

## APHID INFESTATION OF DECORATIVE PERENNIALS

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**Abstract:** The many years' study on species composition and harmfulness of aphids infesting perennials in the decorative plant collection Agricultural University in Poznań permitted to ascertain occurrence of 23 aphid species on 66 species of decorative perennials, representing 20 botanical families. The species that occurred in all the four study seasons in 2000, 2002, 2003 and 2005 included: *Aphis fabae* Scop., *Brachycaudus cardui* (L.) and *Aphis sedi* Kalt.. Very often *Aphis newtoni* Theob., *Acyrtosiphon malvae* (Mosl.), *Brachycaudus helichrysi* Kalt. and *Longicaudus trirhodus* (Walk.) were found. Spring and early summer was the period of numerous occurrence of aphids on decorative perennials. The high degree of plant infestation was resulted in decreasing the plant' decorative value. The aphid infestation may be especially dangerous for numerous cultivars of *Dahlia x cultorum*, *Eryngium planum*, *Echinops ritro*, *Leucanthemum maximum*, *Papaver orientale*, *Sedum aizoon*, *Iris sibirica*, *Yucca filamentosa*, *Achillea ptarnica*, *Dicentra eximia*, *Doronicum orientale* i *Geum coccineum*.

Key words: *Hemiptera*, *Aphidoidea*, fauna, aphids, perennials

### INTRODUCTION

Among many harmful species infesting long-living plants wintering in the ground, i.e. perennials, aphids play a significant role. Their infestation may result in decreasing the plants' decorative value. The plants strongly infested by those insects grow and bloom poorly, their organs infested by aphids become discoloured or deformed, and the honeydew aphids produce contaminates the plant surface and limits assimilation. A great threat for plants is also the fact that those insects carry viruses. Aphid infestation of decorative perennials is known only partially and unsatisfactorily.

Experimental facilities of the Department of Decorative Plants at August Cieszkowski Agricultural University in Poznań provide the perfect conditions to study this topic, as there is a rich collection of decorative plants located in the proximity of the Department of Gardening buildings at ul. Dąbrowskiego 159. Currently the collection has 960 taxons of decorative plants, out of which about 400 are perennials.

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The aim of the study was to find out about the species composition of aphids infesting decorative perennials, determining their phenology of occurrence in the vegetation season and an evaluation of their harmfulness.

## MATERIALS AND METHODS

The study was conducted during 4 vegetation seasons in the years 2000, 2002, 2003 and 2005 in the collection of decorative plants at Agricultural University in Poznań. The perennials were growing on same-size plots placed in rows of 1.65 m<sup>2</sup> area. In each season regularly three times a month from May to October the plants were checked for infesting aphids. The observation covered all plants, approximately 400 taxons. After aphids infestation was found, a sample was taken in order to determine the species, a place of infestation on the plant and damage symptoms were described. The degree of plant infestation was determined on a 5-degree scale, where: 1 – no aphids, 2 – low infestation (individual specimens), 3 – medium infestation (small colonies), 4 – high infestation (large colonies), 5 – very high infestation (aphids cover the surface of whole plant organs). Heie [1986, 1992, 1994, 1995] and Taylor [1984] keys were used to determine aphid species.

## RESULTS

As a result of the studies conducted in the decorative perennials collection in the years 2000, 2002, 2003 and 2005, 23 aphids species were found on 66 species of decorative perennials, representing 20 botanical families. All the found aphid species belonged to the Aphididae family. In particular study seasons from 8 to 16 various aphid species were found on the plants (tab. 1).

The species that occurred in all the four study seasons included: *Aphis fabae* Scop., *Aphis sedi* Kalt. and *Brachycaudus cardui* (L.). *Aphis newtoni* Theob., *Acyrtosiphon malvae* (Mosl.), *Brachycaudus helichrysi* (Kalt.) and *Longicaudus trirhodus* (Walk.) occurred in three out of four study seasons. Another group was *Aphis vanderghooti* (Börn.), *Aphis frangulae* Kalt., *Aulacorthum solani* (Kalt.), *Macrosiphum rosae* (L.) and three species of the *Uroleucon* genus, namely *Uroleucon achilleae* (Koch), *Uroleucon doronici* (Börn.) and *Uroleucon jaceae* (L.), found in two seasons of the study conducted. As many as 9 other aphid species rarely occurred on the plants, as they were found only in one season (tab. 1).

Most aphid species collected were monoecious and holocyclic, infesting herbaceous plants. In this group the taxon found very often was *A. sedi*, infesting as many as ten different taxons of the *Sedum* genus in the collection. On the stonecrops strongly infested by aphids significant inhibition of plants growth was observed. The species often and in great numbers infested various species of the *Iris* – *A. newtoni* genus. The aphids were initially found on the bottom part of leaves, later also on the flower clusters. Among the infested species of *Iris* aphids most often infested *Iris sibirica* (tab. 2).

Table 1. Aphid species infesting perennials in the decorative plant collection at Agricultural University of Poznań in 2000, 2002, 2003 and 2005

Tabela 1. Gatunki mszyc atakujące byliny w kolekcji roślin ozdobnych Akademii Rolniczej w Poznaniu w latach 2000, 2002, 2003 i 2005

Aphid species Gatunek mszyc	Occurrence of aphids on perennials in season Występowanie mszyc na bylinach w latach			
	2000	2002	2003	2005
<i>Aphis fabae</i> Scop.	•	•	•	•
<i>Aphis sedi</i> Kalt.	•	•	•	•
<i>Brachycaudus cardui</i> (L.)	•	•	•	•
<i>Longicaudus trirhodus</i> (Walk.)	•	•	•	
<i>Brachycaudus helichrysi</i> (Kalt.)	•	•	•	
<i>Aphis newtoni</i> Theob.		•	•	•
<i>Acyrtosiphon malvae</i> (Mosl.)		•	•	•
<i>Macrosiphum rosae</i> (L.)	•	•		
<i>Aphis vanderghooti</i> (Börn.)		•	•	
<i>Aulacorthum solani</i> (Kalt.)		•	•	
<i>Uroleucon achilleae</i> (Koch)		•		•
<i>Uroleucon doronici</i> (Börn.)		•		•
<i>Uroleucon jaceae</i> (L.)		•		•
<i>Aphis frangulae</i> Kalt.			•	•
<i>Amphorophora gei</i> (Börn.)	•			
<i>Uroleucon nigrocampanulae</i> (Theob.)	•			
<i>Dysaphis ranunculi</i> (Kalt.)		•		
<i>Macrosiphum cholodkovskiyi</i> (Mordv.)		•		
<i>Myzus lythri</i> (Schrk.)		•		
<i>Macrosiphum euphorbiae</i> (Thom.)			•	
<i>Aphis sambuci</i> L.				•
<i>Macrosiphoniella tanacetaria</i> (Kalt.)				•
<i>Uroleucon campanulae</i> (Kalt.)				•

As often as the above-mentioned monoecious and holocyclic species, *A. fabae* was found on the perennials. This polyphagous and heteroecious species was collected in the season from May to the end of October on numerous perennials (20 taxons) of 13 botanical families. Those were most often the plants of the *Asteraceae* family, among them many cultivars of *Dahlia × cultorum*. Aphids of this species often created huge colonies covering all the surface of young shoots, very often pedicels, which led to inhibition of growth and deformations. Large colonies of this aphid were also observed in all seasons on *Echinops rito*, *Eryngium planum* and *Yucca filamentosa*.

Plants of the *Asteraceae* family were also frequently and in great numbers infested by two other heteroecious species of the *Brachycaudus* genus: *B. cardui* and *B. helichrysi*. The former did most damage to *Leucanthemum maximum* and *Achillea ptarnica*.

Massive infestation of other aphid species was observed only in some seasons. An example was a numerous occurrence of *Macrosiphum euphorbiae* on *Dicentra eximia*, *Amphorophora gei* on *Geum coccineum* and *Longicaudus trirhodus* on *Aquilegia × cultorum* in 2002.

Particular seasons greatly differed in terms of the number of aphid species occurring. The richest species composition was noted in the 2002 season, when 16 various aphid taxons were collected on perennials, and the poorest – the season of 2000, when 8 species were identified (tab. 1).

Table 2. List of perennials infested by aphids in decorative plant collection at Agricultural University in Poznań

Tabela 2. Byliny zaatakowane przez mszyce w kolekcji roślin ozdobnych Akademii Rolniczej w Poznaniu

Aphid species Gatunek mszycy	Botanical family Rodzina	Plant species Gatunek rośliny
<i>Acyrtosiphon malvae</i> (Mosl.)	<i>Geraniaceae</i>	<i>Geranium sanguineum</i> L.
		<i>Geranium pratense</i> L.
<i>Amphorophora gei</i> (Börn.)	<i>Rosaceae</i>	<i>Geum coccineum</i> Sibth. et Sm.*
	<i>Agavaceae</i>	<i>Yucca filamentosa</i> L.*
<i>Aphis fabae</i> Scop.	<i>Apiaceae</i>	<i>Eryngium planum</i> L.*
	<i>Asteraceae</i>	<i>Dahlia cultorum</i> (Thorsv. et Ries)*
		<i>Echinops ritro</i> L.*
		<i>Inula helenium</i> L.
		<i>Leucanthemum maximum</i> (Ramoud) DC.
		<i>Silphium perfoliatum</i> L.
		<i>Tanacetum parthenium</i> (L.) Sch. Bip.
	<i>Campanulaceae</i>	<i>Campanula grandis</i> Fisch. et C.A.Mey.
		<i>Campanula glomerata</i> L.
		<i>Campanula latifolia</i> L.
	<i>Hemerocallidaceae</i>	<i>Hemerocalis x hybrida</i> hort.
	<i>Hostaceae</i>	<i>Hosta lancifolia</i> (Thunb.) Engl.
	<i>Lamiaceae</i>	<i>Monarda didyma</i> L.
<i>Lythraceae</i>	<i>Lythrum virgatum</i> L.	
<i>Onagraceae</i>	<i>Oenothera fruticosa</i> L.	
<i>Papaveraceae</i>	<i>Papaver orientale</i> L.*	
<i>Ranunculaceae</i>	<i>Thalictrum lucidum</i> L.	
<i>Rutacea</i>	<i>Dictamnus albus</i> L.	
<i>Scrophulariaceae</i>	<i>Digitalis lutea</i> L.	
<i>Aphis frangulae</i> Kalt.	<i>Lamiaceae</i>	<i>Nepeta x faassenii</i> Bergm. ex Steam
	<i>Scrophulariaceae</i>	<i>Digitalis lutea</i> L.
<i>Aphis newtoni</i> Theob.	<i>Iridaceae</i>	<i>Iris germanica</i> L.
		<i>Iris x intermedia</i> hort.
		<i>Iris orientalis</i> Mill.
		<i>Iris pumila</i> L.
		<i>Iris sibirica</i> L.*
<i>Aphis sambuci</i> L.	<i>Onagraceae</i>	<i>Oenothera fruticosa</i> L.
		<i>Sedum aizoon</i> L.*
		<i>Sedum floriferum</i> Praeger
		<i>Sedum x hybridum</i>
		<i>Sedum kamschaticum</i> Fisch. et C.A.
		<i>Sedum populifolium</i> Pall.
		<i>Sedum reflexum</i> L.
		<i>Sedum sediforme</i> (Jacq.) Pau
		<i>Sedum spectabile</i> Boreau
		<i>Sedum spurium</i> M. Bieb.
<i>Sedum telefium</i> L.		
<i>Aphis vanderghooti</i> (Börn.)	<i>Asteraceae</i>	<i>Achillea filipendulina</i> Lam.
<i>Aulacorthum solani</i> (Kalt.)	<i>Geraniaceae</i>	<i>Geranium sanguineum</i> L.
	<i>Ranunculaceae</i>	<i>Aconitum henryi</i> E. Pritz.
	<i>Saxifragaceae</i>	<i>Bergenia cordifolia</i> (Haw.) Stemb.

Aphid species Gatunek mszycy	Botanical family Rodzina	Plant species Gatunek rośliny
<i>Brachycaudus cardui</i> (L.)	Asteraceae	<i>Achillea ptarmica</i> L.*
		<i>Aster novi-belgii</i> L.
		<i>Echinops ritro</i> L.
		<i>Inula helenium</i> L.
		<i>Leucanthemum maximum</i> (Ramond) DC.*
		<i>Leucanthemum vulgare</i> Lam.
<i>Brachycaudus helichrysi</i> (Kalt.)	Asteraceae	<i>Anaphalis margaritacea</i> (L.) Benth. et Hook.
		<i>Aster dumosus</i> L.
		<i>Aster novae-angliae</i> L.
		<i>Erigeron speciosus</i> (Lindl.) DC.
		<i>Leucanthemum maximum</i> (Ramond) DC.
<i>Dysaphis ranunculi</i> (Kalt.)	Ranunculaceae	<i>Ranunculus lanuginosus</i> L.
<i>Longicaudus trirhodus</i> (Walk.)	Ranunculaceae	<i>Aquilegia cultorum</i> Bergm.*
		<i>Aquilegia hybrida</i>
<i>Macrosiphum cholodkovskiyi</i> (Mordv.)	Rosaceae	<i>Filipendula ulmaria</i> (L.) Maxim.
<i>Macrosiphum euphorbiae</i> (Thom.)	Fumariaceae	<i>Dicentra eximia</i> (Ker-Gawl) Torr.*
	Saxifragaceae	<i>Astilbe x arendsii</i> Arends
<i>Macrosiphum rosae</i> (L.)	Dipsacaceae	<i>Cephalaria gigantea</i> (Ledeb.) Bobrov
		<i>Scabiosa caucasica</i> M. Brieb.
<i>Macrosiphoniella tanacetaria</i> (Kalt.)	Asteraceae	<i>Tanacetum vulgare</i> L.
<i>Myzus lythri</i> (Schrk.)	Lythraceae	<i>Lythrum salicaria</i> L.
<i>Uroleucon achilleae</i> (Koch)	Asteraceae	<i>Achillea millefolium</i> L.
<i>Uroleucon campanulae</i> (Kalt.)	Campanulaceae	<i>Campanula latifolia</i> L.
<i>Uroleucon daronici</i> (Börn.)	Asteraceae	<i>Doronicum orientale</i> Hoffm.*
		<i>Centaurea macrocephala</i> Puschk. ex Willd.
		<i>Campanula glomerata</i> L.
		<i>Campanula grandis</i> Fisch. et C.A.Mey.
		<i>Campanula latifolia</i> L.

\*high 4 or 5 – degree scale of plant infestation

Spring and early summer is the period of massive aphid occurrence on perennials. The samples collected in this period were rich in species (fig. 1). The greatest number of 10 different aphid species in the first decade of June in 2002 was found. Large number of aphid taxons also in the period from the beginning of June to the beginning of July was gathered in 2003 and 2005.

The highest degree: 4 or 5 of the adopted scale of plant infestation was observed on the perennials in case of the following aphid species: *A. fabae*, *B. cardui*, *A. newtoni*, *A. sedi*, *L. trirhodus*, *M. euphorbiae*, *U. daronici* and *A. gei* (tab. 2). It was always related to visible damage symptoms that led to diminishing the decorative value of host plants.

Multi-year studies show that aphid infestation may be dangerous for many plants. Among the most endangered in this respect are the following: numerous cultivars of *Dahlia* × *cultorum*, *Echinops ritro*, *Eryngium planum*, *Yucca filamentosa* and *Papaver orientale* of *A. fabae*; *Achillea ptarmica* and *Leucanthemum maximum* of *B. cardui*; among numerous infested species of the *Iris* genus particularly *Iris sibirica* of *A. newtoni*; among numerous infested species of the *Sedum* particularly *Sedum aizoon* of

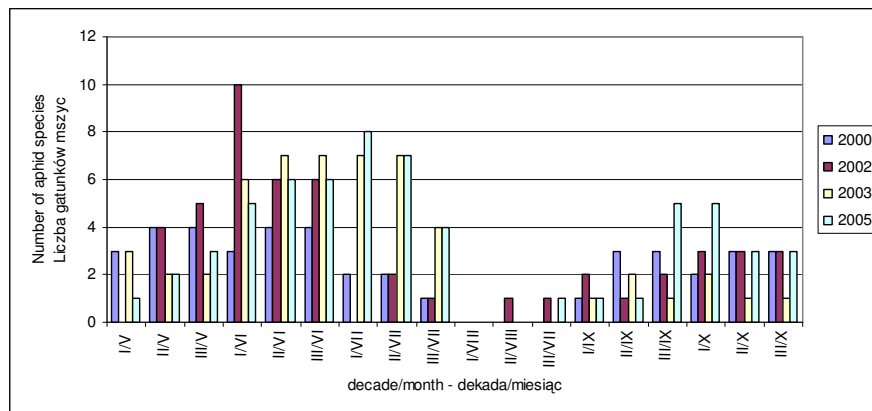


Fig. 1. The number of aphid species found on decorative perennials in the decorative plant collection in successive decades of months in vegetation season in the years 2000–2005

Rys. 1. Liczba gatunków mszyc znalezionych na bylinach roślin ozdobnych w poszczególnych dekadach miesięcy okresów wegetacyjnych lat 2000–2005

*A. sedi*; *Aquilegia × cultorum* of *L. trirhodus*; *Dicentra eximia* of *M. euphorbiae*; *Doronicum orientale* of *M. euphorbiae*; *Geum coccineum* of *A. gei*.

## DISCUSSION

Studies of the harmful plant fauna of the decorative plant collection of the Poznań AU were conducted at the beginning of 1970s by Burdajewicz i Borejsza-Wysocki [1978]. Those authors found then 8 aphid species. The current study confirmed the occurrence of three of them: *A. fabae*, *M. euphorbiae* and *A. solani*. The results quoted did not include information on the insects' host plants.

A similar topic of aphid infestation on perennials in nurseries was also addressed by Soika and Łabanowski [2006]. Their multi-year studies conducted in 2000–2005 helped determine 20 aphid species.

Both our studies and the previous ones corroborated a big influence of at least 8 species on decorative perennials, among them being *A. fabae*, *B. cardui*, *A. solani*, *M. euphorbiae*, *L. trirhodum*, *A. newtoni*, *A. sedi* and *A. frangulae*.

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**WYSTĘPOWANIE MSZYC NA BYLINACH OZDOBNYCH**

**Streszczenie.** Wieloletnie badania dotyczące składu gatunkowego i szkodliwości mszyc zasiedlających byliny w kolekcji roślin ozdobnych Akademii Rolniczej w Poznaniu pozwoliły stwierdzić występowanie 23 gatunków mszyc zasiedlających 66 gatunków bylin ozdobnych, przedstawicieli 20 rodzin botanicznych. Gatunkami pojawiającymi się we wszystkich czterech sezonach badań w latach 2000, 2002, 2003 i 2005 były *Aphis fabae* Scop., *Brachycaudus cardui* (L.) i *Aphis sedi* Kalt. Bardzo często notowano obecność *Aphis newtoni* Theob., *Acyrtosiphon malvae* (Mosl.), *Brachycaudus helichrysi* Kalt. i *Longicaudus trirhodus* (Walk.). Wiosna i wczesne lato było okresem masowego występowania mszyc na bylinach ozdobnych. Wysoki stopień zasiedlenia roślin wpływał na walory dekoracyjne roślin. Mszyce okazały się szczególnie groźne dla wielu odmian *Dahlia* × *cultorum*, *Eryngium planum*, *Echinops ritro*, *Leucanthemum maximum*, *Papaver orientale*, *Sedum aizoon*, *Iris sibirica*, *Yucca filamentosa*, *Achillea ptarmica*, *Dicentra eximia*, *Doronicum orientale* i *Geum coccineum*.

Słowa kluczowe: *Hemiptera*, *Aphidoidea*, fauna, mszyce, byliny

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