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Ecological Study on Major Insect Species Attacking Wheat Plants and their Associated Predators in Qutour Region, Gharbia Governorate, Egypt

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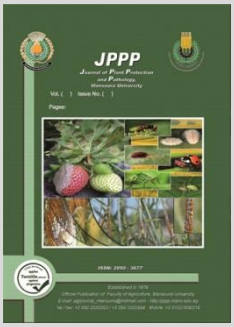

ABSTRACT

This study investigated the population density of aphids and their associated predators during two wheat seasons in Qutour, Gharbia, Egypt, along with the effect of weather factors (temperature and humidity). Two sampling methods were used: visual inspection and sweep net collection. Results obtained indicated that aphid densities were nearly similar in both seasons. *Rhopalosiphum padi* was the first species to appear, peaking at 380 individuals per leaf in late February before declining. There was no significant difference between *R. padi* and *R. maidis* populations, whereas a strong positive correlation was observed between *Sitobion avenae*, *Diuraphis noxia*, and their predators. In the 2022 season, temperature showed a significant negative correlation with *R. maidis*, *R. padi*, and *D. noxia*, while its correlation with *S. avenae* populations was significant. No significant correlation was found between *Schizaphis graminum* and predator populations. Relative humidity had a significant positive correlation with all aphid species except *S. avenae*. Predator populations were not significantly correlated with temperature. In the 2023 season, temperature negatively correlated with *R. maidis* and *R. padi*, while no significant correlations were detected for other species and their predators. These findings highlight the influence of weather factors on aphid and predator populations and their interaction, providing insights for pest management strategies in wheat crops.

***Keyword*: -** Correlation, Population, Sweep net, Weather factors, Visual inspection,

INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the important grain crops grown on more than 200 million hectares worldwide, it provides about 21% of the global food requirements (FAO, 2015). Wheat cultivation is essential for global food security, as it serves as a staple crop in several countries. Sustainable wheat production is facing challenges due to climate change. Significant alterations in the global climate will influence wheat output both directly and indirectly by affecting wheat–pest interactions (Bajwa *et al*.,2020). The increasing temperature affects crop plants and the biology of associated pests (Ziska *et al.*, 2011). Crop losses are typically characterized as a decrease in the quantity or quality of the yield. (Zadoks and Schein 1979) and These losses can be driven by both abiotic and biotic factors, which contribute to a decline in crop productivity.

Different insect pests attack wheat crops, and among these are Cereal aphids (Hemiptera: Aphididae) are one of the most destructive pests to grain crops, causing serious threats to crop yields. These small, sap-feeding insects mainly affect wheat (Triticum aestivum), causing both direct and indirect damage. Aphids feed directly on plants, reducing vitality, leaf curling, and grain yield, while their role as plant viral vectors, particularly the Barley Yellow Dwarf viral (BYDV), exacerbates crop losses. Ecological and environmental factors influence cereal aphid population density, such as temperature, host plant, and interactions with natural enemies.

Many investigators in different parts of the world studied the occurrence of insect pests infesting wheat plantations (Ghanim and El-Adl, 1983; El-Heneidy, 1991; Barro, 1992; Samad, 2004; Yigit et al. 2007; Nadeem et al. 2014; Awadalla et al. 2018 and Ghanim et al. 2018).

Several aphid species infest wheat fields. *Rhopalosiphum padi*, *Rhopalosiphum maidis*, *Duraphis noxia*, *Schizaphis graminum*, and *Sitobion avenae* are the most abundant aphid species prevailing in wheat fields.

These species of aphids suck sap from leaves and shoots and transmit a variety of plant diseases. Sap sucking from leaves, shoots, and grains causes significant yield reduction (Simon *et al.* 2021).

Natural predators contribute significantly to aphid population control in wheat fields. It has been determined that there are many predators that prey on various types of aphids and significantly reduce the population, reducing dependency on chemical control, which has many negative effects, both on the environment and on humans, especially since wheat is one of the crops that is used directly without treatment, increasing the rate of human exposure to pesticide residues (Ali and Darwish, 1990; Ghanim and El- Adl, 1991; El-Henedy and Abd el- Samad,2001; Slman and Ahmed, 2005).

Ladybird beetles (Coccinellidae: Coleoptera: Insecta) are the most diverse arthropod predators of insects and have excellent foraging and predatory performance (Pervez et al., 2020; Kumar and Omkar, 2023). They prey on soft insects like aphids, bugs, thrips, scale insects, and whiteflies (Omkar and Pervez, 2004; Ahmad *et al.*, 2024). Other aphidophagous arthropods include chrysopids (Chrysopidae: Neuroptera: Insecta) (Bakthavatsalam and Varshney, 2023), predatory bugs (Ballal *et al.*, 2023), and a few carabid beetles (Sreedevi *et al.*, 2023).

The aim of this study is to investigate the population density of main aphid species attacking wheat fields and their

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associated predators in Qutour region and the impact of some climate factors and related predators on aphid populations.

MATERIALS AND METHODS

Experimental design

A field survey was conducted in Qutour region, Gharbia Governorate, Egypt during 2022 and 2023 wheat growing seasons to investigate the main piercing-sucking insects and their associated predators. The experimental area was one feddan. In both seasons, the experimental plots were planted with Masr 3 cultivar on 5th December of 2022 and 2023 seasons. Throughout the two growing seasons, all plots were managed according to standard agricultural practices, with no insecticide applications. Nitrogen, phosphorus, and potassium fertilizers were applied in accordance with the recommendations of the Egyptian Ministry of Agriculture.

Sampling methods

Samples were weekly taken by using two methods as follows:

1- Visual examination: -

During both seasons of the study, one hundred plants of wheat which randomly distributed in the same experimental area were marked and investigated weekly to record, count, and collect the piercing-sucking insect species and their associated predators. Each collection was made at 10 a.m. In addition, a spirator was used for collecting fast movable and flying insects. The study period started from the second week of January till the end of April during both seasons of study. The collected insects were further transferred to the laboratory, then anaesthetized and identified under binocular microscope.

2- Sweep net method: -

In this method, fifty double strokes with the sweeping net from each of the four directions (North-South- East- West- and Middle) of the experimental area were weakly applied. Thus, 250 double strokes were fulfilled in the tested area. The collected insects were put in plastic bag and immediately anesthetized by ether, then transferred to the laboratory. Insects were classified to species level, recorded and counted.

Effect of temperature, relative humidity, predators on insect populations

The influence of temperature and relative humidity on the population density of aphid species and their associated predators was examined. Daily temperature and relative humidity data during the 2022 and 2023 growing seasons were obtained from the Egyptian Meteorological Department at the Gharbia Agricultural Research Station, located at Gharbia Governorate. The weekly averages of the these variables were used to determine the partial correlation coefficients between each of these climatic factors and the population densities of insect species, and their predators.

3Predators and their role in the control of aphid species

The relationship between the total number of aphid species and the total number of predators was used to evaluate the regulative role of predators in biocontrol of these insect species as outlined by Ferier et al. (1980), as follows:

$$\text{Predator pest ratio (P: P ratio)} = \frac{\text{Total number of injurious insects}}{\text{Total number of predacious insects}}$$

RESULTS AND DISCUSSION

Population estimates

The obtained results of the population density of Aphididae species that infesting wheat plants at Qutour region during 2022 and 2023 seasons was presented in Table (1). Data cleared that the aphid species that showed the highest populations in the first season was *Sitobion avenae* followed by *Schizaphis graminum* and the mean number of population density was 232 and 214 individuals, respectively, whereas the lowest population was *Rhopalosiphum maidis.* While in the second season, itgave the highest population was for *S. graminum* followed by *Rhopalosiphum padi* with a mean density of 229 and 224 individuals, respectively, whereas the lowest density was for *Duraphis noxia* (198 aphids).

Table 1. Population density of major species that infesting wheat plants in Qutour regions during 2022 and 2023 seasons.

Aphid species	1st season (2022)	2nd season (2023)
Rhopalosiphum maidis	1860	2120
Rhopalosiphum padi	1950	2240
sitobion avenae	2320	2140
Duraphis noxia	1920	1980
Schizaphis graminum	2140	2290

Data summarized in Table (2) indicate that there was non-significant correlation between either of the two aphid species *R. Padi* and *R. maidis* and each of predator species, whereas it was significant positive correlation between the grain aphid *S. avenae* or the Russian wheat aphid *D. noxia* and each of all associated predators.

Table 2. Partial correlation coefficient values between population density of some aphid species and their associated insect predators during 2022 wheat season.

	Rhopalosiphum maidis	Rhopalosiphum padi	Sitobion avenae	Diuraphis noxia	Schizaphis graminum
Coccinella undecimpunctata	-0.09^{ns}	-0.14^{ns}	0.896^{***}	0.69^{**}	0.49^{*}
Cydonia vicina isis	0.06^{ns}	-0.04^{ns}	0.79^{***}	0.63^{**}	0.44^{ns}
Scymnus sp.	-0.02^{ns}	-0.10^{ns}	0.83^{***}	0.69^{**}	0.51^{*}
Orius sp.	0.01^{ns}	-0.07^{ns}	0.80^{***}	0.63^{**}	0.66^{**}
Chrysoperla carnea	0.35^{ns}	0.37^{ns}	0.65^{**}	0.74^{**}	0.56^{*}
Cydonia vicina nilotica	-0.21^{ns}	-0.25^{*}	0.71^{**}	0.38^{ns}	0.29^{ns}

Data represented in Table (3) show that the predator-prey ratio in wheat fields during the 2022 season, that focuses on different predator species and their relationships with different aphid species.

Table 3. Predator-prey ratio in wheat fields during 2022 season.

	Rhopalosiphum maidis	Rhopalosiphhum padi	Sitobion avenae	Diuraphis noxia	Schizaphis graminum
Coccinella undecimpunctata	1.99	2.03	2.23	2.09	2.26
Cydonia vicina isis	2.14	2.18	2.39	2.24	2.43
Scymnus sp.	3.05	3.11	3.41	3.20	3.45
Orius sp.	3.53	3.60	3.95	3.70	4
Chrysoperla carnea	1.70	1.74	1.91	1.79	1.93
cydonia vicina nilotica	2.79	2.85	3.13	2.93	3.17

Among predators, *Orius* sp. has the highest predator-prey ratio of any aphid species, ranging from 3.53 to 4.00, indicating a significant predatory capacity. *Ch. carnea*, on the other hand, has the lowest predator-prey ratio, ranging from 1.70 to 1.93. *Scymnus* sp. and *Cydonia vicina nilotica* also showed strong predator-prey interactions, with ratios consistently above 3.00, indicating their efficacy in aphid control.

Schizaphis graminum appears to have the highest overall predator-prey ratios, indicating that it is more susceptible to predation than other aphid species. *Rh. maidis* and *Rh. padi* had slightly lower ratios, which could indicate differences in population density or resilience to predation.

Data represented in Table (4) show that correlation coefficient values between the population density of different aphid species and their associated insect predators in wheat fields during 2023 season. *S. avenae*, *D. noxia*, and *S. graminum* had the strongest correlations with several predators, showed a well-established predator-prey connection. *S. avenae* and *D. noxia* had the highest positive correlation values with various predators, mainly *Scymnus sp.* and *Ch. carnea*, that confirmed their function in aphid reduction.

Table 4. Partial correlation coefficient between population density of some aphid species and insect predators during 2023 wheat season.

	Rhopalosiphum maidis	Rhopalosiphum padi	Sitobion avenae	Diuraphis noxia	Schizaphis graminum
Coccinella undecimpunctata	-0.145ns	0.09ns	0.80***	0.81***	0.57*
Cydonia vicina isis	0.34ns	0.34ns	0.70**	0.69**	0.65**
Scymnus sp.	0.43ns	0.42ns	0.65**	0.65**	0.70**
Orius sp.	0.29ns	0.3383	0.63**	0.46*	0.60*
Chrysoperla carnea	0.51*	0.49*	0.65**	0.84****	0.87****
cydonia vicina nilotica	0.097ns	0.08ns	0.71**	0.3508*	0.38*

Results in Table (5) indicate that *Orius sp.* had the highest predator-prey ratio of any aphid species, ranging from 3.93 (*R. maidis*) to 4.12 (*S. graminum*), showed notable predatory efficiency. *Scymnus* sp. had relatively high ratios, with values more than 2.7 across all aphid species, indicated a potential function in aphid population control. *Ch. carnea*, on the other hand, had the lowest ratios, ranged from 1.81 to 2.03. *Coccinella undecimpunctata* and *Cydonia vicina isis* had intermediate predator-prey ratios, typically ranged from 2.1 to 2.5. This showed that, while they decreased aphid populations, they might be less successful than *Orius sp.* or *Scymnus sp. C. vicina nilotica* had similar predator-prey ratios among aphid species, ranging from 2.54 to 2.85.

Table 5. predator-prey ratio in wheat fields during 2nd season 2023.

	Rhopalosiphum maidis	Rhopalosiphum padi	Sitobion avenae	Diuraphis noxia	Schizaphis graminum
Coccinella undecimpunctata	2.26	2.35	2.30	2.11	2.37
Cydonia vicina isis	2.38	2.47	2.42	2.22	2.49
Scymnus sp.	2.89	3	2.94	2.70	3.03
Orius sp.	3.93	4.09	4	3.67	4.12
Chrysoperla carnea	1.93	2.01	1.97	1.81	2.03
cydonia vicina nilotica	2.71	2.82	2.76	2.54	2.85

Influence of Temperature: -

Table (6) showed the correlation between the population density of aphid species and their related predators on wheat fields in two seasons

Table 6. Partial correlation coefficient values for the population density of some Aphididae species, associated with predators and main abiotic factors, in wheats fields during 2022 and 2023 seasons

	2022		2023	
	Temp (°C)	Relative humidity(%)	Temp (°C)	Relative humidity(%)
Rhopalosiphum maidis	-0.52*	0.53*	-0.50*	-0.005ns
Rhopalosiphum padi	-0.49*	0.54*	-0.47*	0.028ns
Duraphis noxia	-0.49*	0.54*	-0.099ns	-0.17ns
Schizaphis graminium	0.28ns	0.32ns	-0.26ns	-0.21ns
Sitobion avenae	0.48*	-0.15ns	0.62**	-0.65**
Coccinella undecimpuntata	0.14ns	-0.21ns	0.14ns	-0.21ns
Cydonia vicina isis	0.25ns	-0.18ns	0.24ns	-0.18ns
Scymnus sp.	0.14ns	0.012ns	0.14ns	0.012ns
Orius sp.	0.066ns	-0.047ns	0.066ns	-0.047ns
Chrysoperla carnea	0.29ns	-0.07ns	0.29ns	-0.07ns

In the 1st season of 2022, there was a significant negative correlation between the temperature degree and *Rh. maidis*, *Rh. Padi*, and *D. noxia,* while the correlation between *S. avenae* and temperature was significant. The correlation wasn't significant between the aphid species *S. graminum* and all studied predators. As for relative humidity, the correlation was significantly positive for all aphid species except for *S. avenae*. The correlation between predators and temperature wasn't significant. In the 2nd season (2023), there was significant negative correlation between the temperature degree *and Rh.maidis, Rh. Padi*, and it wasn't significant for other species and its predator.

Figures (1 and 2) presented the aphid species population density in relation to wheat growth during the first and second seasons 2022 and 2023. Aphids appeared from the last week of December and their population increased gradually. The maximum population was estimated during March. The aphid population varied at various growth stages Heading, stem elongation.

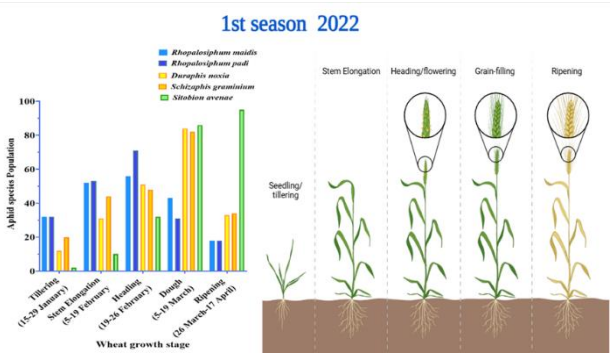

Figure 1. aphids population at different stages of wheat crop at first season (2022)

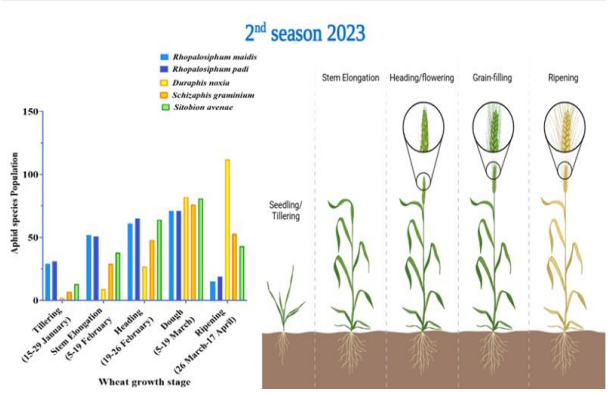

Figure 2. Aphids population at different stages of wheat crop at first season (2023)

There were variations in population densities of various species of aphids in relation to wheat growth stage. At the start of the growing season(seedling and elongation stage), *R. padi* and *R. maidis* were the most prevalent species; then they started decreasing, and the other two species of aphids, *D. noxia* and *S. graminum* and *S. avenae* , the dough stage and ripening stages were observed to be most pronounced to be influenced by these spe cies, particularly for the species *S. avenae*.

Figure (3) illustrates seasonal population density of five aphid species (Rh. padi, and Rh. maidis, S. graminum, D. noxia and S. avenae) in wheat fields during the 2022 and 2023 growing seasons. Figure showed that the aphid population densities were approximately similar for both seasons. Rh. padi population was the first aphid species appeared and began to gradually increase in mid-January, reaching its peak (38 individuals per leaf) in the final third of February. Subsequently, the population started to decline, reaching its lowest count by the end of the season. Rh. maidis population reach its peak from mid – February till the end of March (31 individuals/ leaf) then it decreased during the end of seasons. D. noxia population reached its peak on the end of march and during April (31 individuals per leaf) and there were two peaks for S. graminum on the middle of February

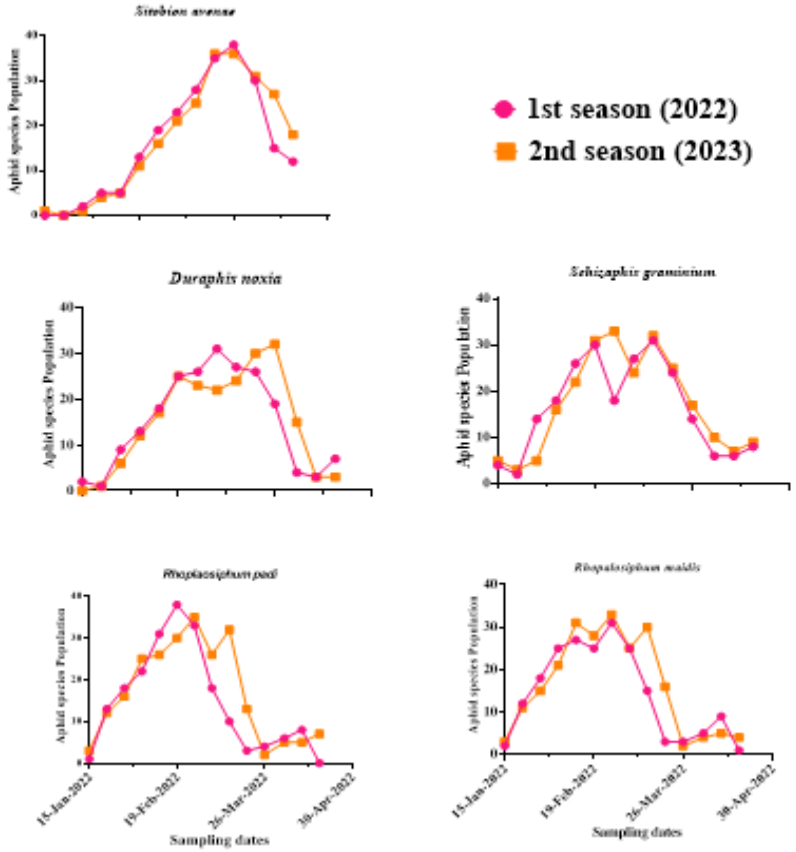

Figure 3. Seasonal population density of five aphid species on wheat crop

and March. Figure (3) illustrated that the last aphid species appeared was S. avenae and its peak was on the end of march.

Results were almost in agreement with those found by (Khan et al. 2012) who stated aphid infestation occurred in mid-January and grew during wheat crop growth. The population peaked in mid-March during the wheat heading stage and decreased as the crop matured.

Similarly, (Kostyukovskii and Kushneuk, 1990) found that the total amount of aphids increased between 20 and 25°C during wheat earring and flowering. The highest density was observed during grain growth and the start of wax ripening. According to (Riedell, 1990), a reduction in the aphid infestation could also be attributed to crop maturity; aphid infestation on wheat crops is numerous throughout the heading and blooming stages but decreases after the crop's maturity.

Our findings were consistent with Yang (1990), who observed that at low temperatures, the development of aphids was delayed. The author also determined that a temperature of 25°C promotes population increase.

Sitobion avenae appeared later than *R. padi* and *S. graminum* during the second week of March (5.99 aphid/tiller) and remained until the second week of April on spike. These findings are in close conformity with Zeb *et al.* (2011). They identified the second week of March as the most

crucial by indicating peak population on the wheat crop. Shahzad et al. (2013) also found that *R. padi* and *S. graminum* on wheat crop before *S. graminum* [33,34].

Figure (4) illustrated the seasonal population densities of six aphidophagous predators across two growing seasons (2022 and 2023), In both seasons the species Ch. carnea initially started to appear in the end of January, and its population gradually grew until it reached its highest point at the end of February, after which it began to decreased again, but its presence persisted until the end of the season.

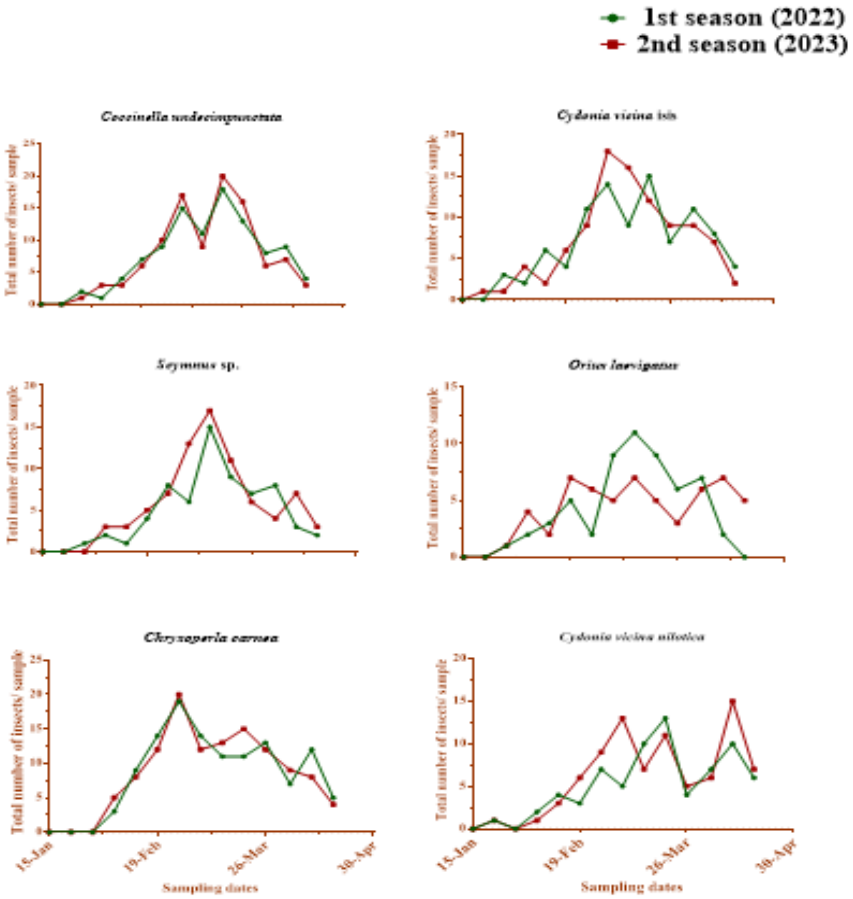

Figure 4. the seasonal population densities of six aphidophagous predators across two growing seasons (2022 and 2023)

As for the species C. vicina nilotica, it was clearly present in small numbers at the beginning of the season, then it began to rise, and there was a fluctuation in the population throughout the season, as it reached the highest population during the months of March and April.

In both seasons, the species O. lavigatus initially started to appear in the middle of January, and its population gradually grew until it reached its highest point at the end of February, and the population was almost in a stable state during March and the beginning of April, after which it began to decrease again.

Scymnus sp. population gradually grew until it reached its highest point in the middle of March, after which it began to decrease again.

There were two peaks for C. undecimpunctata population on the end of February and middle of March. As for C. vicina isis its population densities were almost similar to C. undecimpunctata.

REFERENCES

Ahmad, M. E., Nawal, D., Kumari, M. and Kumari, K. (2024). Prey and host records of *Coccinella* spp. (Coleoptera: Coccinellidae) in India (a review). Journal of Advanced Zoology, 4(5): 170–187.

Ali, A.M. and Y.A. Darwish (1990). Incidence of the greenbug, *Schizaphis graminum* (Rondani) (Homoptera; Aphididae) on wheat in Upper Egypt.*Assiut J. Agric. Sci.* 21: 184-190.

Awadalla, S. S., A.A. Ghanim, F.E. Abd Allah, and A.A. Abdel-Aziz, 2018. The main insect pests attacking wheat plants and their associated predators in Sakha District, Kafr Elsheikh Governorate. J. Plant Prot. and Path., Mansoura Univ., 9 (2): 97 – 101.

Bajwa, A. A., Farooq, M., Al-Sadi, A. M., Nawaz, A., Jabran, K., and Siddique, K. H. (2020). Impact of climate change on biology and management of wheat pests. *Crop Protection*, *137*, 105304.

Bakthavatsalam, N. and Varshney, R. (2023). Chrysopids (Neuroptera: Chrysopidae). In. Insect Predators in Pest Management (ed. Omkar), CRC Press, Taylor & Francis Group, LLC, pp. 161–174.

Ballal, C. R., Gupta, T. and Varshney, R. (2023). The flower bugs (Anthocoridae). In. Insect Predators in Pest Management (ed. Omkar), CRC Press, Taylor & Francis Group, LLC, pp. 73–106.

Barro, P. D. (1992). A survey of *Rhopalosiphum padi* (L.) (Hemiptera: aphididae) and other wheat-infesting cereal aphids flying over South Australia in 1989. Australian Journal of Entomology, 31(4): 345-349.

Eissa Ghada MF. "Studies on certain piercing-sucking insects infesting soybean plants at Kafr El-Shiekh governorate". Ph. D thesis (Agric.), Tanta University, Tanta University (2018): 112.

El-Heneidy, A. H., Rezk, G. N., Abdel-Megeed, M. I., and Abdel-Samad, S. S. (2004). Comparative study of cereal aphids species and their associated predators and parasitoids in two different wheat regions in Egypt. *Egypt*. J. Biol. Pest Control. 14(1): 183-191.

El-Heneidy, A.H. (1991). Seasonal abundance of aphids and their natural enemies in wheat fields in Upper Egypt. J. Biol. P. Control., 1(1): 5-10.

El-Heneidy, A.H. and Abdel-Samad S.S. (2001). Tritrophic interactions among Egyptian wheat plants, cereal aphids, and natural enemies. *Egypt.* J. Biol. Pest Control., 11(2): 119-125.

FAO, 2015. Cereal Supply and Demand BRIEF. (Accessed 12 June 2018).

Freier, B.; Reinsch, B. and Wetzel, T. (1980). Zur bedeutung der artdetermination bei getreideblattlausen fur die uberwachung und gezielte bekampfung. Nachrichtenblatt Pflanzen. Schutz., 34: 1-5.

Ghanim, A. A., Awadalla, S. S., Abd Allah, F. E., and Abdel-Aziz, A. A. (2018). The economic thresholds and injury levels for the English grain aphid, *Sitobion avenae* (F.) (Hemiptera-Aphididae) on wheat crop. Journal of Plant Protection and Pathology, 9(2), 93-95.

Ghanim, A.A. and M.A. El-Adl (1983). Studies on the main insects inhabiting wheat fields at Mansoura district, Egypt. J. Agric. Sci. Mansoura Univ., 8(4): 969-976.

Ghanim, A.A. and M.A. El-Adl (1991). The role of *Coccinella undecimpunctata* L. in suppressing the population level of *Schizaphis graminum* (Rond.) and increasing the yield of wheat plantation at Dakahlia Governorate, Egypt. *Beitrag Zur Entomologie*, 41(1): 277-286.

Iqbal, J., Ashfaq, M., and Ali, A. (2008). Screening of wheat varieties/advanced lines against aphids. Pak. Entomol, 30(1): 77-81.

Khan AM, Khan AA, Afzal M, and Iqbal MS (2012). Wheat Crop Yield Losses Caused by the Aphids Infestation. J Biofertil Biopestici 3:122.

Kostyukovskiĭ, M. G., and Kushnerik, V. M. (1990). Population dynamics of cereal leaf aphids on winter wheat. Zashchnita Rastenii (Kiev) 37: 10-13.

Kumar, B. and Omkar, (2023). Ladybird beetles. In. Insect Predators in Pest Management (ed. Omkar), CRC Press, Taylor & Francis Group, LLC, pp. 187–228.

Nadeem, M.; M.A. Shahzad; M. Nasir; A. Basit; M.S. Anwar and J. Iqbal (2014). Population dynamics of wheat aphids and beneficial insects in Bhakar,Pakistan. Sci. 2(1*): 238-5061.*

Omkar and Pervez, A. (2004). Predaceous coccinellids in India: predator–prey catalogue. Oriental Insects, 38: 27–61.

Pervez, A., Yadav, M. and Khan, M. (2020). Diversity of predaceous coccinellid beetles (Coleoptera: Coccinellidae) in Uttarakhand, North India. Journal of Mountain Research, 1, 7–20.

Riedell, W. E. (1990). Tolerance of wheat to Russian wheat aphids: nitrogen fertilization reduces yield loss. Journal of plant nutrition, 13(5): 579-584.

Shahzad, M. W., Razaq, M., Hussain, A. R. J. A. D., Yaseen, M., Afzal, M., and Mehmood, M. K. (2013). Yield and yield components of wheat (Triticum aestivum L.) affected by aphid feeding and sowing time at Multan, Pakistan. *Pak. J. Bot*, *45*(6): 2005-2011.

Simon, A. L., Caulfield, J. C., Hammond-Kosack, K. E., Field, L. M., and Aradottir, G. I. (2021). Identifying aphid resistance in the ancestral wheat Triticum monococcum under field conditions. Scientific reports, 11(1): 13495.

Slman, F.A.A and M.A. Ahmed (2005). Seasonal abundance of cereal aphids and ladybird beetle *Coccinella undecimpunctata L.* on four cereal crops in south Egypt. *Assiut Jour. of Agric. Sci.*, 36(4): 205-215.

Sreedevi, K., Mahendiran, G., and Chandana, P. S. (2023). Ground Beetles (Coleoptera: Carabidae). In Insect Predators in Pest Management (pp. 175-186). CRC Press.

Yang, X. W. (1990). Effects of temperature and light on the population growth of *Schizaphis graminum* (Rondani). Insect knowledge 27:263-266.

Yiğit, A., Sertkaya, E., and Tiryakioğlu, M. (2007). Population fluctuations of cereal aphids, *Rhopalosiphum padi* (L.) and *Sitobion avenae* (F.) (Homoptera: Aphididae) and their impact on crop loss parameters of wheat. Turkish Journal of Entomology, 31(1): 21-34.

Zadoks JC, Schein RD (1979) Epidemiology and plant disease management. Oxford University Press, New York.

Zeb, Q., Badshah, H., Ali, H., Shah, R. A., and Rehman, M. (2011). Population of aphids on different varieties/lines of wheat and their effect on yield and thousands of grain weight. *Sarhad J. Agric*, *27*(3), 443-450.

Ziska, L. H., Blumenthal, D. M., Runion, G. B., Hunt Jr, E. R., and Diaz-Soltero, H. (2011). Invasive species and climate change: an agronomic perspective. Climatic change, *105*(1): 13-42.

الأنواع الرئيسية لحشرات المن المهاجمة لحقول القمح وتقييم دور المفترسات المرتبطة بها في تقليل تعدادها وتأثير بعض العوامل الجوية عليها في منطقة قطور محافظة الغربية، مصر

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الملخص

تمت دراسة التغيرات في تعداد حشرات المن والمفترسات المرتبطة بها، بالإضافة إلى تأثير درجة الحرارة والرطوبة في منطقة قطور، محافظة الغربية، مصر. تم استخدام طريقتين للفحص: الفحص البصري وشبكة الجمع. أظهرت النتائج أن كثافة أعداد حشرات المن كانت متقاربة خلال الموسمين. كانت *Rhopalosiphum padi* أولى الأنواع التي ظهرت، وبدأت في الزيادة التدريجية في منتصف يناير، وبلغت ذروتها (38 فردًا لكل ورقة) في الثلث الأخير من فبراير، ثم بدأت في الانخفاض. لم يكن هناك فرق معنوي بين نوعي المن *Rh. padi* و *R. maidis*، في حين لوحظت علاقة ارتباط إيجابية معنوية بين *Sitobion avenae* و *Diuraphis noxia* والمفترسات المرتبطة بهما. في موسم 2022، وُجدت علاقة ارتباط سلبية معنوية بين درجة الحرارة وكل من *R. maidis* و *R. padi* و *D. noxia*، بينما كانت العلاقة بين *S. avenae* ودرجة الحرارة معنوية. لم تكن هناك علاقة ارتباط معنوية بين *Schizaphis graminum* وجميع المفترسات المدروسة. أما بالنسبة للرطوبة النسبية، فقد كانت العلاقة إيجابية معنوية مع جميع أنواع المن باستثناء *S. avenae*. كما لم تكن هناك علاقة ارتباط معنوية بين المفترسات ودرجة الحرارة. في موسم 2023، لوحظت علاقة ارتباط سلبية معنوية بين درجة الحرارة وكل من *R. maidis* و *R. padi*، بينما لم تكن هناك علاقة ارتباط معنوية للأنواع الأخرى أو مفترساتها. تسلط هذه النتائج الضوء على تأثير العوامل البيئية على ديناميكيات أعداد حشرات المن وتفاعلاتها مع المفترسات، مما يوفر رؤى مهمة لاستراتيجيات مكافحة الآفات في محاصيل القمح.