Survey of Aphid Species Affecting Some Ornamental Nurseries in Karbala Governorate, Iraq

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Abstract

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A survey was conducted during the period 2023-2024 to identify some of the most common aphid species belonging to the family Aphididae on ornamental plants in Karbala Governorate. Few nurseries distributed in over six districts were selected. Collected aphid species were identified using a previously described taxonomic key. The results obtained revealed the presence of Dandelion aphid, *Aphis taraxacicola* infesting gazania, zinnia, and tecoma plants, green citrus aphid, *Aphis spiraecola* infesting *Spiraea canescens* (Bursera), chrysanthemum aphid, *Macrosiphoniella sanborni* infesting Datura and Jasminum sambac plants, and cabbage aphid, *Brevicoryne brassicae* infesting ornamental cabbage.

Keywords: Aphididae, nurseries, ornamental plants, Karbala.

Introduction

A wide range of plant types and forms stocked in nurseries usually attract different insect species. However, similar to other plants, ornamental plants cultivated in a nursery, garden, or park are likely to be attacked by varied numbers of insect pests. Usually, these pests can contribute to a large amount of damage, stress which can lead to numerous plant diseases (Feldmann & Vogler, 2021). Major existing pests include worms, leaf miners, mealybugs, scale insects, whiteflies, cicadas, thrips and aphids (Gahukar, 2018).

Aphids beside sucking plant sap, they secrete honeydew, which increases dust deposition and development of fungi on the plant, thus turning the plant parts into yellow colour, in addition to withering and curling of leaves, which leads to reduced productivity (Blackman & Eastop, 2000; Brumley, 2020). The factors that impact the increase of aphid colonies on plants cultivated in greenhouses are the quality of their food, plant environment, aphids' density, and presence of natural enemies. Aphids life cycle is quite complex: during summer, females reproduce parthenogenetically under greenhouse conditions, and no development of males has been recorded. Females can change from sexual to asexual and vice versa (Nordey *et al.,* 2021). When the number of aphids on one plant becomes too large, females with wings are produced and then move to other healthy plants. In nature, during winter, specifically in fruit trees, the life cycle becomes more complex. The females lay eggs fertilized from sexual reproduction (Simon *et al.,* 2008).

Given the growing interest in ornamental plants, along with the large number of aphid species and the limited research available on them, this study was conducted to identify the most important aphid species from the family Aphididae found in some ornamental plant nurseries in the holy city of Karbala.

Materials and Methods

The research was conducted on some ornamental plants distributed in Karbala Governorate (Table 1). Six areas within the governorate were selected: Imam Aun, City Center, Al-Husseinia, Al-Bubiyat, Al-Hur, and Al-Hindiya. Two nurseries from each area were selected, and the ornamental plants therein were surveyed every week to monitor aphids' infestation. In each nursery, sticky traps were fixed over the identified areas to check the emergence of winged insects. The targeted insects were observed thoroughly with the help of a magnifying hand lens. During the visits, the ornamental plants infested with aphids were sampled. Infested plant parts were collected and placed in plastic containers for transportation, with ice-filled bags put inside to help keep the material fresh until further examination at the Mite Laboratory, Plant Protection Department, College of Agriculture, University of Karbala. The aphids were isolated and preserved by freezing to maintain their structure and color. Some specimens were stored in small plastic containers filled with 70% alcohol, with labels indicating the collection date, the area collected from, and the name of the infested plant. Other samples were pinned onto small cardboard pieces using glue, with the collection information recorded beneath the samples. These were then stored in a special box. Additionally, some samples were mounted on concave glass slides with Canada balsam to avoid damage and deformation when the slide covers were applied, preventing air from entering to better preserve the specimens. The taxonomic description of each aphid species as observed under the binocular dissecting microscope and the compound microscope at magnifications of 40-80X was carried out. These characteristics included body color, length and shape of antennae, spinal setae, siphunculi, tail shape, and the number of hairs in the tail. Specimens' photographs were taken at 40X magnification.

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Table 1. Coordinates of the six areas in Karbala Governorate where aphid samples were collected from for identification.

Area name	East	South
Imam Aun	938 170 44°	758 376 32°
City Center	002 037 44°	333 604 32°
Al-Husseinia	830 075 44°	270 637 32°
Al-Bubiyat	966 012 44°	190 635 32°
Al-Hur	820 005 44°	826 617 32°
Al-Hindiya	619 214 44°	670 532 32°

Results and Discussion

Aphid species were identified using the taxonomic key provided in "Aphids Book of Herbaceous Plants and Shrubs of the World" (Blackman & Eastop, 2006). The identified species are as follows:

I. *Aphis spiraecola* (Patch, 1914)

Common names: Spirea aphid, green citrus aphid.
Main host scientific name: *Catharanthus roseus* (Apocynaceae)
Common names of infested plants: Madagascar periwinkle, periwinkle, cape periwinkle, Vinca rosea, myrtle periwinkle

Taxonomic characteristics of *Aphis spiraecola*:

The body is greenish-yellow to shining apple green (Figure 1-A).
Body length (BL) ranges from 1.2 to 2.2 mm. The dorsal abdomen is free of dark markings (Figure 1-B).
Both the siphunculi (SIPH) and cauda are dark. The cauda typically has a noticeable constriction between the basal and distal parts and contains 7-15 hairs. The siphunculi are 0.9-1.7 times the length of the cauda (Figure 1-C).
The antennal processes terminal/base (ANT PT/BASE) ratio is less than 3.0 (Figure 1-D).
Antenna segment III is 0.9 to 1.2 times the length of the cauda and may have a distinct constriction at its midpoint with 6-15 (usually 9-11) hairs (Figure 1-E).
The last two segments of the rostrum may form a compact structure (R IV+V) that is 1.0–1.25 times the length of the two segments of the hind tarsus (HT II). Marginal tubercles (MTu) are rare on abdominal tergites 2–4 (Figure 1-B).
Groin hairs may be long, thin, and fine, with the longest extending beyond the trochantrofemoral suture (Figure 1-F).
Aerial tubercles are undeveloped. The head is free of setae, while the siphunculi and cauda are dark black (Figures 1-C, 1-D).

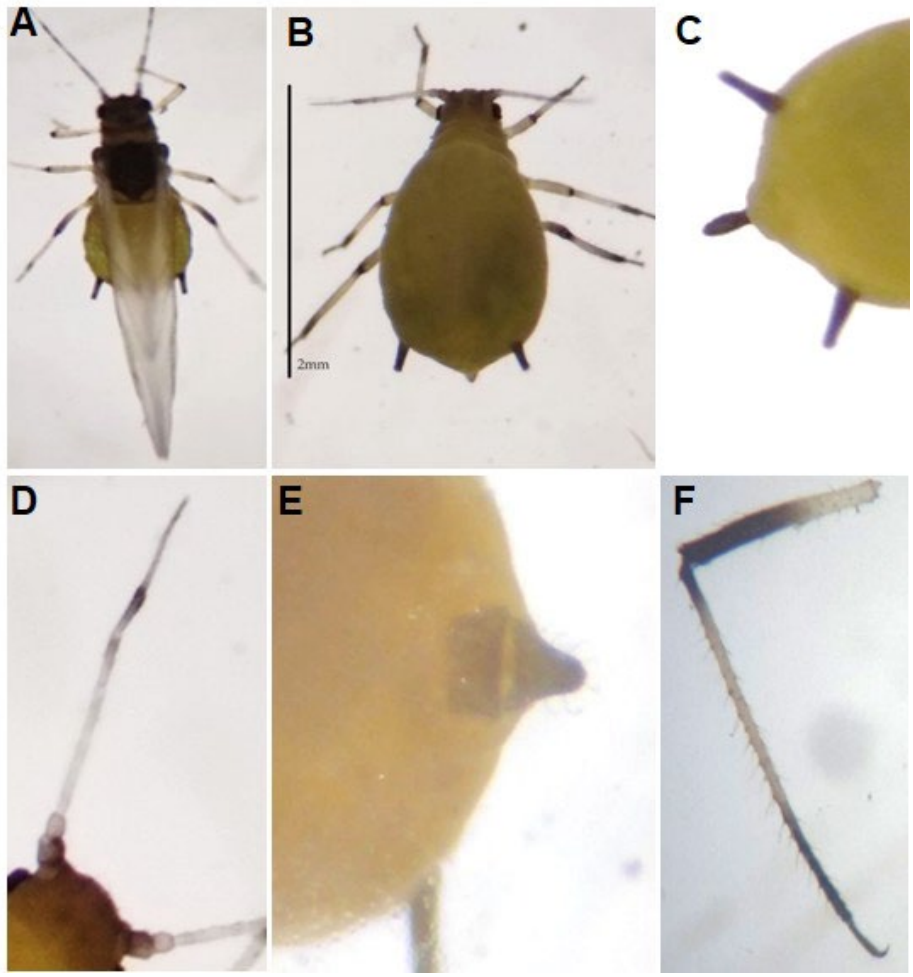

Figure 1. Taxonomic characteristics of the spirea aphid *Aphis spiraecola* Patch, 1914, which included the following: A= body color, B= body length, C= the siphunculi and cauda, D= antennae. E= the cauda hairs and so on until, F= groin hairs.

Aphis spiraecola is an aphid species that has been well-documented (Patch, 1914). It is commonly known as green citrus, spirea, or apple aphid. This species is widespread across the globe, with its likely origin in the Far East (Harmon *et al.,* 2000). It is believed to be native to the Far East and has been reported in North America since at least 1907. The aphid was introduced to the Mediterranean region in 1939, Africa in 1961, Australia in 1926, and New Zealand in 1931. Today, *A. spiraecola* is found in both temperate and tropical regions worldwide (Blackman & Eastop, 2000). These aphids are often found near flowers. Females can give birth to 40-80 nymphs each. As the colony expands, about three-quarters of these nymphs develop into winged females, while the rest remain wingless. The winged aphids then disperse to other parts of the tree or to other trees and orchards, where they establish new colonies (Loxdale *et al.,* 2020).

II. Dandelion aphid *Aphis taraxacicola* (Börner, 1940)

Host scientific and common names and botanical families:

A. *Tecomaria capensis* (Bignoniaceae) (Cape honeysuckle, trumpet vine, African trumpet vine, yellow trumpet vine, tecoma, campsis)
B. *Gazania splendens* (Asteraceae) (African daisy, treasure flower, gazania, starflower, tricolor daisy, coastal daisy, nogoza, burweed daisy)
C. *Hibiscus rosa-sinensis* (Malvaceae) (Chinese hibiscus, Chinese rose, black shoe plant, Hawaiian hibiscus, rose mallow).

Taxonomic characteristics of *Aphis taraxacicola*:

Body mottled dark green, with a size of 1.3-2.3 mm (Figure 2-A).
Abdominal view of the aphid (Figure 2-B).
Antennal segment III typically has 5-13 secondary rhinaria, segment IV has 0-4, and segment V has 0-1 (Figure 2-C).
The head lacks a spinal tubercle (Stu) (Figure. 2-D).
The cauda, which may resemble an elongated triangle, has 5-14 hairs (Figure 2-E).

Aphis taraxaci Börner, synonymous with *Aphis taraxacicola* (Börner, 1940), commonly known as the dandelion aphid, is a small insect. This aphid species is widespread across most parts of the world and feeds on a variety of plants, including dandelions, cabbage, lettuce, tomatoes, and peppers (Singh & Singh, 2021). The dandelion aphid forms colonies on the leaves of its host plants and feeds on the plant sap using its long proboscis. It can reproduce rapidly, with a single female capable of producing hundreds of offspring within a few weeks (Sahayaraj & Hassan, 2023). This aphid is often found on lower leaves, new buds, and the root collar, particularly in dry, sunny areas with sparse vegetation. It has been recorded across Britain, Europe, Siberia, Canada, and Japan (Rivers, 2017).

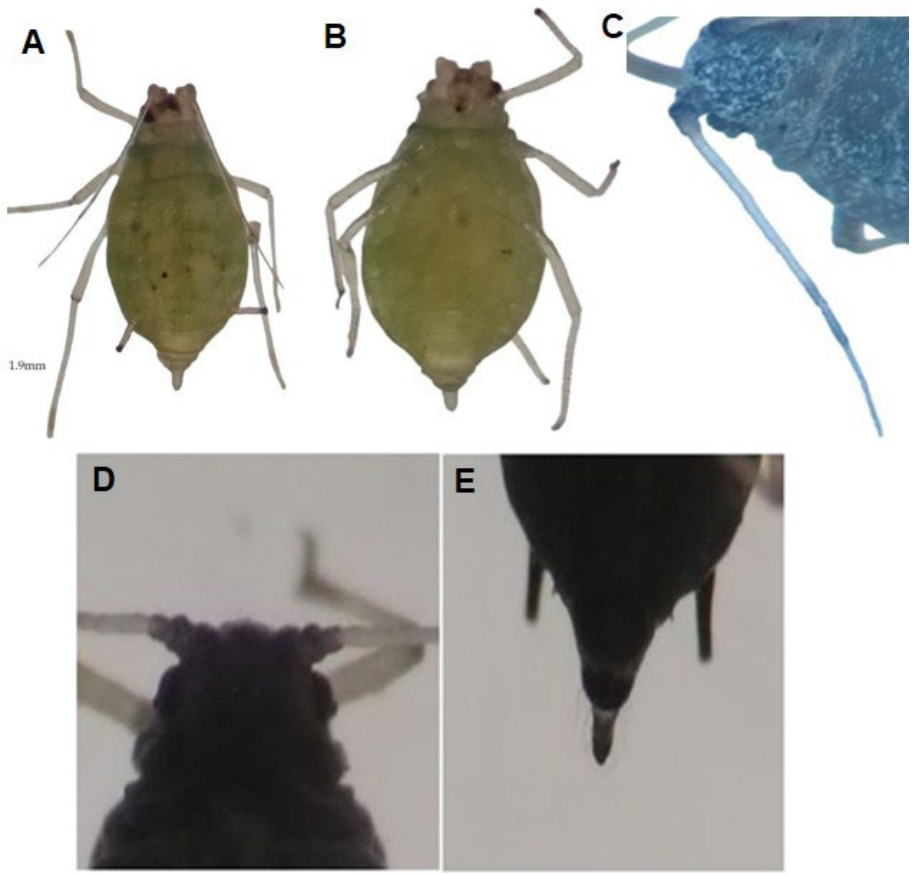

Figure 2. Taxonomic characteristics of Dandelion aphid *Aphis taraxacicola* (Börner, 1940). A= Body color, B= abdominal view. C= antennal, D= spinal tubercle, E= the cauda.

III. *Brevicoryne brassicae* (L.)

It is commonly known as the mealy cabbage aphid.
Host Scientific Names and Botanical Families in Iraq:
Brassica oleracea (Brassicaceae)
Common Names of infested host plants: Kale, flowering kale, German kale, ornamental cabbage, ornamental kale, flowering cabbage, thousand-headed kale.

Taxonomic features of *Brevicoryne brassicae*:

The head and legs are dark, with some dark dorso-ventral markings, especially on the posterior segments. The siphunculi (SIPH) are dark, slightly swollen in the middle, and taper just before the tip (Figure 3-A).
The body is grayish-green or medium green with a pale appearance and a dark head. It is densely covered with fine white to gray wax, with a body length (BL) of 1.6-2.6 mm (Figure 3-B).
The flagellum of the antenna (ANT III) is 2.5–3.7 times the length of the siphunculi (SIPH). The siphunculi (SIPH) are 0.8–1.0 times the length of the cauda, It is triangular and contains 6–9 hairs (Figures 3-C, 3-D, 3-E).
Abdominal tergite (ABD TERG) 8 has 8-18 hairs. The dorsal abdomen displays paired dark markings (Figure 3F).
The cauda is triangular and broad, approximately equal to its basal width (Figure 3-E).
The ratio of Antennal VI Base to terminal processes (ANT PT/BASE) is 1.8–3.6 (Figure 3-C).
Abdominal tergites (ABD TERG) 1-5 possess double indurations, usually small in size, and are never cross-banded (Figure 3-F).
Siphunculi (SIPH) are tapered or barrel-shaped and longer than their primary width (Figure 3-D).

Brevicoryne brassicae, commonly referred to as the cabbage aphid or mustard aphid, originated in Europe but it is now distributed worldwide. This aphid is easily recognizable by the soft, grayish-waxy coating that hides its green body. It primarily feeds on a variety of plants within the Brassica genus, including cabbage, cauliflower, brussels sprouts, turnips, swede, and mustard (Sporer *et al.,* 2021). It does not feed on plants outside the Cruciferous family. This species prefers to feed on small buds, leaves, flower buds, and stems, particularly in the upper part of the infested plants. It also targets the buds at the growing tips (Hume *et al.,* 2016). Severe damage has been reported on various Brassicaceae plants in regions such as the Netherlands, Canada, South Africa, China, and India. Aphid feeding causes leaves to curl downward, become yellowish, with stunted plant growth. A significant problem is the contamination of plant parts with aphids in the nurseries intended for market (van Emden & Harrington, 2017).

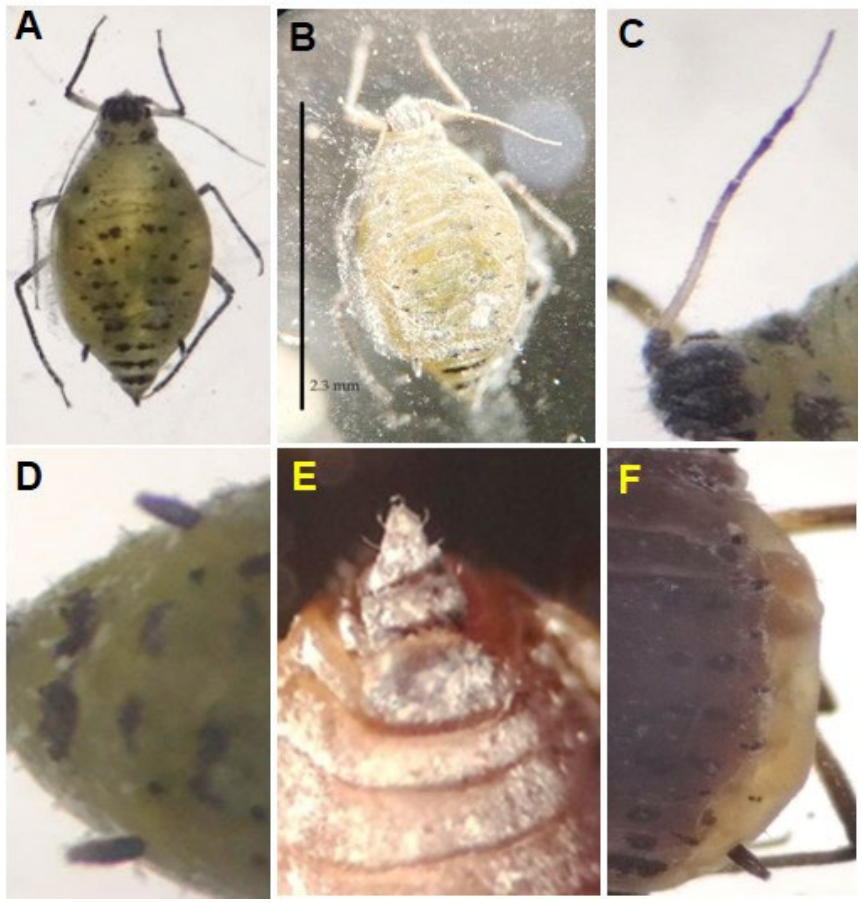

Figure 3. Taxonomic features of mealy cabbage aphid (*Brevicoryne brassicae* L.). A= body parts, B= body color and length, C= antennal, D= siphunculi, E=the cauda, F= abdominal tergites.

IV. *Macrosiphoniella sanborni* (Gillette, 1908)

Commonly known as the chrysanthemum aphid, is associated with various plants in Iraq. This aphid infests the following host plants:
Chrysanthemum (Asteraceae). Common names: Chrysanthemum, Chrysanthemum morifolium, hardy chrysanthemum, showy daisy, florist's daisy, and autumn flower.
Plumeria (Apocynaceae)
Common names: Graveyard flower, west Indian jasmine, frangipani, plumeria, and temple flower.

Taxonomic Features of *Macrosiphoniella sanborni*:

The body is shiny, with a dark red-brown to blackish-brown color, fusiform shape, and broad appearance. (Figure 4-A).
Dorsal abdominal hairs mainly emerge from small indurations, which are more prominent on the ventral tergites, particularly on segments 6-8 (Figure 4-B).
The siphunculus (SIPH) has a reticulated structure and is shorter than the black cauda, with a length ranging from 0.65 to 0.9 times the size of the cauda (Figure 4-D).
The body length (BL) varies from 1.0 to 2.3 mm. (Figure 4-E).
The antennae (ANT) are black, relatively short, and thick, the ratio of the antenna base (ANT VI) to terminal processes (PT) is 4.6 and 5.7 (Figure 4-C).
The Cauda is black and has 10-17 hairs (Figure 4-F).

The chrysanthemum aphid (*Macrosiphoniella sanborni*), previously known as the "black aphid" due to its dark color, is an important pest for chrysanthemums and various other crops (Puzanova *et al.,* 2023). Aphid infestations can drastically reduce flowering, leading to decreased market value, weakened and deformed plants, yellowing, premature leaf drop, and stunted growth, with losses in the range of 20-40%. Sooty mold can develop on the honeydew excreted by aphids, giving the plants a blackened appearance (Zaller, 2020). This aphid reproduce asexually, producing large number of females without the need for mating. They survive winter in greenhouses, feeding on plants, and as temperatures rise, some aphids migrate in search of new plants. They can also spread through the shipment of infested plants. Winged females, when they move to new plants, can produce four to eight nymphs daily (Kranti *et al.,* 2021). Within a week, these nymphs mature into wingless females that begin reproducing. Aphid populations can increase rapidly, and when overcrowded, more offspring develop into winged females that migrate to other plants, spreading infestations quickly (Loxdale *et al.,* 2020).

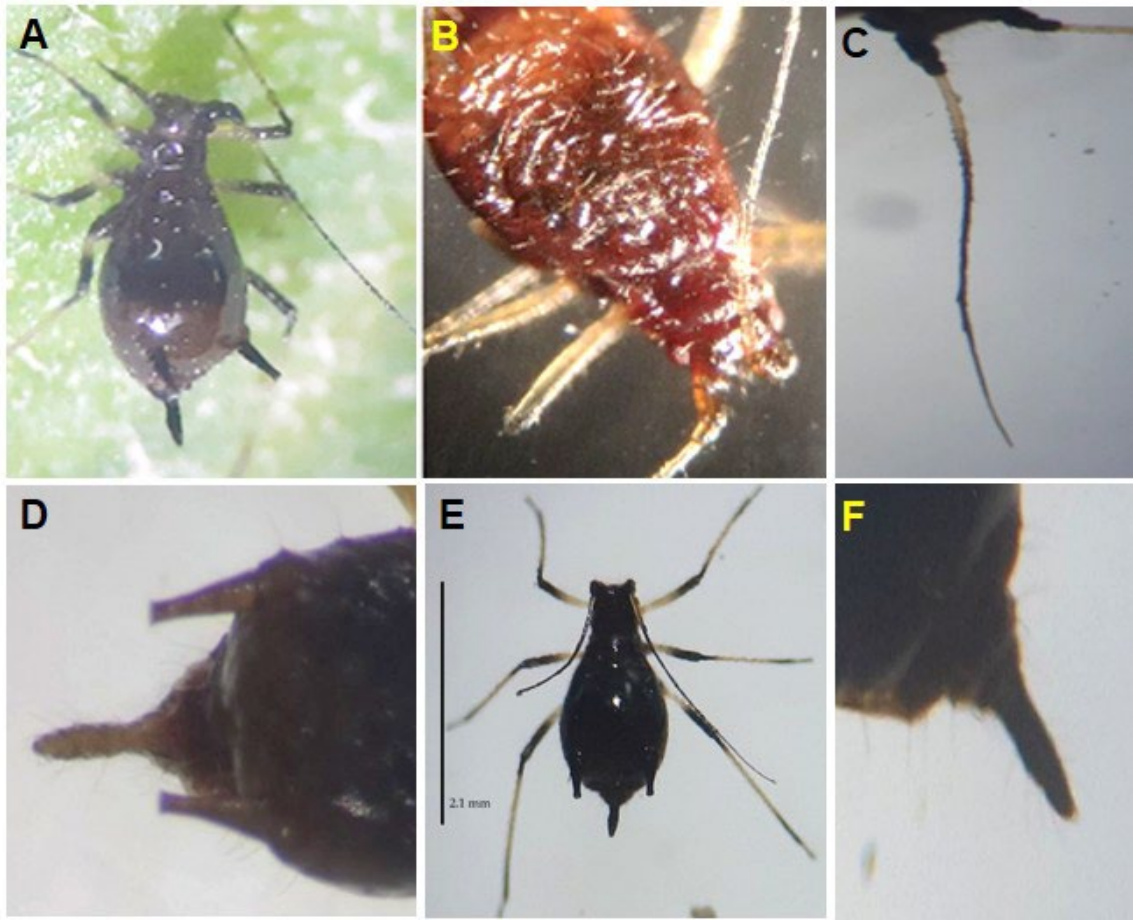

Figure 4. Morphological features of the chrysanthemum aphid, *Macrosiphoniella sanborni* (Gillette, 1908). A= body color. B= dorsal part, C= antennal, D= the siphunculi and cauda. E= The body length, F= the Cauda.

الملخص

الحسين، ضياء وطه السويدي. 2026. مسح لأنواع المنّ التي تصيب نباتات الزينة في محافظة كربلاء، العراق. مجلة وقاية النبات العربية، 44(2): 189-195. https://doi.org/10.22268/AJPP-001389

تمّ إجراء مسح خلال الفترة 2023–2024 للتعرف على بعض أنواع المنّ الأكثر شيوعاً والتي تنتمي لعائلة Aphididae على نباتات الزينة في محافظة كربلاء. تمّ اختيار مجموعة من المشاتل الموزعة على ستّ مناطق، وتمّ التعرف على أنواع المنّ التي جمعت باستخدام المفاتيح التصنيفية المعتمدة. كشفت النتائج المتحصّل عليها عن وجود منّ الهندباء (*Aphis taraxacicola*) الذي يصيب نباتات الكازانيا والزينيا والتيكوما، ومنّ الحمضيات الأخضر (*Aphis spiraecola*) الذي يصيب نبات عين البزون، ومنّ الأقحوان (*Macrosiphoniella sanborni*) الذي يصيب نباتات الداودي والياسمين، ومنّ الملفوف (*Brevicoryne Brassicae*) الذي يصيب نبات ملفوف الزينة.

كلمات مفتاحية: Aphididae، مشاتل، نباتات الزينة، كربلاء.

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References

Blackman, R.L. and V.F. Eastop. 2000. Aphids on the World's Crops: An Identification and Information Guide. 2nd edition. John Wiley and Sons, Chichester, UK. 476 pp.

Blackman, R.L. and V.F. Eastop. 2006. Aphids on the World's Herbaceous Plants and Shrubs. 2 vols. John Wiley & Sons,

Börner, C. 1940. Neue Blattläuse aus Mitteleuropa. Self-published. 4 pp.

Brumley, C. 2020. A checklist and host catalogue of the aphids (Hemiptera: Aphididae) held in the Australian National Insect Collection. Zootaxa, 4728(4):575-600. https://doi.org/10.11646/zootaxa.4728.4.12

Feldmann, F. and U. Vogler. 2021. Towards sustainable performance of urban horticulture: ten challenging fields of action for modern integrated pest management in cities. Journal of Plant Diseases and Protection, 128:55-66. https://doi.org/10.1007/s41348-020-00379-x

Gahukar, R.T. 2018. Management of pests and diseases of important tropical/subtropical medicinal and aromatic plants: a review. Journal of Applied Research on Medicinal and Aromatic Plants, 9:1-18. https://doi.org/10.1016/j.jarmap.2018.03.002

Gillette, C.P. 1908. New species of Colorado Aphididae, with notes upon their life habits. The Canadian Entomologist, 40(2):61-68.

Harmon, J.P., A.R. Ives, J.E. Losey, A.C. Olson and K.S. Rauwald. 2000. *Coleomegilla maculata* (Coleoptera: Coccinellidae) predation on pea aphids promoted by proximity to dandelions. Oecologia, 125:543-548. https://doi.org/10.1007/s004420000476

Hume, D.E., G.D. Ryan, A. Gibert, M. Helander, A. Mirlohi and M.R. Sabzalian. 2016. *Epichloë* fungal endophytes for grassland ecosystems. Pp. 233-305. *In*: Sustainable Agriculture Reviews. E. Lichtfouse (ed.). Springer International Publishing, Cham, Switzerland. https://doi.org/10.1007/978-3-319-26777-7_6

Kranti, W., G. Nivedita and M. Shindikar. 2021. Understanding the plant–aphid interaction: a review. European Journal of Biology and Biotechnology, 2(6):1-6. https://doi.org/10.24018/ejbio.2021.2.6.294

Loxdale, H.D., A. Balog and D.G. Biron. 2020. Aphids in focus: unravelling their complex ecology and evolution using genetic and molecular approaches. Biological Journal of the Linnean Society, 129(3):507-531. https://doi.org/10.1093/biolinnean/blz194

Singh, R. and G. Singh. 2021. Aphids. Pp. 105-182. *In*: Polyphagous Pests of Crops. Omkar (ed.). Springer Singapore, Singapore. https://doi.org/10.1007/978-981-15-8075-8_3

Nordey, T., S.B. Boni, M.K. Agbodzavu, R. Mwashimaha, N. Mlowe, S. Ramasamy and E. Delétré. 2021. Comparison of biological methods to control *Aphis fabae* Scopoli (Hemiptera: Aphididae) on kalanchoe crops in East Africa. Crop Protection, 142:105520. https://doi.org/10.1016/j.cropro.2020.105520

Patch, E.M. 1914. Homoptera of Maine. Maine Agricultural Experiment Station Bulletin, 238:355-356.

Puzanova, Y.V., I.A. Novikov, A.I. Bilyk, A.K. Sharmagiy, Y.V. Plugatar and V.V. Oberemok. 2023. Perfect complementarity mechanism for aphid control: oligonucleotide insecticide Macsan-11 selectively causes high mortality rate for *Macrosiphoniella sanborni* Gillette. International Journal of Molecular Sciences, 24(14):11690. https://doi.org/10.3390/ijms241411690

Rivers, D.B. 2017. Insects: Evolutionary Success, Unrivaled Diversity, and World Domination. Johns Hopkins University Press, Baltimore, MD, USA. 474 pp.

Sahayaraj, K. and E. Hassan. 2023. Controlled field cage and field evaluation. Pp. 665-701. *In*: Worldwide Predatory Insects in Agroecosystems. K. Sahayaraj and E. Hassan (eds.). Springer Nature Singapore, Singapore. https://doi.org/10.1007/978-981-99-1000-7

Simon, J.-C., J. Bonhomme, R.L. Blackman and M. Hullé. 2008. Winged morph of the high arctic aphid *Acyrthosiphon svalbardicum* (Hemiptera: Aphididae): abundance, reproductive status, and ecological significance. The Canadian Entomologist, 140(3):385-387. https://doi.org/10.4039/n08-002

Sporer, T., J. Körnig, N. Wielsch, S. Gebauer-Jung, M. Reichelt, Y. Hupfer and F. Beran. 2021. Hijacking the mustard-oil bomb: how a glucosinolate-sequestering flea beetle copes with plant myrosinases. Frontiers in Plant Science, 12:645030. https://doi.org/10.3389/fpls.2021.645030

van Emden, H.F. and R. Harrington. 2017)Aphids as Crop Pests. CABI, Wallingford, UK. 717 pp. https://doi.org/10.1079/9781780647098.0000

Zaller, J.G. 2020. Where are the solutions to the pesticide problem? Pp. 223-295. *In:* Daily Poison: Pesticides – An Underestimated Danger. J.G. Zaller (ed.). Springer International Publishing, Cham, Switzerland. https://doi.org/10.1007/978-3-030-50530-1_3

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