$\text{Regression } \hat{Y} = a + bx(R^2)$$

Where,

a= intercept

b= Regression coefficient

R^2= coefficient of multiple determination.

Test of significance 'r'

$$t = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}$$

Results and Discussion

Whitefly, *Bemisiatabaci*, Gennadius

The incidence of whitefly was first noticed in the 12th standard week (0.50 whitefly/six leaves/plant) and persisted until crop maturity (0.77 whitefly/six leaves/ plant). The 21st standard week was the peak time (3.55 white flies/six leaves/plant) for the incidence of whiteflies, when maximum and minimum temperatures was 41°C and 26.7°C, respectively and morning and evening relative humidity was 62 and 33 percent respectively. Correlation studies carried out between meteorological parameters and population of whitefly. The population of whitefly showed significant positive correlation with evaporation (r=0.55). Present findings are partially supported by the findings of Thakur and Panday (2023) they studied the seasonal incidence of insect pests of sesame and reported that the population of whitefly showed significant negative correlation with maximum temperature (r = -0.74) while its population showed significant positive correlation with relative humidity (r = 0.83).

Leafhopper, *Orocious albicinctus*, Distance

Leafhopper first noticed on the crop during 12th standard week (0.25 leafhopper/six leaves/plant) and persisted until the crop reached maturity. The 19th standard week was the peak time (2.33 leafhopper / six leaves/plant) for the incidence of leafhoppers when the maximum and minimum temperatures was 38.6°C and 24.6°C respectively and morning and evening relative humidity levels was 63 and 36 percent respectively.

Correlation studies carried out between meteorological parameters and population of leafhopper and found that the leafhopper population had non -

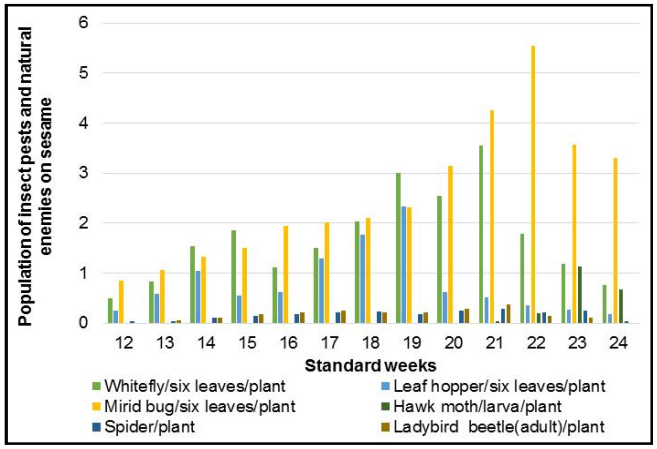

Fig. 1: Seasonal incidence of insect pest complex of sesame and their predators during summer, 2024.

Table 2: Correlation between abiotic factors and major insect pests and their predators.

Weather parameters	Correlation coefficient (r)				Predators	
	Whitefly	Leaf hopper	Mirid bug	Hawk moth	Spider	Ladybird beetle
N	13	13	13	4	13	11
Max. T. (°C)	0.29^{NS}	-0.02^{NS}	0.84^{**}	-0.02^{NS}	0.60^{*}	0.11^{NS}
Min. T (°C)	0.37^{NS}	-0.10^{NS}	0.91^{**}	0.37^{NS}	0.67^{*}	0.27^{NS}
Sunshine (hrs.)	0.23^{NS}	0.52^{NS}	-0.05^{NS}	-0.40^{NS}	0.36^{NS}	0.12^{NS}
Rainfall (mm)	-0.11^{NS}	-0.19^{NS}	-0.22^{NS}	0.13^{NS}	-0.09^{NS}	0.02^{NS}
Morn. RH (%)	-0.45^{NS}	-0.16^{NS}	-0.76^{**}	0.22^{NS}	-0.77^{**}	-0.05^{NS}
Even. RH (%)	0.25^{NS}	-0.28^{NS}	0.29^{NS}	0.12^{NS}	0.21^{NS}	0.51^{NS}
Wind speed (km/hr)	0.30^{NS}	0.09^{NS}	0.75^{**}	0.53^{NS}	0.49^{NS}	0.18^{NS}
Evaporation (mm)	0.55^{*}	0.39^{NS}	0.49^{NS}	-0.13^{NS}	0.86^{**}	0.18^{NS}
Morn. VP (mm)	0.31^{NS}	-0.27^{NS}	0.80^{**}	-0.27^{NS}	0.49^{NS}	0.47^{NS}
Even. VP (mm)	0.42^{NS}	-0.20^{NS}	0.80^{**}	0.10^{NS}	0.58^{*}	0.54^{NS}
*significant at 5% level, ** significant at 1% level, NS = non-significant						

significant positive association with sunshine hours (r=0.527) wind speed (r= 0.098), evaporation (r= -0.398) while its incidence showed non-significant negative correlation with temperature maximum (r= -0.021), temperature minimum (r= -0.109), sunshine hours (r= -0.67), relative humidity morning (r= -0.167), relative humidity evening (r= -0.282), vapor pressure morning (r= -0.276) and vapor pressure evening (r= -0.202). Present findings are corroborated with the findings of Saravanan and Selvanarayanan (2024) they reported that the leafhopper population showed non-significant positive correlation with minimum temperature and mean relative humidity.

Mirid bug, *Nesidiocoris tenuis*, Reuter

The mirid bug first emerged on the crop in the 12th standard week (0.85 mirid bug / six leaves/plant) and remained active till maturity of the crop (3.31 mirid bug / six leaves/plant). The 22nd standard week was the highest period for (5.55 mirid bugs/six leaves/plant) for the occurrence of mirid bug. During the peak active period of mirid bug the maximum and minimum temperatures was 42.9°C and 29.9°C while morning and evening relative humidity levels was 51 and 29 percent respectively.

Correlation studies carried out between meteorological parameters and population of mirid bug. The population of mirid bug showed significant positive correlations with maximum temperature (r= 0.84), minimum temperature (r= 0.91), wind speed (r= 0.75), vapor pressure morning (r= 0.80) and vapor pressure evening (r= 0.81). however its population showed significant negative correlation with morning relative humidity (r= -.076). Present findings are supported by the findings of Devaiah *et al.,* (2020) they studied that the incidence of nymph and adult population of mirid bugs on sesame during summer and *kharif* seasons and reported that during *Summer*, the highest incidence of mired bug was recorded during the fourth week of February and during *Kharif*, the highest incidence was recorded during the third week of September. Among the meteorological variables, morning relative humidity (r=-0.71) rainfall (r=- 0.45) and rainy days (r=-0.44) were found to have a significant negative influence on the incidence of mired bug on sesame.

Hawk moth, *Acherontia* spp.

The incidence of hawk moth was first noted on the crop during 21st standard week (0.02 larvae /plant) and they remained active till maturity of the crop (0.65 larvae/ plant). The peak period for the incidence of hawk moth (1.14larvae/plant) was recorded in 23th standard week when the maximum and minimum temperature was 41.7°C and 29.2°C and morning and evening relative humidity was 59 and 31 percent respectively.

Correlation studies carried out between meteorological parameters and population of hawk moth. The population of hawk moth showed non-significant positive correlation with minimum temperature (r= 0.37), wind speed (r= 0.53) and vapor pressure evening (r= 0.10). Present findings are corroborated with the findings of kumar *et al.,* (2023) they reported that the population of hawk moth showed significant positive correlation with rainfall, evening relative humidity and minimum temperature.

Spider

The activity of spider was first noticed during 12th standard week (0.01 spider/plant) and persisted until the crop reached maturity (0.04 spider/plant). The highest spider population (0.29 spiders/plant) was seen during the 21st standard week when morning and evening relative humidity levels was 62 and 33 percent however maximum

and minimum temperatures was 41°C and 26.7°C respectively.

Correlation studies carried out between meteorological parameters and population of spider. The population of spider showed significant positive correlation with maximum temperature (r=0.600), minimum temperature (r=0.676), morning relative humidity (r=-0.777), evening vapour pressure (r=0.586) and evaporation (r=0.868). Present findings are supported by the findings of Thakur and Panday (2023) they correlated the population of spider with meteorological factors and reported the population of spider showed significant positive correlation with maximum temperature, minimum temperature, vapor pressure morning and evaporation.

Ladybird beetle, *Cheilomenessex maculata*, Fabricius

The activity of ladybird beetles was first noticed on the crop during 13th standard week (0.05 adult/plant) and they remained active till maturity of the crop. The peak period for the activity (0.38 adults/plant) of ladybird beetle was recorded in 21th standard week when the maximum and minimum temperature was 41 °C and 26.7°C, morning and evening relative humidity was 62 and 33 percent respectively. Present findings are supported by the findings of Choudhary *et al.*, (2015) they studied the seasonal occurrence of sesame insect pests and their predators in connection to environmental variables and reported that the main predator of sucking insect pests of sesame is the lady bird beetle, *Coccinellia septempunctata* Linn. Correlation studies carried out between meteorological parameters and population of ladybird beetle adults. The population of ladybird beetle showed non-significant positive correlation with vapour pressure evening (r=0.54) and evaporation (r=0.18).

Conclusion

The peak period for the incidence of mirid bug was recorded during 22nd standard week however the peak incidence period for leafhopper and whitefly was recorded during 19th and 21st standard week respectively. The peak period for the incidence of hawk moth was recorded during 23rd standard week. Whitefly exhibited a positive and significant correlation with evaporation. Leafhopper and hawk moth did not show any significant correlation with weather factors. mirid bug exhibited a positive and significant correlation with maximum and minimum temperature morning relative humidity, wind speed, morning and evening vapour pressure.

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