

Aphids /Hemiptera, Aphidoidea/ on ornamental plants under covers

GABRIEL ŁABANOWSKI

Research Institute of Pomology and Floriculture
Pomologiczna 18, 96-100 Skierniewice, Poland
glabanow@insad.pl

Introduction

Aphids are common and they are therefore harmful pests occurring on pot plants and cut flowers in glasshouses. Apart from common aphid species which have been observed for a long time there are also some rare species which came with imported plants. In Poland, aphids on ornamental plants in glasshouses were studied by CICHOCKA & GOSZCZYŃSKI (1975) and CICHOCKA (1992), as well as by BURDAJEWICZ & BOREJSZA-WYSOCKI (1978), whereas aphids in green houses of the Botanical Gardens were revised by ACHREMOWICZ *et al.* (1986).

Material and methods

Observations of aphids occurring on ornamental plants were carried out in commercial glasshouses and plastic tunnels during 1981-2007 all over Poland, especially in the Mazowieckie and Łódzkie provinces at a varied frequency, ranging from once a week to three times a year. The research sites where the observations are carried out were marked in the text using the following letter symbols: Mazowieckie province: A – Horticultural Farm, Stara Miłosna near Warsaw, B – Horticultural Farm, Anin near Warsaw, C – Botanical Garden in Warsaw, D – Botanical Garden in Powsin near Warsaw, E – Horticultural Farm Tomala in Wola Warszawska, F – Horticultural Farm in Piastów,

G – Horticultural Farm Pietrzak in Rembertów near Grójec, H – Horticultural Plant Breeding Station in Wieliszewo near Nowy Dwór Mazowiecki, I – Horticultural Farm Baćmaga in Radom, Łódzkie province: J – experimental glasshouses and tunnels of the Research Institute of Pomology and Floriculture in Skierniewice, K – Experimental Glasshouse Research Department of the Research Institute of Vegetable Crops and Horticultural Farm Tomaszewski, L – Horticultural Farm Metalowiec in Skierniewice, M – Horticultural Farm in Szymanowice near Łowicz, N – Experimental Glasshouse Department in Pabianice near Łódź, Kujawsko-Pomorskie province: O – Horticultural Plant Breeding Station in Waganiec near Toruń, Wielkopolska province: P – glasshouses and tunnels of the Nursery of Ornamental Shrubs Zymon in Tłokinia Wielka near Kalisz, Silesia province: R – Horticultural Farm in Częstochowa, S – Nursery Farm in Będzin, Lubelskie province: T – Nursery Farm Młynki near Puławy, Małopolska province: U – Horticultural Plant Breeding Station in Zaborze near Oświęcim.

Aphids, along with plant parts were brought to a laboratory where under a stereoscopic microscope the permanent slides with aphids in Hoyer liquid were made.

Aphid were identified to species using identification keys of BLACKMAN & EASTOP (2000; 2006) and of HEIE (1986; 1992; 1994; 1995). Latin names of aphids were applied according to the “Checklist of Animals of Poland” („Wykaz Zwierząt Polski”) edited by RAZOWSKI (1990), while plant names were applied according to the Great Plant Encyclopedia. Diagnostic features of particular aphid species are provided according to MILLER & STOETZEL (1997) and identification keys.

Review of Aphid Species

Aphis fabae Scopoli, 1763 – black bean aphid

Collected material: *Anthurium scherzerianum* (R, 23.02.1991; J, 3.10.1996), *Chrysanthemum grandiflora* (J – plastic tunnel, 26.06, 24.07. and 15.09.1981), *Gerbera jamesonii* (J, 14.07.1997), *Impatiens walleriana* (C, 10. 06. 2002), *Kalanchoe blossfeldiana* (H, 9.04.1992), *Plectranthus coleoides* (L, 28.06.2004).

This aphid is known from its presence on crops in the field as well as under covers, and also on wild-growing plants. In Polish glasshouses so far it has been confirmed to occur on 27 plant taxons grown under covers of 19 botanic families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975). In comparison with domestic data in references the range of host plants has been extended by 4 species (Tab. 1).

Diagnostic features:

wingless virginoparae 1.8-2.6 mm long; processus terminalis (antennal appendix) 2.7-3 times as long as the base of VI segment, on the III segment lack of secondary rhinaria, hairs on it longer than its diameter; siphunculi dark, barrel-shaped, 3-3.5 times as long as their width; cauda dark with 8-12 marginal- and 2-5 dorsal hairs;

winged virginoparae 1.9-2.4 mm long; antennal appendix of the VI segment 2.5-3.25 times as long as its base; on the III segment of antennae 6-16 secondary rhinaria of varied size, on IV segment 0-7; hairs on III segment are longer than its diameter; siphunculi dark and barrel-shaped, 3.25-4.5 times as long as their width, the cauda dark, finger-like with 8-12 marginal- and 0-4 dorsal hairs; abdomen with round lateral sclerites and with longitudinal sclerites in the middle (MILLER & STOETZEL, 1997).

***Aphis gossypii* Glover, 1877 – melon and cotton aphid**

Collected material: *Aphelandra squarrosa* (J, 28.05.1991), *Begonia elatior* (L, 10.07.1996), *Chrysanthemum grandiflora* (J, 6.07.1999), *Cordylina petiolaris* 'Compacta' (K, 8.03.2007), *Cordylina terminalis* (K, 4.07.1997; 8.09.1998), *Cuphea hyssopifolia* (J, 16.12.1994), *Cyclamen persicum* (K, 5 and 20.05.1997), *Dieffenbachia maculata* (I, 21.02.1991; G, 15.01. and 16.08.1996), *Epipremum pinnatum* (L, 21.07.1997), *Fatsyhedera lizei* (J, 4.07.1997); *Ficus benjamina* (K, 21.05.1992), *Fuchsia x hybrida* (S, 5.06.1997; T, 30.06.1999), *Hatiora salicornioides* (I, 8.02.2002), *Hedera helix* (I, 26.02.1996; 6.02.2006), *Hibiscus rosa-sinensis* (K, 20.06.1996 and 15.12.2003), *Impatiens* 'New Guinea' (P, 13.05.1997; J, 4.08.2003), *Ixora coccinea* (K, 23.11.1998; I, 24.09. and 11.11.2007), *Kalanchoe blossfeldiana* (K, 24.09.1997; 8.01.2004), *Lilium orientale* (J, 3.09.1993), *Pilea cadierei* (L, 23.10.2000), *Polyscias fabiana* (K, 30.03.1998), *Radermachera sinica* (K, 14.08.1997; 3.08.1998; 1.09.1999; H, 14.08.1977), *Rosa* spp. (J, 25.09.2007), *Saxifraga stolonifera* (K, 29.01.1996), *Schefflera arboricola* (K, 16.11.1990; 19. and 24.09.1997; I, 28.09. and 11.10.1995; 23.03. and 19.09.2007), *Senecio macroglossus variegatus* (K, 8.01.1991; 10.12.1998), *Syngonium podophyllum* (L, 20.05.1997; 23.10.2000).

In Poland it was collected for the first time in glasshouses twice in 1969 from cucumber and since the beginning of the 1990s it has been known as a harmful pest of glasshouse crops, cucumber in particular (CICHOCKA, 1994; CICHOCKA & GOSZCZYŃSKI, 1994; GOSZCZYŃSKI & CICHOCKA, 1994).

Diagnostic features:

wingless virginoparae 1.4-1.7 mm long, forehead in a sinusoid shape with a median tubercle; 6-segment antennae reaching the middle of their body or slightly longer, antennal appendix 2 – 3.25 times as long as the base of the VI segment; III segment without rhinaria; hairs on this segment shorter than its diameter;

dark siphunculi, narrowing with a scaly structure, 1.3 – 2 as long as the cauda; the cauda light or darkened, cone-shaped with 6 (4-6) marginal hairs; winged virginoparae 1.4-2 mm long, on III segment 4 – 9 secondary rhinaria; on IV segment 0 – 1 rhinaria, hairs on III segment of the antennae shorter than its diameter; dark siphunculi, barrel-shaped, subapical swollen, 3-5 times as long as wide; cauda light, finger-like with 6 (4 – 6) marginal hairs; on abdominal tergites of II and IV marginal sclerites and large sclerite behind the siphunculi (MILLER & STOETZEL, 1997).

Table 1. Host plants for the common aphid species, so far not referred to in Polish research papers

Aphid species	Host plant
<i>Aphis fabae</i>	Araceae: <i>Anthurium scherzerianum</i> Balsaminaceae: <i>Impatiens walleriana</i> Crasullaceae: <i>Kalanchoe blossfeldiana</i> Lamiaceae: <i>Plectranthus coleoides</i>
<i>Aulacorthum solani</i>	Araceae: <i>Anthurium andreaeanum</i> , <i>Dieffenbachia maculata</i> , <i>Syngonium podophyllum</i> Araliaceae: <i>Fatsia japonica</i> , <i>Hedera helix</i> Asteraceae: <i>Calceolaria x hybrida</i> , <i>Callistephus chinensis</i> , <i>Gynura aurantiaca</i> , <i>Senecio cinerarius</i> Begoniaceae: <i>Begonia elatior</i> Euphorbiaceae: <i>Euphorbia pulcherrima</i> Geraniaceae: <i>Pelargonium peltatum</i> Gesneriaceae: <i>Saintpaulia ionantha</i> , <i>Streptocarpus x hybridus</i> , <i>Synningia x hybrida</i> Liliaceae: <i>Tulipa spp.</i> Moraceae: <i>Ficus elastica</i> Nyctaginaceae: <i>Pisonia umbelifera</i> Onagraceae: <i>Fuchsia x hybrida</i> Saxifragaceae: <i>Saxifraga stolonifera</i> Solanaceae: <i>Petunia x hybrida</i>
<i>Macrosiphum euphorbiae</i>	Araceae: <i>Schefflera arboricola</i> Asteraceae: <i>Gerbera jamesonii</i> , <i>Gynura aurantiaca</i> Liliaceae: <i>Freesia x hybrida</i> , <i>Tulipa spp.</i>
<i>Nectarosiphon ascalonicus</i>	Araceae: <i>Schefflera arboricola</i> Liliaceae: <i>Freesia x hybrida</i> Onagraceae: <i>Fuchsia x hybrida</i>
<i>Nectarosiphon persicae</i>	Acanthaceae: <i>Strobilanthes atropurpureas</i> Agavaceae: <i>Cordyline petiolaris</i> , <i>Yucca elephantipes</i> Amaranthaceae: <i>Celosia argenta var. crista</i> Araliaceae: <i>Hedera helix</i> , <i>Polyscias fabiana</i> , <i>Polyscias 'Ming'</i> , <i>Schefflera arboricola</i> Bignoniaceae: <i>Rademachera sinica</i> Celastraceae: <i>Euonymus fortunei</i> Crassulaceae: <i>Kalanchoe blossfeldiana</i> Gesneriaceae: <i>Aeschynathus radicans</i> Myrsinaceae: <i>Ardisia creanata</i> Nyctaginaceae: <i>Pisonia umbellifera</i> Orchidaceae: <i>Epidendrum difforme</i> , <i>Oncidium flexuosum</i> Rubiaceae: <i>Ixora coccinea</i> Urticaceae: <i>Pilea cadierei</i>
<i>Neomyzus circumflexus</i>	Araceae: <i>Anthurium andreaeanum</i> , <i>Syngonium podophyllum</i> Ericaceae: <i>Rhododendron simsii</i> Musaceae: <i>Musa cavendishii</i>

***Aphis hederæ* Katlenbach, 1843 – ivy aphid**

It is present mostly on ivy which grows on buildings, it is rarely present in glasshouses.

Collected material: *Hedera helix* (K, 29.07.1993; D, 6.05.1998).

It is a monoecious aphid of holocyclic development, but its parthenogenetic reproduction may be permanent during winter when present under covers (HEIE, 1986).

Diagnostic features:

wingless virginoparae 1.4-2.5 mm long, they have well developed forehead tubercles, the forehead gibbous, antennal appendix 1.8 – 3.6 times longer than base segment VI, on III segment of the antennae 0-19 small secondary rhinaria, on IV segment 0-5, on V segment 0-1 rhinaria; siphunculi 1.5-2.3 times the length of cauda, subapical swelling; cauda short with 8-18 hairs; abdomen with sclerites little, marginal, behind siphunculi and between segments VI-VIII, on dorsal reticular;

winged virginoparae with large marginal and sclerites behind the siphunculi, as well as a few small ones in the middle; on III segment 8-25 secondary rhinaria, on IV segment 0-13, on V segment 0-4 rhinaria (HEIE, 1986).

***Aphis nerii* Boyer de Fonscolombe, 1841 – milkweed-oleander aphid**

Collected material: *Nerium oleander* imported from Italy (K, 1.06.2007).

It comes from the Mediterranean region, where it is present on plants of the Asclepiadaceae and Apocynaceae family, but mainly on *Nerium oleander* (McAUSLANE, 2001). Occasionally, it settles plants of other families, such as *Euphorbiaceae*, *Asteraceae*, *Convolvulaceae*. It is widespread in the tropical and subtropical zone of the Old and New Continent, including the Pacific ocean islands (BLACKMAN & EASTOP, 2000). In Poland, so far it has not been observed.

Diagnostic features:

wingless virginoparae 1.5-2.6 mm long; antennal appendix of VI antennae segment is 3.4-4.7 the length of its base; siphunculi and cauda black, siphunculi 1.7-2.7 times as long as the cauda;

winged virginoparae 2.2 mm long; their antennae reach beyond the mid of their body, cauda with 9-18 hairs (BLACKMAN & EASTOP, 2000).

***Aphis spiraeicola* Patch, 1914 = *A. citricola* van der Goot, 1912 – spiraea aphid = green citrus aphid**

Collected material: *Kalanchoe blossfeldiana* (H, 9.04.1992), plants imported from Costa Rica – *Polyscias fabiana* (K, 30.03.1998) and *Polyscias* 'Ming' (K, 29.04.2004), *Schefflera arboricola* (K, 24.09.1997; 1.03. and 15.11.1999; 16.06.2000; 12.04. and 17.05.2002).

It probably comes from the Far East, in North America it has been known since 1907, it was brought to the Mediterranean region around 1939, to Africa in 1961, Australia 1926 and New Zealand in 1931 (BLACKMAN & EASTOP, 2000). In Poland it has not been so far recorded. In Europe it has been observed in many countries, including Croatia, France, Greece, Italy, the Netherlands, Switzerland, Great Britain (Distribution Maps of Plant Pests, 2001). In Brazil it is known to occur on the following plants: *Allamanda blanchetti*, *Bougainvillea spectabilis*, *Cordyline terminalis*, *Gladiolus hortulanus*, *Hibiscus syriacus*, *Pittosporum tobira*, *Polyscias guilfoylei*, *Rosa spp.*, *Viburnum spp.* (PERONTI, 2002) and *Ixora coccinea* (IMENES *et al.*, 2002).

Diagnostic features:

wingless virginoparae 1.2-2 mm long; their antennae reaching the middle part of their body or slightly longer; III segment of antennae without secondary rhinaria; antennal appendix 2 or 3 times as long as the base of VI segment; abdomen with no sclerites; siphunculi and cauda dark with 5-6 pairs of hair; winged virginoparae 1.4-1.8 mm long, on III and IV segment there are 4-10 and 0-4 secondary rhinaria, respectively; abdomen with marginal sclerites on tergites II-IV, on tergite VIII there is a narrow transverse sclerite, behind siphunculi small sclerites, siphunculi 1.1-1.4 times as long as the cauda; cauda finger-like, narrow at the base with 4-6 pairs of hairs (MILLER & STOETZEL, 1997).

***Aulacorthum solani* (Kaltenbach, 1843) – foxglove aphid**

Collected material: *Anthurium andreanum* (J, 11.01. and 21.11.2001; E, 1.02.2003), *A. scherzeranum* (R, 23.02.1991; E, 5.10.2005), *Asparagus densiflora* (J, 1.02.2002), *Begonia elatior* (L, 15.06.2004; J, 27.12.1995), *Calceolaria x hybrida* (O, 8.05.1991; H, 3.01.1986), *Callistephus chinensis* (J, 27.02.2007), *Chrysanthemum grandiflora* (J, 28.11.2007), *Dieffenbachia maculata* (J, 21.02.1991), *Euphorbia pulcherrima* (J, 27.11.2007), *Fatsja japonica* (O, 8.05.1991), *Ficus elastica* (R, 23.01.1998, K, 6.04.1998), *Freesia x hybrida* (I, 26.11.1985 and 4.04.1986; M, 28.01.1988), *Fuchsia x hybrida* (J, 11.04. and 19.05.1997; 21.08.1998; D, 6.05.1998; H, 23.01. and 28.02.1998), *Gynura aurantiaca* (O, 26.05.1986), *Hedera helix* (D, 6.05.1998; I, 8.02.2006), *Pelargonium peltatum* (K, 14.06.1987; 26.06.1989; 5.05.1997; 17.05.2002; 16.02.2006; 24.09.2007), *Pelargonium zonale* (R, 5.07.2000), *Petunia x hybrida* (N, 28.04.1998; 18.05.1998; 19.05.1999; H, 24.03.1997; K, 7.06.1997; 20.01.2001), *Pisonia umbellifera* (L, 17.08.1998), *Saintpaulia ionantha* (N, 5. and 17.10.1990; M, 28.01.1988), *Saxifraga stolonifera* (K, 17.08.1995), *Senecio cinerarius* (K, 8.01.1991; H, 15.12.1993), *Streptocarpus x hybridus* (O, 15.06.1987), *Syngonium podophyllum* (L, 9.06 and 23.10. 2000), *Synningia x hybrida* (O, 15.06.1987), *Tulipa spp.* (J, 3.03.2007).

In Polish glasshouses so far it has been recorded on 25 taxons from 15 botanical families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975; CICHOCKA, 1992). In comparison with the previously known host plants 21 new species have been indexed (Tab. 1).

Diagnostic features:

wingless virginoparae 1.8-3 mm long; forehead tubercles well developed parallel to one another; antennal appendix 5-6 times as long as the base of VI segment; on III segment of antennae 1-6 secondary rhinaria at the base; siphunculi light with a dark top and large flange, at the end 2 rows of polygons, cauda light, finger-like with 6 (4-6) marginal hairs and one hair on the upper side;

winged virginoparae 2-3 mm long; the antennal appendix of VI segment 5-6 times as long as its base; on III segment 8-13 secondary rhinaria; siphunculi light with a dark reticular on the top; cauda light, finger-like with 6 (4-6) marginal hairs and one hair on the top (MILLER & STOEZEL, 1997).

***Cavariella aegopodii* (Scopoli, 1763) – carrot aphid**

Collected material: aphids collected in a tunnel from *Hedera helix* (Pruszków, 19.06.1998).

It has been recorded on *Hedera helix* by BLACKMAN & EASTOP (2006), by CICHOCKA it has been observed to have been dragged on parsley (*Petroselinum*) roots meant for force (CICHOCKA, 1992).

Diagnostic features:

wingless virginoparae 1.5-2.8 mm long; antennae 0.4 times as long as their body, antennal appendix of VI segment 0.64-1.25 times as long as its base; sclerites twice long as the cauda, swelled; the cauda with 5 hairs; supracaudal process above the cauda 0.75-1.05 times as long as the cauda;

winged virginoparae with a dark spot on abdomen; antennae 0.6 times as long as the body, antennal appendix 0.85-1.5 times as long as its base, on III segment 14-32 secondary rhinaria (HEIE, 1992).

***Illinoia azaleae* (Mason, 1925) – azalea aphid**

Collected material: *Rhododendron x simsii* (Braniewo, 24.06.1998; Kostantynów Łódzki, 26.05.1994; Skierniewice, 15.03.2001 and 4.01.2007).

This aphid was know earlier from its presence on *Rhododendron x simsii* (ACHREMOWICZ, 1978).

Diagnostic features:

wingless virginoparae 1.9-2.7 mm long; antennae 1.1-1.5 times the length of the body, antennal appendix 4.5-6 times the length of base, on III segment of antennae 1-6 rhinaria at the base, hairs on III segment are 0.5 times the size

of its diameter; siphunculi 2.2-2.5 times the length of cauda reticulated by the top, slightly swollen; tail with 7-9 hairs; winged virginoparae about 2 mm long; on III segment of antennae 10-21 secondary rhinaria placed in a row (HEIE, 1995).

Longicaudus trirhodus (Walker, 1849)

Collected material: *Rosa x hybrida* (Rembertów near Grójec, 2.06.1998).

In Poland it is collected in glasshouses also from *Epiphyllum*=*Schlumbergera truncatum* along with *Rosa* spp. (CICHOCKA & GOSZCZYŃSKI, 1975). It is also observed in parks on *Rosa canina* in May and on *Rosa rugosa* from May until July (JAŚKIEWICZ, 1988; 2004).

Diagnostic features:

wingless virginoparae 1.3-2.4 mm long; antennae 0.5-0.7 times as long as the body, antennal appendix 1-1.3 times the size of its base; siphunculi very short, 0.3 times as long as the cauda, triangular; cauda very long, finger-like with 14-19 hairs;

winged virginoparae 2.3-2.5 mm long; their abdomen with a dark sclerite in the central part and with marginal sclerites; antennae 0.8 times as long as their body, on III segment 45-103 secondary rhinaria all over the surface (HEIE, 1992).

Macrosiphum euphorbiae (Thomas, 1878) – **potato aphid**

Collected material: *Chrysanthemum grandiflora* (J, 7.04.1999), *Dianthus caryophyllus* (J – tunnel, 21.02.1991), *Fuchsia x hybrida* (J, 21.08.1998), *Gerbera jamesonii* (J, 19.07.1993), *Gynura aurantiaca* (H., 15.12.1993), *Rosa* spp. (J, 6.11.1981; 12.03.1984; 20.11.1992; J-plastic tunnel, 15.06., 29.06. and 18.09.1981; 19.05.1989; 31.07.1990; 8.05., 5.06. and 7.07.1992; 11.06. and 14.07.1999; 8.07.2002), *Schefflera arboricola* (O, 23.07.1987; K, 16.02.1990).

So far this aphid has been noted in glasshouses on 11 taxons of plants from 9 botanical families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975). As a result of observations, the range of host plants has been extended by 5 new species (Tab. 1).

Diagnostic features:

wingless virginoparae 2.7-3.5 mm long; tubercles forehead well developed and arranged divergently; antennal appendix 5-8.3 times as long as its base; on III segment of antennae at the base there are 3-6 secondary rhinaria; siphunculi light, tubular, 6-7.5 times as long as wide at the base, with reticulum of polygons at the top; cauda light with 8-10 marginal hairs and 1-2 hairs on the upper side;

winged virginoparae 2.5-3 mm long; antennal appendix 5.3-7 times as long as its base; on III segment 13-18 secondary rhinaria arranged in a row; on the abdomen around siphunculi a few rows of polygons forming reticulum; siphunculi light, apical darker near the polygonal reticulum; cauda is light, finger-like with 8-10 marginal hairs and 1-2 hairs on the upper side (MILLER & STOETZEL, 1997)

***Macrosiphum rosae* (Linnaeus, 1758) – rose aphid**

Collected material: *Rosa x hybrida* (J-plastic tunnel, 30.06.1987; 28.05.1991; 17.06.1994; 19.05.1998; 11.06.1999).

It commonly appears on roses in the field. It is observed rarely under covers (CICHOCKA & GOSZCZYŃSKI, 1975; CICHOCKA, 1992).

Diagnostic features:

wingless virginoparae 2.7-4.2 mm long; antennae are 0.9-1.2 times as long as their body, antennal appendix 5-6 times as long as the base, on III segment of antennae 10-35 rhinaria arranged all over the surface at the base; siphunculi are 1.9-2.4 times as long as the cauda, bent outside and reticular at the end; cauda with 10-14 hairs;

winged virginoparae have black marginal sclerites behind the siphunculi, in front of siphones, and between the segments; on III segment of antennae there are 31-68 secondary rhinaria; siphunculi 2.3-2.9 times as long as the cauda (HEIE, 1994).

***Macrosiphoniella sanborni* (Gillette, 1908) – chrysanthemum aphid**

Collected material: *Chrysanthemum grandiflora* (J-plastic tunnel, 16.09.1982; J, 29.07.1989).

In Poland it is known mainly as a pest on chrysanthemum which is grown in plastic tunnels and in glasshouses (ACHRAMOWICZ *et al.*, 1986; BARANOWSKI, 1976; CICHOCKA & GOSZCZYŃSKI, 1975).

Diagnostic features:

wingless virginoparae are 1.7-2.6 mm long; tubercles forehead well developed, arranged divergently; antennae are dark except for III segment with 11-24 secondary rhinaria, on IV segment with 0-2 rhinaria; antennal appendix 4.5-5 times as long as the base; siphunculi dark, conically with a reticulum situated in the middle of its length; cauda dark, finger-like with 8-10 marginal hairs and 3-7 hairs on the upper side;

winged virginoparae 1.8-2.8 mm long; antennal appendix 4.25-5.25 times as long as the base of VI segment; III segment of antennae with 18-30 secondary rhinaria, IV segment with 0-13 rhinaria; siphunculi, gradually narrowing with a reticulum situated at around the middle of their length; cauda dark and finger-like with 8-10 marginal hairs and 3-5 on the upper side (MILLER & STOETZEL, 1997).

***Metopolophium dirhodum* (Walker, 1948) – rose-grain aphid**

Collected material: *Rosa* spp. (J, 26.06.1981)

In Poland so far it has been reported only on *Rosa* spp. (CICHOCKA & GOSZCZYŃSKI, 1975; CICHOCKA, 1992; JAŚKIEWICZ, 2004; Kmieć, 2006).

Diagnostic features:

wingless virginoparae 3 mm long; antennae about 0.6 times as long as their body, antennal appendix 2.5-3.2 times as long as its base and much shorter than III segment; on III segment 1-3 small rhinaria at the base; siphunculi 1.5-1.7 times as long as the cauda; the cauda with 9-13 hairs;

winged virginoparae 1.6-3.3 mm long; antennae 0.8-1 times as long as their body, antennal appendix 2.7-4.3 times as long as its base; on III segment of antennae 14-29 secondary rhinaria arranged in a row; siphunculi 1.4-2 times as long as the cauda; the cauda with 8-15 hairs (HEIE, 1994).

***Nectarosiphon ascalonicus* Doncaster, 1946 – shallot aphid**

Collected material: *Chrysanthemum grandiflora* (K, 2.11.1999), *Freesia x hybrida* (I, 26.05. and 26.11. 1985), *Fuchsia x hybrida* (J, 11.04.1997; 7.10.1998), *Schefflera arboricola* (R, 9.12.1995).

In Polish glasshouses so far it has been recorded on 18 taxons of plants from 10 botanical families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975). On the basis of the research, the list of host plants has been extended by 3 species (Tab. 1).

Diagnostic features:

wingless virginoparae 1.5-2.1 mm long; forehead tubercles well developed, parallel in arrangement; light antennae except for the top of segment V and segment VI completely black; antennal appendix 2.5-3.25 times as long as the basis of the segment; and on segment III no secondary rhinaria; siphunculi dark, shorter than III segment of antennae, slightly swollen in the apical part; the cauda finger-like with 4 (4-6) marginal hairs;

winged virginoparae 2-2.6 mm long; antennae dark, antennal appendix less than 3 times as long as the basis of VI segment; on III segment of antennae 25-35 or 11-13 secondary rhinaria; on IV segment there are 7-24 rhinaria or 0-1 rhinaria; in the middle of the abdomen a large, dark sclerite; siphunculi dark, swollen; the cauda finger-like with 6 (6-8) marginal hairs (MILLER & STOETZEL, 1997).

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

Collected material: *Aeschynanthus radicans* (H, 24.03.1997), *Anthurium andreaeanum* (E, 5.10.2005), *A. scherzeranum* (J, 3.10.1996; I, 6.04.2002; E, 1.02.2003), *Ardisia crenata* (J, 21.06.1991), *Asparagus densiflora* (N, 29.01.

and 10.02.1981; F, 5.04.1984), *Bougainvillea glabra* (I, 12.11.2991), *Celosia argenta* var. *crista* (J, 25.09.1985), *Chrysanthemum grandiflora* (J, 26.06.1981; 24.10.1985), *Cordyline petiolaris* 'Compacta' (K, 8.03.2007), *Dianthus caryophyllus* (B, 18.02.1981), *Epidendrum difforme* (K, 28.04.2005), *Euonymus fortunei* (H, 24.03.1997; K, 26.03.1997 and 16.02.2005) *Freesia x hybrida* (J, 14.01.1986; I, 16.05.1991), *Gerbera jamesonii* (A, 18.02.1981), *Hedera helix* (J, 6.05.1996), *Ixora coccinea* (I, 25.02.2007), *Kalanchoe blossfeldiana* (K, 24.09.1997; 8.01.2004; 16.03.2006), *Mandevilla laxa* (U, 30.05.2007), *Muehlenbeckia complexa* (G, 24.01.1997), *Oncidium flexuosum* (K, 1.06.2007), *Pilea cadierei* (L, 31.07.2000); *Pisonia umbellifera* (L, 6.12.2001), *Polyscias fabiana* (K, 4.03.1997; 2.02.1998), *Polyscias* 'Ming' (K, 4.03.1997; 10.08.1998; 30.03.1999), *Radermachera sinica* (E, 3.08.1998), *Schefflera arboricola* (G, 6.04.1998), *Strobilanthes atropurpureas* (K, 20.05.1997), *Yucca elephantipes* (K, 25.11.2006).

It is the most common aphid of annual plants and trees in natural environment and under covers. So far in Poland it has been indexed on 54 taxons of crop plants in glass houses from 32 botanical families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975; CICHOCKA, 1992). Although the number of the already known host plants was high, it still has been extended by 18 species (Tab. 1).

Diagnostic features:

wingless virginoparae 1.5-2.2 mm long; forehead tubercles well developed, convergently; antennae reaching beyond the middle part of the body, antennal appendix 2.75-3.25 times as long as the base of segment VI of the antennae; on III segment without secondary rhinaria; siphunculi light with a dark top, cylindrical, 5-7 times as long as their width slightly swollen in their final part; cauda light or darkened, 0.4-0.5 times as long as the siphunculi, finger-like with 6 marginal hairs;

winged virginoparae 1.7-2.3 mm long; antennae as long as their body, antennal appendix 3-3.75 times as long as the base of VI segment, on III segment 10-13 secondary rhinaria arranged in a row; siphunculi light with a dark top, slightly swollen in the middle, 4.75-8 times as long as wide; cauda light or darkened, finger-like with 6 marginal hairs; on the abdomen in the middle a large, dark sclerite, marginal sclerites large, small sclerites behind the siphunculi (MILLER & STOETZEL, 1997).

Neomyzus circumflexus (Buckton, 1876) – crescentmarked lily aphid

Collected material: *Anthurium andraeanum* (N, 25.11.1985), *Syngonium podophyllum* (L, 26.10.1990), *Cyclamen persicum* (N, 2.03.1985), *Musa cavendishii* (D, 6.05.1998), *Rhododendron simsii* (P, 13.05.1997).

In Polish glasshouses so far it has been observed on 42 taxons of plants from 24 botanical families (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI,

1975; CICHOCKA, 1992). Such a numerous range of hosplants was extended by further 4 species.

Diagnostic features:

wingless virginoparae 1.7-2.2 mm long; the dorsal abdominal dark sclerite horseshoe shaped; antennal appendix of VI segment is 4-5 times as long as its base; on III segment 1 (0-3) secondary rhinaria; siphunculi light, cylindrical; cauda light, finger-like with 4 (4-6) marginal hairs;

winged virginoparae 1.4-2.2 mm long; antennal appendix 4.3-7.3 times as long as the base of VI segment, on III segment 10-17 secondary rhinaria, on IV segment 0-1 rhinaria; siphunculi light, cylindrical, 4-7 times as long as wide; cauda light, finger-like with 4 marginal hairs and 1-2 hairs on the upper side (MILLER & STOETZEL, 1997).

***Rhopalosiphum padi* (Linnaeus, 1758) – bird cherry-oat aphid**

Collected material: *Cyperus alternifolius* (K, 8.09.1997)

In Polish glasshouses so far it has been recorded only on wheat seedlings which were used as a substrate for cucumber cultivation (CICHOCKA, 1992).

Diagnostic features:

wingless virginoparae 1.1-2.5 mm long; dorsal abdominal reticulation constructed out of processes; antennae 0.5 times as long as the body, antennal appendix is 3.1-5.2 times as long as its base siphunculi almost twice as long as the tail, slightly swelled at the top; cauda tongue-shaped with 4-5 hairs;

winged virginoparae with dark marginal sclerites and large sclerites behind the siphunculi; antennae 0.7-0.8 times as long as their body, on the III segment there are 12-33 secondary rhinaria, on IV segment there are 1-11, and on V segment 0-6 secondary rhinaria; siphunculi 1.4-2 times as long as cauda, cauda with 4-7 hairs (HEIE, 1992).

***Rhopalosiphum rufiabdominalis* (Sasaki, 1899) – rice root aphid**

Collected material: it was collected from the bulb bases of *Freesia* spp. imported from the Netherlands (Waganiec near Toruń, 8.04.1988).

It is present in Asia, Africa, Australasia and Pacific Ocean Islands, North and South America, in Europe it is only recorded in the Azores and in Portugal (DISTRIBUTION MAPS OF PLAVIT PESTS, 1971). So far it has not been recorded in Poland but known in the Netherlands as a dangerous pest of freesia (SABELIS, 2001), previously it was brought to glasshouses on *Dieffenbachia* (REITZEL, 1973 after HEIE, 1986), and on zucchini in Italy (CIAMPOLINI *et al.*, 1993).

Diagnostic features:

wingless virginoparae 1.2-2.8 mm long; antennae V-segmental, and about 0.65 times as long as their body, antennal appendix of V segment 4.7-6.5 times as

long as its base, on III segment the hairs 4-5 times as long as its diameter; siphunculi about 2 times as long as cauda, cylindrical with a large flange; the tail with 4-6 hairs;

winged virginoparae antennae usually V-segmental, antennal appendix 5.5-6.5 times the size of its base, on III segment of V-segmental antennae 3-35 secondary rhinaria, on IV segment 0-4 and on III segment of VI-segmental antennae 11-22 secondary rhinaria, on IV segment 2-12 rhinaria and on V segment – 0-4 rhinaria; siphunculi semi-cylindrical or swollen (HEIE, 1986).

***Schizaphis rotundiventris* (Signoret, 1860) – oil palm aphid**

Collected material: *Dypsis* = *Chrysalidocarpus lutescens* (Skierniewice, 28.08. and 15.12.2003; 10.11.2004; 27.07.2007).

So far it has not been recorded in Poland. This aphid originates from the tropics and subtropics of the Old Continent, but it was observed in the glasshouses in Florida, where it settled *Cyperus papyrus*. Apart from that it settled other plants from the Cyperaceae family: *Cyperus esculentus*, *C. rotundus*, *Fimbristylis* spp., *Kyllingia* spp., *Mariscus* spp. and from the Palmae family: *Cocos nucifera*, *Elaeis guineensis* (BLACKMAN & EASTOP, 2000; HALBERT *et al.*, 2000). In Europe it was collected in 1972 in Portugal (HARTEN, 1975).

Diagnostic features:

wingless virginoparae 1.2-1.7 mm long; cuticle with reticulated structure; antennal appendix 5.6-7.1 times as long as its base, hairs on III segment of antennae reaching half the length of the diameter of this segment at the base; siphunculi and cauda black, siphunculi cylindrical with a flange, 2.4-3.2 times as long as cauda, the last segment of rostrum short;

winged virginoparae with the middle vein of the wing with one divergation; antennal appendix 5.9-6.5 times as long as its base; siphunculi 2.3-3.1 times as long as cauda (HALBERT *et al.*, 2000; NOORDAM, 2004).

***Tetraneura nigriabdominalis* (Sasaki, 1899) – oriental grassroot aphid**

Collected material: the specimens were collected in a glasshouse from the roots at the bulb base of *Freesia* spp. imported from Holland (I, 17.09.1985).

So far it has not been indexed in Poland. It occurs all over the world except for colder regions. It is a heteroecious, species – elms (*Ulmus* sp. is primary host while numerous grass species are its secondary host (BLACKMAN & EASTOP, 2000), hence it is known as a pest of many plants of the Poaceae family (www.aphidweb.com).

Diagnostic features:

wingless virginoparae: V segment of antennae 1.7-2.8 times as long as VI segment; tergite VIII of the abdomen with a pair of long and thick hairs; cauda

with two hairs, the last segment of rostrum as long as the width of its base (BLACKMAN & EASTOP, 2000).

***Toxoptera aurantii* (Boyer de Fonscolombe, 1841) – black citrus aphid**

Collected material: it was recorded on *Schefflera arboricola* imported from the Netherland (K, 12.04.2002; 18.03.2005).

It is present in Asia, Africa, North, Central and South Americas and Oceania but also in many European countries such as Cyprus, France, Greece, Italy, Malta, Portugal, Russia, Spain (DISTRIBUTION MAPS OF PLAVIT PESTS, 2006). So far it has not been indexed in Poland. It is known to occur in Brazil on *Ficus benjamina*, *Murraya exotica*, *Pachystachys lutea*, *Schefflera arboricola* and *Camellia japonica* (PERONTI, 2002).

Diagnostic features:

wingless virginoparae less than 2 mm long; antennal appendix 3.5-5 times as long as the base of VI segment of antenna, the longest hairs on III segment and 0.5-1 times as long as its diameter; cauda with 10-26 hairs; stridulatory apparatus near the siphunculi; on hind tibiae a row of short spines (BLACKMAN & EASTOP, 2000).

On ornamental plants in glasshouses and plastic tunnels some aphid species which were indexed in previous studies were not found (ACHRAMOWICZ *et al.*, 1986; CICHOCKA & GOSZCZYŃSKI, 1975; CICHOCKA, 1992), including: *Acaudus cardui*, *Acyrtosiphon pisum*, *Aphis craccivora*, *Aphis nasturtii*, *Aphis solanella*, *Brachycaudus helichrysi*, *Chaetosiphon tetraerhodus*, *Cinara pinea*, *Colorado tanacetina*, *Hyalopterus pruni*, *Idiopterus nephrolepidis*, *Lipaphis rysimi*, *Macrosiphoniella oblonga*, *Macrosiphoniella tanacetaria*, *Metopeurum fusciviridae*, *Myzus ornatu*, *Rhodobium porosum*, *Rhopalosiphoninus latysiphon*, *Rhopalosiphum nymphaeae*. This may result from the observed plants species composition, or from the occasional character of these aphids' presence on plants under covers.

Conclusions

On ornamental plants in glasshouses and plastic tunnels, out of 31 confirmed aphid species the following were identified as frequent and common: *Nectarosiphon persicae*, *Aulacorthum solani*, *Aphis gossypii* and *Illonoia azaleae*, for which many new host plant species were indexed.

On ornamental plants imported from Costa Rica and Honduras via the Netherland and Italy, one could observe, though rarely, aphid species that have not been so far recorded in Poland: *Aphis nerii*, *Aphis spiraeicola*, *Rhopalosiphum rufiabdominalis*, *Schizaphis rotundiventris*, *Tetraneura nigriabdominalis* and *Toxoptera aurantii*.

References

- ACHREMOWICZ J. 1978. Rzadkie i mniej znane w Polsce gatunki mszyc z roślin ozdobnych. *Zesz. Prob. Post. Nauk Roln.*, 208: 141-146.
- ACHREMOWICZ J., MAŚLANKA L., OBROCKA E. 1986. Z badań nad fauną mszyc uszkadzających szklarniowe i doniczkowe rośliny ozdobne. *Zesz. Prob.. Post. Nauk Roln.*, 329: 57-68.
- BARANOWSKI T. 1976. Badania nad szkodliwą fauną złocieni w okolicach Poznania. *Rocz. Nauk Rol., ser. E*, 6(1): 19-39.
- BLACKMAN R.L., EASTOP V.F. 2000. Aphids on the world's crops. An identification and information guide. Wiley, New York 466p.
- BLACKMAN R.L., EASTOP V.F. 2006. Aphids on the World's Herbaceous Plants and Shrubs. Wiley&Sons, New York, 1460p.
- BURDAJEWICZ S., BOREJSZA-WYSOCKI Z. 1978. Szkodliwa fauna roślin ozdobnych w okolicach Poznania. II. Mszyce (*Aphididae*) w uprawach pod szkłem i w gruncie. *Rocz. AR Poznań*, 98: 37-49.
- CIAMIOLINI M., MAIULINI C., di Perna V. 1993. Danni da afidi radicolari a countre ortive in serra nel Lazio. *Inform. Agrario*, 49: 59-63.
- CICHOCKA E., GOSZCZYŃSKI W. 1975. Mszyce (*Homoptera, Aphidoidea*) szkodniki roślin uprawianych pod szkłem. *Fragm. Faun.*, 20(17): 273-305.
- CICHOCKA E. 1992. Glasshouse aphids in Poland. [In:] *Aphids and Other Homopterous Insects*. PAS, Warsaw, 3: 13-32.
- CICHOCKA E. 1994. Biology and population parameters of the melon and cotton aphid. [In:] *Aphids and Other Homopterous Insects*, 4: 47-52.
- CICHOCKA E., GOSZCZYŃSKI W. 1994. Nowe szkodniki upraw szklarniowych. *Mater. XXXIV Sesji IOR, II*: 270-274.
- GOSZCZYŃSKI W., CICHOCKA E. 1994. *Aphis gossypii* Glov., a new glasshouses pest in Poland. [In:] 5th Europ. Congr. of Entomol. University of York, UK, 268-269.
- HALBERT S.E., Remaudiere G., Webb S.E. 2000. Newly established and rarely collected aphids (Homoptera: Aphididae) in Florida and the Southeastern United States. *Florida Entomol.*, 83(1): 79-91.
- HARTEN A. van. 1975. Notes on a small collection of aphids from continental Portugal (Homoptera, Aphidoidea). *Agronomia Lusitana*, 36(3): 217-222.
- HEIE O.E. 1986. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. III, family Aphididae: subfamily Pterocommatinae & tribe Aphidini of subfamily Aphidinae. *Fauna Entomol. Scandinav.*, 7, 314p.
- HEIE O.E. 1992. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. IV, family Aphididae: part 1 of tribe Macrosiphini subfamily Aphidinae. *Fauna Entomol. Scandinav.*, 25, 188p.
- HEIE O.E. 1994. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. V, family Aphididae: part 2 of tribe Macrosiphini of subfamily Aphidinae. *Fauna Entomol. Scandinav.*, 28, 239p.

- HEIE O.E. 1995. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. VI, family Aphididae: part 3 of tribe Macrosiphini of subfamily Aphidinae, and family Lachnidae. *Fauna Entomol. Scandinav.*, 31, 222p.
- IMENES S.D.L., BERGMANN E.C., PERONTI A.L.B.G., Ide S., MARTINES J.E.R. 2002. Aphids (Hemiptera: Aphididae) and their parasites (Hymenoptera) on *Icora* sp. (Rubiaceae) in the states of Bahia and So Paulo, Brazil – formal records of interactions. *Arq. Inst. Biol.*, 69(4): 55-64.
- JAŚKIEWICZ B. 1988. Dynamika występowania mszyc na *Rosa rugosa*. *Rocz. Nauk Rol. Ser. E*, 18(2): 255-266.
- JAŚKIEWICZ B. 2004. The population dynamics of aphids colonizing the shrubs of *Rosa canina* L. in urban conditions of Lublin. *Electronic Journal of Polish Agricultural Universities Ser. Horticulture*, 7(2): 1-13.
- KMIĘĆ K. 2006. Dynamics of number of *Metopolophium dirhodum* (Walk.) (Hemiptera, Aphididae) occurring on shrubs on roses in Lublin. *Acta Sci. Pol. Hortorum Cultus*, 5(2): 11-21.
- MCAUSLANE H.J. 2001. Oleander aphid – *Aphis neri* Boyer de Fonscolombe. http://creatures.ifas.ufl.edu/orn/shrubs/oleander_aphid.htm: 1-4.
- MILLER G.L., STOEZEL M.B. 1997. Aphids associated with chrysanthemums in the United States. *Florida Entomol.*, 80(2): 218-239.
- NOORDAM D. 2004. Aphids of Java. Part V: Aphidini (Homoptera: Aphididae). *Zool. Verh. Leiden*, 346: 28.
- PERONTI A.L. 2002. Aphids (Hemiptera: Aphidoidea) of ornamental plants from São Carlos. São Paulo state, Brazil. *Rev. Biol. Trop.*, 50(1): 137-144.
- RAZOWSKI J. (ed.). 1990. *Wykaz Zwierząt Polski. Checklist of Animals of Poland*, T. I, cz. Aphidoida. Ossolineum, Wrocław – Warszawa – Kraków.
- SABELIS M.W. 2001. Biological control of arthropod pest of freesia corms: controlled colonization and population development of soil-inhabiting predatory mites after soil sterilization and pre-storage treatment. Project number: abi4398: 1-2.
- Distribution Maps of Plant Pests. 1971. *Rhopalosiphum rufiabdominalis*. CAB International, Wallingford, UK, Map 289.
- Distribution Maps of Plant Pests. 2001. *Aphis spiraecola*. CAB International, Wallingford, UK, Map 256.
- Distribution Maps of Plant Pests. 2006. *Toxoptera aurantii*. CAB International, Wallingford, UK, Map 131.
- <http://www.aphidweb.com/Aphids%20of%20Karnataka/Tetraneuranigriabdominalis>

Mszycy /Hemiptera, Aphidoidea/ występujące na roślinach ozdobnych pod osłonami

Streszczenie

W latach 1981-2007 zebrano 21 gatunków mszyc zasiedlających rośliny ozdobne uprawiane w szklarniach i tunelach foliowych. Po raz pierwszy odnotowano 6 gatunków mszyc: *Aphis nerii*, *Aphis spiraeicola*, *Ropalosiphum rufiabdominalis*, *Schizaphis rotundiventris*, *Tetranura nigriabdominalis*, *Toxoptera aurantii*, które zawleczono wraz z roślinami z zagranicy. Dla 6 gatunków mszyc wcześniej obserwowanych w naszych szklarniach i cieplarniach ogrodów botanicznych wykazano kilkadziesiąt nowych roślin żywicielskich, oraz 27 gatunków roślin, na których stwierdzono *Aphis gossypii*.

