



Research Article



## Estimation of the numerical number of insect predators on ornamental plants

Taghreed Anad Mahmood Al-Khazraji and Husham Naji Hameed 

Department of Life Sciences, College of Education, Samarra University Department of Life Sciences, College of Education, Samarra University, Iraq

Received: Mar 2, 2023/ Revised: Mar 28, 2023/ Accepted: Mar 30, 2023

(✉) Corresponding Author: [tghrydnad65@gmail.com](mailto:tghrydnad65@gmail.com)

### Abstract

The study was conducted on ornamental plants located in the Dujail district of Salah al-Din Governorate for the year 2021-2022 in the winter and summer season of insect predators, as the larvae of the predator *Coccinella septempunctata* were more abundant on the succulent plant, so the average number of larvae in the winter season was 12.3. As for the adults, the parasite *Aphidius ervi* Haliday on the aster plant was 16.7, while the summer season the density of larvae and adults of the predator *Coccinella septempunctata* on the zinnia plant was 8.3 and 5.7, respectively.

**Keywords:** Insect Pests, Ornamental Plants, Predators.

### Introduction

Mankind has known ornamental plants 5,000 years ago from the beginning of human civilizations, and the paintings that the Egyptian civilization left behind before 1400 BC is considered one of the most important tangible evidence indicating human interest in ornamental plants and landscape design. These paintings depicted basins of lotus flowers surrounded by symmetrical rows. From acacias and palms (Abu Zahra, 2015) ornamental plants constitute one of the most important branches of plant production in many countries, especially those that are famous for the cultivation of cut flowers, such as the Netherlands, France, Belgium, Greece, and others (Kattar and Faisal, 2001). After the increasing pressures on natural habitats and forest plants, ornamental plants constituted one of the important elements that partially compensate man for nature. Because of its aesthetic appearance and air purification, some types of these plants could be used as windbreaks and to provide shade in some sunny areas (Davidson and Miller, 1990).

Less than 0.5% of known insect species are considered pests because they cause injury to plants either directly or indirectly in their attempts to secure food. And that all parts of plants are

attacked and damaged by a different group of insects, each of which follows a different pattern of infection (Sampa and Sathi, 2020). The term biological control was used by Smith in 1919 when controlling pests with parasites, predators, and pathogens. This method means taking advantage of the vital enemies of pests to regulate the population of their hosts. It can be defined as a method that aims to recruit or encourage beneficial organisms to reduce the number of harmful organisms.

### Materials and Methods

#### Field study

#### Preparing the plastic plant house for ornamental plants in the winter season

The plastic house was prepared in the Al-Sajla area of the Dujail district on 11/15 for the winter and summer seasons of the year 2021-2022, as the length of the plastic house was 12 meters, the width was 5 meters, and the height was 3 meters. Lines containing three replicates for each type, where the number of plant species was 11 types for the winter season and 7 types for the summer season.



**Fig. 1 Prepare and place samples inside the plastic house**

## Statistics of the population density of predators

### Check and manual collection

The samples were collected after observing the infected plants by grasping them after knowing the extent of the effect of these pests on the plants, and among these samples was the ladybug, as these samples were collected from the infected plants and transferred to the laboratory to know the numbers of these pests.

### Air nets

Insects were collected through nets from infected plants after monitoring them, as a part of the infected plant containing pests was collected, and work was done to count these pests and indicate the extent of their effect on the plant, as in chrysanthemums (lace) and their accompanying predators.

### Combine with a soft brush

Small insects such as aphids and larvae of predators were collected using a soft brush to coat the specimens (Meadow et al., 1985).

### Effect of average temperature and relative humidity on the population density of predators

Average temperatures and relative humidity were estimated on the population density of insect pests through daily records, which were obtained from (Ministry of Transport and Communications / Iraqi General Authority for Meteorology - Climate Department) in Baghdad during the year 2021-2022. On a weekly basis, average temperatures and relative humidity were calculated.

### statistical analysis

The data were analyzed according to the R.C.B.D randomized complete block design of the protected and uncovered field experiment using an ANOVA table. These data were tested by Duncan's Multiple Range Test at a probability level of 0.05 (Al-Rawi and Khalafallah, 1980).

## Results and Discussion

### Numerical density of predators and parasites on pests of winter ornamental plants

#### Number density of larvae of predators and parasites on winter ornamental plants

The results of Table 1. showed, through the average numbers of predator larvae, that there were significant differences between the treatments, as the density of predator larvae, *Coccinella septempunctata*, was on the Shabwe flower plant infected with the insect pest type *Macrosiphum* sp. euphorbiae and the seven palate plant infected with *A. gossypii* and the *Macrosiphum* sp.2 plant, as the average numbers were 12.3, 9, 8, 7.3, and 6.3 pests, respectively, while the larvae of the predator *Coccinella undecimpunctata* on the chrysanthemum plant infected with *A. gossypii* and rose plant The image infected with *Aphis gossypii* and Dakma flower plant infected with *B. helichrysi* had a density of 5.3, 3.7, 3, respectively. As for the parasite *Aphidius ervi* Haliday on the aster plant infected with *A. gossypii* and the parasite *Aphidius colemani* Viereck on the Petunia plant, the presence of its larvae was not recorded, while Abu Khanjar Chinese carnation, ornamental, with no recorded predator.

#### Number density of complete predators and parasites on winter ornamental plants

Through the average numbers of complete predators, the results of Table 2. showed that there were significant differences between the treatments, as the density of the parasite *Aphidius ervi* Haliday on the aster plant was 16.7, and the parasite *Aphidius colemani* Viereck on the petunia plant reached 15.3 parasites, while the predator *Coccinella septempunctata* on the plant of the Shabwe flower and the one infected with the insect pest *Macrosiphum* sp.1, the enamel plant infected with *A. orientalis*, the aster plant infected with *M. euphorbiae*, the seven palate plant infected with *A. gossypii*, and the shaboy plant infected with *Macrosiphum* sp.2, as the average numbers were 9.7, 6.7, 5.3, 4.7, 4.3 Whole, respectively, while the average numbers of adults of the predator *Coccinella undecimpunctata* on the

chrysanthemum plant infected with *A. gossypii*, the picture rose plant infected with *A. gossypii*, and the Dakma rose plant infected with *B. helichrysi* were 3.7, 2.7, and 2.3 complete,

respectively, while Abu Khanjar plants, Chinese carnation, for ornamental hummus, no predators or parasites recorded on it.

**Table 1: Number density of larvae of predators and parasites on winter ornamental plants**

Average number of larvae	Predator and parasite	Plant type
0.0 G	<i>Aphiduserri auliday</i>	Ester
8.0 BC	<i>Coccinella septempunctata</i>	Ester
12.3 A	<i>Coccinella septempunctata</i>	Ward Al-Shabawi
6.3 DE	<i>Coccinella septempunctata</i>	Ward Al-Shabawi
3.0 F	<i>Coccinella undecimpunctata</i>	The bruise rose
7.3 CD	<i>Coccinella septempunctata</i>	Seven palate
3.7 F	<i>Coccinella undecimpunctata</i>	Photo rose
9.0 B	<i>Coccinella septempunctata</i>	Enamel
5.3 E	<i>Coccinella undecimpunctata</i>	chrysanthemum
0.0 G	<i>Aphidus colemani viereck</i>	Petunia
0.0 G	Nothing	Abu dagger
0.0 G	Nothing	Chinese carnation
0.0 G	Nothing	To insult the decorations

Similar letters mean that there are no differences between them at a probability level of 0.05

**Table 2. Number density of complete predators and parasites on winter ornamental plants**

The average number of females	Predator and parasite	Plant type
16.7 A	<i>Aphiduserri auliday</i>	Ester
5.3 D	<i>Coccinella septempunctata</i>	Ester
9.7 B	<i>Coccinella septempunctata</i>	Ward Al-Shabawi
4.3 DE	<i>Coccinella septempunctata</i>	Ward Al-Shabawi
2.3 F	<i>Coccinella undecimpunctata</i>	The bruise rose
4.7 DE	<i>Coccinella septempunctata</i>	Seven palate
2.7 F	<i>Coccinella undecimpunctata</i>	Photo rose
6.7 C	<i>Coccinella septempunctata</i>	Enamel
3.7 E	<i>Coccinella undecimpunctata</i>	chrysanthemum
15.3 A	<i>Aphidus colemani viereck</i>	Petunia
0.0 G	Nothing	Abu dagger
0.0 G	Nothing	Chinese carnation
0.0 G	Nothing	To insult the decorations

Similar letters mean that there are no differences between them at a probability level of 0.05

**Numerical density of predators on summer ornamental plant pests**

**Density of predatory larvae on summer ornamental plants**

Through the average numbers of predator larvae, the results of Table 3. showed that there were significant differences between the treatments, as the predator density reached

*Coccinella septempunctata* on the Zinnia plant infected with the insect pest *A. fabae*, on the Jaafari plant infected with the pests *C. marmorata*, *P. marginatus*, and on the mane plant infected with *A. fabae* and sunflower plant infected with *O. funesta* voucher were 8.3, 7.7, 5, 3, and 2.7, respectively, while the average number of larvae of the predator *Adalia bipunctata* on Zinnia plant infected with *C. marmorata* was 2.3 larvae.

**Table 3. Number density of predator larvae on summer ornamental plants**

Average number of larvae	Predator	Plant Type
8.3 A	<i>Coccinella septempunctata</i>	Zinnia
2.3 D	<i>Adalia bipunctata</i>	Zinnia
5.0 B	<i>Coccinella septempunctata</i>	Jaafari
7.7 A	<i>Coccinella septempunctata</i>	Jaafari
3.0 C	<i>Coccinella undecimpunctata</i>	Cockscomb
2.7 CD	<i>Coccinella septempunctata</i>	Sunflower

Similar letters mean that there are no differences between them at a probability level of 0.05

**Population density of predators on summer ornamental plants**

The results of Table 4 showed, through the average number of predator larvae, that there were significant differences between the treatments, as the density of the predator was *Coccinella septempunctata* on the Zinnia plant infected with

*Aphis fabae*, on the Jaafari plant infected with *C. marmorata*, *P. marginatus*, and on the mane plant infected with the pest *A. fabae* and sunflower plants infected with *O. funesta* voucher, the average numbers were 5.7, 4.3, 3, 2.3, and 1.7 whole, respectively, while the larvae of the predator *Adalia bipunctata* on zinnia plants infected with *C. marmorata* were 1.3 whole.

**Table 4. Number of predators on summer ornamental plants**

The average number of females	Predator	Plant Type
5.7 A	<i>Coccinella septempunctata</i>	Zinnia
1.3 E	<i>Adalia bipunctata</i>	Zinnia
3.0 C	<i>Coccinella septempunctata</i>	Jaafari
4.3 B	<i>Coccinella septempunctata</i>	Jaafari
2.3 D	<i>Coccinella undecimpunctata</i>	Cockscomb
1.7 E	<i>Coccinella septempunctata</i>	Sunflower

Similar letters mean that there are no differences between them at a probability level of 0.05

Through the results of the Table 1, 2, 3, 4 and with regard to natural enemies, we notice a sharp decrease in their population density rates in the first three months (January, February, March) of plant growth, especially ladybirds, and perhaps the reason is due to the influence of environmental conditions and Especially the low temperatures during these months, in addition to that it may be affected by the control operations and the increasing use of chemical pesticides in the control of aphids in the study areas, which are repeated annually. The current study agreed with the study of Khan (2005) regarding the types of aphid parasitoids spread in the wheat crop and

their population density in the seasons 2001-2004. Of the parasitoids *Aphidius colemani* and *Aphidius ervi* the parasitism rates were 78, 93, 95 and 100%, respectively, for the four seasons in the studied wheat fields in Pakistan. The activity of *A. ervi* and *A. colemani* parasitoids started from mid-February to the end of April in the wheat fields of Pakistan (Khan et al., 2007).

## Conclusion

Hence, we conclude that feeding the larvae on different densities of aphid nymphs affects the period of pupal growth and is inversely proportional, that the increase in the number of prey has a clear effect on increasing the predatory efficiency of the predator, which in turn affects the duration of growth and speed of development, and this is similar to Holling (1965), Murdoch and Oaten (1975) who reported that predators eat more prey in high prey population densities compared to low prey population densities and then they grow faster and kill more prey because of their larger size.

The results were similar to what was indicated by Al-Jassani (1980) that the 7-pointed predatory ladybug, *C. septempunctata*, begins to appear in the second half of February until it reaches its peak at the end of March and the beginning of April, with an average of 14 infected insects / plants. Similar to what El-Gamil (2005) concluded. The larvae in the third age of the 11-point ladybird predator consumed 649 nymphs of the green peach *Myzus persica*. Likewise, with what Muhammad (1996) found, that the larva of the 7-pointed predator, Abu al-Eid, consumed during its larval stage 343 nymphs of black beavers, and with what Al-Zubaidi et al. (1991), that the larval stage of the 7-pointed predator, Abu al-Eid in Iraq consumed During the four larval instars about 373.3 + 23 nymphs are left for the black beak. Muhammad et al. (1988) also found. That the larval age of the predator *C. septempunctata* daily consumed 10 individuals of cottonseed *A. gossypia*, and that the larval age 2 and 3 consumed (30 and 40) individuals, respectively, while the larval age 4 consumed 70 individuals. Sakr (2015) noted that the population density of the larvae and adults of the predator *C. septempunctata* is highly efficient in reducing the population density of the insect's different roles.

## Conflict of Interest

The author hereby declares no conflict of interest.

## Consent for publication

The author declares that the work has consent for publication.

## References

- Davidson, A. John and Miller, R. Douglas. (1990). Ornamental Plants, p.627.
- Paul, S., & Das, S. (2021). Natural insecticidal proteins, the promising bio-control compounds for future crop protection. *The Nucleus*, 64, 7-20.
- Meadow, R. H., Kelly, W. C., & Shelton, A. M. (1985). Evaluation of *Aphidoletes aphidimyza* [Dip.: Cecidomyiidae] for control of *Myzus persicae* [Hom.: Aphididae] in greenhouse and field experiments in the United States. *Entomophaga*, 30, 385-392.
- Khan, S. A., Ullah, F., Hussain, N., Hayat, Y., & Sattar, S. (2007). Natural enemies of cereal aphids in North West Frontier Province (NWFP) of Pakistan. *Sarhad Journal of Agriculture*, 23(2), 435.
- Khan, R. J., Fick, D., Keogh, A., Crawford, J., Brammar, T., & Parker, M. (2005). Treatment of acute Achilles tendon ruptures: a meta-analysis of randomized, controlled trials. *JBJS*, 87(10), 2202-2210.
- Al-Jassani, R. F. (1980). Biological studies of *Aphis fabae* (Homoptera: Aphididae) in Iraq, master's thesis, College of Agriculture, University of Baghdad.
- Al-Jameel, S. K. (2005). Predational Efficiency of Two Species of Coccinellidae for *Myzus persicae* (suiz) and the White Fly *Bemisia tabaci* in Potato Crop, Ph.D thesis submitted to Plant Protection Department, College of Agriculture and Forestry - University of Mosul, 173 pages.
- Sakr, C. H. (2015). Predational efficiency of *Coccinella septempunctata* (L.) in control of *Aphis fabae* (Scop) black bean (Homoptera: Aphididae). *Babylon University Journal. Pure and Applied Sciences*, 23(1).
- Muhammad, A., Jina, I. (1996). Predational efficacy of three types of ladybirds against aphids with Referring to artificial feeding, master's thesis - College of Agriculture and Forestry / University of Mosul.
- Al-Zubaidi, H. Kazem., Awwad, S. D. and Muhammed, F. I. (1991), Predational Efficiency of the Seven-Pointed Ladybug on Apricot Leaves with a Study of Its Sensitivity to Chemical Pesticides, *Al-Rafidain Agriculture Journal*. 23(1):149-157.
- Muhammad, M. A., Al-Karim, and Suad, A. A. (1988). Study of the effect of an insect of black bean on the green and dry yield of the bean crop in the Mosul region. *Al-Rafidain Agriculture Journal*, (2): 293-300.
- May, R. M. (1978). Host-parasitoid systems in patchy environments: a phenomenological model. *The Journal of Animal Ecology*, 833-844.
- Holling, C. S. (1965). The functional response of predators to prey density and its role in mimicry and population regulation. *The Memoirs of the Entomological Society of Canada*, 97(S45), 5-60.

## How to cite this article

Al-Khazraji, T. A. M. and Hameed, H. N. (2023). Estimation of the numerical number of insect predators on ornamental plants. *Science Archives*, Vol. 4(1),67-72. <https://doi.org/10.47587/SA.2023.4111>

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)



**Publisher's Note:** MD International Publishing stays neutral about jurisdictional claims in published maps and institutional affiliations.