



Temporal patterns of aphid infestations in coriander

RD Dodiya^{1#}, PS Patel², NP Pathan³ and Sushma Deb¹

Summary

Understanding the temporal pattern of aphid infestation is essential for developing effective and ecologically sound pest management strategies in coriander (*Coriandrum sativum* L.). This study was conducted during the *rabi*, 2023–24 and 2024-25 cropping seasons to identify the dominant aphid species infesting coriander and to elucidate their seasonal population trends under field conditions. Aphid species were identified based on morphological characteristics and confirmed through molecular analysis. Three species, *Hyadaphis coriandri*, *Aphis gossypii*, and *Aphis spiraecola* were found to be major pests of coriander. Their infestation began in the 4th week after germination (3rd week of December; 51st Standard Meteorological Week), peaked during the 12th week (4th week of February; 7th SMW), and declined thereafter, coinciding with crop maturity. A highly significant positive correlation was observed between aphid population and natural enemies, particularly coccinellids and syrphid fly larvae, indicating a density-dependent predator response. The findings highlight the importance of monitoring aphid population dynamics and conserving natural enemies for timely and sustainable aphid management in coriander ecosystems.

JAE 2025, Vol 20

Received: 25 June 2025

Accepted: 13 July 2025

Published: 18 July 2025

<https://doi.org/10.58628/JAE-2520-111>

Associated Editor: Dr. SM Haldhar

Copyright © 2025 The Author(s). Published by Society for Agriculture and Arid Ecology Research (SAAER). This is an Open Access article under the Creative Commons Attribution License 4.0 (CC BY-NC-SA).



Keywords: Aphid, *Aphis gossypii*, *Aphis spiraecola*, Coriander, *Coriandrum sativum*, *Hyadaphis coriandri*, Temporal Patterns, Seasonal abundance

Introduction

India is known as the 'Land of Spices' as foreign invaders invaded India for spices in ancient times. Vasco De Gama found that the dangerous coastal path leading to India was solely used for the trade in spices (Sastry & Sharma 2001). One of the most significant seed spices is coriander (*Coriandrum sativum* Linnaeus), often called "*Dhania*," which is utilized as a green vegetable, spice, and medicinal ingredient in addition to being a seed spice. It is an annual herbaceous crop growing in the winter that is a member of the Apiaceae family. Coriander was perhaps the first spice that man utilized as a common flavour. It is usually referred to as "Cilantro" or "Chinese parsley" and is a native of Southern Europe, North Africa and Southwestern Asia. It has existed since the time of the Bible (Weiss 2002). All across India, coriander is cultivated for its leaves, but the majority of its seeds are produced in Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Gujarat, Tamil Nadu and Uttar Pradesh (Lal et al. 2009, Singh et al. 2018; Prakyath et al. 2022). In Gujarat, it is mainly grown in Junagadh, Devbhumi Dwarka, Rajkot, Jamnagar, Surendranagar, Morbi, Porbandar, Amreli, Bhavnagar, Gir Somnath, Botad, Kutch, Patan, Sabarkantha, Mehsana, Banaskantha, and Ahmedabad districts. Gujarat occupies 1,39,480 ha of area producing about 2,06,660 metric tons (MT) of seeds with a productivity of 1480 kg/ha during the year 2024-25 (Anon. 2025). Various biotic and abiotic stresses are responsible for the low

productivity of coriander among them, insect pest is recognized as one of the major constraints on the production of coriander, causing severe losses. In Indian conditions, a variety of insect pests have been reported to attack the coriander crop. Sucking insect pest are among the major contributors to yield losses in coriander, accounting for up to 43.28% reduction in production (Ghadage et al. 2010; Haldhar & Maheshwari 2021). Among these, aphids are particularly destructive, causing yield losses ranging from 40 to 50% when infestations are severe (Meena et al. 2016). The aphid species infesting coriander, *H. coriandri*, *A. gossypii*, *M. persicae* and *A. spiraecola* belongs to the family Aphididae of order Hemiptera and suborder Homoptera (Meena et al. 2017; Singh et al. 2017). As per Nair et al. (2021) in the Aphididae family, *H. coriandri* cause 45 to 50% coriander yield losses.

Materials and Methods

To determine the temporal pattern of aphid infestations on coriander, a field experiment was carried out at the Agronomy Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *rabi*, 2023-24 and 2024-25. The recommended agronomical practices were followed, and plot was kept free from any plant protection measures. The coriander crop was sown in 30 cm spacing during *rabi*, 2023-24 and 2024-25. The plot (10.0 × 10.0 m) was divided into four equal quadrates (5.0 × 5.0 m) to record the incidence of aphid population. Ten plants were selected randomly for recording the observations from each quadrate. The observations were recorded at a weekly interval starting from one week after germination till the crop harvest. The temporal pattern of aphid was estimated by

¹Department of Entomology, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar

²Directorate of Extension Education, S. D. Agricultural University, Sardarkrushinagar

³Department of Plant Protection, College of Horticulture, S. D. Agricultural University, Jagudan

[#]Corresponding author: RD Dodiya, E-mail: ravid1208@gmail.com

adopting zero to four indices through the observations made from randomly selected ten plants. The observations on natural enemies *i.e.*, coccinellids, syrphid fly were recorded from randomly selected ten plants in each quadrat. The following indices were suggested by Patel et al. (2011) for the estimation of aphid population.

Indices Description		
Aphid Index	:	Degree of infestation
0	:	Plants free from aphids
1	:	Aphid present but colonies are not built up
2	:	Presence of small colonies of aphids
3	:	Large colonies of aphids present on tender parts (counting of the aphid colonies is possible and tender plant parts show the damage symptoms due to aphids)
4	:	Entire plants covered by aphids (counts of aphids in colonies is impossible and plants shows the damage symptoms due to aphid) and finally plant dies
Average aphid index = $\frac{0N + 1N + 2N + 3N + 4N}{\text{Total no. of plants observed}}$		
Where, 0, 1, 2, 3, and 4 are aphid index N = Number of plants showing respective aphid index		

Correlation of insect with weather parameters

In order to study the effect of various abiotic and biotic factors on temporal pattern of aphid infesting coriander, the data of aphid population and their natural enemies were correlated with different abiotic factors *viz.*, maximum and minimum temperature, morning and evening relative humidity, rainfall, bright sunshine hours and wind velocity.

Statistical analysis

The simple correlation coefficient (*r*) was worked out by using standard statistical technique (Steel & Torrie 1980).

Results and Discussion

Comprehensive morphological and molecular investigations confirmed that coriander crops were infested by a diverse aphid complex, comprising three distinct species: *Hyadaphis coriandri*, *Aphis gossypii*, and *Aphis spiraecola* (Aphididae: Hemiptera). Molecular sequences of three aphid species were submitted in NCBI GeneBank database (*H. coriandri* (PQ066209), *Aphis gossypii* (PQ160042), and *Aphis spiraecola* (PV888944)). Infestation of aphid begins with the arrival of winged (alate) aphids on coriander plants. These alates act as primary colonizers, selecting young, tender plant parts for feeding and reproduction (Figure 1A and B). After settling, the winged aphids give rise to wingless (apterous) parthenogenetic females. The first generation starts feeding and reproducing rapidly through

viviparous parthenogenesis (Figure 1C & D). Colonies initially form on young leaves, stems, and developing inflorescences. Aphids cluster in concealed or sheltered areas, particularly the underside of leaves and near flower buds (Figure 1E). Under favourable conditions, the population multiplies quickly, forming dense colonies. The infestation spreads from leaves to inflorescences and eventually to developing umbels (Figure 1F). As the infestation intensifies, aphids occupy entire umbels and immature green seeds. Feeding results in shrivelling of seeds, poor seed setting, and malformed umbels (Figure 1G & H). In severe cases, umbels are entirely blackened due to large aphid colonies. Heavy infestation causes significant yield loss, stunted plant growth, and poor seed quality (Figure 1I & J). Aphids secrete honeydew, which promotes the growth of sooty mold, reducing photosynthesis. Infested umbels become sticky and blackened, further affecting marketability (Figure 1K & L).

The periodical data on the population of aphid recorded during the year 2023-24 are presented in Table 1. The activity of aphid (1.38 A.I.) was initiated after the 4th week following germination of the crop, *i.e.*, the 3rd week of December (51st SMW), on the coriander crop and continued until the crop was harvested. After appearance, its population gradually increased and reached a peak level (3.45 A.I.) on the 12th week of germination *i.e.* 2nd week of February (7th SMW). After reaching the peak population, the pest started declining gradually and disappeared or migrated to other alternate hosts at the time of harvesting of coriander crop. The population of aphid declined in subsequent weeks and reached 3.15 A.I. at the harvesting time of the coriander crop (9th SMW). The data on the abundance of aphid on coriander crop (Table 1) during 2024-2025 showed that the pest activity (1.34 A.I.) 4th week after germination of the crop *i.e.* 3rd week of December (51st SMW) and continued till harvesting of crop. Gradually population of aphid increased and reached to its peak (3.25 A.I.) on 12th week after germination *i.e.*, during the 4th week of February (9th SMW). After reaching the peak population, the pest started declining gradually and disappeared or migrated to other alternate host at the time of harvesting of coriander. The activity of aphid, on the coriander crop can be easily understood from the above results. Infestation of coriander aphid initiated from 3rd week of December and continued up to the 1st week of March, and attained the peak status in the 1st week of February, reported by Regar et al. (2022). Kant et al. (2019) observed that the average incidence of aphid started from 51st and continued up to 12th SMW with peak incidence in the 11th SMW. Meena et al. (2017) noted that the infestation of at three to four leaf stage at 30-45 days after germination and is active throughout the crop season of coriander, with peak infestation recorded during November to December. These findings are in close agreement with present findings.

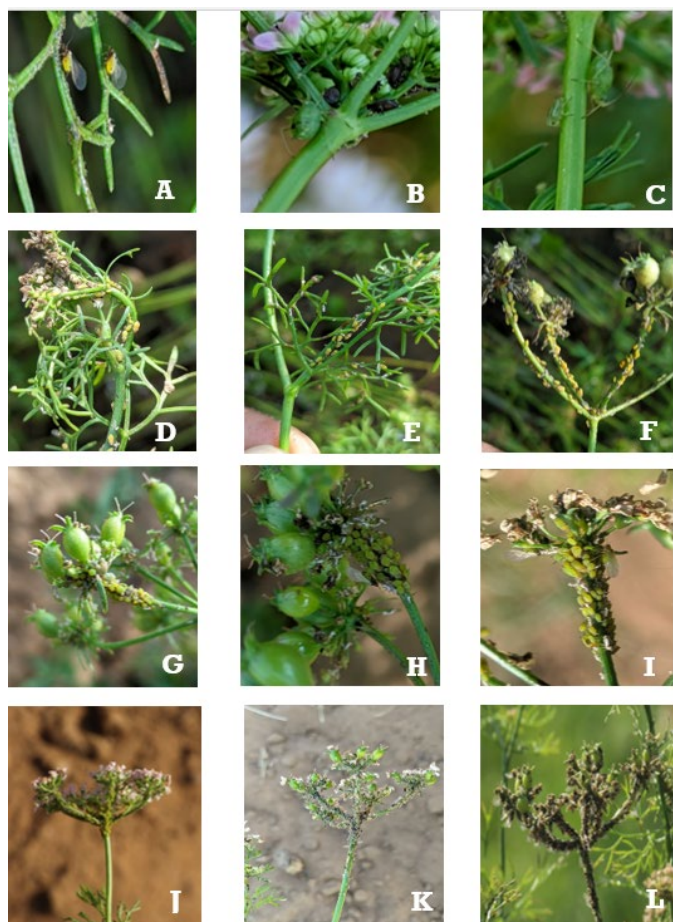


Figure 1. Colony development of aphid infesting coriander

Natural enemies: During both the experimental year population of coccinellids and syrphid fly were seen most abundantly feeding on aphid-infested coriander.

Coccinellids: A Large population of coccinellids, including *Coccinella septempunctata* Linnaeus, *Cheilomenes sexmaculata* Fabricius, *Coccinella transversalis* Fabricius, and *Brumoides suturalis* Fabricius, were observed (Figure 2) simultaneously with aphid incidence during 2023-24 and 2024-25. Mean population of coccinellids recorded at a weekly interval presented in Table 1 revealed that the population of coccinellids (grub + adults) appeared during the 4th week of December (52nd SMW, 5th WAG) i.e., 0.6 coccinellid per plant. The activity of coccinellids was gradually increased and reached its peak (8.2 coccinellids/plant) on the 2nd week of February (7th SMW, 12th WAG). Later on, the population declined in subsequent weeks until the harvesting of crops. The higher activity of coccinellids was noticed from 5th week of January to 1st week of March. During 2024-25, the population of coccinellids was recorded from during 4th week of December (52nd SMW, 5th WAG) to harvesting of coriander crop. The activity of coccinellids was gradually increased and reached to its peak (7.8 coccinellids/plant) in 2nd week of February (7th SMW, 12th WAG). Later on, the population declined in subsequent weeks until the harvesting of crops (6.8 coccinellids/plant). Coccinellid activity on coriander aphid was reported by Devi (2013) from the 52nd SMW (4th week of December) to the 10th SMW (1st week of March), with peak activity observed during the 5th SMW

(last week of January) at 2.84 coccinellids per plant. Similarly, Patel (2021) recorded coccinellid presence from the 53rd SMW (last week of December) to the 10th SMW (2nd week of March), with population densities ranging from 2.00 to 14.00 coccinellids per plant. Peak activity was observed in the 8th SMW (4th week of February), reaching 10.00 coccinellids per plant. Regar et al. (2022) also reported a gradual rise in coccinellid numbers starting from the 4th week of December, peaking in the 1st week of February at 4.00 coccinellids per plant. Additionally, Pareek et al. (2013) recorded peak populations of *C. septempunctata* and *M. sexmaculatus* at 14.8 and 3.8 adults per plant and 17.8 and 4.2 adults per plant, respectively, during the 4th week of February. Swami et al. (2018) observed the peak abundance of *C. septempunctata*, *M. sexmaculatus*, and *Adonia variegata* during the same period, with 2.0, 1.8, and 2.2 individuals per five plants in 2015–16 and 17.6, 18.2, and 18.6 individuals per five plants, respectively, in 2016–17. Thus, the current findings are more or less similar to these earlier studies.

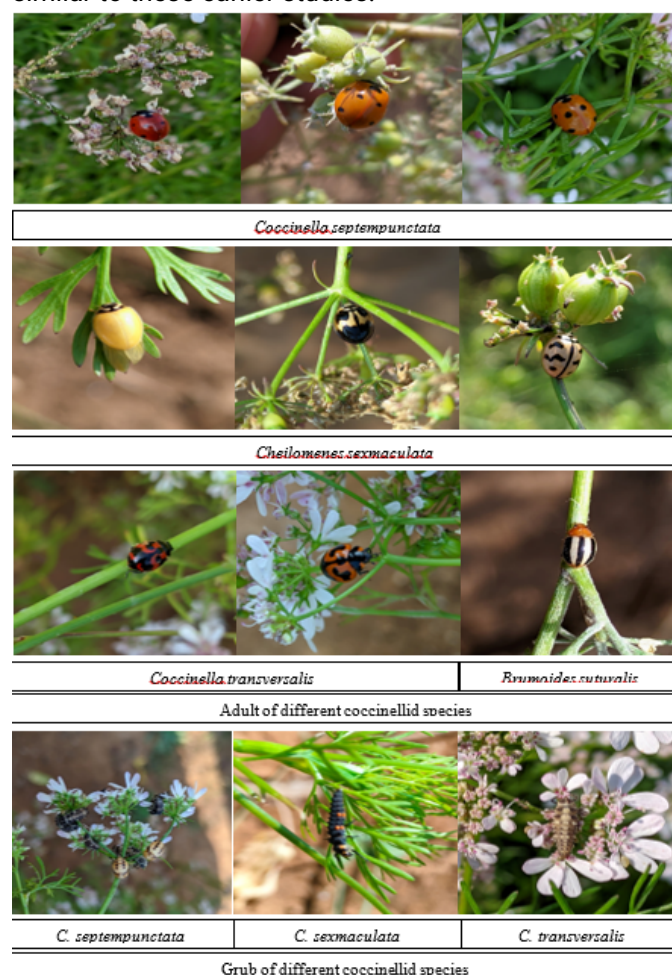


Figure 2. Different coccinellids feeding on aphid-infested coriander

Syrphid fly larvae: Two species of syrphid flies, *Episyrphus balteatus* and *Ischiodon scutellaris* (Diptera: Syrphidae), were observed feeding on aphids infesting coriander. The population of syrphid fly larvae (Figure 3) was observed from 2nd week of January (0.7 larvae/plant) i.e., 7th week after germination (2nd SMW), till the 1st week of March (9th SMW, 14th WAG). The activity of syrphid larvae was gradually increased and

reached to its peak (1.8 larvae/plant) on the 2nd week of February (7th SMW, 12th WAG) during 2023-24 (Table 1). During the 2024-25, the population of syrphid fly larvae was first observed in the 2nd week of January (2nd SMW; 7th WAG) with an initial count of 0.5 larva per plant. Their activity continued until the 1st week of March (9th SMW; 14th WAG). The population gradually increased over time, reaching a peak density of 1.6 larvae per plant during the 2nd week of February (7th SMW; 12th WAG), as shown in Table 1. The activity of syrphid larvae on coriander aphid was reported by Devi (2013) from the 1st SMW (1st week of January), continuing until the 9th SMW (4th week of February). Peak activity was recorded during the 5th SMW (last week of January). Similarly, Kant et al. (2019) observed the presence of syrphid larvae from the 6th to the 12th SMW, with larval densities in alignment with aphid abundance. Patel (2021) reported syrphid larval populations between the 2nd SMW (2nd week of January) and the 10th SMW (2nd week of March), and the highest population was observed during the 8th SMW (4th week of February). These earlier findings are more or less in agreement with the present investigation.

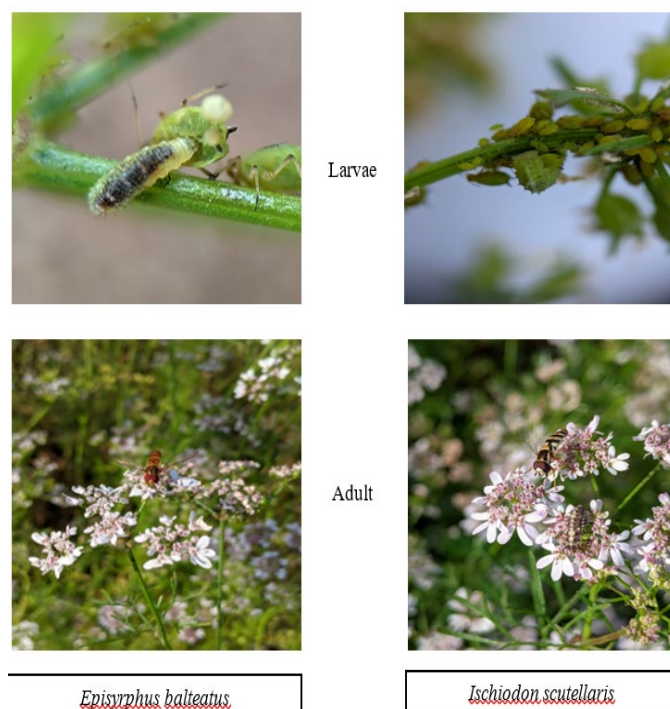


Figure 3. Syrphid fly larvae and adults in coriander

Table 1. Temporal pattern of aphid infestations of coriander and its natural enemies

SMW	Month and Week		WAG	Aphid index (0-4)		Number of natural enemies/ plant			
				2023 -24	2024-25	Coccinellids		Syrphid fly larvae	
						2023 -24	2024-25	2023 -24	2024-25
48	November	4	1	0.0	0.0	0.0	0.0	0.0	0.0
49	December	1	2	0.0	0.0	0.0	0.0	0.0	0.0
50		2	3	0.0	0.0	0.0	0.0	0.0	0.0
51		3	4	1.38	1.34	0.0	0.0	0.0	0.0
52		4	5	1.55	1.48	0.6	0.4	0.0	0.0
01	January	1	6	1.63	1.50	1.1	0.9	0.0	0.0
02		2	7	1.68	1.59	1.5	1.3	0.7	0.5
03		3	8	1.78	1.65	2.7	2.4	0.9	0.8
04		4	9	1.95	1.82	3.6	3.2	1.2	0.9
05		5	10	2.95	2.85	5.1	4.9	1.5	1.1
06	February	1	11	3.18	3.15	6.2	5.8	1.7	1.4
07		2	12	3.45	3.25	8.2	7.8	1.8	1.6
08		3	13	3.30	3.20	7.8	7.2	1.1	0.7
09	March	1	14	3.15	3.12	7.7	6.8	0.8	0.4
SMW: Standard Meteorological Week				WAG: Week After Germination					

Effect of weather parameters on aphid infesting of coriander and its natural enemies Aphid

The aphid population exhibited highly significant positive association with evapotranspiration ($r = 0.637^{**}$) in coriander crop during 2023-24. However, evening

relative humidity ($r = -0.791^{**}$) had highly significant negative correlation with aphid population in coriander crop. The weather parameter evaporation ($r = 0.487$), maximum temperature ($r = 0.457$) and wind speed ($r = 0.369$) were positively associated, with aphid incidence

on coriander but correlation was non-significant (Figure 4). Bright sunshine hours ($r = 0.487$) and wind speed ($r = 0.369$) had significant positive relationship with aphid incidence on coriander. No measurable influence of minimum temperature, morning relative humidity and rainy days was observed on aphid population. Data presented in Fig. 5 clearly indicate that no weather parameters showed a significant correlation with aphid population during 2024–25. However, maximum temperature ($r = 0.488$), minimum temperature ($r = 0.455$), evening relative humidity ($r = 0.448$), evapotranspiration ($r = 0.397$), bright sunshine hours ($r = 0.295$) and wind speed ($r = 0.250$) exhibited a positive but non-significant correlation with aphid population in the coriander crop. Conversely, morning relative humidity showed a negative, yet non-significant, association with aphid population ($r = -0.373$). This inconsistency may be attributed to fluctuating environmental conditions which may have played a greater role in influencing aphid dynamics during that year. Pareek *et al.* (2013) recorded that maximum and minimum temperature had a non-significant positive correlation with aphid incidence ($r = 0.30$ and $r = 0.03$, respectively), relative humidity and rainfall had a non-significant negative correlation with coriander aphid incidence ($r = -0.43$ and $r = -0.20$, respectively) at Jobner, Rajasthan. As per Purti *et al.* (2017) the maximum temperature ($r = 0.501$) and morning relative humidity ($r = 0.609$) had significant positive correlation with coriander aphid incidence. According to Swami *et al.* (2018) the maximum temperature had a non-significant positive correlation ($r = 0.309$, $r = 0.298$ and $r = 0.312$, respectively on all three varieties *i.e.* RCr-436, RCr-475 and RCr-728), while average relative humidity and total rainfall had a negative non-significant correlation on aphid population at Jobner, Rajasthan. As per Patel (2021), the minimum temperature non-significant positive correlation ($r = 0.014$) with aphid incidence. However, evening relative humidity had a significant negative correlation ($r = -0.704$) with aphid incidence. The population of aphid shows a significant negative correlation with morning relative humidity ($r = -0.690$) according to Kumar *et al.* (2023). These findings are in close conformity with present findings.

Coccinellids

Correlation analysis showed (Figure 4) that coccinellid populations had a highly significant positive association with evapotranspiration ($r = 0.822^{**}$) and maximum temperature ($r = 0.660^{**}$) during 2023-24. Bright sunshine ($r = 0.493$) and wind speed ($r = 0.485$) also showed positive but non-significant correlations. Minimum temperature ($r = 0.241$), morning relative

humidity ($r = 0.058$), rainy days ($r = 0.088$) and rainfall ($r = -0.034$) exhibited no significant influence. Interestingly, evening relative humidity showed a highly significant negative correlation with coccinellid abundance ($r = -0.681^{**}$). During 2024-25, maximum temperature showed a highly significant positive correlation with coccinellid population ($r = 0.704^{**}$) as per data presented in Fig. 5. Other positive but non-significant correlations were observed with bright sunshine ($r = 0.503$), evapotranspiration ($r = 0.513$), minimum temperature ($r = 0.514$) and evening relative humidity ($r = 0.183$). Morning relative humidity had a negative but non-significant correlation ($r = -0.378$). There was no significant relationship between wind speed and coccinellid population ($r = -0.010$). According to Devi (2013), both morning and evening relative humidity exhibited positive but non-significant correlations with coccinellid populations, with correlation coefficients of $r = 0.037$ and $r = 0.461$, respectively. In contrast, Swami *et al.* (2018) observed a significant positive association between maximum temperature and coccinellid abundance ($r = 0.771$), highlighting temperature as a key influencing factor. The current findings are largely consistent with these earlier studies, confirming the prominent role of temperature and the variable influence of other weather parameters on coccinellid fluctuation.

Syrphid fly larvae

Syrphid fly larvae population displayed a highly significant positive correlation with evapotranspiration ($r = 0.614^{**}$) and a significant positive correlation with bright sunshine ($r = 0.582^*$) as per data presented in Fig. 4 during 2023-24. Other parameters such as maximum temperature ($r = 0.304$), minimum temperature ($r = 0.001$), morning relative humidity ($r = 0.004$), rainy days ($r = -0.179$), rainfall ($r = -0.231$) and wind speed ($r = 0.164$) were not significantly correlated with syrphid larvae population. Evening relative humidity showed a highly significant negative correlation ($r = -0.746^{**}$) with syrphid larvae population. As per data presented in Fig. 5, bright sunshine ($r = 0.475$), maximum temperature ($r = 0.315$), evening relative humidity ($r = 0.255$), and evapotranspiration ($r = 0.133$) exhibited a positive but non-significant correlation with syrphid larvae. Morning relative humidity ($r = 0.047$) and minimum temperature ($r = 0.072$) showed no significant effect on the syrphid larvae population, while wind speed exhibited a negative but non-significant correlation ($r = -0.122$). Present findings conform with the findings of Devi (2013). They recorded that morning and evening relative humidity had positive, non-significant correlation with larvae of syrphid fly ($r = 0.060$ and $r = 0.467$, respectively).

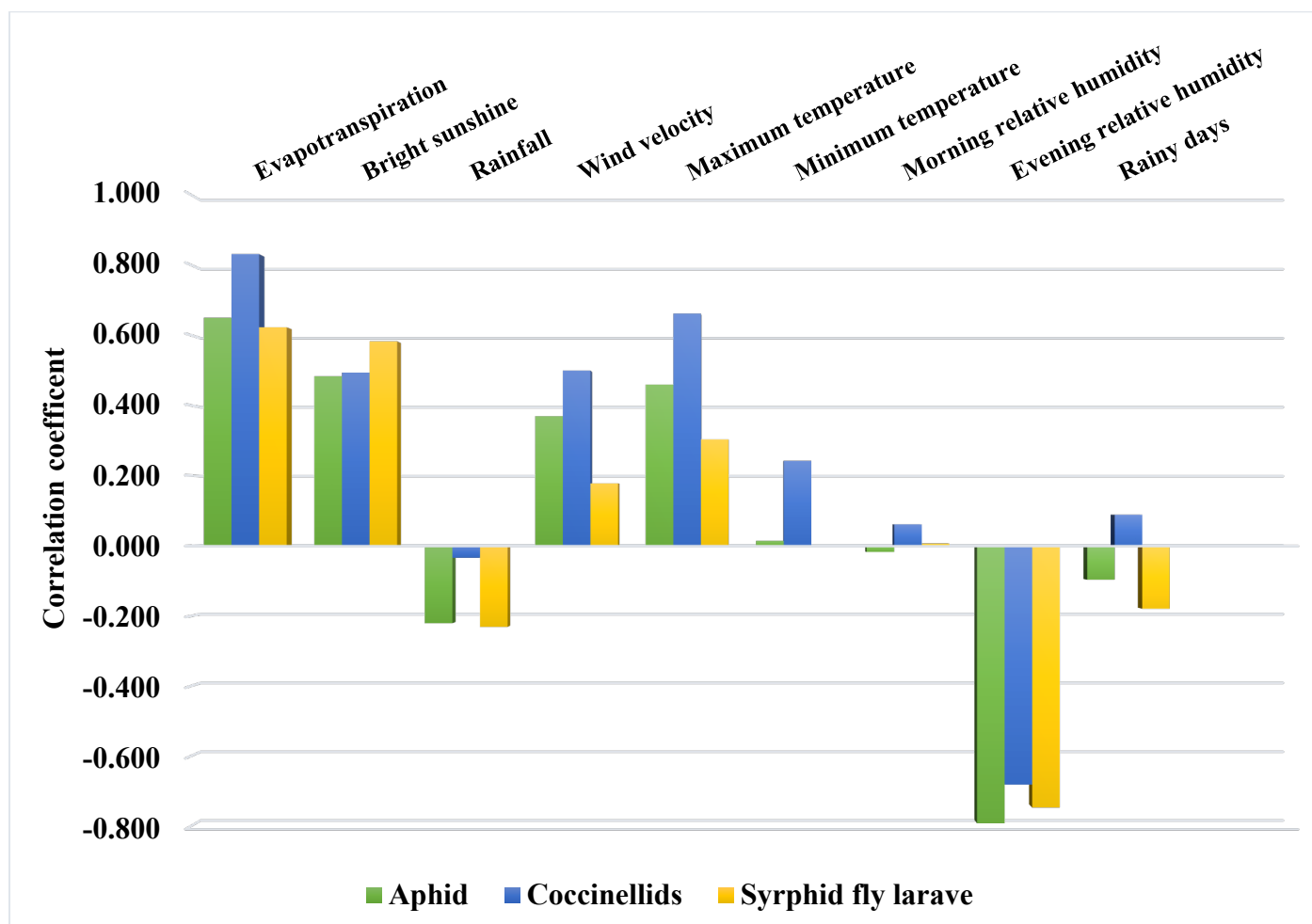


Figure 4. Correlation coefficient between aphid infesting coriander, its natural enemies, and weather parameters during 2023-24

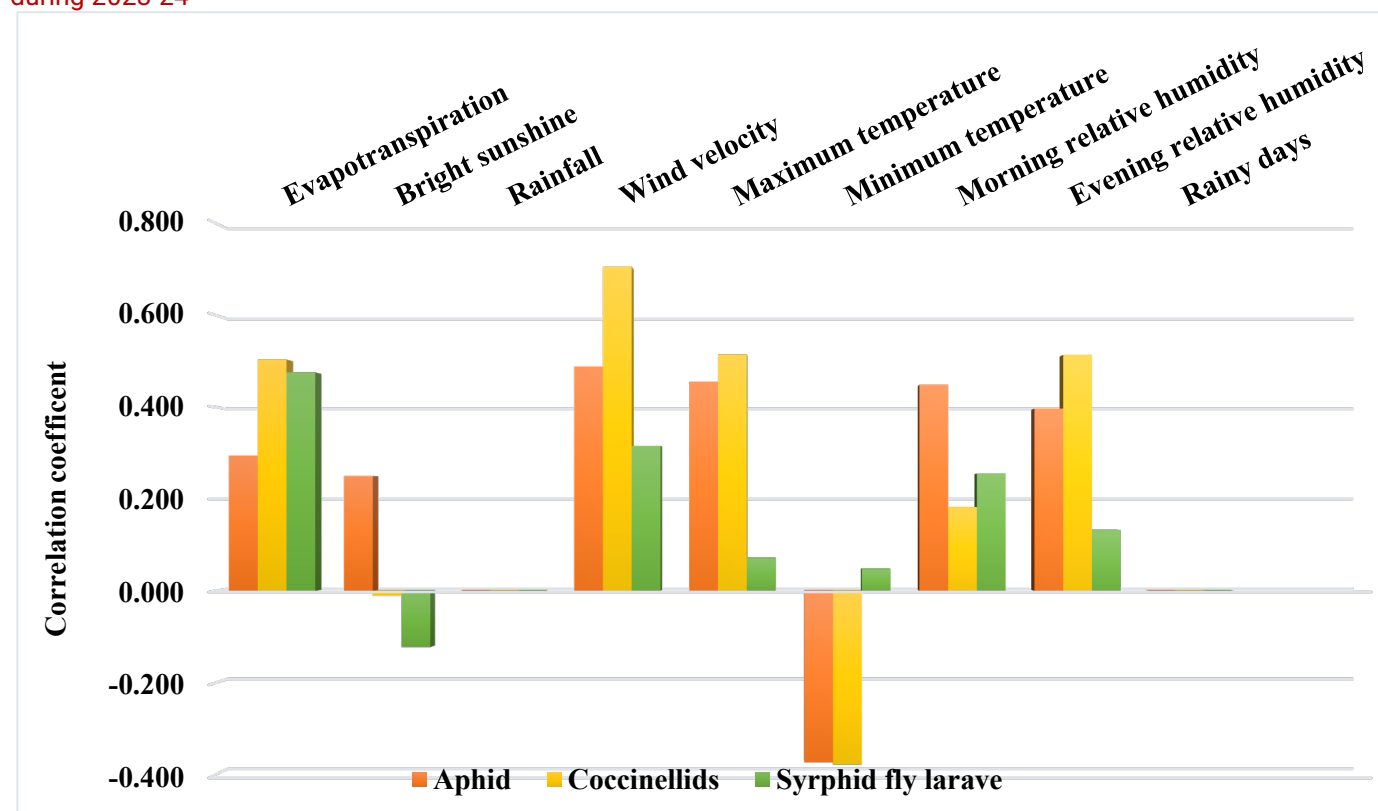


Figure 5. Correlation coefficient between aphid infesting coriander, its natural enemies and weather parameters during 2024-25

Correlation between aphid and its natural enemies

Aphid populations showed consistently strong and highly significant positive correlations with key natural enemies across both 2023–24 and 2024–25, underscoring their role as principal biocontrol agents. The population of aphid was highly positively correlated with coccinellids ($r = 0.915^{**}$ and $r = 0.917^{**}$, respectively) and syrphid fly larvae ($r = 0.831^{**}$ and $r = 0.766^{**}$, respectively), highlighting these natural enemies as principal biocontrol agents of aphid. As the aphid population increased, the population of natural enemies gradually rose in response.

Conclusion

The present study demonstrated that *H. coriandri*, *A. gossypii*, and *A. spiraecola* are the major aphid species affecting coriander crops, with peak infestation occurring in late February. Natural enemies such as coccinellids and syrphid fly larvae showed a strong numerical response to aphid populations, highlighting their potential role in biological control. These results emphasize the need for integrated pest management strategies that incorporate the conservation of beneficial insects for sustainable coriander cultivation.

Declaration of interests

The authors do not have any conflict of interest, and the research was conducted in the absence of any commercial relationship with anyone.

Data Sharing

All relevant data are within the manuscript and are available from the first author.

References

- Anonymous. 2025. Retrieved from Directorate of Horticulture, Govt. of Gujarat <https://doh.gujarat.gov.in/index.htm>.
- Devi AR. 2013. Bionomics of aphid, *Aphis gossypii* glover and its biorational management on coriander. M. Sc. (Agri.) Thesis (Unpublished). Anand Agricultural University, Anand.
- Ghadage SM, Vyas HJ & Joshi MD. 2010. Loss estimation in coriander due to sucking pests and screening of coriander genotypes against jassids. *Agricultural Science Digest*, 30 (4): 299-301.
- Haldhar SM & Maheshwari SK. 2021. Pest Management in Dryland Horticultural Crops. *Biotech Books*, pp-473; ISBN: 978-81-7622-491-8.
- Kant K, Meena SR, Sharma YK, Meena NK, Vishal MK, Saxena SN & Mishra BK. 2019. Development of aphids *Hyadaphis coriandri* (Das), its natural enemies and pollinators on coriander (*Coriandrum sativum* L.). *International Journal of Seed Spices*, 9(1): 79-84.
- Kumar V, Deshwal HL, Gurjar MK & Kumawat R. 2023. Population dynamics of the coriander aphids in hyper arid region of Rajasthan and their correlation with biotic and abiotic factors. *International Journal of Environment and Climate Change*, 13(11): 384-389.
- Lal G, Meena SS, Anwer MM & Mehta RS. 2009. Advance Production Technology of Coriander. Publisher Director, National Research Centre on Seed Spices, Ajmer, Rajsthan. pp. 6- 7.
- Meena NK, Lal G, Meena RS, Harisha CB & Meena SR. 2017. Pest scenario of coriander (*Coriandrum sativum* L.) and population dynamics in semi-arid region of Rajasthan. *International Journal of Tropical Agriculture*, 35(4): 779-783.
- Meena NK, Singh B, Lal G, Kant K & Meena RD. 2016. Sustainable management of aphid in coriander (*Coriandrum sativum* L.) through botanicals and bio-pesticides. *International Journal of Seed Spices*, 6(1): 25-31.
- Nair R, Das SB & Jyothsna J. 2021. Integrated management of aphid (*Hydaphis coriandri* (Das) and powdery mildew in coriander. *Journal of Entomology and Zoology Studies*, 9: 1019-1022.
- Pareek RK, Sharma A & Kumawat KC. 2013. Seasonal abundance of insect pests and their major natural enemies in coriander, *Coriandrum sativum* Linn. *Indian Journal of Applied Entomology*, 27(1): 21-26.
- Patel SA, Patel IS, Patel JK & Patel PS. 2011. Seasonal abundance of fennel aphid, *Hyadaphis coriandri* (Das) and associated bioagents in fennel crop. *Trends in Biosciences*, 4(1): 116-117.
- Prakyath KM, Gurunath VS, Channamma P, Sampada N, Shruthi M, Kavitha BM & Asha D. 2022. Performance of coriander under organic and chemical nutrient management practice. *Journal of Agriculture and Ecology*, 14: 173–177, DOI: [10.58628/JAE-2214-225](https://doi.org/10.58628/JAE-2214-225).
- Purti Rinku & Anuradha. 2017. Correlation between the incidence of coriander aphids (*Hyadaphis coriandri*), their natural enemies (coccinellids) and abiotic factors of the environment. *Chemical Science Review and Letters*, 6(23): 1745-1749.
- Regar PK, Mahla MK, Lekha AP & Chhangani G. 2022. Population dynamics of coriander aphid and occurrence of their natural enemies in organic coriander. *Pharma Innovation*, 11(6): 1201-1205.
- Sastry EVD & Sharma RK. 2001. Status of seed spices research in Rajasthan. In Agarwal, S., Sastry, E.V.D. and Sharma, R.K. (Eds.) *Seed Spices- Production Quality and Export*. Pointer Publishers Jaipur, Rajasthan, pp. 19-41.
- Singh A, Singh D, Agrawal VP & Dayanand. 2018. Study of variability and heritability in coriander (*Coriandrum sativum* L., 2n=22) genotypes under normal and limited moisture stress condition. *Journal of Agriculture and Ecology*, 5: 50-55.
- Singh H, Deshwal HL, Haldhar SM and Singh V. 2017. Bio-efficacy of some insecticides and botanicals against mustard aphid, *Lipaphis erysimi* Kalt. (Hemiptera: Aphididae) on Indian mustard. *Journal of Experimental Zoology*, 20 (1): 259-253.
- Steel RGD & Torrie JH. 1980. Principles and procedures of statistics. Publ. McGraw-Hill Book Company, New York, p. 137.
- Swami D, Jat BL & Dotasara SK. 2018. Population dynamics of insect pests of coriander and their correlation with biotic and abiotic factors. *Journal of Entomology and Zoology Studies*, 6(4): 460-464.
- Weiss EA. 2002. Umbelliferae. *Spice Crops* (EA Weiss, ed.), CAB International, Wallingford, UK, pp. 284-298.