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Correlation analysis and population dynamics of major insect pests of okra in arid zone of Rajasthan

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Abstract

Investigation on “Correlation analysis and population dynamics of major insect pests of okra in arid zone of Rajasthan” was carried out at Instructional farm, College of Agriculture, Jodhpur and Agricultural Research Sub-Station, Sumerpur, Pali, during *Kharif*, 2025. The result of population dynamics on leafhopper appeared during the 31st Standard Meteorological Week (SMW) and gradually achieved its maximum during the 41st SMW at both locations, after which the population fluctuated until crop maturity. The population ranged from 0.20 to 14.60 per plant at Jodhpur and 3.47 to 26.07 per plant at Sumerpur. The peak population of 14.60 and 26.07 leafhoppers per plant was occurred during the 41st SMW at Jodhpur and Sumerpur, respectively. The starting of whitefly appeared during the 31st SMW and significantly highest during the 41st SMW at both locations. The population ranged from 0.13 to 7.20 per plant at Jodhpur and 1.67 to 12.87 per plant at Sumerpur. The maximum occurrence of whiteflies per plant (7.20 and 12.87) was confirmed during the 41st SMW at Jodhpur and Sumerpur, respectively. The appearance of aphid population at 31st SMW and subsequently highest during the 42nd SMW at both locations. The population ranged from 0.40 to 16.40 per plant at Jodhpur and 5.20 to 27.53 per plant at Sumerpur. The maximum infestation of aphids per plant, 16.40 and 27.53 was reached during the 42nd SMW at Jodhpur and Sumerpur, respectively. The mite population appeared during the 31st SMW and gradually increased to reach its peak during the 44th SMW at both locations. The population ranged from 0.80 to 5.67 per plant at Jodhpur and 1.33 to 8.73 per plant at Sumerpur. The peak population of 5.67 and 8.73 mites per plant was recorded during the 44th SMW at Jodhpur and Sumerpur, respectively. Correlation analysis revealed that maximum temperature was positively associated with the populations of sap-sucking pests at Jodhpur.

Keywords: Population dynamics, Correlation, *Kharif*, Weather parameters, Standard Meteorological Week

Introduction

Indian agriculture is well defined for its multiple roles from suffering environmental and food securities, employment and livelihood to nutritional described by Sharma *et al.* (2025)^[1]. The global population is projected to grow nearly 10 billion up to 2050, intensifying the food demand previous reviewed by Kumari *et al.* (2024)^[2]. Applying high doses of fertilizers inputs to gain more yields is indispensable studied by Sharma *et al.* (2020)^[3] and Kumari *et al.*, (2025)^[4] under intensive cropping practices, but blanket chemical inputs application is included as one of the most essentials to maintain agriculture crop production previous described by Sharma *et al.* (2021)^[5]; Kumari *et al.* (2025)^[6] and Sharma *et al.* (2026)^[7]. At present next-generation precision farming systems to increase sustainable agricultural production with environmental sustainability previous reviewed by Kumari *et al.* (2026); Yadav *et al.* (2026a) and Yadav *et al.* (2026b)^[8, 9, 10]. With the global population steadily enhancing, there is a reaching require to enhance agricultural productivity in order to secure sufficient food supply for future prospectus (Gt *et al.*, 2025)^[11].

Okra is a widely recognized and utilized species of the family Malvaceae (Naveed *et al.*, 2009)^[12]. Okra is related to hibiscus and cotton family, often referred as “lady’s finger, bamia and gumbo”. Okra [*Abelmoschus esculentus* (L.) Moench] is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. (Wammanda *et al.*, 2010)^[13]. Okra is regarded as one of the major vegetable crops due to its nutritional and economic importance and it has its unique significance, flavour and nutritional value as a human diet. Okra fruits are rich in vitamin C (13 mg/100 g), and also contain considerable

amounts of vitamin A (58 IU), vitamin B (0.06 mg), nicotinic acid (0.06 mg), riboflavin (0.06 mg), calcium (66 mg/100 g) and iron (0.35 mg/100 g). It is also rich in protein and minerals with about moisture (88%), carbohydrate (7.7%), fibre (1.1%), mineral matter (0.7%), phosphorus (0.08%) and 41 (kcal) calorific values. Okra seeds contain 18 to 20% oil and 20 to 23% raw protein.

Globally, okra is cultivated on an estimated area of 2 million hectares, yielding 9 million tonnes annually (Kuo *et al.*, 2025) ^[14]. Commercial okra production in India covers 0.53 million hectares and produces about 6.46 million tonnes per year. With 62 per cent of the world's production, India makes a substantial contribution in okra production. The major okra-growing states in India are Gujarat, Maharashtra, Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, Haryana, Punjab and Rajasthan. Cultivation of okra in these areas are carried out during both the summer and *Kharif* seasons (Nandaniya *et al.*, 2025) ^[15]. In India, okra is cultivated over an area of 5.47 lakh ha with an annual production of about 71.49 lakh MT.

Around 72 insect pest species are known to infest okra in India, resulting in a 48.97 per cent decrease in pod output (Das *et al.*, 2021) ^[16]. Among the numerous insect pests associated with okra, the most destructive species include the leafhopper (*Amrasca biguttula biguttula* Ishida), aphid (*Aphis gossypii* Glover), whitefly (*Bemisia tabaci* Gennadius), spotted bollworm (*Earias vittella* Fabricius and *Earias insulana* Boisduval) and fruit borer (*Helicoverpa armigera* Hubner) (Mandal *et al.*, 2006 and Mane *et al.*, 2010) ^[17, 18]. Minor insect pests associated are cutworm (*Agrotis* sp. Hufnagel), semilooper (*Acontia graellsii* Feisth and *Anomis flava* Fabricius), dusky cotton bug (*Oxycarenus laetus* Kirby), mealybug (*Nipaecoccus napae* Maskell and *Ferrisia virgata* Cockerell), scale insect (*Saissetia nigra* Nietner), plant bug (*Coptosoma cribraria* Fabricius), shoot bug (*Eurybrachys tomentosa* Fabricius), shoot weevil (*Alcides bubo* Fabricius), stem weevil (*Alcides afflaver* Aurive) and stem borer (*Sphenoptera gossypii* Cotes) (Vevai, 1969) ^[19]. Natural enemies that live on these pests are also part of the okra ecosystem.

Among these, the cotton jassid (*Amrasca biguttula biguttula*; Ishida), aphid (*Aphis gossypii*; Glover), and whitefly (*Bemisia tabaci*; Gennadius) are the most significant sucking pests responsible for considerable hindrance to okra cultivation causing 50-56% losses of okra. The leafhopper is reported to cause 57.1% fruit damage and 54.04% yield loss in okra crop (Chaudhary and Dadheech, 1989) ^[20]. There are two species of shoot and fruit borer *Earias vittella* Fabricius and *Earias insulana* Boisduval which are notorious and cause more than 40-50 per cent losses to okra in various parts of India.

Helicoverpa armigera (Hubner) also cause significant damage to crop to the tune of 91.60 per cent. In general, the overall damage due to insect pests accounts to 48.97 per cent loss in fruit yield (Subbireddy *et al.*, 2018) ^[21]. The honeydew produced by whiteflies *Bemisia tabaci* (Genn.) covers plant surfaces and encourages the growth of fungi that cause black sooty mould, which impairs photosynthesis and fruit quality (Patil, 2021) ^[22]. Jassids cause cupping, yellowing and bronzing of leaves affecting growth of the okra crop adversely (Mahal *et al.*, 1994) ^[23] and the losses in yield due to this pest have been reported to vary from 32.06 to 40.84 per cent (Singh and Brar, 1994) ^[24].

The study was mainly focused on the assessment of population dynamics of okra pests. This provides insight into the application of low cost, cheap and safer techniques that can be effectively helpful for preventing the development of insect resistance towards chemical insecticides.

Materials and Methods

The current investigation on, "Correlation analysis and population dynamics of major insect pests of okra in arid zone of Rajasthan" was performed during *Kharif*, 2025 on Okra crop at Instructional farm, College of Agriculture, Jodhpur and Agricultural Research Sub-Station, Sumerpur, Pali. The experimental field was set up by ploughing successively followed by cross harrowing and ridge packer. The crop was sown in the field from July to December during the *Kharif* season 2025. All the recommended package of practices for raising a good crop were followed. The trial was laid out in uniformly sized plots measuring 10m×10m in Factorial Block Design containing seven treatments with three replications at each; thus, in all, there were 21 plots. The plant to plant distance and row to row 45 and 45 cm respectively. Okra variety "Mahyco No. 10" were sown in mid of July, 2025 with a view of keeping with all recommended package of practices except application of pesticidal spray for pest management.

Correlation of weather parameters with pest population

Correlation of weather parameters with pest population was compared with the weekly meteorological data which were obtained from the meteorological observatory of Instructional farm, College of Agriculture, Jodhpur and Agricultural Research Sub-Station, Sumerpur, Pali to investigate the specific effect of various weather parameters on population dynamics of major insect pests in okra. With a view to study the impact of various weather parameters such as rainfall (RF), wind speed (WS), temperature [maximum (MaxT) and minimum (MinT)], relative humidity [morning (RH₁) and evening (RH₂)], vapour pressure [morning (VP₁) and evening (VP₂)] and rainy days on pest population. According to the weekly obtained pest population data, a simple correlation was carried out between pest population and weather parameters as presented Table 1.

Results and Discussion

Our research study titled "Correlation analysis and population dynamics of major insect pests of okra in arid zone of Rajasthan" was conducted during the *Kharif* season of 2025 under field conditions at the Instructional farm, College of Agriculture, Jodhpur and Agricultural Research Sub-Station, Sumerpur, Pali. Our findings reported are outlined here and examined in context with previous research studies conducted elsewhere, as well as in both direct and indirect relation to the current investigations. The results obtained are shown in Table 1 and 2.

The highest number of insect pests estimated during the study period (30th to 46th Standard Meteorological Week) on okra variety Mahyco No. 10 were leafhopper (*Empoasca kerri* Pruthi), whitefly (*Bemisia tabaci* Genn.), aphid (*Aphis craccivora* Koch), mite (*Tetranychus urticae*), and shoot and fruit borer (*Earias vittella* Fabricius). The population dynamics of these pests were studied in relation to abiotic factors including maximum temperature, minimum

temperature, relative humidity, wind speed, and rainfall. The initial population of leafhopper appeared during the 31st Standard Meteorological Week (SMW) and gradually achieved its maximum during the 41st SMW at both locations, after which the population fluctuated until crop maturity. The population ranged from 0.20 to 14.60 per plant at Jodhpur and 3.47 to 26.07 per plant at Sumerpur. The peak population of 14.60 and 26.07 leafhoppers per plant was occurred during the 41st SMW at Jodhpur and Sumerpur, respectively. The present findings are in agreement with the earlier work carried out by Suman *et al.* (2022) [25] revealed incidence of *A. biguttula biguttula* from 30th SMW to 41st SMW. Similarly, Bhatt and Karnatak, (2018) [26] revealed that the first incidence of leaf hopper (1.31 leafhopper/3 leaves) from 34th SMW lasted upto 43rd SMW.

The population density of leafhopper at Jodhpur started when the maximum and minimum temperatures were 33.46 °C and 24.87 °C, mean relative humidity was 73.42 per cent, wind speed 5.83 kmph, and rainfall 0.95 mm, whereas at Sumerpur, the incidence commenced at 34.7 °C maximum temperature, 26.1 °C minimum temperature, 72.0 per cent maximum RH, and 54.0 per cent minimum RH. The peak population at Jodhpur (14.60/plant) was recorded at 32.78 °C maximum temperature, 18.11 °C minimum temperature, 51.75 per cent mean RH, 1.54 kmph wind speed, and 0.00 mm rainfall, while at Sumerpur, the peak population (26.07/plant) occurred at 29.3 °C maximum temperature, 21.4 °C minimum temperature, and 78.0 per cent maximum RH. Similarly, Kumar *et al.* (2022) [27] reported that the jassid incidence commenced in the last week of March with a population of 2.22 insects per plant, when the mean maximum temperature, minimum temperature, and relative humidity were 30 °C, 18 °C, and 38%, respectively. Correlation analysis documented that at Jodhpur, maximum temperature reflected a significant positive correlation ($r = 0.500$) with leafhopper population, while minimum temperature, relative humidity, and rainfall exhibited positive non-significant correlations ($r = 0.348, 0.287, 0.106$), and wind speed showed a negative non-significant correlation ($r = -0.172$). At Sumerpur, maximum and minimum temperatures illustrated significant negative correlations ($r = -0.512$ and -0.550), maximum RH showed a negative non-significant correlation ($r = -0.202$), and minimum RH emphasized a positive non-significant correlation ($r = 0.464$) with leafhopper population, these findings are in agreement with Patel *et al.* (2022) [28] observed a significant positive correlation between leafhopper population and minimum temperature in summer season in okra crop and also supported by Naghera *et al.* (2025) [29].

The starting of whitefly appeared during the 31st SMW and significantly highest during the 41st SMW at both locations. The population ranged from 0.13 to 7.20 per plant at Jodhpur and 1.67 to 12.87 per plant at Sumerpur. The maximum occurrence of whiteflies per plant (7.20 and 12.87) was confirmed during the 41st SMW at Jodhpur and Sumerpur, respectively. The infestation of whitefly started at Jodhpur when the maximum and minimum temperatures were found to be 33.46 °C and 24.87 °C, mean RH 73.42 per cent, wind speed 5.83 kmph, and rainfall 0.95 mm, whereas at Sumerpur, the incidence commenced at 34.7 °C maximum temperature, 26.1 °C minimum temperature, 72.0 per cent maximum RH, and 54.0 per cent minimum RH.

The peak population at Jodhpur (7.20/plant) was recorded at 32.78 °C maximum temperature, 18.11 °C minimum temperature, 51.75 per cent mean RH, 1.54 kmph wind speed, and 0.00 mm rainfall, while at Sumerpur, the peak population (12.87/plant) occurred at 29.3 °C maximum temperature, 21.4 °C minimum temperature, and 78.0 per cent maximum RH. Our result is in partial confirmation with the findings of Yadav *et al.* (2024) [30] found that incidence of whitefly commenced during the 30th SMW and reached its maximum population of 16.14 insects during the 35th SMW. The whitefly population exhibited a positive correlation with maximum temperature, minimum temperature, morning relative humidity, and bright sunshine hours, while a negative correlation was observed with evening relative humidity. Burade *et al.* (2019) [31] who cited that whitefly had significant positive correlation with both maximum and minimum temperature.

Correlation analysis explained that at Jodhpur, maximum temperature depicted a significant positive correlation ($r = 0.504$) with whitefly population, while minimum temperature and relative humidity exhibited positive non-significant correlations ($r = 0.303, 0.237$), and rainfall and wind speed showed negative non-significant correlations ($r = -0.020, -0.171$). At Sumerpur, maximum and minimum temperatures suggested significant negative correlations ($r = -0.522$ and -0.512), maximum RH showed a negative non-significant correlation ($r = -0.135$), and minimum RH showed a significant positive correlation ($r = 0.566$) with whitefly population.

The appearance of aphid population at 31st SMW and subsequently highest during the 42nd SMW at both locations. The population ranged from 0.40 to 16.40 per plant at Jodhpur and 5.20 to 27.53 per plant at Sumerpur. The maximum infestation of aphids per plant, 16.40 and 27.53 was reached during the 42nd SMW at Jodhpur and Sumerpur, respectively. The incidence of aphid started at Jodhpur when the maximum and minimum temperatures were 33.46 °C and 24.87 °C, mean RH 73.42 per cent, wind speed 5.83 kmph, and rainfall 0.95 mm, whereas at Sumerpur, the incidence commenced at 34.7 °C maximum temperature, 26.1 °C minimum temperature, 72.0 per cent maximum RH, and 54.0 per cent minimum RH. The peak population at Jodhpur (16.40/plant) was recorded at 33.21 °C maximum temperature, 18.13 °C minimum temperature, 52.21 per cent mean RH, 2.21 kmph wind speed, and 0.00 mm rainfall, while at Sumerpur, the peak population (27.53/plant) occurred at 27.5 °C maximum temperature, 22.0 °C minimum temperature, 76.0 per cent maximum RH, and 66.0 per cent minimum RH. Our observations are in partial align with the findings of Patel *et al.* (2022) [28] who reported that the incidence of aphids started from first week of March i.e., at 10th SMW and continued up to the crop termination in the last week of May reaching the peak activity in third week of April i.e., 17th SMW with a population of 16.20 per three leaves. The slight difference might be due to change in sowing date and the ecological conditions of the locality. The incidence of aphids commenced from 29th standard week and was lowest (3.30 aphids/3 leaves). Yaqoob *et al.* (2019) [32] reported that the aphid counts gradually increased and reached its peak in 32nd SMW (47.28 aphids/3leaves) thereafter it declined and was again minimum during 40th SMW (5.19 aphids/3 leaves).

Correlation analysis exhibited that at Jodhpur, maximum temperature showed a significant positive correlation ($r = 0.523$) with aphid population, while minimum temperature, relative humidity, and rainfall exhibited positive non-significant correlations ($r = 0.350, 0.377, 0.073$), and wind speed showed a negative non-significant correlation ($r = -0.102$). At Sumerpur, maximum and minimum temperatures showed significant negative correlations ($r = -0.508$ and -0.571), maximum RH showed a negative non-significant correlation ($r = -0.258$), and minimum RH pointed out a significant positive correlation ($r = 0.534$) with aphid population. The present findings differ with that of Mohanasundaram and Sharma (2011)^[33] and Selvaraj *et al.* (2010)^[34] who reported that maximum temperature had positive impact whereas rainfall and relative humidity had negative effect on leafhopper population.

The mite population appeared during the 31st SMW and gradually increased to reach its peak during the 44th SMW at both locations. The population ranged from 0.80 to 5.67 per plant at Jodhpur and 1.33 to 8.73 per plant at Sumerpur. The peak population of 5.67 and 8.73 mites per plant was recorded during the 44th SMW at Jodhpur and Sumerpur, respectively. The incidence of mite started at Jodhpur when the maximum and minimum temperatures were 33.46 °C and 24.87 °C, mean RH 73.42 per cent, wind speed 5.83

kmph, and rainfall 0.95 mm, whereas at Sumerpur, the incidence commenced at 34.7 °C maximum temperature, 26.1 °C minimum temperature, 72.0 per cent maximum RH, and 54.0 per cent minimum RH. The peak population at Jodhpur (5.67/plant) was recorded at 31.57 °C maximum temperature, 18.80 °C minimum temperature, 62.68 per cent mean RH, 2.62 kmph wind speed, and 0.72 mm rainfall, while at Sumerpur, the peak population (8.73/plant) occurred at 27.3 °C maximum temperature, 20.2 °C minimum temperature, 74.0 per cent maximum RH, and 67.0 per cent minimum RH.

Correlation analysis revealed that at Jodhpur, maximum temperature showed a significant positive correlation ($r = 0.512$) with mite population, while minimum temperature, relative humidity, and rainfall exhibited positive non-significant correlations ($r = 0.306, 0.276, 0.032$), and wind speed showed a negative non-significant correlation ($r = -0.094$). At Sumerpur, maximum and minimum temperatures showed significant negative correlations ($r = -0.669$ and -0.735), maximum RH showed a negative non-significant correlation ($r = -0.284$), and minimum RH showed a positive non-significant correlation ($r = 0.285$) with mite population. The present investigation supported by conducted studied of Naghera *et al.* (2026)^[35].

Table 1: Population dynamics of major insect pest on okra at ARSS, Sumerpur

S. N.	SMW*	Date	Average temperature		Average Relative humidity-1 (%)	Average Relative humidity-2 (%)	Shoot and fruit borer Fruit Infestation (%)		Pest population per plant			
			Maximum	Minimum			Number basis	Weight basis	Whiteflies	Leafhoppers	Aphids	Mites
1	30	23 Jul-29 Jul	33.3	25.1	79	57	0.00	0.00	1.67	0.00	0.00	0.00
2	31	30 Jul-05 Aug	34.7	26.1	72	54	0.00	0.00	2.73	3.47	5.20	1.33
3	32	06 Aug-12 Aug	32.8	23.6	77	61	0.00	0.00	3.00	6.53	7.67	1.67
4	33	13 Aug-19 Aug	33.0	25.6	89	69	0.00	0.00	4.67	7.67	9.33	2.80
5	34	20 Aug-26 Aug	30.0	24.4	93	81	5.00	4.69	7.13	12.80	10.47	4.07
6	35	27 Aug-02 Sep	33.5	25.8	85	71	6.67	6.25	7.87	16.13	12.33	5.00
7	36	03 Sep-09 Sep	33.1	24.3	81	73	8.33	7.81	8.08	18.33	14.80	5.60
8	37	10 Sep-16 Sep	32.1	22.8	78	74	11.67	10.94	8.53	19.00	15.87	6.00
9	38	17 Sep-23 Sep	32.2	22.5	81	72	15.00	14.06	9.13	21.60	18.67	6.40
10	39	24 Sep-30 Sep	31.0	23.0	77	71	18.33	17.19	9.80	22.13	20.80	6.80
11	40	01 Oct-07 Oct	30.8	21.4	74	71	20.00	18.75	10.33	24.00	25.87	7.00
12	41	08 Oct-14 Oct	29.3	21.4	78	68	24.59	23.08	12.87	26.07	26.50	7.27
13	42	15 Oct-21 Oct	27.5	22.0	76	66	28.33	26.56	11.07	24.33	27.53	7.80
14	43	22 Oct-28 Oct	28.1	21.3	71	66	30.91	28.81	10.13	22.27	20.80	8.47
15	44	29 Oct-04 Nov	27.3	20.2	74	67	31.67	29.69	9.00	20.20	18.13	8.73
16	45	05 Nov-11 Nov	27.1	20.3	68	64	33.33	31.25	8.27	18.47	15.80	4.87
17	46	12 Nov-18 Nov	26.3	18.4	72	67	35.00	32.81	5.93	12.13	12.07	0.00
Simple Correlation of pest population with Maximum Temperature							-0.985*	-0.919*	-0.522*	-0.512*	-0.508*	-0.679*
Simple Correlation of pest population with Minimum Temperature							-0.882*	-0.921*	-0.512*	-0.550*	-0.571*	-0.735*
Simple Correlation of pest population with Relative Humidity-1							-0.821*	-0.610*	-0.135 ^{NS}	-0.202 ^{NS}	0.258 ^{NS}	0.284 ^{NS}
Simple Correlation of pest population with Relative Humidity-2							-0.077 ^{NS}	-0.193 ^{NS}	0.566*	0.464 ^{NS}	0.534*	0.285 ^{NS}

*Significance at 5%

NS-Non-significance

Table 2: Population dynamics of major insect pest on okra at COA, Jodhpur

S. No.	SMW*	Date	Average temperature		Average Relative humidity (%)	Precipitation	Wind Speed	Shoot and fruit borer Fruit Infestation (%)		Pest population per plant			
			Maximum	Minimum				Number basis	Weight basis	Whiteflies	Leafhoppers	Aphids	Mites
1	30	23 Jul-29 Jul	34.84	26.13	73.01	17.96	4.94	0.00	0.00	0.00	0.00	0.00	0.00
2	31	30 Jul-05 Aug	33.46	24.87	73.42	0.95	5.83	0.00	0.00	1.00	1.53	3.53	2.20
3	32	06 Aug-12 Aug	34.78	24.56	67.8	0	5.42	0.00	0.00	1.20	2.93	7.93	2.67
4	33	13 Aug-19 Aug	35.15	26.14	70.95	5.84	2.92	0.00	0.00	1.80	3.60	8.60	2.80
5	34	20 Aug-26 Aug	32.88	25.75	78.04	51.53	3.77	0.00	0.00	2.67	5.20	9.20	3.20
6	35	27 Aug-02 Sep	31.76	25.25	82.4	87.86	3.26	4.00	2.63	2.80	6.53	9.53	3.60
7	36	03 Sep-09 Sep	31.72	24.43	81.64	32.27	4.14	5.26	5.00	3.00	7.00	11.00	3.93
8	37	10 Sep-16 Sep	32.92	22.48	75.49	0	4.06	6.41	7.59	4.93	7.73	12.73	4.27
9	38	17 Sep-23 Sep	34.87	23.39	69.4	0	3.18	8.86	8.75	6.80	8.60	13.60	4.40
10	39	24 Sep-30 Sep	35.01	23.52	68.25	2.78	3.26	11.25	11.11	6.93	9.27	14.27	4.87
11	40	01 Oct-07 Oct	31.65	22.78	75.1	18.03	3.32	13.58	12.35	7.07	10.00	15.00	5.00
12	41	08 Oct-14 Oct	32.78	18.11	51.75	0	1.54	14.81	13.25	7.20	14.60	15.60	5.13
13	42	15 Oct-21 Oct	33.21	18.13	52.21	0	2.21	18.07	15.48	6.33	10.67	16.40	5.27
14	43	22 Oct-28 Oct	32.71	18.44	58.59	4.29	3.4	20.24	16.05	3.20	7.00	14.67	5.40
15	44	29 Oct-04 Nov	31.57	18.8	62.68	0.72	2.62	20.99	18.60	1.80	4.73	9.73	5.67
16	45	05 Nov-11 Nov	30.1	12.34	45.02	0	2.6	22.09	19.54	1.20	1.20	6.60	2.87
17	46	12 Nov-18 Nov	29.28	12.24	38.23	0	1.67	22.99	19.77	1.00	0.73	3.07	1.93
18	47	19 Nov-25 Nov	28.69	12.68	46.46	0	2.37	24.42	21.67	0.40	0.20	1.13	1.00
19	48	26 Nov-02 Dec	27.68	13.95	51.97	0.003	2.57	25.00	22.22	0.13	0.20	0.40	0.80
20	49	03 Dec-09 Dec	27.64	11.96	28.55	0	2.31	25.40	22.81	0.00	0.00	0.00	0.00
Simple Correlation of pest population with Maximum Temperature								-0.753*	-0.776*	0.504*	0.500*	0.523*	0.512*
Simple Correlation of pest population with Minimum Temperature								-0.915*	-0.922*	0.303 ^{NS}	0.348 ^{NS}	0.350 ^{NS}	0.306 ^{NS}
Simple Correlation of pest population with Relative Humidity								-0.858*	-0.864*	0.237 ^{NS}	0.287 ^{NS}	0.377 ^{NS}	0.276 ^{NS}
Simple Correlation of pest population with Precipitation								-0.516*	-0.554*	-0.020 ^{NS}	0.106 ^{NS}	0.073 ^{NS}	0.032 ^{NS}
Simple Correlation of pest population with Wind Speed								-0.693*	-0.691*	-0.171 ^{NS}	-0.172 ^{NS}	-0.102 ^{NS}	-0.094 ^{NS}

*Significance at 5%

NS-Non-significance

Conclusion

Leafhopper populations peaked during the 41st SMW at both locations, with higher incidence at Sumerpur, and showed location-specific correlations positive with maximum temperature at Jodhpur but negative with both maximum and minimum temperatures at Sumerpur. Whitefly populations also peaked during the 41st SMW, with greater abundance at Sumerpur, and exhibited significant positive correlation with maximum temperature at Jodhpur but significant negative correlations with maximum and minimum temperatures at Sumerpur. Aphid populations reached their peak during the 42nd SMW, with higher numbers at Sumerpur, and showed significant positive correlation with maximum temperature at Jodhpur while demonstrating significant negative correlations with both temperature extremes at Sumerpur. Mite populations peaked during the 44th SMW, with greater density at Sumerpur, and followed a similar correlation pattern positive with maximum temperature at Jodhpur but significantly negative with both maximum and minimum temperatures at Sumerpur.

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