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SEASONAL INCIDENCE OF APHID, *Acyrtosiphon pisum* (HARRIS) OF FENUGREEK AND THEIR CORRELATION WITH BIOTIC AND ABIOTIC FACTORS

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ABSTRACT

The present study entitled “Seasonal incidence of Aphid, *Acyrtosiphon pisum* (Harris) of fenugreek and their correlation with biotic and abiotic factors” was carried out under field conditions at the Instructional Farm and in the laboratory of the Department of Entomology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner during the *Rabi*, 2024-25 and 2025-26. Observations on the seasonal occurrence of *Acyrtosiphon pisum* on fenugreek indicated that the infestation of aphid appeared in second week of January (2SMW) and reached to peak in the first week of February (5SMW) during *Rabi*, 2024-25 and 2025-26. The infestation of *A. pisum* showed significant positive correlation with relative humidity (morning). A significant positive correlation was also found between *A. pisum* and *Coccinella septempunctata* during *Rabi*, 2024-25 and 2025-26.

Keywords: Aphid, Fenugreek, *Acyrtosiphon pisum*, *Coccinella septempunctata*.

Introduction

Fenugreek (*Trigonella foenum-graecum* L.) commonly known as Methi, is an annual crop belongs to family Leguminosae (Fabaceae) and native of South Eastern Europe and Western Asia (Pruthi, 1976). Fenugreek plant is also known as Bird's Foot, Greek Hay, Medhika, Metha, Menthya. India is one of the major producer and exporter of fenugreek. In Rajasthan, fenugreek cultivation is prevalent in Bikaner, Jodhpur, Churu, Sikar, Jhunjhunu and Nagaur districts. The productivity of fenugreek is greatly affected by biotic and abiotic factors. Among the biotic factor, yield loss due to insect pests is an important contributing factor. The important insect pests of fenugreek are aphids, *Aphis craccivora* (Koch) and *Acyrtosiphon pisum* (Harris); whitefly *Bemisia tabaci* (Genn.); leaf hopper, *Empoasca kerri* (Pruthi); leaf miner, *Liriomyza congesta* (Becker); thrips, *Thrips tabaci* (Lindeman); leaf eating caterpillar, *Spodoptera litura* (Fabricius); weevil, *Hypera postica* (Gyllenhal) and *Hypera branneipennis* (Boh.) (Kalra et al., 2002 and Manjula et al., 2015).

Evidently, sucking insect pests are the most damaging ones of fenugreek and they developed on the crop during vegetative stage but heavy population developed during flowering and pod stages causing significant losses in the yield (Abro et al., 2016). Among them, *A. craccivora* is the major insect pest of fenugreek. Both nymphs and adults of aphid infest the crop either in colonies or individually by piercing their sharp needle like stylets into cells of plant for sucking the cell sap, resulting in curling of leaves or appearance of discoloured spots on the foliage. The plant gradually wilts resulting into death of the plant. The aphid excretes honeydew (sweet sugary substance) which results into the development of the sooty mould which ultimately hamper the process of photosynthesis. Higher aphid population causes stunted growth and reduction in seed yield. A loss upto 62.3 to 68.8 per cent was recorded due to aphid infestation in fenugreek (Sharma and Kalra, 2002). A thorough understanding of the seasonal abundance of aphids is essential for developing timely and effective pest management strategies. Environmental factors such as temperature,

relative humidity, and rainfall are known to influence the population dynamics of insect pests. Therefore, the present investigation was undertaken to examine the seasonal incidence of *Acyrtosiphon pisum* on fenugreek and to determine its relationship with important meteorological parameters. The findings are expected to identify the environmental conditions that favour aphid development in the hyper-arid ecosystem of Rajasthan and provide useful information for planning sustainable pest management practices.

Materials and Methods

The present investigation was conducted during the Rabi seasons of 2024–25 and 2025–26 at the Instructional Farm and the Laboratory of the Department of Agricultural Entomology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University (SKRAU), Bikaner, Rajasthan.

The fenugreek variety RMt-361 was sown in a 10 × 10 m² experimental plot on 16 November 2024 and 19 November 2025, respectively. The crop was maintained with a spacing of 30 cm between rows and 10 cm between plants. All recommended agronomic practices prescribed for Agro-climatic Zone IC were followed throughout the cropping period to ensure healthy crop establishment and uniform growth.

Observations on aphid incidence were initiated immediately after the first appearance of the pest and continued at weekly intervals until crop maturity. In each experimental plot, ten plants were selected randomly and permanently tagged for recording observations. Aphid population was assessed by counting the number of individuals present on six leaflets per plant, comprising two upper, two middle, and two lower leaflets from each tagged plant. Thus, observations were recorded from all selected plants during every sampling interval. Simultaneously, the population of natural enemies, particularly predatory insects, was recorded from the entire tagged plants throughout the observation period. Meteorological data, including maximum temperature, minimum temperature, morning and evening relative humidity, and rainfall, were collected for the corresponding observation weeks.

To determine the influence of environmental conditions and natural enemies on aphid population dynamics, Pearson's correlation coefficient (r) was computed between aphid population, predator abundance, and the selected abiotic parameters. This analysis was performed separately for each experimental season to evaluate the relationship between aphid incidence and prevailing weather conditions.

Results and Discussion

Seasonal Incidence of *Acyrtosiphon pisum* on Fenugreek

The weekly observations on the population dynamics of *Acyrtosiphon pisum* recorded during the Rabi seasons of 2024–25 and 2025–26 are presented in Tables 1 and 2. The results indicated that aphid infestation commenced during the second Standard Meteorological Week (2nd SMW), corresponding to the second week of January, and persisted until the third week of March (11th SMW) in both cropping seasons. At the initial stage of infestation, the aphid population was 2.9 aphids per plant during 2024–25 and 2.6 aphids per plant during 2025–26. Thereafter, the population increased steadily with crop growth and attained its maximum density during the fifth Standard Meteorological Week (5th SMW), corresponding to the first week of February, when 102.7 and 98.0 aphids per plant were recorded during 2024–25 and 2025–26, respectively. Throughout the observation period, the aphid population varied from 1.6 to 102.7 aphids per plant during 2024–25 and from 0.9 to 98.0 aphids per plant during 2025–26. Following the peak infestation, the population gradually declined and reached its minimum level by the 11th SMW, coinciding with crop maturity during both years.

It is clear from Table 1 & 2 and Fig. 1 & 2 that the appearance of aphid population on fenugreek crop started at 2nd SMW which was Second week of January with 20.7 °C maximum, 5.2 °C minimum temperature and 80.9 % and 34 % morning and evening relative humidity respectively during 2024–25 and at 18.8 °C maximum, 2.1 °C minimum temperature and 76.3 % and 45.7 % morning and evening relative humidity respectively during 2025–26. The peak aphid population (102.7 aphids/plant) was recorded at 25 °C maximum, 5.7 °C minimum temperature and 87.3 % and 33.7 % morning and evening relative humidity respectively during 2024–25, while at 22.9 °C maximum, 5.3 °C minimum temperature and 81.5 % and 38.4 % morning and evening relative humidity respectively during 2025–26. The maximum temperature has non-significantly negative ($r = -0.128^*$) correlation and minimum temperature has non-significantly negative ($r = -0.485$) correlation with aphid population while morning relative humidity has significantly positive ($r = 0.532$) correlation and evening relative humidity has negligible positive correlation with aphid population and rainfall has non-significant negative ($r = -0.198$) correlation during 2024–25. During 2025–26 maximum and minimum temperature had non-significant negative ($r = -0.379$ & $r = -0.414$) correlation with aphid population, whereas morning

relative humidity has significantly positive ($r=0.587$) correlation and evening relative humidity has non-significantly positive ($r=0.276$) correlation with aphid population and rainfall has non-significant negative correlation.

Seasonal incidence of *C. septempunctata*

Simultaneously, it was observed that appearance of population of *C. septempunctata* commenced with the infestation of aphid in the 2nd SMW which was second week of Jan. during 2024-25 and 2025-26 and remained active throughout the crop season *i.e.* upto third week of March 2024-25 and 2025-26 (Table-1 & 2). Initially, the population of *C. septempunctata* was 0.5 & 0.7 per plant in (2nd SMW) during 2024-25 and 2025-26, respectively. The population of *C. septempunctata* increase gradually and reached to its peak in last week of January/first week of February *i.e.* 5th SMW (9.1/plant & 8.3/plant) during 2024-25 & 2025-26 respectively. The population of *C. septempunctata* ranged between 0.5 to 9.1 and 0.7 to 8.3 during 2024-25 & 2025-26 respectively. After reaching the peak, the population of *C. septempunctata* started to decline and reached to low level in 11th SMW near maturity of the crop during both the years. The aphid population had significantly positive correlation ($r = 0.986$ and $r = 0.937$) with population of *C. septempunctata* during 2024-25 & 2025-26.

The present investigations are fully supported by the findings of Mishra and Pandey (2023), who reported that aphid is a major pest of fenugreek and its population buildup started from 1st SMW, increasing gradually and reaching its peak in the 5th SMW. Similarly, Nema Ram *et al.* (2023) also observed that the population of *A. craccivora* on fenugreek appeared in the 1st meteorological week and reached a maximum of 59.93 aphids per plant in the second week of February (6th SMW). The results are in partially

agreement with Yadav (2004) and Deshwal (2007) who recorded the seasonal incidence (6.25 aphids/5 plants) of fenugreek aphid, *Acyrtosiphon pisum* in the second week of January (2nd SMW) in year 2002-03 and reached to the peak (103.25 aphids/5 plants) in the second week of February (6th SMW). The population declined (6 aphids/5 plants) gradually in the third week of March (11th SMW). The present finding also corroborates with the observations made by Naga *et al.* (2015) in fenugreek that population of aphid, *Acyrtosiphon pisum* started appearing (5.02 aphids/central shoot) from second week of January (2nd SMW) and reached to its peak in third week of February (7th SMW) with aphid population recorded (105 aphids/central shoot), gradually decline (5 aphids/central shoot) was noticed in the first week of April (13th SMW). These results are in partially agreement with Kumar *et al.* (2016) in fenugreek as he found the initiation of population of aphid, *Acyrtosiphon pisum* (5 aphids/5 plants) in the third week of January (3rd SMW) reached its peak in third week of February, *i.e.*, 7th SMW (115 aphids/5 plants) and gradually declined (11 aphids/5 plants) in the third week of March (11th SMW). These finding also corroborates with the observations made by Naga *et al.* (2015) as he found negative non-significant correlation of aphid population with maximum temperature and positive significant correlation with mean relative humidity and rainfall in fenugreek. These results are in contradiction with Kumar *et al.* (2016) and found that the relationship between aphid population with maximum temperature (positive significant; $r = 0.704$), minimum temperature (positive non-significant; $r = 0.465$), maximum relative humidity (negative non-significant; $r = -0.479$), minimum relative humidity (negative non-significant; $r = -0.357$) and rainfall (positive non-significant; $r = 0.001$) correlation in fenugreek.

Table 1 : Seasonal incidence of *A. pisum* of fenugreek and their correlation with Biotic and Abiotic factors during Rabi, 2024-25

SMW*	Date of observation		Temperature (°C)		Relative humidity (%)		Total rainfall (mm)	Aphid population/ plant	<i>Coccinella septempunctata</i> population/ plant
	From	To	Maximum	Minimum	Morning	Evening			
2	08-01-2025	14-01-2025	20.7	5.2	80.9	34.0	1.0	2.9	0.5
3	15-01-2025	21-01-2025	21.6	5.7	87.3	31.0	0.0	29.0	2.9
4	22-01-2025	28-01-2025	25.5	3.4	85.4	24.6	0.0	54.0	5.4
5	29-01-2025	04-02-2025	25.0	5.7	87.3	33.7	0.0	102.7	9.1
6	05-02-2025	11-02-2025	27.4	6.9	76.2	21.0	0.0	61.0	6.4
7	12-02-2025	18-02-2025	30.0	9.6	77.3	26.9	0.0	47.0	5.1
8	19-2-2025	25-2-2025	28.8	11.2	78.6	31	0.0	26.8	3.1
9	26-2-2025	04-3-2025	28.3	14.4	63.3	34.6	25.8	19.6	2.7
10	05-3-2025	11-3-2025	33.4	11.3	59.6	20.4	0.0	8.5	2.4
11	12-3-2025	18-3-2025	28.6	14.1	73.5	26.9	0.6	1.6	1.2

*Standard Meteorological Week

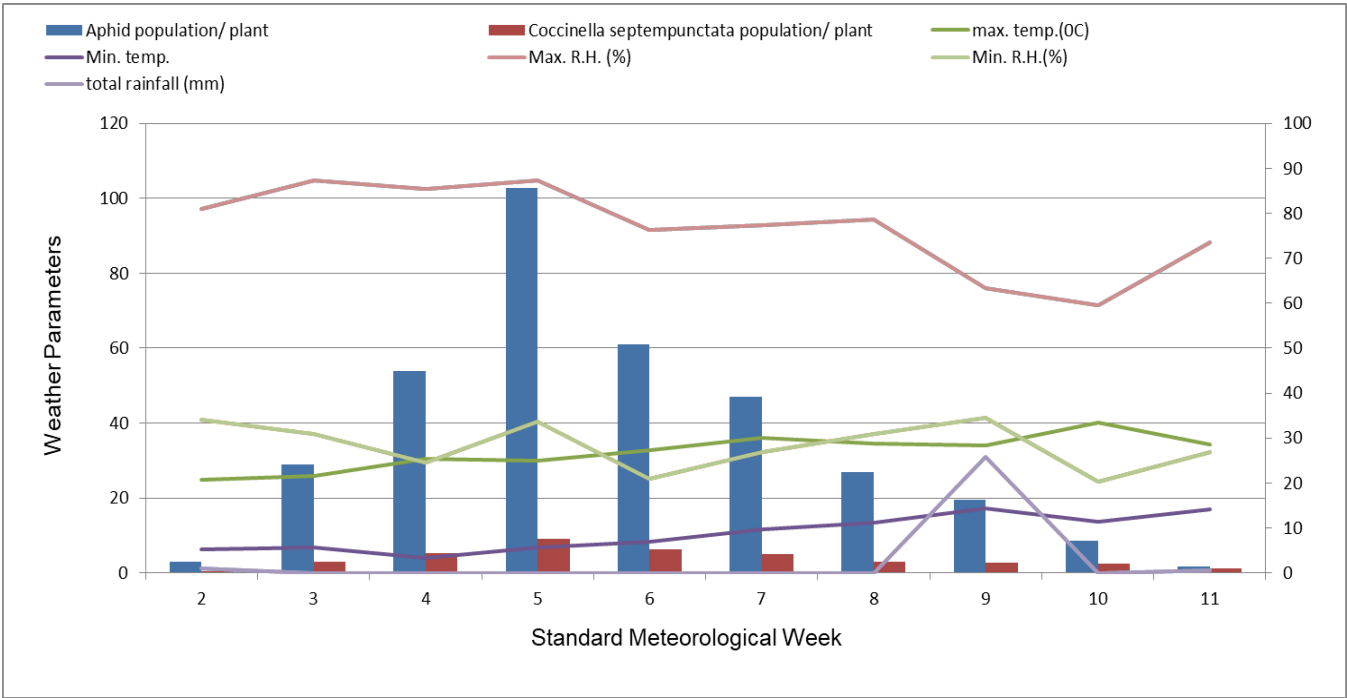


Fig. 1 : Seasonal Incidence of Aphid, *Acyrtosiphon pisum* on fenugreek and their correlation with Biotic and Abiotic factors during Rabi, 2024-25

Table 2 : Seasonal incidence of *A. pisum* of fenugreek and their correlation with Biotic and Abiotic factors during Rabi, 2025-26

SMW*	Date of observation		Temperature (°C)		Relative humidity (%)		Total rainfall (mm)	Aphid population /plant	<i>Coccinella septempunctata</i> population/ plant
	From	To	Maximum	Minimum	Morning	Evening			
2	08-01-2026	14-01-2026	18.8	2.1	76.3	45.7	0.0	2.6	0.7
3	15-01-2026	21-01-2026	25.3	5.7	74.3	32.4	0.0	22.4	2.8
4	22-01-2026	28-01-2026	20.4	3.6	77.0	39.4	0.0	45.0	6.9
5	29-01-2026	04-02-2026	22.9	5.3	81.5	38.4	0.0	98.0	8.3
6	05-02-2026	11-02-2026	28.4	7.5	75.0	24.6	0.0	57.0	5.8
7	12-02-2026	18-02-2026	30.0	9.7	69.6	28.1	0.0	32.1	4.6
8	19-2-2026	25-2-2026	30.8	12.1	76.0	29.0	0.0	23.0	3.9
9	26-2-2026	04-3-2026	35.2	13.7	65.2	17.7	0.0	16.2	3.1
10	05-3-2026	11-3-2026	38.3	15.2	73.6	16.0	0.0	11.7	2.0
11	12-3-2026	18-3-2026	33.8	15.1	71.6	24.9	0.0	1.2	0.9

*Standard Meteorological Week

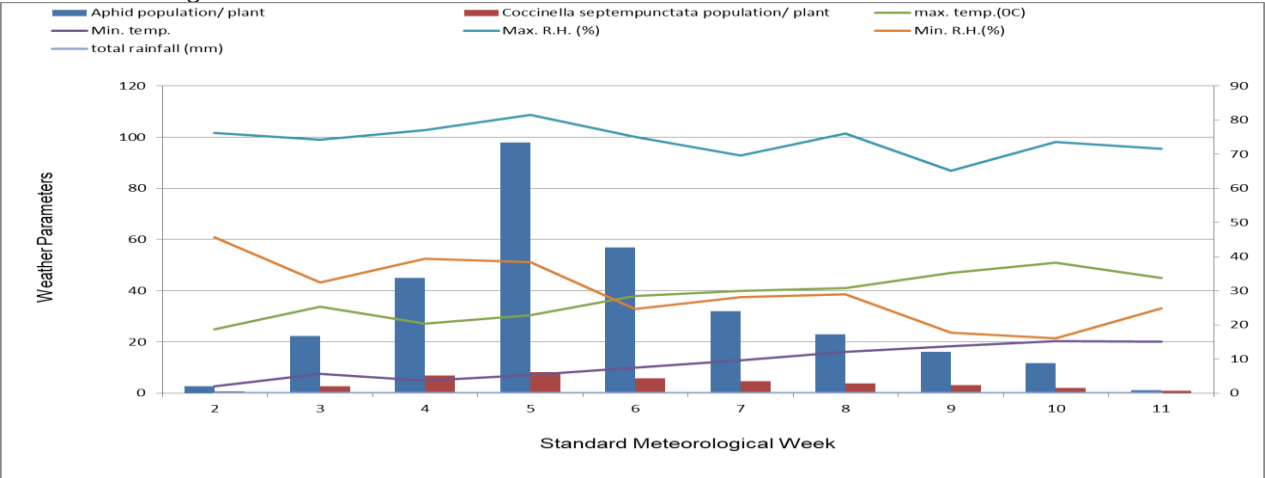


Fig. 2 : Seasonal Incidence of Aphid, *Acyrtosiphon pisum* on fenugreek and their correlation with Biotic and Abiotic factors during Rabi, 2025-26

Conclusions

The peak infestation of *A. pisum* on fenugreek was observed during first week of February. The infestation of *A. pisum* showed significant positive correlation with relative humidity (morning). A significant positive correlation was also found between *A. pisum* and *Coccinella septempunctata*.

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Conflict of Interest

All the author both individually and collectively, affirms that they do not possess any conflicts of interest either directly or indirectly related to the research being reported in the publication.

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