

## Aphids (Aphidoidea) associated with ornamental grasses (Poaceae)

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### ABSTRACT

Research concerning aphids of ornamental grasses were carried out in the years 2007-2009. In order to seize aphids and therefore study the species composition, two sampling methods were chosen and deployed: direct collection from plants and the use of a sweep net. By means of both methods, nine aphid species were caught and identified. The most commonly recorded were the following: *Sitobion avenae*, *Laingia psammae* and *Hyalopterus pruni*, but also numerous were studied, including *Atheroides doncasteri* and *A. serrulatus*. Aphid species such as *Sipha elegans*, *Myzus (Nectarosiphon) persicae*, *Metopolophium dirhodum* and *Rhopalosiphum padi* only occasionally occurred on ornamental grasses.

**KEY WORDS:** grass aphids, ornamental nurseries, collecting methods: direct collection, sweep net

### INTRODUCTION

Ornamental grasses are produced in nurseries all over Poland and are intended for planting in city greeneries and home gardens. These plants are usually infested by aphid species previously known from grasses cultivated for seeds (ŻURAŃSKA *et al.*, 1994) and growing in meadow communities (BOROWIAK-SOBKOWIAK *et al.*,

2008; BOROWIAK-SOBKOWIAK *et al.*, 2009). The aim of this research was to study the aphid fauna associated with ornamental grasses cultivated in commercial nurseries and in botanical gardens.

## MATERIALS AND METHODS

The observations were carried out during 2007-2009 in four locations: Braniewo in the Masurian Lake District (Pojezierze Mazurskie) (19.06.2008, 22.06.2009 and 30.07.2009), Bydgoszcz in the Great Poland-Kujawy Lowland (Nizina Wielkopolsko-Kujawska) (12.06 and 14.08.2007, 18.06. and 30.07.2008), Skierniewice (25.07.2007, 24.07.2008, and 1.06.2009) and Topola Królewska (1.08.2007, 8.07.2008) in the Mazovian Lowland (Nizina Mazowiecka). In order to collect aphids, two methods were applied: direct collection from plants (207 samples) and with the use of a sweep net (111 samples). Samples were collected monthly during the period from June to August. Gathered specimens were identified with species using the keys by HEIE (1982, 1986, 1994) and WIECZOREK (2010). Latin names of aphids were applied according to “Fauna Polski – Charakterystyka i wykaz gatunków” (“Polish Fauna – Characteristics and Species Outline”) edited by PAN Museum & Institute of Zoology (WĘGIEREK & WOJCIECHOWSKI, 2004).

## RESULTS

The experiments carried out proved that in the years 2007-2009, the number of samples containing aphids was dependent on the collection method, year of research and location. However, independent of the sampling method, the percentage of grass samples with aphids was similar (Tab. 1).

**Table 1.** Number of samples with aphids collected in 2007-2009

Location	2007		2008		2009		2007-2009	
	No. samples		No. samples		No. samples		No. samples	
	Total	With aphids	Total	With aphids	Total	With aphids	Total	With aphids
Direct collection from plants								
Braniewo	-	-	12	5	11	1	23	6
Bydgoszcz	65	8	12	1	57	7	134	16
Skierniewice	11	10	13	1	-	-	24	11
Topola K.	12	5	6	1	8	0	26	6
Total	88	23	43	8	76	8	207	39
Proportion of samples with aphids	26.1%		18.6%		10.5%		18.8%	

Location	2007		2008		2009		2007-2009	
	No. samples		No. samples		No. samples		No. samples	
	Total	With aphids	Total	With aphids	Total	With aphids	Total	With aphids
Sweep net method								
Braniewo	-	-	12	6	11	3	23	9
Bydgoszcz	-	-	12	2	57	9	69	11
Skierniewice	-	-	13	1	-	-	13	1
Topola K.	-	-	6	1	-	-	6	1
Total	-	-	43	10	68	12	111	22
Proportion of samples with aphids	-		23.3%		17.6%		19.8%	

Aphids were collected from 31 species of grasses and, independent of the collection method, aphids always inhabited grasses from the *Deschampsia* and *Elymus* genera. In many cases, aphids from the same species were collected on grass regardless of the collecting method (Tab. 2).

**Table 2.** Species of grasses with aphids collected using two sampling methods

Species of grass	2007	2008		2009	
	A	A	B	A	B
<i>Alopecurus pratensis</i>	-	-	+	-	-
<i>Avenula pubescens</i>	-	-	-	+	+
<i>Calamagrostis acutiflora/ epigejos/ stricta</i>	-	+	-	+	+
<i>Deschampsia caespitosa/ media</i>	+	+	+	+	+
<i>Elymus dahuricus/gmelinii/hispidus/ pycnanthus</i>	+	+	+	+	+
<i>Festuca cinerea/glauca/ scopolina/virginata</i>	+	-	-	+	+
<i>Glyceria maxima</i>	-	+	+	-	-
<i>Helictotrichon sempervirens</i>	-	-	+	-	-
<i>Hierochloë odorata</i>	-	-	-	-	+
<i>Holcus lanatus/mollis</i>	-	+	-	+	-
<i>Koeleria glauca/pyramidata</i>	+	-	-	+	+
<i>Miscanthus sacchiflorus/ sinensis</i>	+	+	-	-	-
<i>Pennisetum alopecuroides/glaucum/villosum</i>	+	+	+	-	+
<i>Phalaris arundinacea</i>	+	+	+	-	-
<i>Phragmites australis</i>	-	-	-	+	-
<i>Stipa barbata/ capillata/ tenuissima</i>	+	-	-	-	+
Species of grasses infested with aphids	8	7	8	7	11

A – direct collection from plants

B - collected using with sweep net

In total, 9 aphid species were recorded on grasses using both collecting methods. The most numerous was *Sitobion avenae* (Fabricius 1775) – present in over 30% of samples; slightly less abundant were *Laingia psammae* Theobald 1922

and *Hyalopterus pruni* (Geoffroy 1762) – present in about 19% of samples. Typical grass aphid species such as *Atheroides doncasteri* Ossiannilsson 1955 and *Atheroides serrulatus* Haliday 1838 were noted in about 8% of samples. *Sipha elegans* Del Guercio 1905 and two polyphagous species: *Metopolophium dirhodum* (Walker 1849) and *Rhopalosiphum padi* (Linnaeus 1758) were collected with a sample frequency of 4% (Tab. 3).

**Table 3.** Frequency expressed as the number of samples with particular aphid species on grasses

Genera of grass	Number of samples with aphids								
	<i>A. doncasteri</i>	<i>A. serrulatus</i>	<i>L. psammae</i>	<i>S. elegans</i>	<i>S. avenae</i>	<i>M. persicae</i>	<i>H. pruni</i>	<i>M. dirhodum</i>	<i>R. padi</i>
<i>Alopecurus</i>	0	0	0	0	1	0	0	0	0
<i>Avenula</i>	0	1	0	0	1	0	0	0	0
<i>Calamagrostis</i>	0	0	4	0	0	0	0	0	0
<i>Deschampsia</i>	2	0	0	0	0	0	0	0	0
<i>Elymus</i>	0	0	0	1	0	0	0	0	0
<i>Festuca</i>	0	0	1	0	3	0	0	0	1
<i>Glyceria</i>	0	0	0	0	0	0	0	1	0
<i>Hierochloë</i>	0	0	0	0	1	0	0	0	0
<i>Holcus</i>	0	0	0	0	1	0	0	0	0
<i>Koeleria</i>	0	0	0	0	1	0	0	0	0
<i>Miscanthus</i>	0	0	0	0	0	1	0	0	0
<i>Phragmites</i>	0	0	0	0	0	0	4	0	0
<i>Stipa</i>	0	1	0	0	0	0	1	0	0
Total samples	2	2	5	1	8	1	5	1	1
Frequency	7.7 %	7.7 %	19.2 %	3.8%	30.8 %	3.8 %	19.2 %	3.8 %	3.8 %

## Family: Aphididae

### Subfamily: Drepanosiphinae

#### *Genus: Atheroides* Haliday, 1839

Five species of *Atheroides* genus were noted on grasses cultivated in Europe and two of them occurred on ornamental grasses. The genus *Atheroides* was revised and information about the distribution and host plants was provided by WIECZOREK (2006-2007, 2009).

#### *Atheroides doncasteri* Ossiannilsson, 1955

Material examined: *Deschampsia caespitosa* (L.) P. Beauv. (Bydgoszcz 5.06.2008 – apterae, larvae), *Deschampsia media* (Gouan) Roem. & Schult. (Bydgoszcz 30.07.2009 - apterae).

In Poland, until present, this aphid was only recorded in the Great Poland-Kujawy Lowland (OSIADACZ & HAŁAJ, 2009). Bydgoszcz is placed in the Great

Poland-Kujawy Lowland and this record confirmed the geographical region of Poland for this aphid species.

Slide-mounted characteristics (Fig. 1): the apterous viviparous female has an elongated and slender body, about 3.5 times longer than wide. Frons convex, head with very long hairs. Abdomen with visible dark pigmented sclerites, dorsally rectangular and laterally oval with numerous long, short and very short pointed hairs arranged in rows. Tergite VIII with three, pointed hairs. Antennae 5-segmented, short; processus terminalis about as long as the base; segment III without rhinaria with 2 hairs. Apical segment of rostrum blunt, 0.6 times the size of the second segment of the hind tarsus. Siphunculi on tergite V, pore-shaped. Cauda broadly rounded with 4 hairs. Larvae similar to the apterous female, but body about 3 times longer than wide; 4-segmented antennae and sclerites in the middle abdomen, oval in shape, not jointed in rectangle, arranged in two rows.

### *Atheroides serrulatus* Haliday, 1839

Material examined: *Avenula pubescens* (Huds.) (Bydgoszcz 18.06.2009 – apterae, larvae); *Elymus dahuricus* (Turcz. ex Griesb.) (Bydgoszcz 5.06.2008 – larvae); *Stipa capillata* L. (Bydgoszcz 18.06.2009 – apterae, larvae).

In Poland this aphid is common and occurs in such areas as the Baltic Sea Coast (Wybrzeże Bałtyku), the Masurian Lake District, the Great Poland-Kujawy Lowland, the Mazovian Lowland, the Kraków-Wieluń Uplands (Wyżyna Krakowsko-Wieluńska), the Lesser Poland Upland (Wyżyna Małopolska), the Orawsko-Nowotarska Dale (Kotlina Nowotarska), on grasses (*Deschampsia flexuosa* L., *Poa annua* L., *Festuca durinscula* L., *Festuca rubra* L., *Festuca ovina* L.) and sedges (*Carex fusca* Bellardi & All.) (SZELEGIEWICZ, 1968). New distribution regions are Upper Silesia (Górny Śląsk), the Lublin Upland (Wyżyna Lubelska), the Sandomierz Lowland (Nizina Sandomierska) and the Western Beskidy Mountains (Zachodnie Beskidy) (OSIADACZ & HAŁAJ, 2009). Apterous viviparous females are known from sedges and water grasses (ACHREMOWICZ, 1967).

Slide-mounted characteristics (Fig. 2): the apterous viviparous female has an elongated and slender body, about 3x longer than wide, almost parallel-sided. Dorsal cuticle strongly wrinkled, rugose with very short hairs in rod shape. Frons convex with 5 pairs of long and thick hairs. Thorax and abdomen with weak visible dark pigmented sclerites. Abdominal tergite VIII with 14 very long and thick, pointed hairs. Antennae 5-segmented, processus terminalis 1.2 times longer than the base. Antennal segment III without rhinaria, with 2 hairs. Apical segment of rostrum 0.7 times the size of the second segment of hind tarsus. Siphunculi on tergite V, pore-shaped. Cauda rounded with 2 long and 2 shorter hairs. Larvae similar to apterous female, but body about 2.5 times longer than wide; antennae 4-segmented; sclerites in middle abdomen sharp visibly arranged at two rows, on each 3 short hairs rod in shape.

**Genus: *Laingia*** Theobald, 1922

The genus *Laingia* can be distinguished by the elongate body, dorsum partially membranous and pore-shaped siphunculi placed on the anterior margin of abdominal segment VI. One species of this genera is known.

***Laingia psammae*** Theobald, 1922

Material examined: *Calamagrostis acutiflora* ‘Karl Föster’ (Bydgoszcz 23.06.2008 – larvae), *Calamagrostis epigejos* (L.) Roth (Bydgoszcz 18.06.2009, 30.07.2009 – apterae; Topola Królewska 10.06.2009 – apterae, larvae); *Calamagrostis stricta* (L.) Roth (Bydgoszcz 18.06.2009 – apterae, larvae); *Calamagrostis pseudophragmites* (Haller f.) Koeler (Bydgoszcz 18.06.2009 – apterae, larvae), *Festuca glauca* ‘Eliash Blue’ (Braniewo 22.06.2009 – apterae).

This aphid is dispersed throughout Europe and Asia. It became established in Bulgaria on *Calamagrostis arundinacea* (L.) Roth in 1992 (TASHEVA-TERZIJSKA, 1999). In Poland, this aphid was found at the Baltic Sea Coast, the Masurian Lake District, the Great Poland-Kujawy Lowland and the Mazovian Lowland on *C. epigejos*, *Ammophila arenaria* Link. and *Agrostis alba* L. (SZELEGIEWICZ, 1968). It was also observed on *Alopecurus pratensis* L. cultivated for seeds (ŻURAŃSKA *et al.*, 1994). Hosts are also listed for this aphid species: *Agropyron repens* (L.), *Calamagrostis villosa* (Chaix) J. F. Gmel., *Dactylis glomerata* L., *Holcus lanatus* L. and *Triticum aestivum* L. (ANONYMOUS, 2012).

Slide-mounted characteristics (Fig. 3): apterous viviparous female with long and slender body, about 3 times longer than wide. Dorsal and lateral abdomen with weak visible dark sclerites. Dorsal cuticule with structure consist with numerous long and short, spiny hairs. Frons convex with three pairs of longer hairs. Antennae 5-segmented, processus terminalis 1.6 times than the base; segment III with one, small secondary rhinarium in the middle of segment and 2 hairs. Apical segment of rostrum about 0.5 times of second segment of hind tarsus. Abdominal tergite VIII with 7 very long pointed hairs. Siphunculi very low, almost pore-shaped, dark. Cauda rounded, with 5 hairs.

Larvae similar to apterous female, but antennae 4-segmented, abdomen dorsal with small, dark sclerites each bearing one, short pointed hair arranged in 6 rows; tergite VIII with 4 very long pointed hairs.

**Genus: *Sipha*** Passerini, 1860

In Poland, there are listed a total of 4 species of *Sipha*, three species from subgenera *Rungisia* and one from subgenera *Sipha*. All species are associated with grasses.

***Sipha (Rungsia) elegans*** del Guercio, 1905

**Material examined:** *E. dahuricus* (Bydgoszcz 5.06.2008 – apterae, larvae), *Elymus hispidus* (Opiz) Meldris (Bydgoszcz 18.06.2009 – alatae), *Elymus pycnanthus* (Godr.) Melderis. (Bydgoszcz 30.07.2009 – larvae).

This aphid in Poland was found at the Baltic Sea Coast, the Masurian Lake District, the Wielkopolsko-Kujawska Lowland, the Mazovian Lowland, the Podlasie Lowland, the Lower Silesia, the Kraków-Wieluń Upland and the Małopolska Upland. In Czech, it was recorded on eleven species of *Aegilops* and on two species of wild *Triticum* (HAVLIČKOVÁ, *et al.*, 1996).

**Slide-mounted characteristics** (Fig. 4): apterous viviparous female with elongate and oval body. 5-segmented antenna, third antennal segment very long without secondary rhinaria with 5 long pointed hairs. Head and dorsum with long, pointed hairs. Cauda broadly rounded with 3 hair pairs, pale. Siphunculi very short, truncated cones, about 2 times shorter than their basal diameter. Alata with 3-7 rhinaria on third antennal segment. Fore wings with double forked vein. Larvae similar to apterous female, head, thorax and abdomen with long, pointed hairs.

**Subfamily: Aphidinae****Genus: *Hyalopterus*** Koch, 1854

The secondary host for both species from this genera: *H. amygdali* and *H. pruni*, have as their secondary host is *Phragmites australis* (Cav.) Trin. ex Steud.

***Hyalopterus pruni*** (Geoffroy, 1762)

**Material examined:** *Phragmites australis* f. *variegata* (Bydgoszcz, 15.06.2007; 22.06.2007; 20.06.2008 – apterae, larvae; Braniewo 10.09.2009 - apterae, larvae).

This aphid is very common in all regions of Poland (OSIADACZ & HAŁAJ, 2009). It is host-alternating between *Prunus* spp. (*Prunus domestica* L., *Prunus spinosa* L.) as its primary hosts and *P. communis* as its secondary host (SZELEGIEWICZ, 1968). Aphids feed in large colonies on the undersides of leaves. *H. pruni* was also recorded on *P. australis* in dry-ground forests in South-Eastern Poland (DURAK *et al.*, 2009).

**Slide-mounted characteristics** (Fig. 5): body of apterous female slender, 2-3 times as long as greatest width. 6-segmented antennae, about 0.5 x body size, processus terminalis 3.4 times base size; III segment without secondary rhinaria with very short hairs. Rostrum reaching to middle coxae, apical segment obtuse 0.5-0.6 x 2 second hind tarsus, with 1-2 accessory hairs. Siphunculi very small, 0.4 times shorter than cauda, almost cylindrical, flangeless, dark. Cauda long and slender, with 5 hairs, dark. Larvae similar to apterous female, but antennae are 5-segmented; cauda short and rounded with 4 hairs.

**Genus: *Metopolophium*** Mordvilko, 1914

Among five known species of *Metopolophium* genera only *M. dirhodum* and *M. festucae* Theobald 1917 are known in Poland and are associated with grasses.

***Metopolophium dirhodum*** (Walker, 1849)

Material examined: *Glyceria maxima* 'Variegata' (Braniewo 23.06.2008 – larvae).

This aphid is common in all region of Poland except in the Podlasie Lowland (Nizina Podlaska), the Białowieża Primeval Forest (Puszcza Białowieska), the Lower Silesia (Dolny Śląsk), the Trzebnica Hills, the Małopolska Upland, the Świętokrzyskie Mountains (Góry Świętokrzyskie), the Roztocze Upland (Roztocze), the Eastern Sudety Mountains (Wschodnie Sudety), the Eastern Beskidy Mountains (Wschodnie Beskidy), the Pieniny Mountains (Pieniny) and the Tatra Mountains (Tatry) (OSIADACZ & HAŁAJ, 2009). It is host alternating between *Rosa* spp. as its primary hosts and different species of grasses, *Agropyron repens*, *Poa annua*, *Zea mays* L. (SZELEGIEWICZ, 1968), but many more grasses are known as hosts: *Agrostis* spp., *Alopecurus pratensis*, *Avena* spp., *Bromus* spp., *Calamagrostis* spp., *Dactylis* sp., *Deschampsia* spp., *Festuca* spp., *Glyceria* spp., *Hordeum distichon* L., *Phalaris arundinaceae* L., *Poa trivialis* L. and *Phleum pratense* L. (ANONYMOUS, 2012).

Slide-mounted characteristics: body of larvae elongate, oval. Antennae are 5-segmented reaching hind femora, processus terminalis about 3.5 times longer than base. Body hairs very short and fine. Apical segment of rostrum short, about 0.6 times shorter than second segment of hind tarsus. Siphunculi long, pale with darker tip, about 3 times longer than cauda. Cauda short, triangular with 3 pairs setae, pale.

**Genus: *Myzus*** Passerini, 1860

The genera *Myzus* contains 14 species of aphids and is divided into three subgenera: *Galiobium*, *Myzus* and *Nectarosiphon*. Only *N. persicae* grasses are known as hosts for the subgenera *Nectarosiphon*.

***Myzus (Nectarosiphon) persicae*** (Sulzer, 1776) – green peach aphid

Material examined: *Miscanthus sacchariflorus* (Maxim.) (Braniewo 19.06.2008 - alatae). This aphid is common in all regions of Poland except the Białowieża Primeval Forest, the Trzebnica Hills, the Świętokrzyskie Mountains, the Eastern Sudety Mountains, the Orawsko-Novotarska Dale, the Pieniny Mountains and the Tatra Mountains (OSIADACZ & HAŁAJ, 2009). It is a wide polyphago-



us species feeding on plants growing in fields and under covers, among grasses recorded on plants from the genera: *Hordeum*, *Poa*, *Setaria*, *Triticum*, *Secale* and *Zea* (ANONYMOUS, 2012).

**Slide-mounted characteristics** (Fig. 6): body of alatae female pale, head and thorax dark brown, abdominal dorsum yellow with across bands, those on tergites III-VI being fused in a large patch and smaller dark patches on marginal. Head with inner faces of antennal tubercles convergent. Antenna as long as body, processus terminalis about 3.2 times longer than base, antennal segment III with 6 secondary rhinaria arranged in a row. Siphunculi similar in pigmentation to cauda, dark; 2.4 times longer than the cauda, somewhat swollen with flange 1.4 times wider than the subapical constriction, but without any polygonal reticulation. Last rostral segment about the same length as the second segment of hind tarsus.

### **Genus: *Rhopalosiphum* Koch, 1854**

Among the five species from this genera, all are associated with grasses except *Rhopalosiphum rufulum* Richards 1960, which occurs on *Acorus calamus* L. (Acoraceae).

### ***Rhopalosiphum padi* (Linneus, 1758)**

**Material examined:** *Festuca glauca* ‘Eliash Blue’ (Braniewo, 22.06.2009 – alatae).

This aphid was the dominant species, with 14.3% frequency of occurrence on five species of grasses: *Alopecurus pratensis*, *Festuca pratensis*, *Dactylis glomerata* L., *Poa pratensis* and *Phleum pratense* (ŽURAŃSKA *et al.*, 1994). *R. padi* was also observed on *Dactylis glomerata* and *D. polygama* in dry-ground forests in South-Eastern Poland (DURAK *et al.*, 2009). It is also recorded on other grasses: *Agropyron* sp., *Agrostis stolonifera* L., *Alopecurus geniculatus* L., *Avena sativa* L., *Bromus* sp., *Calamagrostis canescens* (Weber) Roth and also species from genera: *Cynosurus*, *Elymus*, *Melica*, *Triticum*, *Hordeum*, *Glyceria* as well as *Holcus lanata*, *Trisetum* sp., *Zea mays* and on *Juncus articulatus* L. from the Juncaceae family, and on *Typha latifolia* L. from the Typhaceae family (ANONYMOUS, 2012).

**Slide-mounted characteristics** (Fig. 7): the body of alate female broadly ovate, head, thorax and siphunculi dark. Abdomen green with brown marginal sclerites and large postsiphuncular sclerites. Antennal and body hairs short and fine. Antenna are 6-segmented, almost as long as body, processus terminalis 3.5 times longer than base of last antennal segment, on third antennal segment 24 secondary rhinaria, on IV segment 7, on V segment 2. Siphunculi 1.8 times as long as cauda, dark. Cauda short, with 3 pairs laterally hairs and 2 on dorsal side, less dark than siphunculi. Last rostral segment about the same length as the second segment of hind tarsus.

**Genus: *Sitobion*** Mordvilko, 1914

Three species from this genera were recorded in Poland, but *Sitobion avenae* as monophagous are associated with grasses and *Sitobion fragariae* (Walker 1848) alternate their host between *Rosa* sp. and grasses.

***Sitobion avenae*** (Fabricius, 1775)

Material examined: *Alopecurus pratensis* 'Aurevariegata' (Braniewo 19.06.2008 - alatae), *Avenula pubescens* (Huds.) Dumort. (Bydgoszcz 18.06.2009 - larvae), *Deschampsia caespitosa* (Skierniewice 24.07.2008 – larvae), *Festuca glauca* 'Eliash Blue', *F. glauca* 'Eisvogel' (Braniewo 22.06.2009 – alata, apterae, larvae), *Festuca virginata* (Bydgoszcz 18.06.2009 – larvae), *Hierochloë odorata* (L.) P. Beauv. (Bydgoszcz 18.06.2009 – apterae, larvae), *Holcus lavidus* (Bydgoszcz 18.06.2009 – larvae), *Holcus mollis* (Braniewo 23.06.2008 – larvae), *Koehleria splendens*, *Koehleria pyramidata* (Lam.) P. Beauv. (Bydgoszcz 18.06.2009 – alata, larvae).

This aphid is common in almost all regions of Poland except the Białowieża Primeval Forest, the Trzebnica Hills, the Świętokrzyskie Mountains, the Roztocze Upland, the Eastern Sudety Mountains, the Eastern Beskidy Mountains, the Pieniny Mountains and the Tatra Mountains (OSIADACZ & HALAJ, 2009). It was dominant on such grasses cultivated for seeds as *Festuca pratensis*, *Dactylis glomerata*, *Alopecurus pratensis*, *Poa pratensis* and *Phleum pratense* (ŻURAŃSKA *et al.*, 1994).

*S. avenae* is known as a pest of cereals and grasses, hosts are also other species from the Poaceae family: *Arrhenatherum elatius*, *Avena fatua*, *Holcus mollis*, *Agrostis tenuis*, *Phleum pratense*, *Agropyron repens*, *Festuca rubra*, *Poa pratensis*, *Triticum aestivum*, *Trisetum flavescens* (ANONYMOUS, 2012).

Slide-mounted characteristics (Fig. 8): apterous viviparous female broadly with elongate body, with dark, small intersegmental markings. Antennal and body hairs fine. Antenna are 6-segmented, 0.8-1.1 x body size, processus terminalis 5.4 times longer than base, segment III with 1 small rhinaria near base, antennal hairs very short. Apical segment of rostrum short, about 0.7-0.8 times as the second segment hind tarsus. Siphunculus 1.2 times longer than cauda with polygonal reticulation on apical, black. Cauda elongate, slightly constricted, with 3 pairs of lateral setae and 2 dorsal preapical setae, pale.

Alata similar to the apterous female, but on third antennal segment 4 secondary rhinaria; the dorsal intersegmental markings are darker. Siphunculi 1.4 times longer than cauda, completely dark. Cauda elongated, the same color as the body, with 8 hairs.

Larvae similar to apterous female, but body without intersegmental markings; processus terminalis 4.2 times longer than the base; cauda short and triangular, pale with 2 lateral and one dorsal pair of hairs; siphunculi without a subapical zone of polygonal reticulation, dark.

## DISCUSSION

The species composition of aphids associated with ornamental grasses is a somewhat poorer than the aphids recorded on grasses cultivated for seeds, but for both environments, *Sitobion avenae* was the most frequent. This species found on grasses cultivated for seeds was associated with *Dactylis glomerata* and *Festuca pratensis* (ŻURAŃSKA *et al.*, 1994). In dry-ground forests in south-eastern Poland, *S. avenae* occurred much more frequently on *Brachypodium sylvaticum*, *Calamagrostis pseudophragmites*, *Dactylis glomerata*, *D. polygama*, *Festuca drymeia*, *F. heterophylla* and *Glyceria plicata* (DURAK *et al.*, 2009). Up to present, it was known mainly as a cereal pest (MRÓWCZYŃSKI *et al.*, 2005).

Some species such as *Atheroides doncasteri* on *Deschampsia* spp. and *A. serulatus* on *Avenula pubescens*, *Elymus dahuricus* and *Stipa capillata* were collected on ornamental grasses, contrary to observations carried out on grasses cultivated for seeds, where on *Alopecurus pratensis* and *Poa pratensis*, the only species found was *Atheroides hirtellus* (ŻURAŃSKA *et al.*, 1994).

*Laingia psammae* was collected from *Calamagrostis acutiflora* 'Karl Föster', *C. epigejos*, *C. stricta*, *C. pseudophragmites* and *Festuca glauca* 'Eliash Blue', but the main host plant of this species is *C. epigejos* and was recorded on 23 species of plants from the Poaceae family and *Carex acutiformis* from the Cyperaceae family (WIECZOREK, 2010). However, till present, it was only observed on *Alopecurus pratensis* cultivated for seeds (ŻURAŃSKA *et al.*, 1994).

*Hyalopterus pruni*, among large numbers of species of ornamental grasses, was found only on *Phragmites australis*, which is confirmed by other authors (BOROWIAK-SOBKOWIAK *et al.*, 2009; DURAK *et al.*, 2009).

*Metopolophium dirhodum* was associated with *Glyceria maxima*, and it was never noticed on such species as *Festuca pratensis*, *Dactylis glomerata*, *Poa pratensis* and *Phleum pratense* (ŻURAŃSKA *et al.*, 1994).

*Myzus (Nectarosiphon) persicae* was only found on *Miscanthus sacchariflorus*, even though many species from the Poaceae family are listed as host-plants (ANONYMOUS, 2012).

*Rhopalosiphum padi* was only recorded on *Festuca glauca*, but normally it is associated with many more species of grasses: *Alopecurus pratensis*, *Dactylis glomerata*, *Festuca pratensis*, *Phleum pratense* and *Poa pratensis* (ŻURAŃSKA *et al.*, 1994) and it was also recorded on *Holcus lanatus* in meadow communities of the *Molinio-Arrhenatheretea* and *Phragmites-Artemisietea* classes (BOROWIAK-SOBKOWIAK *et al.*, 2008; BOROWIAK-SOBKOWIAK *et al.*, 2009).

The following aphid species: *Sipha glyceriae*, *Rungia maydis*, *Diuraphis muehleii*, *Hyalopteroides humilis*, *Macrosiphum fragariae*, *Schizaphis graminum*, *S. nigerrima* and *Metopolophium festucae* were not observed on ornamental grasses, although they were occasionally recorded on grasses cultivated for seeds (ŻURAŃSKA *et al.*, 1994).

## CONCLUSIONS

1. Ornamental grasses were infested by 9 aphid species: *Atheroides doncasteri*, *A. serrulatus*, *Rungsia elegans*, *Hyalopterus pruni*, *Metopolophium dirhodum*, *Myzus (Nectarosiphon) persicae*, *Rhopalosiphum insertum* and *Sitobion avenae*.
2. The most common was *S. avenae* on *Alopecurus pratensis* 'Aurevariegata', *Avenula pubescens*, *Deschampsia caespitosa*, *Festuca glauca* 'Eliash Blue', *F. glauca* 'Eisvogel', *Festuca virginata*, *Hierochloë odorata*, *Holcus lavidus*, *H. mollis*, *Koehleria splendens* and *K. pyramidata*.
3. *Calamagrostis acutiflora* 'Karl Föster', *C. epigejos*, *C. stricta*, *C. pseudophragmites* and *Festuca glauca* 'Eliash Blue' were infested by *Laingia psammae* and *Phragmites australis* f. *variegata* by *Hyalopterus pruni*.
4. *Metopolophium dirhodum* was associated with *Glyceria maxima* 'Variegata', *Myzus (Nectarosiphon) persicae* with *Miscanthus sacchariflorus* and *Rhopalosiphum padi* with *Festuca glauca* 'Eliash Blue'.
5. *Atheroides doncasteri* occurred on *Deschampsia caespitosa* and *D. media*, but *A. serrulatus* was associated with *Avenula pubescens* and *Stipa capillata*.
6. *Rungsia elegans* occurred only on *Elymus dahuricus*, *E. hispidus* and *E. pycnanthus*.

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### **Mszyce (Aphidoidea) występujące na trawach ozdobnych (Poaceae)**

#### **STRESZCZENIE**

W latach 2007-2009 na trawach ozdobnych w czterech regionach Polski: mazurskim (Braniewo), wielkopolsko-pomorskim (Bydgoszcz) i mazowieckim (Skierniewice, Topola Królewska) odłowiono 9 gatunków mszyc dwiema metodami: bezpośredniego zebrania z roślin i za pomocą czerpaka. Najczęściej występowała *S. avenae* na *Alopecurus pratensis* 'Aurevariegata', *Avenula pubescens*, *Deschampsia caespitosa*, *Festuca glauca*

'Eliash Blue, *F. glauca* 'Eisvogel', *Festuca virginata*, *Hierochloë odorata*, *Holcus lavidus*, *H. mollis*, *Koehleria splendens* i *K. pyramidata*. Znacznie rzadziej pojawiała się *Laingia psammae* na *Calamagrostis acutiflora* 'Karl Föster', *C. epigejos*, *C. stricta*, *C. pseudophragmites* i *Festuca glauca* 'Eliash Blue' oraz *Hyalopterus pruni* na *Phragmites australis* f. *variegata*. Pozostałe gatunki mszyc: *Atheroides doncasteri*, *A. serrulatus*, *Rungisia elegans*, *Metopolophium dirhodum*, *Myzus (Nectarosiphon) persicae* i *Rhopalosiphum insertum* były nieliczne.



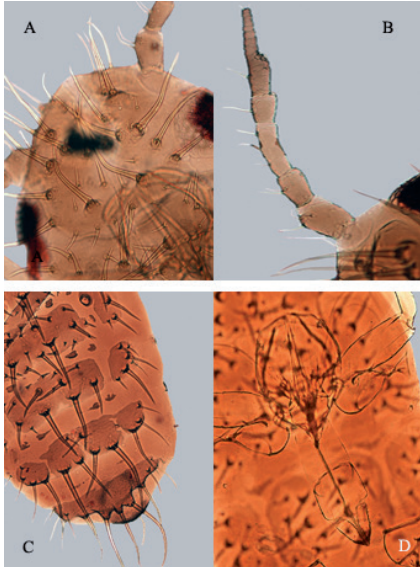


Figure 1 *Atheroides doncasteri* - apterous female; A - head; B - antenna; C - dorsum; D - rostrum

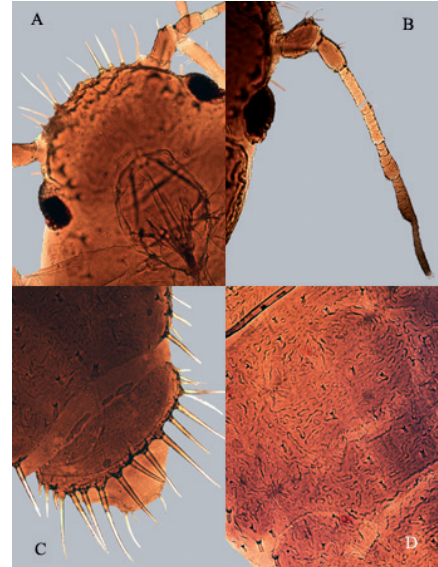


Figure 2 *Atheroides serrulatus* - apterous female; A - head; B - antenna; C - abdominal tergite VIII and cauda; D - cuticular surface with rugose sculpture

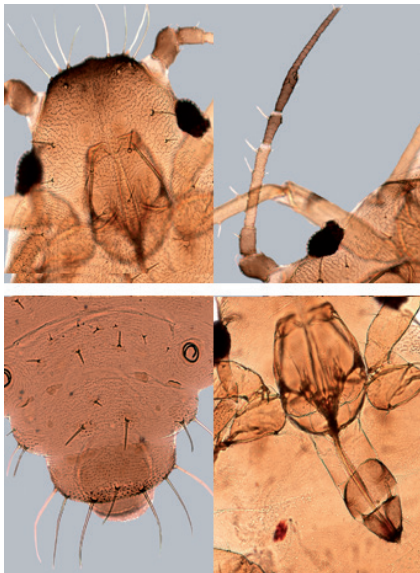


Figure 3 *Laingia psammae* - apterous female; A - head; B - antenna; C - dorsum; D - rostrum

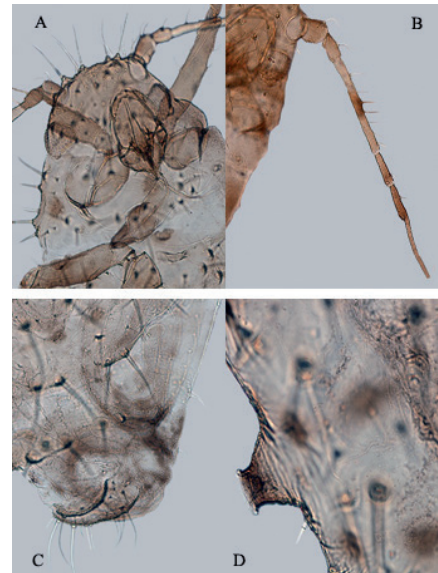


Figure 4 *Rungisia elegans* - apterous female; A - head; B - antenna; C - cauda; D - siphunculi

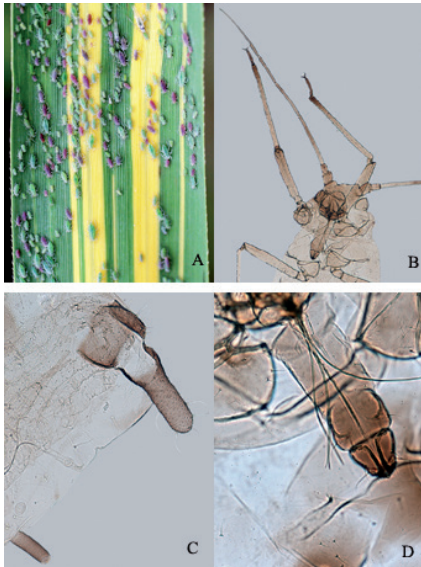


Figure 5 *Hyalopterus pruni* - apterous female; A - aphid colony; B - head, and antenna; C - cauda and siphunculi; D - rostrum

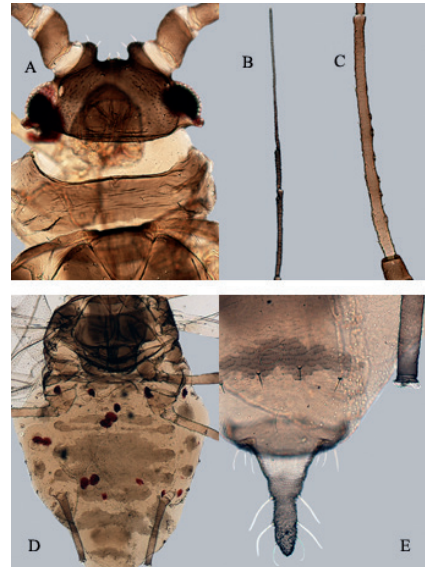


Figure 6 *Myzus (Nectarosiphon) persicae* - alate female; A - head; B - antennal segment V and VI; C - antennal segment III; D - dorsum; E - cauda

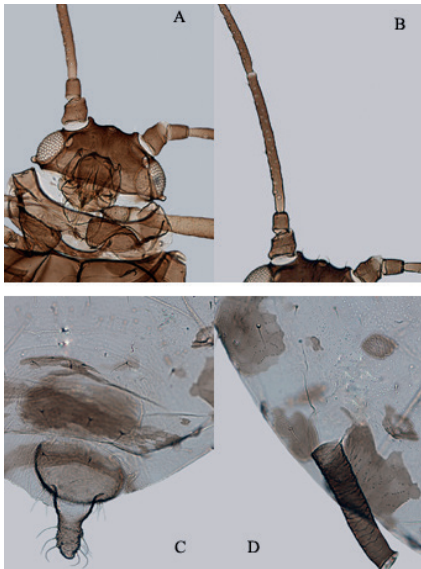


Figure 7 *Rhopalosiphum padi* - alate female; A - head; B - antennal segment III; C - cauda; D - siphunculi

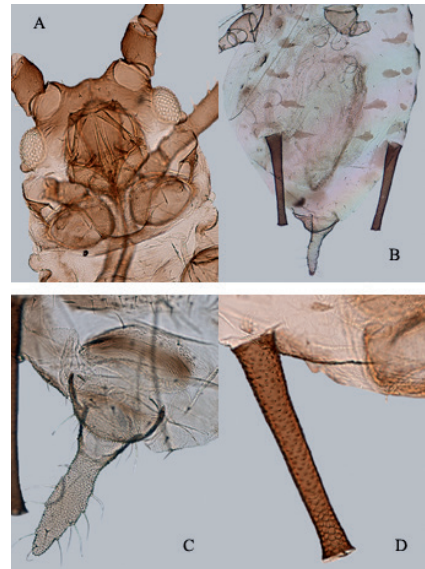


Figure 8 *Sitobion avenae* - alate female; A - head; B - dorsum; C - cauda; D - siphunculi