International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9 (8): 497-505
www.biochemjournal.com
Received: 20-06-2025
Accepted: 22-07-2025

Shivani Patta
Department of Entomology, KNK College of Horticulture, Mandsaur, RVSKVV, Gwalior, Madhya Pradesh, India

SB Singh
Department of Entomology, KNK College of Horticulture, Mandsaur, RVSKVV, Gwalior, Madhya Pradesh, India

Rajesh Aarwe
Department of Entomology, KNK College of Horticulture, Mandsaur, RVSKVV, Gwalior, Madhya Pradesh, India

Corresponding Author:
Shivani Patta
Department of Entomology, KNK College of Horticulture, Mandsaur, RVSKVV, Gwalior, Madhya Pradesh, India

Weather factors influencing population dynamics of major insect pests of Brinjal in Mandsaur district of Madhya Pradesh

Shivani Patta, SB Singh and Rajesh Aarwe

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i8g.5226

Abstract
The field experiment was conducted at K.N.K, College of Horticulture, Mandsaur (M.P.) to study the population dynamics of aphid, jassid and lady bird beetle in 2022-23 and 2023-24. Aphid population started in 40th SMW in 2022-23 (0.43 aphids/leaf) and 41st SMW in 2023-24 (1.08 aphids/leaf) and it peaked in 2022-23 and 2023-24 (10.2 and 22.37aphids/leaf) during 2nd and 4th SMW, respectively. Jassid population was recorded on brinjal during 2022-23 & 2023-24, with 0.05 and 0.34 jassid per leaf on 41st SMWs, respectively. Maximum population of jassid noted during 2022-23 (3.06 jassid/leaf) at 51st SMW and in 2023-24 (3.23 jassid/leaf) on 1st SMW. Lady bird beetles appeared 46th and 48th SMW with initial populations of 0.04 and 0.05 per plant, peaked at 0.68 and 1.07 per plant in 3rd & 4th SMW in 2022-23 and 2023-24 respectively. Highly significant negative association was observed between aphid and maximum and minimum temperature (r = -0.774 &-0.775) in both years of study. Morning relative humidity (r = 0.483**) and evening relative humidity (r = 0.432**) showed positive and significant relation in 2022-23 while, in 2023-24 evening relative humidity (r= 0.422**) obtained a significant positive correlation. In 2022-23 a negative and highly significant correlation was found between maximum and minimum temperature and the jassid population (r= -0.716, -0.651). The association of pest population was positive and significant with morning relative humidity (r= 0.427**) and evening relative humidity (r= 0.515**). In the year 2023-24 the association of pest population had a significant and positive association with evening relative humidity (r= 0.387**). Minimum and maximum temperature exhibited highly significant negative association with *Coccinellids* population. The interaction between aphids and *Coccinellids* was found to be very strong. Aphids and their predator *Coccinellids* showed a positive and highly significant association in 2022–2023 (r=0.78) and 2023–2024 (r=0.50).

Keywords: Abiotic factors, Brinjal, Aphid, Jassid, *Coccinellid*, Population dynamics.

Introduction
Brinjal (*Solanum melongena* Linnaeus) also known as eggplant is referred to as the “King of vegetables”. It belongs to the family “Solanaceae” that is significant both commercially and agronomical. Its fruits are fairly good source of calcium, phosphorus, iron and vitamins particularly - B group. Brinjal has cholesterol reducing properties due to the presence of higher amount of polyunsaturated fatty acids in pulp and seeds (Anonymous, 2024-25 [4]). Among solanaceous vegetables, brinjal is one of the important crops grown throughout India. It is also one of the few vegetables capable of high yield in hot-wet environments with reasonable sources of vitamins and minerals (Tripura *et al.,* 2017 [28]). It has become an important economic source for farmers and field laborers. It is also used as a raw material in pickle making and as an excellent remedy for curing diabetes. It is a good appetizer, good aphrodisiac, cardio tonic, laxative, and reliever of inflammation (Shridhara, 2019 [24]).
India is the second-largest producer of brinjal in the world, with 12.79 million tons, accounting for about 21.02% of the total global production with 6.81 lakh hectares cultivated area and18.81 tones/ha productivity (Anonymous, 2023-24 [2]). In Madhya Pradesh total area under brinjal cultivation is 0.71 lakh hectares with production of 15.15 lakh tones and productivity of 21.33 tones (Anonymous, 2024 [3]).
The main cause of reduced brinjal production is the insect-pests infestations. The most damaging sucking insect-pest are aphids, jassids, and whiteflies do a lot of harm, particularly in the winter, when they may cause 20–70% losses in plants (Kumar *et al.,* 2017 [16]).

Predators are able to reduce the number of aphids associated with brinjal plant below a threshold where they are no longer capable to cause economic injury (Latibari *et al.,* 2020) [17].

Numerous factors such as climatic conditions and presence of natural enemies determine the population dynamics and the complex of aphid and jassid species attacking plant. Among them, climate is one of the most influential factors that determine the distribution and seasonal dynamic of insects (Kanturski *et al.* 2016 [14]). Weather factors play important role in multiplication of insect pests, hence the investigation of the relationship between abiotic variables and brinjal insect pest activity will assist in creating predictive models that will support the prediction of pest occurrence.

Material and methods

The experiment was undertakenat Experimental farm of K.N.K, College of Horticulture, Mandsaur (M.P.) during 2022-23 & 2023-24 on brinjalin four locations. In each location four plots of 3x3 m area were taken with 0.5 m plant to plant and row to row spacing. Weekly observations on aphid and jassid, population,were recorded after 20 days of transplantingon five randomly selected plants and three leaves per plant from each plot till the maturity. Population of natural enemies was counted on five plants per plot and averaged. The mean population of each insect was kept in the table to correlate with various weather parameters as per method suggested by Heathcote (1972 [10]) and Satpathy (1973 [22]). Meteorological observations were taken from the observatory of College of Horticulture Mandsaur to correlate the pest population statistically

Results and discussion

Aphids (*Aphis gossypii*) Glover

The aphid population (0.43 aphids/leaf) commenced on the 40th SMW and reached its peak (10.2 aphids/leaf) during the 2nd SMW in 2022-23 (Table 1) with no rainfall, morning relative humidity 90.57 percent and evening humidity 44.29 percent. In second year 2023-24 (Table 2) the population (1.08 aphids/leaf) commenced in 41st SMW and peaked (22.37 aphids/leaf) in the 4th SMW with no rainfall, morning relative humidity 75.00 percent and the evening humidity 47.86 percent. The maximum and minimum temperature (23.49°C and 6.46°C) was found to be ideal for the multiplication of aphids on brinjal. Chaukikar *et al.* (2020 [7]) reported that the population of aphid observed in 21 DAT and 17 DAT in 41th SMW during 2018 and 2019. Sharma *et al.* (2022 [23]) and Singh *et al.* (2022 [25]) observed the appearance of aphids during the 45th standardweek with 0.33 aphids per plant and reaching its peak level of 83 aphids per plant at the 49th (SW). Prajapati and Singh (2024 [19]) reported peak, aphid population (25.34 aphids/3leaves) during the fourth week of January *i.e.*5th SMW. Anand *et al.* (2024 [1]) reported aphid population (0.10 aphids/plant) at 7 DAT and reached its peak value (25.95 aphids/ plant) during 6th SMW. The findings of these researchers are in the line of agreement with present study with slight variation. Contrary to the current finding Prashanth *et al.* (2023 [20]) reported peak activity of aphid during 9th standard meteorological week (SMW) (26.76 aphids/3leaves/plant). Further, Mourya *et al.* (2023 [18]) also observed highest aphid population (34.67/six leaves) during 7th SMW during 2022-23. The slight difference may likely be due to the crop's early transplanting and the locality's varying agro-climatic conditions.

In present study during 2022-23, aphid population (Table 3&4, fig. 1&2) showed highly significant negative association with maximum temperature (r = -0.774**) and minimum temperature (r = -0.775**) while morning relative humidity (r = 0.483**) and evening relative humidity (r = 0.432**) expressed significant positive relation. In 2023-24 the aphid population exhibited negative and significant correlation with maximum temperature (r= -0.425**) and minimum temperature (r= -0.382**) while, evening relative humidity (r= 0.422**) obtained a significant positive correlation whereas, morning relative humidity (r= 0.354) had a positive and non-significant relation. The present results are in agreement with those of Prajapati and Singh (2024 [19]) who reported that maximum temperature, minimum temperature and rainfall had non-significant negative correlation (r = -0.084, -0.255 and -0.398), respectively. Mourya *et al.* (2023 [18]) stated that maximum and minimum temperature exhibited non-significantly negative correlation while morning and evening relative humidity exhibited non-significantly positive correlation with aphid population. Further, Anand *et al.* (2024 [1]) also stated negatively non-significant correlation of temperature with aphid. Adverse results were reported by Athivarman and Sathyaseelan (2024 [5]) where they noted significant positive correlation between the maximum temperature and aphid population. In same way Prashanth *et al.* (2023 [20]) reported that correlation coefficient had positive and significant association with maximum temperature and positive but non-significant association with minimum temperature and morning relative humidity and with evening relative humidity was negative and significant relation. The relationship with the rainfall was negative and significant.

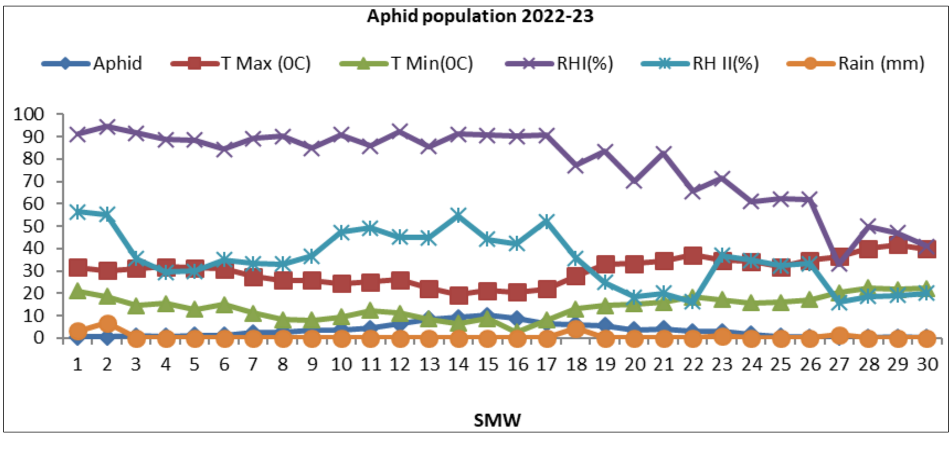

Fig 1: Effect of weather factors on multiplication of aphid population in brinjal during 2022-23

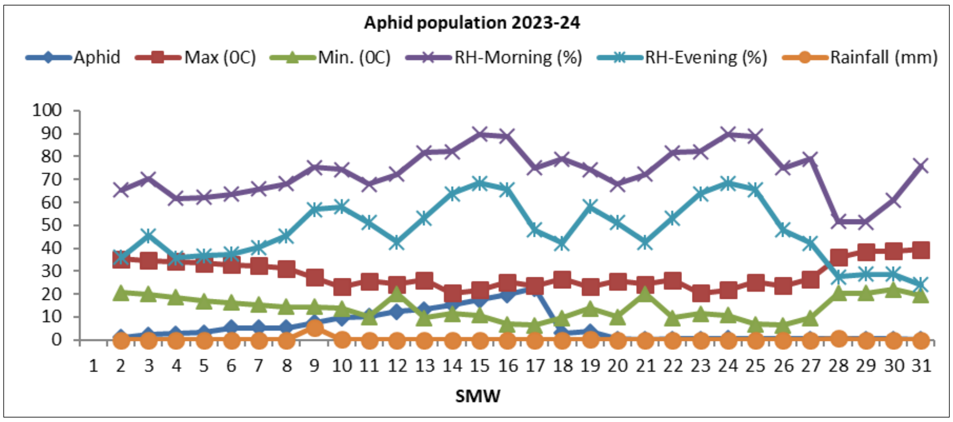

Fig 2: Effect of weather factors on multiplication of aphid population in brinjal during 2023-24

Plate1: Aphid population during 2022-23 Aphid population during 2023-24

Leaf hopper (*Amrasca biguttula biguttula*) Ishida

Occurrence of jassid (Table 1 and 2, fig. 3 & 4) started on brinjal during 2022-23& 2023-24, with 0.05 and 0.34 jassid per leaf on the 41st SMW, respectively. During 2022-23 the pest population reached its peak level (3.06 jassid/leaf) in 51st SMW when temperature (maximum and minimum) recorded was 26.04°C and 11.09°C and relative humidity *viz.,* morning and evening was 92.29% and 45.14% with 0.00mm rainfall. During 2023-24, the pest population peaked in 1st SMW (3.23 jassid/leaf) when maximum and minimum temperature, morning and evening relative humidity, were 20.27°C, 11.31°C, 82.14%, and 63.86%, respectively, 2023-24 with no rainfall. Following research workers supported the present investigation with slight variation and that might be due to changes in climatic conditions. Jat *et al.* (2022 [12]) noted that, population of leaf hopper was initially noted in the range of 0.11/3 leaves during second week of November (46th SMW) and reached its peak during 2nd SMW (4.46/plant). Prajapati *et al* and Singh (2024 [19]) opinioned that leaf hopper startedin the first week of December and the incidence increased up to the end and mid of February. Kadgonkar *et al.* (2018 [13]) revealed that the incidence of leaf hopper was maximum during January, 1st (SW) and minimum during February (8th SW) in brinjal. Almost similar findings were reported by Jaiswal *et al.* (2018 [11]) where they reported that incidence of leaf hopper was maximum during December, 52nd Standard Week (SW) and minimum during March (12th SW). With contradiction Bhattacharyya *et al.* (2019 [6]) reported maximum leaf hopper population (3.9 leafhopper/leaf/plant) on 4th week of March (12th MSW) during fruiting period of the crop. Similarly Prashanth *et al.* (2023 [20]) and Singh *et al.* (2023 [26]) revealed that peak incidence of jassid registered during 5th (16.76 leaf hoppers/ 3 leaves/ plant) and 9th (26 jassid/3 leaves/plant)standard meteorological week (SMW). This might be due to changes in location and climatic conditions.

During 2022-23(Table 3&4), jassid population showed highly significant negative correlation with maximum and minimum temperature (r= -0.716, -0.651), significant positive relation with morning relative humidity (r= 0.427**) and evening relative humidity (r= 0.515**) and negative and non-significant relation (r =-0.260) (Table 1) with rainfall. In the year 2023-24 the jassid population exhibited negative and non-significant association (r= -0.330), (r= -0.176) with maximum and minimum temperature, positive and non-significant association with morning relative humidity (r= 0.267), significant and positive association with evening relative humidity (r= 0.387**) and positive but non-significant relationship with rainfall (r= 0.070). The present results are in agreement with those of Kadgonkar *et al.* (2018 [13]) who reported that leaf hopper showed significant negative correlation with both maximum and minimum temperature while a positive correlation found with mean relative humidity. Similarly, Prajapati and Singh (2024 [19]) assessed that maximum and minimum temperature showed negative non-significant correlation with jassid but evening and average RH also showed a non-significant positive correlation with jassid population. Findings of Jat *et al.* (2022 [12]) are in partial support to the present investigation as they reported that *A. biguttula biguttula* exhibited significantly positive correlation with evening relative humidity and maximum temperature and minimum temperature showed significantly negative correlation. Mourya *et al.* (2023 [18]) reported against the present study as they explained that maximum and minimum temperature exhibited non-significantly positive correlation with jassid population while, relative humidity evening, relative humidity morning and rainfall showed non-significantly negative correlation. This contradiction might be due to changes in climatic conditions and differed location.

Plate 2: Jassid population during 2022-23 Jassid population during 2023-24

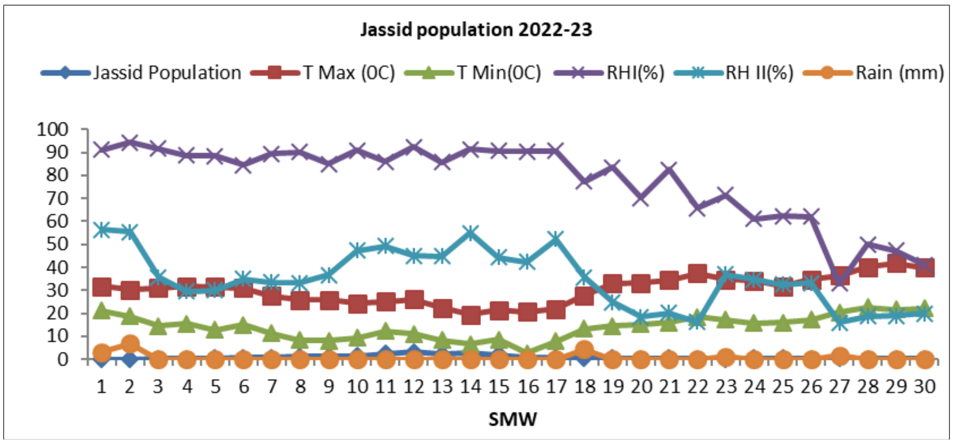

Fig 3: Effect of weather factors on multiplication of aphid population in brinjal during, 2022-23

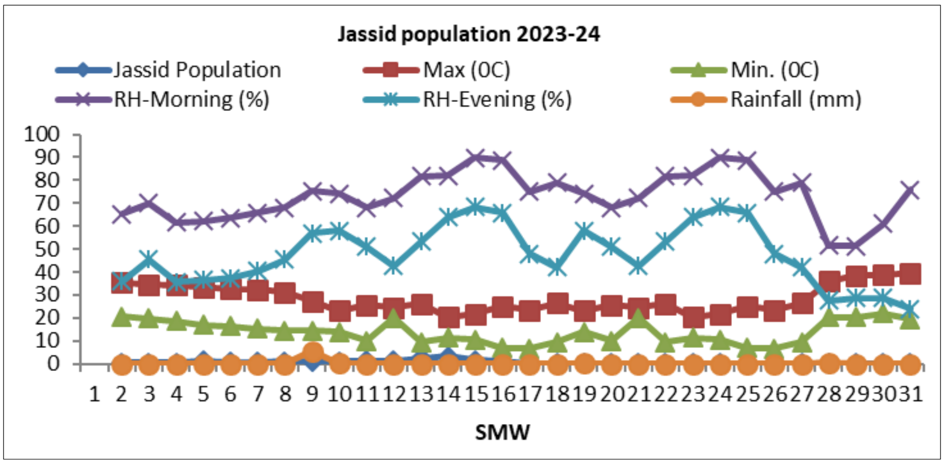

Fig 4: Effect of weather factors on multiplication of aphid population in brinjal during2023-24

Coccinellid

Coccinellid population was observed 0.04 *Coccinellid*/plant at first appearance in 46th SMW *i.e.* second week of November during 2022-23(Table 1) during the vegetative stage of the crop. The maximum activity of natural enemy was as 0.68 *Coccinellid*/plant, recorded in the 3rd SMW *i.e.* third week of January when the maximum temperature, minimum temperature, morning relative humidity, evening relative humidity and rainfall were recorded as 20.54°C, 2.63°C, 90.29%, 42.29% and 0.00mm, respectively. In 2023-24 (Table 2) *Coccinellid* activity was noticed during the 48th SMW *i.e.* last week of November (0.05coccinellid/plant). During 4th SMW *i.e.* fourth week of January, there was a peak in activity (1.07 *Coccinellid*/plant) when the maximum temperature, minimum temperature, morning relative humidity, evening relative humidity and rainfall were recorded as 23.49°C, 6.46°C, 75.00%, 47.86% and 0.00 mm, respectively. The present findings get support from the observations of Sharma *et al.* (2022 [23]) where they reported that the lady bird beetle appeared from 50th standard week (December second week) with an average 1.67 larvae/plant and reached its peak level of 8.33larvae/plant at 4th standard week (January fourth week). Kishore *et al.* (2024 [15]) noted that population of ladybird beetle were first noticed from the second week of November (45th SMW) with mean population of 0.1/plant, and reached peak of 1.50/plant during December (48th and 49th SMW). Prashanth *et al.* (2023 [20]) also reported *Coccinellid* activity during the 46th SMW (0.39 adult /grub/plant) but dissimilarity in peak activity noted in 9th SMW (3.62 adults/ grub/ plant). Garg and Patel (2022 [9]) reported that lady bird beetle was initiated in 44th SMW with 3.40 individuals / plant and peaked, 5.14 per plant during 10th SMW.

In 2022-23 (Table 1&2, fig. 5&6), in relation to correlation studies, it was found that minimum temperature and maximum temperature (r= -0.529** and -0.644**) exhibited highly significant negative association whereas, morning and evening relative humidity (r= 0.209 and 0.172) obtained non-significant positive association with *Coccinellid*; conversely, rainfall (r= -0.207) exhibited non-significant negative relationship with *Coccinellid* population. In 2023-24 maximum temperature (r= -0.619**) and minimum temperature (r= -0.490**) exhibited highly significant negative association whereas, morning relative humidity (r= 0.520**) and evening relative humidity (r= 0.461**) obtained significant positive association conversely, rainfall (r= -0.168) exhibited non-significant negative relationship. The present results are in partial conformity with Kishore *et al.* (2024 [15]) who reported a non-significant positive correlation with evening relative humidity (r =0.404) and non-significant negative correlation morning relative humidity (r=-0.013). Similarly, Deshmukh *et al.* (2025 [8]) revealed that lady bird beetle had positive significant correlation with relative humidity at morning.

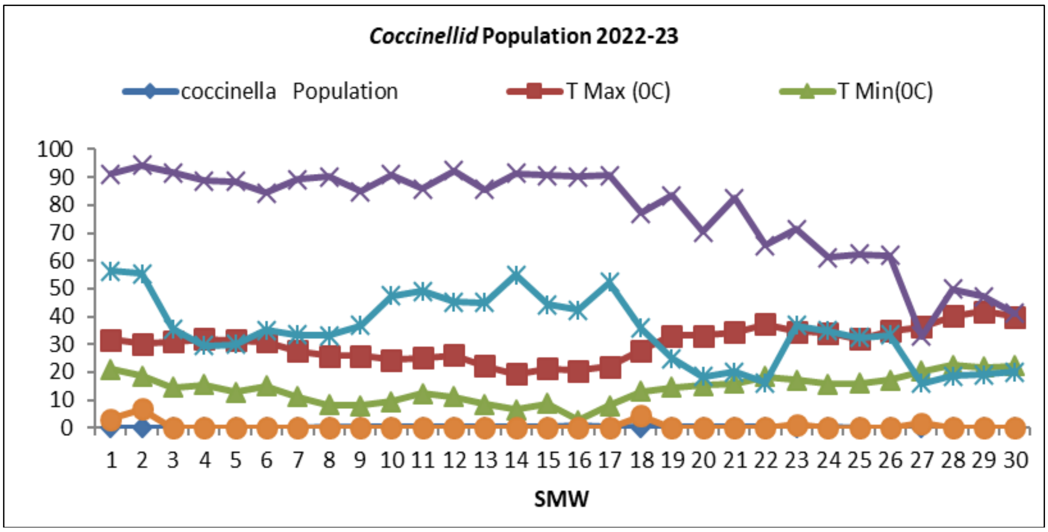

Fig 5: Effect of weather factors on multiplication of aphid population in brinjal during 2022-23

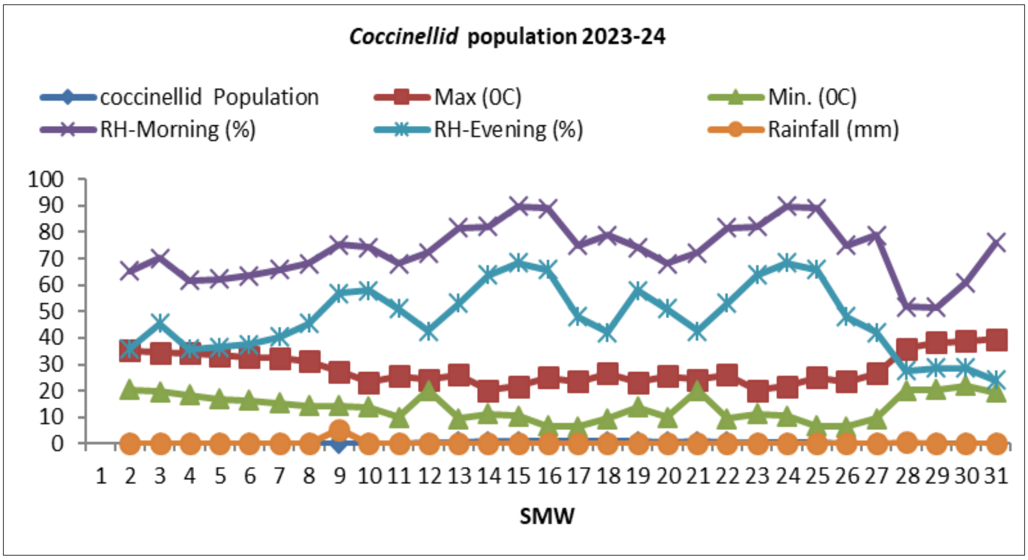

Fig 6: Effect of weather factors on multiplication of aphid population in brinjal during 2023-24

Interaction between Aphid and Ladybird Beetle

The interaction between aphids and *Coccinellids* was found to be very strong. The coefficient of correlation between the aphids and their predator *Coccinellids* was found to be positive and highly significant in 2022-23 (r=0.78) and 2023-24 (r=0.50) (Table 5, fig. 7) indicating that the increased predator population was caused by an increase in the aphid population. In 2022-23 the regression equation Y = 0.037x + 0.026 and coefficient of determination (R^2=0.609) and in 2023-24 Y = 0.026x + 0.025 and R^2=0.251 showed that prey population has a 60.9 and 25.1% impact on the predators (Table 5). The current findings concur with those of Prashanth *et al.* (2023 [20]) who reported the correlation between the aphids and their predator *Coccinellid* was positive and significant (r=0.88) and found a very strong interaction. Similarly Khan and Akbar (2015) stated that ladybird beetle is one of the most important factors that decline the aphid's population in okra. Samantaray and Singh (2024 [21]) reported peak population of aphid and ladybird beetle population on mustard during 5th SMW. Soni *et al.* (2013 [27]) revealed that the grubs and adult population of *Coccinellid* showed a strong positive correlation with aphid complex.

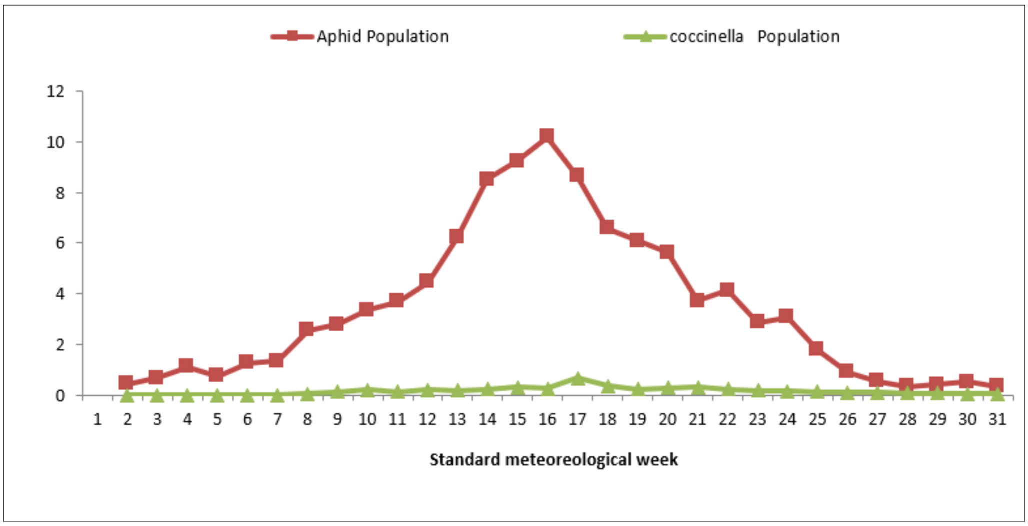

Fig 7: Interaction between *Coccinellid* and aphid with weather factors in brinjal during, 2022-23

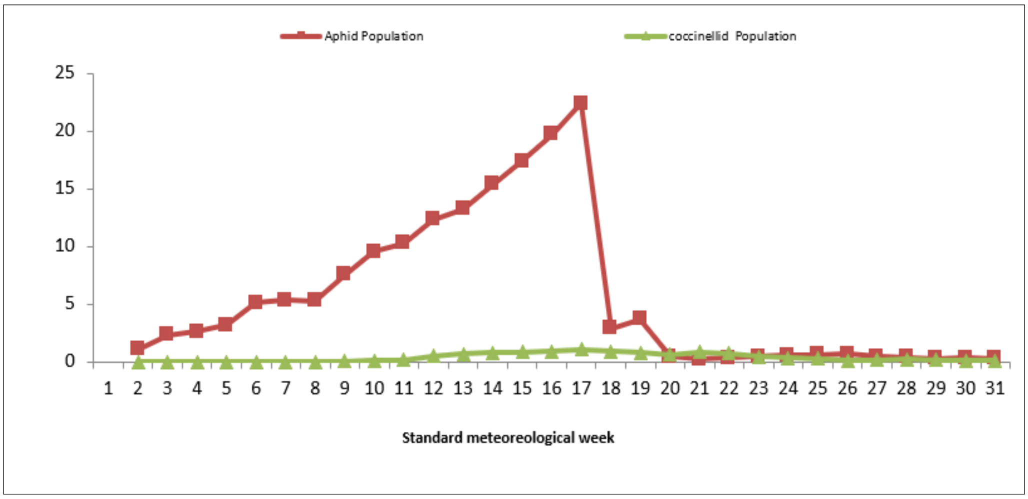

Fig 8: Interaction between *Coccinellid* and aphid with weather factors in brinjal during, 2023-24

Plate 3: Population of ladybird beetle on brinjal, preying on aphid

Table 1: Meteorological causation of insect pests and weather parameters in brinjal during 2022-23.

SMW	Aphid population	Leaf hopper population	*Coccinellid* population	T Max (^{0}C)	T Min(^{0}C)	RH-Morning (%)	RH-Evening (%)	Rain (mm)
40	0.43	0	0	31.63	21.13	91.14	56.43	3.21
41	0.66	0.05	0	30.27	18.6	94.43	55.29	6.79
42	1.1	0.08	0	31.04	14.53	91.57	35.57	0
43	0.76	0.23	0	31.83	15.56	88.71	29.43	0
44	1.26	0.34	0	31.46	12.77	88.43	30	0
45	1.35	0.62	0	30.9	14.96	84.43	35	0
46	2.55	0.76	0.04	27.64	11.24	89.29	33.43	0
47	2.78	1.08	0.12	25.77	8.31	90.14	33.14	0
48	3.35	1.27	0.2	25.83	8.01	84.86	36.71	0
49	3.68	1.53	0.13	24.37	9.41	90.86	47.29	0
50	4.45	2.33	0.21	25.1	12.26	85.86	49.14	0
51	6.22	3.06	0.17	26.04	11.09	92.29	45.14	0
52	8.51	2.18	0.22	22.29	8.4	85.63	44.88	0
1	9.23	2.58	0.31	19.39	6.47	91.29	54.86	0
2	10.2	1.83	0.25	21.34	8.64	90.57	44.29	0
3	8.63	0.84	0.68	20.54	2.63	90.29	42.29	0
4	6.58	0.63	0.35	21.93	7.94	90.71	52.14	0
5	6.08	0.52	0.23	27.84	13.14	77.2	35.68	4.34
6	5.62	0.38	0.27	33.01	14.54	83.37	24.87	0
7	3.72	0.25	0.3	33.21	15.23	70.26	18.46	0
8	4.12	0.31	0.24	34.43	15.93	82.43	20.1	0
9	2.86	0.22	0.17	37.3	18.37	65.61	16.17	0
10	3.06	0.17	0.15	34.67	17.1	71.43	36.86	1.14
11	1.79	0.31	0.12	34.17	15.79	61.14	34.71	0
12	0.9	0.4	0.1	31.81	15.96	62.29	32.43	0
13	0.55	0.25	0.11	34.73	17.11	62	33.29	0
14	0.34	0.32	0.08	36.39	20.4	33	16	1.57
15	0.42	0.28	0.07	40.14	22.57	49.86	18.71	0
16	0.51	0.12	0.06	41.87	21.67	47.14	19	0
17	0.33	0.08	0.05	39.81	22.19	41.14	20	0

SMW- Standard Meteorological Week, T – Temperature, Max- Maximum, Min- Minimum, RH- Relative Humidity

Table 2: Meteorological causation of insect pests and weather parameters in brinjal during 2023-24.

SMW	Aphid population	Leaf hopper population	*Coccinellid* population	T Max (^{0}C)	T Min. (^{0}C)	RH-Morning (%)	RH-Evening (%)	Rainfall (mm)
41	1.08	0.34	0					
42	2.28	0.45	0	35.34	20.54	65.29	36	0
43	2.57	0.48	0	34.6	19.8	70.14	45.43	0
44	3.18	1.26	0	34.27	18.57	61.71	35.71	0
45	5.11	0.72	0	33.44	16.96	62.29	36.57	0
46	5.32	0.67	0	32.69	16.33	63.57	37.43	0
47	5.28	0.88	0	32.41	15.39	65.86	40.43	0
48	7.52	1.03	0.05	31.17	14.46	68.14	45.43	0
49	9.53	1.14	0.09	27.26	14.4	75.29	57	5.53
50	10.29	1.25	0.14	23.17	13.8	74.29	58	0.21
51	12.31	1.36	0.47	25.63	9.99	68	51.14	0
52	13.21	2.47	0.66	24.39	20.13	72.29	42.71	0
1	15.36	3.23	0.76	26.19	9.5	81.63	53.13	0
2	17.35	1.62	0.81	20.27	11.31	82.14	63.86	0
3	19.68	1.29	0.87	21.64	10.64	89.71	68.43	0
4	22.37	0.22	1.07	25.14	6.84	88.86	65.71	0
5	2.85	0.15	0.90	23.49	6.46	75	47.86	0
6	3.66	0.08	0.77	26.54	9.49	78.86	42.14	0
7	0.42	0.14	0.62	23.17	13.8	74.29	58	0.21
8	0.22	0.18	0.81	25.63	9.99	68	51.14	0
9	0.32	0.21	0.72	24.39	20.13	72.29	42.71	0
10	0.45	0.3	0.43	26.19	9.5	81.63	53.13	0
11	0.55	0.24	0.32	20.27	11.31	82.14	63.86	0
12	0.58	0.25	0.25	21.64	10.64	89.71	68.43	0
13	0.64	0.23	0.12	25.14	6.84	88.86	65.71	0
14	0.43	0.16	0.15	23.49	6.46	75	47.86	0
15	0.39	0.19	0.2	26.54	9.49	78.86	42.14	0
16	0.29	0.14	0.16	36	20.29	51.71	27.57	0.53
17	0.33	0.08	0.12	38.41	20.36	51.43	28.71	0
18	0.24	0.04	0.07	38.79	21.93	61	28.71	0

SMW- Standard Meteorological Week, T – Temperature, Max- Maximum, Min- Minimum, RH- Relative Humidity

Table 3: Correlation coefficient (r) of major insect pests on brinjal with prevailing weather parameters during 2022-23 and 2023-24.

Weather parameters	Correlation coefficient ('r' value)					
	Aphid		Leaf hopper		Coccinellid population	
	2022-23	2023-24	2022-23	2023-24	2022-23	2023-24
Max. Temp.(^{0}C)	-0.77**	-0.42**	-0.71**	-0.33	-0.52**	-0.61**
Min. Temp.(^{0}C)	-0.77**	-0.38**	-0.65**	-0.17	-0.64**	-0.49**
Morning Relative humidity (%)	0.48**	0.35	0.42**	0.26	0.20	0.52**
Evening Relative humidity (%)	0.43**	0.42**	0.51**	0.38**	0.17	0.46**
Rainfall (mm)	-0.16	0.04	-0.26	0.07	-0.20	-0.16

SMW- Standard Meteorological Week, T – Temperature, Max- Maximum, Min- Minimum, RH- Relative Humidity

Table 4: Correlation of major insect pests of brinjal with weather parameters during 2022-23 and 2023-24.

Weather parameters	**Coefficient of determination (R^2)**					
	Aphid		**Leaf hopper**		**Coccinellid population**	
	2022-23	**2023-24**	**2022-23**	**2023-24**	**2022-23**	**2023-24**
Max. Temp.(^{0}C)	0.599	0.181	0.512	0.109	0.280	0.383
Min. Temp.(^{0}C)	0.601	0.146	0.423	0.030	0.415	0.239
Morning Relative humidity (%)	0.233	0.125	0.182	0.071	0.043	0.270
Evening Relative humidity (%)	0.187	0.178	0.265	0.149	0.029	0.212
Rainfall (mm)	0.026	0.002	0.067	0.004	0.042	0.028

SMW- Standard Meteorological Week, T –Temperature, Max- Maximum, Min- Minimum, RH- Relative Humidity

Table 5: Correlation between *Coccinellids* and aphid in brinjal during 2022-23 and 2023-24.

Year	**Natural enemy (Y) * Aphid (X)**	**Correlation coefficient (r)**	**Coefficient of determination (R^2)**	**Regression Equation**
2022-23	*Coccinellids* * Aphid	0.78**	0.609	Y = 0.037x + 0.026
2023-24	*Coccinellids* * Aphid	0.50**	0.251	Y = 0.026x + 0.025

Conclusion
Aphid population reached its peakin 2022-23 and 2023-24 during 2nd and 4thSMW, respectively while maximum population of jassid was noted during 2022-23 at 51st SMW and in 2023-24on 1stSMW with peak activity of Ladybird beetles in3rd& 4th SMW in 2022-23 and 2023-24 respectively. Highly significant negative association was observed between aphid and maximum and minimum temperature in both years of study. Morning relative humidity and evening relative humidity showed positive and significant relation in 2022-23 while, in 2023-24 evening relative humidity obtained a significant positive correlation. In 2022-23 a negative and highly significant correlation was found between maximum and minimum temperature with jassid population. The association of pest population was positive and significant with morning relative and evening relative humidity. In the year 2023-24 the association of pest population had a significant and positive association with evening relative humidity. Minimum and maximum temperature exhibited highly significant negative association with *Coccinellid* population. The interaction between aphids and *Coccinellids* was found to be very strong. Aphids and their predator *Coccinellids* showed a positive and highly significant association in during both the years.

Acknowledgement
We are very grateful to Dr. S. B. Singh, the head of department K.N.K. College of Horticulture Mandsaur, for aiding and mentoring me in the field for this work as well as for giving the resources I needed to complete it.

Reference
1. Anand G, Kumar V, Meena RS, Sahani SK. Impact of weather parameters on the incidence of major insect pests of tomato (*Lycopersicon esculentum* Mill.) in Varanasi Region. Environment and Ecology. 2024;42(3):1358-1363.
2. Anonymous. n.d. https://www.pjtau.edu.in [cited 2025 Aug].
3. Anonymous. n.d. agriwelfare.gov.in [cited 2025 Aug].
4. Anonymous. n.d. https://www.pjtau.edu.in [cited 2025 Aug].
5. Athivarman, Sathyaseelan. Influence of abiotic factors on the incidence of aphid, *Aphis gossypii* Glover on brinjal in coastal areas of Cuddalore district Tamil Nadu. International Journal of Entomology Research. 2024;9(8):169-171.
6. Bhattacharyya K, Mondal B, Mondal P. Seasonal incidence of different insect pests of brinjal (*Solanum melongena* L.) in addition, their correlation with abiotic factors in red lateritic zone of West Bengal. International Journal of Chemical Studies. 2019;7(4):2753-2758.
7. Chaukikar K, Vaishampayan S, Marabi RS. The succession of insect pest complex on brinjal at central Narmada Valley region (Madhya Pradesh). Journal of Entomology and Zoology Studies. 2020;8(3):1757-1761.
8. Deshmukh SS, Suradkar AL, Patil BV, Gadhe RB, Chavan PR. Studies on population dynamics of natural enemies (Lady Bird beetle & predatory stink bug) in brinjal. International Journal of Advanced Biochemistry Research. 2025;9(2):14-15.
9. Garg VK, Patel Y. Effect of meteorological parameters on population dynamics of sucking pest and its natural enemy in brinjal. Indian Journal of Ecology. 2022;49(6):2330-2335.
10. Heathcote GC. Evaluating aphid population on plants. In: Aphid Technology (Ed. H.V. Van Emden). Academic Press, New York. 1972;105-145.

11. Jaiswal SK, Dhingra MR, Kumar A, Bagchi H, Kaushik U. Incidence of insect pest in brinjal under agro-climatic condition of Rewa district, Madhya Pradesh, India. Int J Curr Microbiol App Sci. 2018;7(6):1241-1249.
12. Jat S, Bhadauria NKS, Kumar N, Naveen, Chand A, Suman S. Studies on the succession and incidence of major insect pests of brinjal, *Solanum melongena* Linnaeus in Gwalior (M.P.). The Pharma Innovation Journal. 2022;11(7):1560-1565.
13. Kadgonkar TS, Bagde AS, Deshmukh VJ, Mali AS. Seasonal incidence of major pests of brinjal. Int J Curr Microbiol App Sci. 2018;7(9):2727-2731.
14. Kanturski M, Nawrocka AB, Wieczorek K. Pine pest aphids of the genus *Eulachnus* (Hemiptera: Aphididae: Lachninae): how far can their range extend. Agricultural and Forest Entomology. 2016;8(4):398-408.
15. Kishore SM, Jemimah N, Sridevi G, Reddy MV. Incidence of major insect pests and its natural enemies of Cabbage (*Brassica oleracea* var. *capitata*) under polyhouse conditions. Journal of Entomology and Zoology Studies. 2024;12(2):07-11.
16. Kumar R, Mahla MK, Singh B, Ahir KC, Rathor NC. Relative efficacy of newer insecticides against sucking insect pests of brinjal (*Solanum melongena*). Journal of Entomology and Zoology Studies. 2017;5(4):914-917.
17. Latibari MH, Moravvej G, Ghafouri MM, Barahoei H, Hanley GA. The novel host associations for the aphid parasitoid, *Pauesia hazratbalensis* (Hymenoptera, Braconidae, Aphidiinae). Orient Insects. 2020;5(4):88–95.
18. Mourya PK, Chauhan S, Kumar P, Kumar R. Seasonal incidence of sucking insect pests in brinjal (*Solanum melongena* L.). Biological Forum - An International Journal. 2023;15(8):515-519.
19. Prajapati J, Hasmukhbhai, Singh RN. Response of sucking pest complex on brinjal crop in relation to abiotic factors of Varanasi ecosystem, India. J Exp Zool India. 2024;27(1):1049-1053.
20. Prashanth G, Sunitha ND, Chavan SS. Population dynamics of major insect pests and their natural enemies in brinjal ecosystem. J Farm Sci. 2023;36(1):75-80.
21. Samantaray, Prajnyamita, Singh RN. Population dynamics of mustard aphid (*Lipaphis erysimi* Kalt.) and ladybird beetle (*Coccinella septempunctata* L.) and their correlations with weather parameters. Journal of Experimental Zoology India. 2024;27(1):969.
22. Satpathy JM. Field tested with granulated insecticides for the control of *L. orbonalis*. Indian Journal of Agriculture Science. 1973;4(3):1081-1086.
23. Sharma NR, Chaudhary AK, Gangwar B, Sharma B. Population dynamics of brinjal insect pests with abiotic factor. The Pharma Innovation Journal. 2022;11(8):112-115.
24. Shridhara M, Hanchinal SG, Sreenivas AG, Hosamani AC, Nidagundi JM. Evaluation of newer insecticides for the management of brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenee) (Lepidoptera: Crambidae). International Journal of Current Microbiology and Applied Sciences. 2019;8(3):2582-2592.
25. Singh KD, Ahlawat, Yadav SS, Bhall R, Vipul. Seasonal abundance and impact of abiotic factors on major sucking pests of brinjal. Journal of Entomology and Zoology Studies. 2022;10(4):165-168.
26. Singh RR, Jenab MK, Goudia N. Natural enemies and pollinators of *Solanum melongena* L. and correlation between their daily occurrences with weather parameters. International Journal of Environment and Climate Change. 2023;13(5):276-289.
27. Soni R, Deol GS, Singh S. Seasonal dynamics of wheat aphid complex and predator *Coccinella septempunctata* in relation to abiotic and biotic factors. Journal of Environmental Biology. 2013;34(4):689-694.
28. Tripura A, Chatterjee ML, Pande R, Patra S. Biorational management of brinjal shoot and fruit borer (*Leucinodes orbonalis* (Guenee)) in mid hills of Meghalaya. Journal of Entomology and Zoology Studies. 2017;5(4):41-45.