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Population Fluctuation and Predators of *Myzus lythri* (Schrank) (Hemiptera: Aphididae) Harmful on Mahlep (*Prunus mahaleb* L.) in Erzurum [*]

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Abstract: This study investigated the population fluctuation and predator complex of *Myzus lythri* (Schrank) (Hemiptera: Aphididae), a significant pest of mahlep (*Prunus mahaleb* L., Rosaceae), on the Atatürk University Campus (Erzurum) during May–October 2022–2023. Populations of apterae + nymphs and alatae were monitored at 5-day intervals using leaf samples, while predator species were collected using different sampling methods and identified in the laboratory. The highest apterae + nymph density was recorded on August 13, 2022 (976.61 individuals per leaf) and June 29, 2023 (1324.74 individuals per leaf). The highest alatae density was recorded on August 18, 2022 (81.65 individuals per leaf) and June 29, 2023 (76.54 individuals per leaf). A total of 12 predatory species belonging to the orders Coleoptera (Coccinellidae), Diptera (Syrphidae), Neuroptera (Chrysopidae), and Hemiptera (Nabidae and Anthocoridae) were identified. *Myzus lythri* was recorded in association with *Coccinella septempunctata, Harmonia axyridis, Harmonia quadripunctata, Sphaerophoria scripta, Syritta pipiens, Chrysoperla carnea, Nabis pseudoferus*, and *Orius horvathi* for the first time in Türkiye. These findings provide baseline information for future studies on the pest–predator interactions of *M. lythri*.

Keywords: Aphididae, *Myzus lythri,* population fluctuation, predators, *Prunus mahaleb.*

Erzurum'da Mahlepte (*Prunus mahaleb* L.) Zararlı Olan *Myzus lythri* (Schrank) (Hemiptera: Aphididae)'nin Popülasyon Değişimi ve Predatörleri

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Öz: Bu çalışma, mahlepte (*Prunus mahaleb* L., Rosaceae) önemli bir zararlı olan *Myzus lythri* (Schrank) (Hemiptera: Aphididae)'nin popülasyon dalgalanması ve predatör kompleksini, 2022–2023 yıllarında Mayıs–Ekim döneminde Atatürk Üniversitesi Kampüsü (Erzurum)'nde araştırmıştır. Kanatsız ergin + nimf ve kanatlı ergin popülasyonları, yaprak örnekleri kullanılarak 5 günlük aralıklarla izlenmiş; predatör türler ise farklı örnekleme yöntemleriyle toplanmış ve laboratuvarda teşhis edilmiştir. *Myzus lythri*'nin kanatsız ergin + nimf popülasyonunun en yüksek yoğunluğu 2022 yılında 13 Ağustos'ta (yaprak başına 976.61 birey) ve 2023 yılında 29 Haziran'da (yaprak başına 1324.74 birey) kaydedilmiştir. Kanatlı erginlerin en yüksek yoğunluğu ise 2022 yılında 18 Ağustos'ta (yaprak başına 81.65 birey) ve 2023 yılında 29 Haziran'da (yaprak başına 76.54 birey) kaydedilmiştir. Coleoptera (Coccinellidae), Diptera (Syrphidae), Neuroptera (Chrysopidae) ve Hemiptera (Nabidae ve Anthocoridae) takımlarına ait toplam 12 predatör tür teşhis edilmiştir. *Myzus lythri*'nin *Coccinella septempunctata, Harmonia axyridis, Harmonia quadripunctata, Sphaerophoria scripta, Syritta pipiens, Chrysoperla carnea, Nabis pseudoferus* ve *Orius horvathi* ile birlikteliği Türkiye'de ilk kez kaydedilmiştir. Bu bulgular, *M. lythri*'nin zararlı–predatör ilişkilerine yönelik gelecekte yapılacak çalışmalar için temel bilgiler sunmaktadır.

Anahtar kelimeler: Aphididae, *Myzus lythri,* popülasyon değişimi, predatörler, *Prunus mahaleb.*

INTRODUCTION

Türkiye is among the countries with high potential for fruit production due to its favorable geographical structure and ecological conditions. However, this potential cannot be utilized uniformly across all regions of the country. In particular, fruit-growing activities remain limited in certain regions. From the perspective of fruit cultivation, the Eastern Anatolia Region is among the least suitable areas because of its harsh geographical and ecological characteristics. In this region, where a continental climate prevails, long and severe winters dominate most of the year. During winter, temperatures may fall to as low as −40 to −50 °C, which prevents the cultivation of many fruit species or restricts fruit production to specific microclimatic areas (Güleryüz & Ertürk, 1999).

The subject of this study, mahlep (*Prunus mahaleb* L.), is known in Türkiye by various local names, including İdris ağacı, yabani kiraz, taş kiraz, melem, and endez. It

[*] *This study is part of the master's thesis of Emine ARAS and was presented as an oral presentation at the VI. ASC 2023 Fall Congress held on 21-23 December 2023 in Bingöl, Türkiye. The abstract of the study was also published in the conference abstract book.*

belongs to the family Rosaceae and is a white-flowering fruit tree that can reach up to 10 m in height, producing fruits with a slightly bitter and sour taste. Flowering occurs in March, leaf emergence in April, and fruit set begins in June. Mahaleb trees grow naturally in many regions of Türkiye without irrigation, fertilization, or chemical treatments, and their fruits are considered valuable due to their diverse industrial and nutritional uses (Anonymous, 2023a).

Mahaleb (*Prunus mahaleb* L.) is widely used as a rootstock for sweet and sour cherry cultivars and has various food, pharmaceutical, cosmetic, and industrial uses. Its fruits, seeds, bark, and wood are utilized for different purposes, including flavoring, oil production, furniture, and other traditional uses (Anonymous, 2023a; Webster & Schmit, 1996; Tozlu et al., 2000). Mahaleb trees are also present on the Atatürk University Campus as fruit and ornamental trees.

Worldwide, fruit production, as in many cultivated crops, is negatively affected by pests (insects, mites), plant pathogens (fungal and bacterial agents), and weeds. It has been reported that the majority of insect species recognized as pests in fruit crops belong to the orders Hemiptera, Thysanoptera, Coleoptera, Diptera, Lepidoptera, and Hymenoptera (Özbek & Yıldırım, 2014). Among the insect pests observed on mahaleb (*P. mahaleb*) trees, aphid species (Hemiptera: Aphidoidea) constitute an important group. Aphids cause economically significant yield losses in many agricultural crops. By forming colonies on plant roots, shoots, leaves, and fruits, these insects disrupt plant physiological processes through continuous phloem sap feeding, thereby adversely affecting plant growth and development (Bauernfeind, 2005).

During feeding, aphids consume carbohydrate-rich plant sap and excrete a sweet substance known as honeydew onto plant surfaces. This secretion promotes the growth of saprophytic fungi, leading to the formation of sooty mold. The sooty mold layer covers leaf surfaces and restricts photosynthesis and respiration, resulting in a decline in plant physiological activity. In addition, aphids are of major importance as vectors of plant viruses. Among sap-feeding insects, aphids represent the most significant group involved in virus transmission. Of the 27 plant virus genera currently described, more than 380 viruses are transmitted by members of the order Homoptera. Within this order, approximately 200 aphid species are capable of transmitting 275 viruses belonging to 19 plant virus genera between plants (Nault, 1997). Aphids cause yield losses either directly through sap feeding (35–40%) or indirectly through virus transmission (20–80%) (Kinley et al., 2021).

Aphididae is a highly diverse family comprising approximately 6,000 species worldwide, of which nearly 3,500 occur in the Palearctic Region (Holman, 2009; Simon et al., 2021; Blackman & Eastop, 2023). Studies on the aphid fauna of Türkiye date back to the early twentieth century and have progressively expanded through numerous faunistic and taxonomic investigations (Trotter, 1903; Fahringer, 1922; Houard, 1922; Çanakçıoğlu, 1975; Yiğit & Uygun, 1982; Tuatay, 1999; Toros et al., 2002; Görür, 2002; Özdemir, 2004; Aslan & Uygun, 2005; Özdemir et al., 2006; Geneci & Görür, 2007; Toper Kaygın et al., 2008; Barjadze et al., 2011; Akyıldırım et al., 2011; Görür et al., 2012; Barjadze & Özdemir, 2014; Barjadze et al., 2014; Güçlü et al., 2015; Şenol et al., 2015; Kök et al., 2016; Görür et al., 2017; Barjadze & Özdemir, 2018; Bayındır et al., 2018; Kök & Kasap, 2019; Görür et al., 2019; Başer & Tozlu, 2020; Zeybek & Tozlu, 2022; Tayat & Özder, 2024; Kök & Barjadze, 2025; Görür et al., 2026; Akyıldırım Beğen et al., 2026; Şenol et al., 2026). The currently known aphid fauna of Türkiye comprises approximately 695 species, although the actual diversity is considered to be higher because of the country's rich flora and ecological heterogeneity (Görür et al., 2023; Şenol et al., 2026). It has been reported that *Myzus lythri* was first recorded in Türkiye on *Prunus mahaleb* in Ankara on 27 May 1939 (Tuatay et al., 1967). Later studies reported the presence of this species in various provinces including Erzurum, Ankara, Elazığ, Amasya, Giresun, İstanbul, Tekirdağ, Konya, Rize, Trabzon, Samsun, Afyon, Uşak, and Çanakkale (Tuatay, 1991; Altay & Uysal, 2005; Görür et al., 2009; Akyürek, 2013; Görür, 2014; Kök & Özdemir, 2021; Kök & Kasap, 2022).

Myzus lythri has a heteroecious holocyclic life cycle, with *Prunus* species serving as primary hosts and several herbaceous plants as secondary hosts. The species has been recorded on *P. cerasifera, P. domestica, P. emarginata*, and *P. mahaleb* as primary hosts. In spring, populations developing on *P. mahaleb* may cause curling of the apical leaves, after which alatae migrate mainly to *Lythrum* species. Records from other secondary hosts, including *Epilobium* species, have also been reported (Görür et al., 2009; Holman, 2009; Blackman & Eastop, 2023).

Aphids have numerous natural enemies, both worldwide and in Türkiye. Among these, species belonging to the families Coccinellidae, Syrphidae, Chrysopidae, Anthocoridae, and Nabidae play an important role in regulating aphid populations. These predators feed on both aphid nymphs and adults and contribute significantly to biological control in agroecosystems.

Despite the economic importance of mahaleb trees and the wide distribution of *Myzus lythri* in Türkiye, information on the population fluctuation of this aphid and its predator complex on mahaleb trees remains limited. Therefore, the aim of the present study was to determine the population fluctuations of *M. lythri* and to identify its predator complex on mahaleb (*P. mahaleb*) trees growing on the Atatürk University Campus.

MATERIAL AND METHOD

Sampling area: Erzurum Province, located in the Eastern Anatolia Region of Türkiye, is one of the largest provinces in the country, with a surface area of approximately 25.000 km². It is also among the provinces with the highest elevation (approximately 1.900 m above sea level) and one of the coldest climates in Türkiye. Due to its high altitude, the region is characterized by a severe continental climate, which represents one of the most distinctive climatic types observed in the country. The annual average temperature is approximately 6.1 °C.

Erzurum Province hosts 25 endemic plant communities belonging to 107 genera and 34 families. Atatürk University, where the present study was conducted, is located in this province and has a campus area of approximately 6.5 million m². Various fruit, ornamental, and forest tree species are present within the campus area (Anonymous, 2023b). Among these tree species, mahaleb (*Prunus mahaleb* L.) is also commonly found.

Collection of aphids and their predators: At the beginning of the study, surveys were conducted on the Atatürk University Campus to determine the locations of mahaleb trees and to identify trees infested with *M. lythri*. Field sampling was carried out at 5-day intervals between May and October in 2022 and 2023. At each sampling date, five shoots were collected from each of the four cardinal directions (north, south, east, and west) of each sampled mahaleb tree using pruning shears. The collected shoots were placed in polyethylene bags and transported to the Insect Systematics Laboratory of the Department of Plant Protection, Faculty of Agriculture, Atatürk University.

Aphid counts were performed under a stereomicroscope by examining ten leaves from each shoot. Apterae and nymphs were counted together, whereas alatae were counted separately. Representative images of *M. lythri* colonies on *P. mahaleb* and stereomicroscopic views of the aphid forms are presented in Figure 1. For each sampling date, the population of *M. lythri* was expressed as the mean number of individuals per leaf based on all leaves examined. Population fluctuation data were evaluated descriptively. Subsequently, both alatae and apterae specimens were preserved in glass tubes containing 80% ethyl alcohol.

Predator species were collected using an aspirator, sweep net, Japanese umbrella (beating sheet), and direct hand collection methods. Predator individuals in pre-adult stages (egg, larva, and pupa), particularly those belonging to Coccinellidae and Syrphidae, were collected together with aphid-infested shoots. In the laboratory, these samples were placed in Petri dishes containing aphid-infested leaves to obtain the adult stages of the predators.

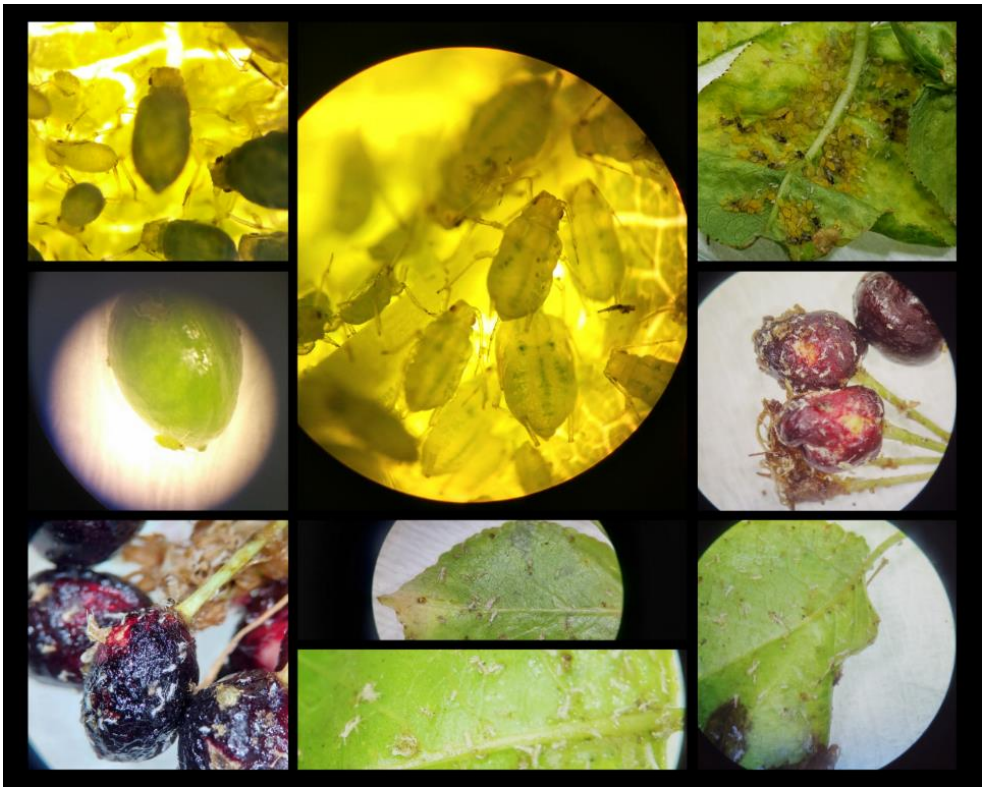

Figure 1. Representative images of *Myzus lythri* colonies on *Prunus mahaleb* and stereomicroscopic views of the aphid forms (Original).

Identification of aphids and their predators: Aphid specimens collected from the field and preserved in tubes containing 80% ethyl alcohol were slide-mounted according to the method described by Blackman & Eastop (2000). Species identification was performed by the specialist Assoc. Prof. Dr. Işıl Özdemir (Kocaeli

University, Türkiye). Predator individuals obtained from laboratory-reared samples, as well as those collected directly from aphid-infested leaves in the field, were classified at the order, family, and genus levels. Identification of coccinellid species was performed by Prof. Dr. Nedim Uygun (Çukurova University, Adana, Türkiye). Specimens belonging to other predator groups were identified by the second author of the study through comparison with previously identified reference material preserved in EMET (Entomology Museum of Erzurum, Türkiye).

Climate data for Erzurum (2022-2023): The climatic conditions of Erzurum during the study period (2022–2023), including average temperature, precipitation, and relative humidity, are presented in Figure 2.

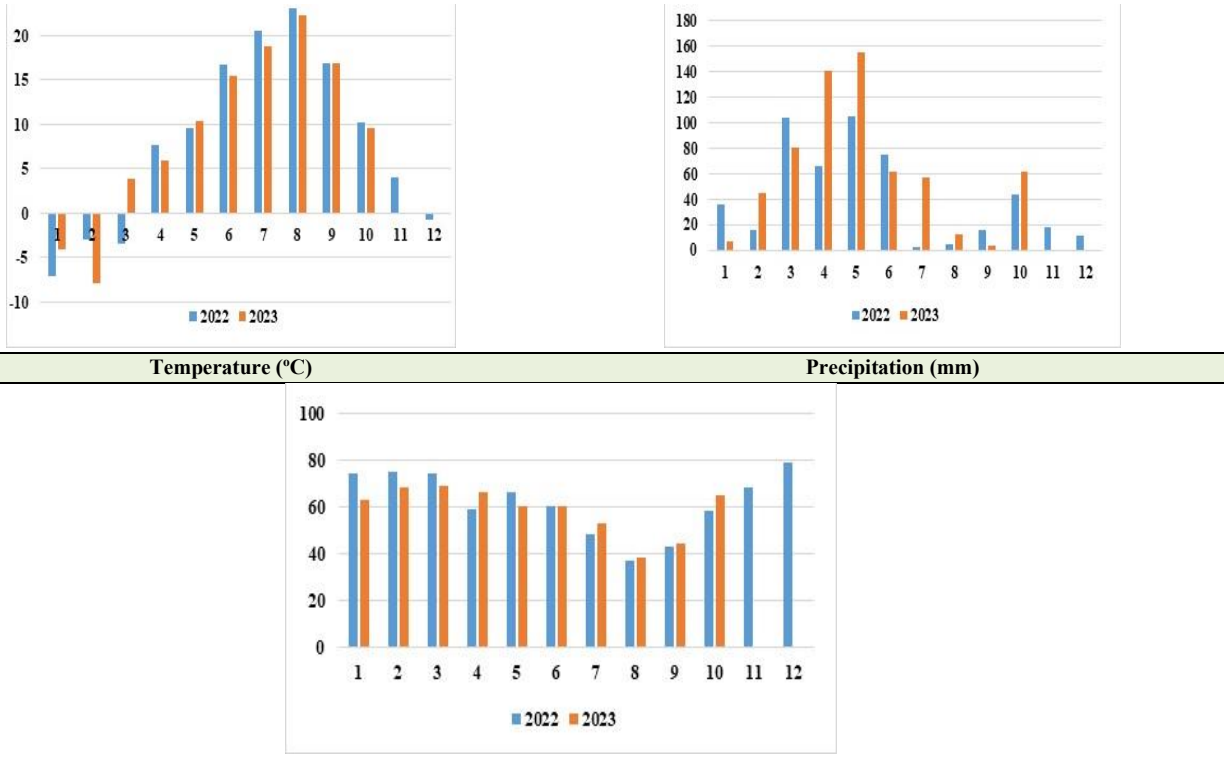

Figure 2. Average temperature, precipitation and relative humidity values in Erzurum for the years 2022 and 2023 (Data of Erzurum Meteorology 12th Regional Directorate).

RESULTS

Population fluctuation of Myzus lythri: Preliminary field observations were conducted before quantitative sampling. *Myzus lythri* was first observed on mahaleb leaves on 8 May 2022 and 14 May 2023; however, these observations were only used to determine the onset of infestation and were not included in the quantitative population counts. Standardized population sampling began on 15 May in both years. Both alatae and apterae forms of the species formed dense colonies on mahaleb trees.

In 2022, the apterae + nymphs population density fluctuated between 15 May and 19 July and subsequently increased, reaching the highest population density on 13 August with 976.61 individuals per leaf (Figure 3). This peak was followed by 653.84 individuals per leaf on 18 August and 664.86 individuals per leaf on 23 August. A marked decline was observed after 23 August, followed by a temporary increase on 12 September (424.55 individuals per leaf). Thereafter, the population declined and reached 2.57 individuals per leaf on 12 October, the final sampling date.

In 2023, the apterae + nymphs population density showed fluctuating levels between 15 May and 14 June and then increased rapidly from 14 June (106.47 individuals per leaf) to 29 June (1324.74 individuals per leaf) (Figure 4). The highest population peak occurred on 29 June with 1324.74 individuals per leaf. The population then declined sharply, with counts of 407.98 individuals per leaf on 9 July and 239.37 individuals per leaf on 14 July.

A further decrease in population density was observed between mid-July and early September. However, another increase was recorded on 7 September (198.87 individuals per leaf) and 12 September (121.32 individuals per leaf). After these dates, the aphid population declined steadily until 12 October, when the final count recorded 0.33 individuals per leaf. The maximum apterae + nymphs population density was 976.61 individuals per leaf on 13 August in 2022 and 1324.74 individuals per leaf on 29 June in 2023.

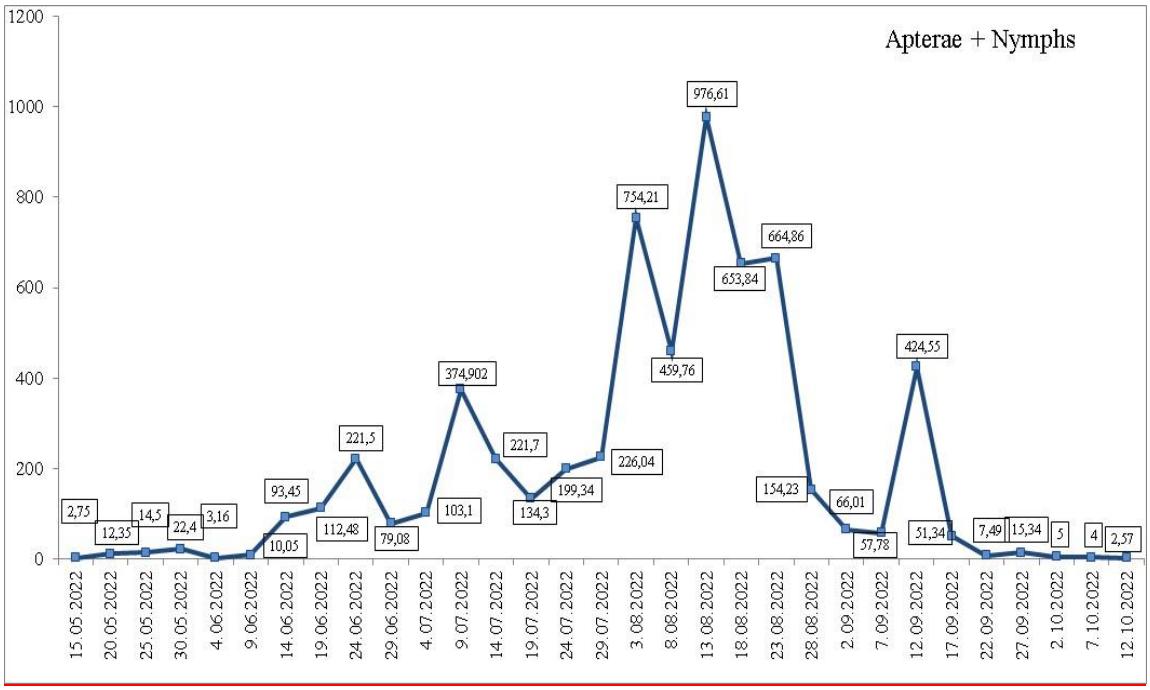

Figure 3. Population fluctuation of apterae + nymphs of *Myzus lythri* on mahaleb in 2022.

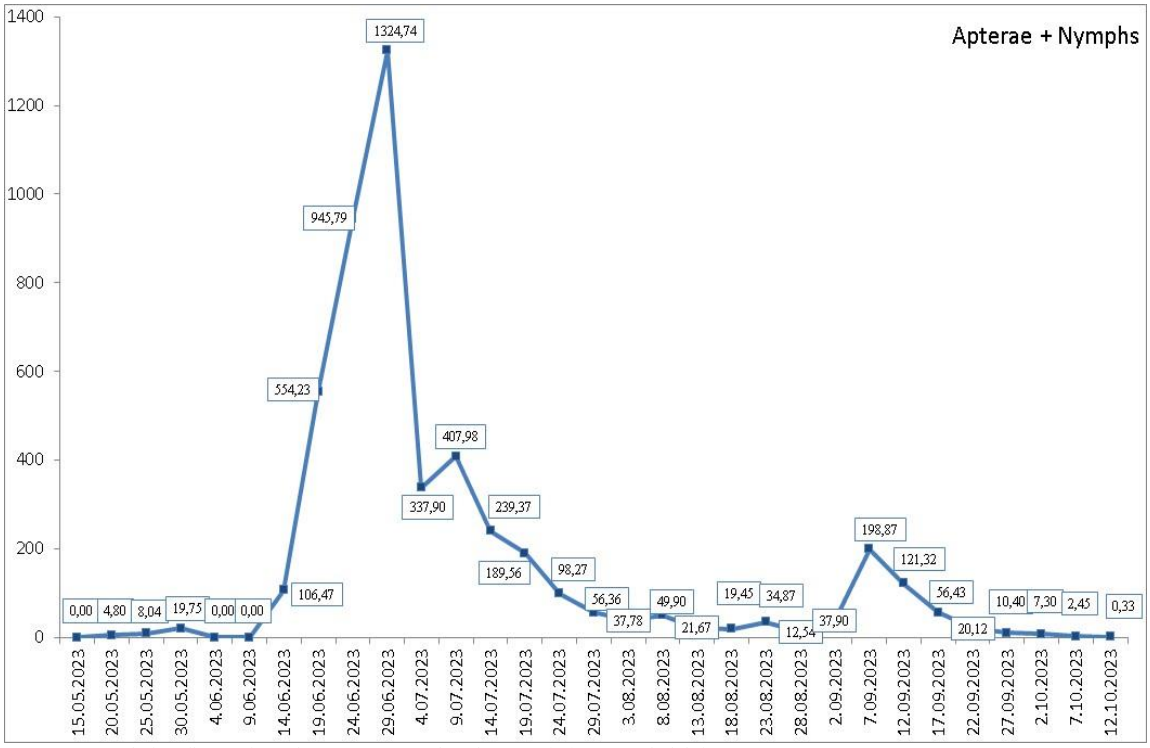

Figure 4. Population fluctuation of apterae + nymphs of *Myzus lythri* on mahaleb in 2023.

In 2022, the highest density of alatae was recorded on 18 August (81.65 individuals per leaf). Relatively high densities were also recorded on 24 June (76.40), 13 August (76.49), and 23 August (76.70 individuals per leaf) (Figure 5).

In 2023, the alatae population reached a single peak on 29 June (76.54 individuals per leaf), and no additional peaks were observed (Figure 6).

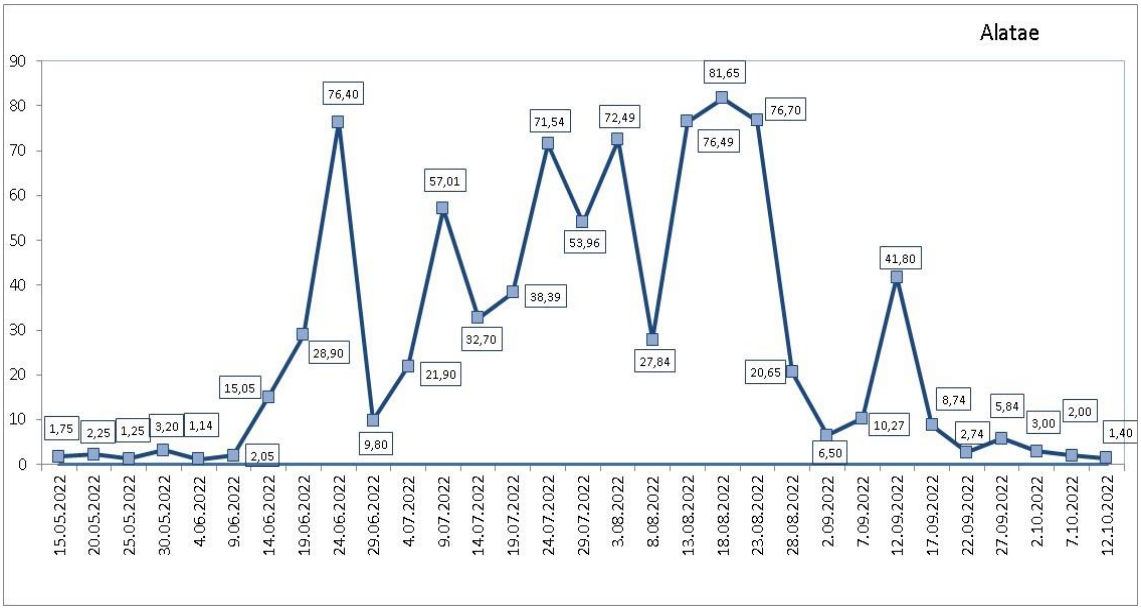

Figure 5. Population fluctuation of *Myzus lythri* alatae on mahaleb in 2022.

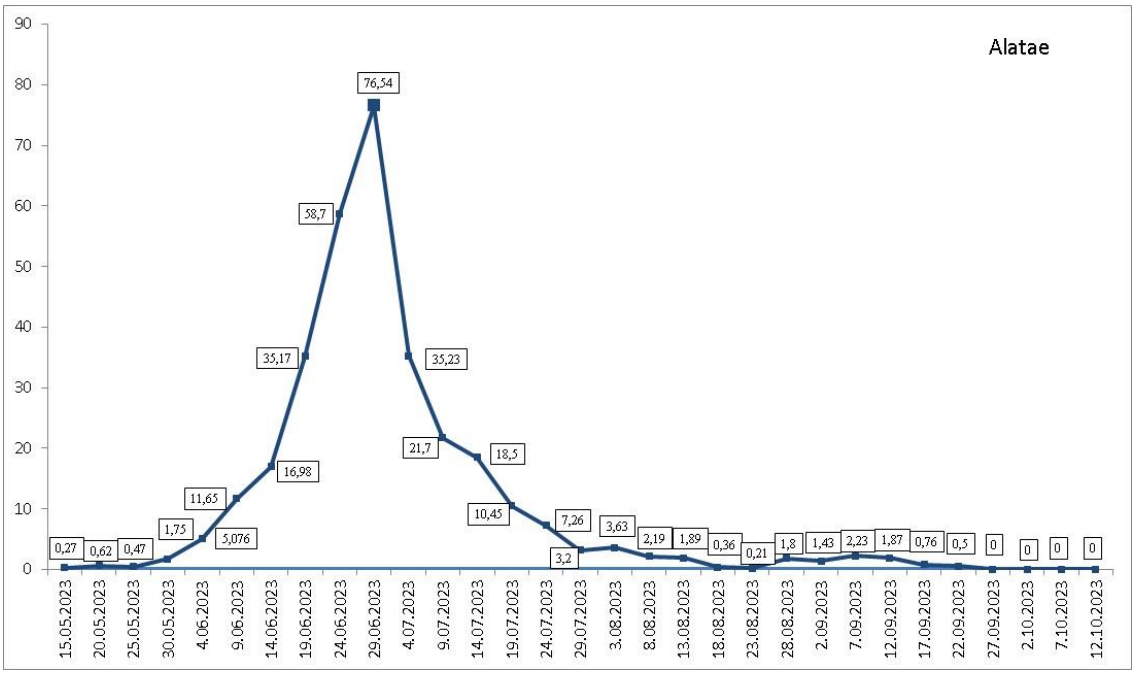

Figure 6. Population fluctuation of *Myzus lythri* alatae on mahaleb in 2023.

Predatory Natural Enemy Species: A total of 12 predator species belonging to four insect orders were recorded as natural enemies of *M. lythri*. These predators consisted of six species from Coccinellidae (Coleoptera), three species from Syrphidae (Diptera), one species from Chrysopidae (Neuroptera), one species from Anthocoridae (Hemiptera), and one species from Nabidae (Hemiptera) (Table 1).

In 2022, a total of 193 predator individuals were obtained. Among these predators, the most abundant species was *Adalia fasciatopunctata revelieri*, representing 29.02% of the total individuals. This species was followed by *Harmonia axyridis* (20.21%) and *Harmonia quadripunctata* (19.17%). Other coccinellid species recorded in 2022 included *Adalia bipunctata* (9.84%), *Adalia decempunctata* (4.15%), and *Coccinella septempunctata* (2.07%). Among the dipteran predators, *Episyrphus balteatus* accounted for 5.18% of the total predator individuals, followed by *Sphaerophoria scripta* (1.55%) and *Syritta pipiens* (0.52%). In addition, the neuropteran predator *Chrysoperla carnea* represented 6.22% of the total predator population. The hemipteran

predators *Orius horvathi* and *Nabis pseudoferus* each constituted 1.04% of the total individuals recorded in 2022 (Table 1).

In 2023, a total of 149 predator individuals belonging to the same 12 species were recorded. As in the previous year, *A. fasciatopunctata revelieri* was the most abundant species, accounting for 32.89% of all predator individuals. This species was followed by *C. septempunctata* and *H. axyridis*, each representing 14.09% of the total individuals. Other Coccinellid species included *A. decempunctata* (10.07%), *H. quadripunctata* (9.40%), and *A. bipunctata* (5.37%). Within Syrphidae, *S. scripta* accounted for 2.68% of the total individuals, followed by *E. balteatus* (2.01%) and *S. pipiens* (1.34%). The Neuropteran predator *C. carnea* represented 4.03% of the predator complex. In addition, the hemipteran predators *O. horvathi* and *N. pseudoferus* each accounted for 2.01% of the total individuals collected in 2023 (Table 1). Although fewer predator individuals were recorded in 2023 than in 2022, Coccinellidae remained the dominant predator group in both years.

Overall, the results indicate that species belonging to the family Coccinellidae constituted the dominant component of the predator complex associated with *M. lythri* in the study area.

During the study period, a total of 342 predator individuals belonging to 12 species were obtained. Among these predators, *A. fasciatopunctata revelieri* was the most abundant species with 105 individuals, followed by *H. axyridis* (60 individuals) and *H. quadripunctata* (51 individuals). Other species included *A. bipunctata* (27 individuals), *C. septempunctata* (25 individuals), *A. decempunctata* (23 individuals), *C. carnea* (18 individuals), *E. balteatus* (13 individuals), *S. scripta* (7 individuals), *S. pipiens* (3 individuals), *O. horvathi* (5 individuals), and *N. pseudoferus* (5 individuals).

Table 1. Monthly distribution of predator species collected from *Myzus lythri* on *Prunus mahaleb* during 2022–2023

			2022								
Order	**Family**	**Species**	**Jun I**	**Jun II**	**Jul I**	**Jul II**	**Aug I**	**Aug II**	**Sep I**	**Total**	**%**
Coleoptera	Coccinellidae	*Adalia bipunctata* (L.)	1	4	3	5	2	3	1	**19**	9.84
		Adalia decempunctata (L.)	-	-	1	3	-	4	-	**8**	4.15
		Adalia fasciatopunctata revelieri (Mulsant)	5	8	13	7	5	12	6	**56**	29.02
		Coccinella septempunctata (L.)	-	-	1	-	1	2	-	**4**	2.07
		*Harmonia axyridis (*Pallas)	3	6	3	4	12	8	3	**39**	20.21
		Harmonia quadripunctata (Pont.)	2	4	8	11	7	5	-	**37**	19.17
Diptera	Syrphidae	*Episyrphus balteatus* (De Geer)	-	-	4	3	-	3	-	**10**	5.18
		Sphaerophoria scripta (L.)	-	-	-	1	2	-	-	**3**	1.55
		Syritta pipiens (L.)	-	-	-	-	-	1	-	**1**	0.52
Neuroptera	Chrysopidae	*Chrysoperla carnea* (Stephens)	-	-	1	2	-	7	2	**12**	6.22
Hemiptera	Anthocoridae	*Orius horvathi* (Reuter)	-	-	2	-	-	-	-	**2**	1.04
	Nabidae	*Nabis pseudoferus* Remane	-	-	-	-	2	-	-	**2**	1.04
Total			**11**	**22**	**36**	**36**	**31**	**45**	**12**	**193**	100.00*
			2023								
Coleoptera	Coccinellidae	*Adalia bipunctata* (L.)	2	-	3	1	2	-	-	**8**	5.37
		Adalia decempunctata (L.)	-	3	5	4	2	1	-	**15**	10.07
		Adalia fasciatopunctata revelieri (Mulsant)	7	9	11	13	3	4	2	**49**	32.89
		Coccinella septempunctata (L.)	1	4	6	7	-	3	-	**21**	14.09
		Harmonia axyridis (Pallas)	-	2	5	7	2	4	1	**21**	14.09
		Harmonia quadripunctata (Pont.)	1	3	4	2	1	2	1	**14**	9.40
Diptera	Syrphidae	*Episyrphus balteatus* (De Geer)	-	-	2	-	1	-	-	**3**	2.01
		Sphaerophoria scripta (L.)	-	-	-	1	3	-	-	**4**	2.68
		Syritta pipiens (L.)	-	-	-	-	2	-	-	**2**	1.34
Neuroptera	Chrysopidae	*Chrysoperla carnea* (Stephens)	-	-	2	-	1	3	-	**6**	4.03
Hemiptera	Anthocoridae	*Orius horvathi* (Reuter)	-	-	1	-	-	2	-	**3**	2.01
	Nabidae	*Nabis pseudoferus* Remane	-	-	-	1	2	-	-	**3**	2.01
Total			**11**	**21**	**39**	**36**	**19**	**19**	**4**	**149**	100.00*

I: 1st-15th days of the month; II: 16th-last day of month.
*Percentages may not total exactly 100 due to rounding.

DISCUSSION

The present study investigated the population fluctuations and predator complex of *M. lythri* (Hemiptera: Aphididae), an important pest of mahaleb (*P. mahaleb* L.), on the Atatürk University Campus (Erzurum). Previous studies conducted in Türkiye have mostly focused on species records rather than detailed ecological investigations. For instance, Narmanlıoğlu & Güçlü (2008) reported *M. lythri* among aphid species detected on cherry trees in the İspir district of Erzurum. Similarly, Tayat & Özder (2024) recorded *M. lythri* on *Epilobium* species in Tekirdağ Province. In contrast to these studies, the present research examined not only the occurrence of the species but also its population fluctuation on *P. mahaleb* together with its predator complex. Therefore, the present study contributes important ecological information regarding the host–pest–predator relationship associated with *M. lythri*.

The population peaks occurred at different times in the two study years, with the highest density recorded in August 2022 and in June 2023. The monthly temperature, precipitation, and relative humidity patterns also differed between the two years (Figure 2). However, because the climatic data were available as monthly averages whereas aphid populations were monitored at 5-day intervals, these observations were interpreted descriptively and no direct

statistical relationship between climatic variables and aphid population density was inferred.

Several predator groups associated with *M. lythri* were recorded in the present study. Previous studies in Türkiye have also documented aphids together with their natural enemies on fruit trees, including predatory coccinellids (Narmanlıoğlu & Güçlü, 2008; Kök & Kasap, 2022). However, the present study did not experimentally evaluate the effect of predators on aphid population decline; therefore, no causal relationship between predator abundance and the suppression of *M. lythri* populations was inferred.

The recorded predator diversity provides useful information on the natural-enemy complex associated with *M. lythri* in this ecosystem.

From a pest management perspective, determining the periods when aphid populations reach peak levels is essential for implementing effective control strategies. The results obtained in this study indicate that *M. lythri* begins to establish populations on mahaleb trees toward the end of May and that population increases become evident from early June onwards. Therefore, if chemical control is required, applications should be conducted at the early stages of aphid emergence before population densities increase substantially. In addition, since predator species begin to establish their populations in the field from early June, the potential negative effects of insecticide applications on beneficial organisms should be carefully considered within integrated pest management programs.

CONCLUSION

In conclusion, this study revealed the population fluctuation of *Myzus lythri* on *Prunus mahaleb* and identified the predator complex associated with this aphid species under the ecological conditions of Erzurum. These findings provide baseline information on the seasonal dynamics of *M. lythri* and its natural enemies under local climatic conditions, contributing to the development of sustainable integrated pest management strategies and helping to reduce unnecessary chemical control applications. Furthermore, the results constitute a valuable scientific basis for future ecological and biological control studies on this aphid species.

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