

Periphyllus testudinaceus (Ferne, 1852)
/Hemiptera, Aphidoidea/ number dynamics on the do-
mestic species of maple-trees

BARBARA WILKANIEC*, KATARZYNA SZTUKOWSKA**

University of Life Sciences in Poznań, Department of Entomology
Dąbrowskiego 159, 60-594 Poznań, Poland

*wilk@au.poznan.pl

**ksztuk@au.poznan.pl

Introduction

Aphids of the *Periphyllus* genus belong to the Aphididae family and Chaitophorinae subfamily. In Poland this genus embraces seven species which are mainly monophagous and settle different taxons of maples including all domestic species: *Acer platanoides* L., *Acer campestre* L., and *Acer pseudoplatanus* L. *Periphyllus aceris* (Linnaeus, 1761.), *Periphyllus lyropictus* (Kessler, 1886) and *Periphyllus coracinus* (Koch, 1854) settle *Acer platanoides* exclusively. *Periphyllus hirticornis* (Walker, 1848) and *Periphyllus obscurus* (Mamon-tova, 1955) are found only on *Acer campestre* while *Periphyllus acericola* (Walker, 1848) on *Acer pseudoplatanus*. Only *Periphyllus testudinaceus* (Ferne, 1852) settles all the domestic maples. This aphid species is encountered very often on maple-trees in urban green areas. *P. testudinaceus* is an oligop-hagous species which develops on different species of domestic and foreign maple and unusually also on horse-chestnut (*Aesculus hippocastanum*). Fun-datrices feed in the spring on one-year-old shoots. The second generation consists of winged and wingless virginoparae and feeds on leaves. The third generation undergoes an aestivation in its larval stage. These larvae differ significantly from the larvae which have a normal type of development which refers to their hair and siphon reduction. Aestivating larvae start to develop only in autumn. The fourth generation consists of wingless oviparous females and winged males. A fertilized egg is its overwintering stage.

The aim of the research was to compare the *P. testudinaceus* number dynamics on domestic maple species.

Material and methods

The research was carried out in the Botanical Garden of the Adam Mickiewicz University in Poznań during two growth seasons, in 2006 and 2007. The observation was initiated in May when aphid's second generation was present and it lasted until late autumn. Every ten days 100 leaves of *A. platanoides*, *A. campestris*, and *A. pseudoplatanus* were collected. Wingless and winged specimens were counted as well as aestivating larvae of *P. testudinaceus*.

Results

The course of number dynamics of *P. testudinaceus* on *A. platanoides*, *A. campestris*, and *A. pseudoplatanus* was alike. Great differences in the degree of maple settling in particular years were recorded. In the growth season of 2006 the greatest number of *P. testudinaceus* was observed on *A. platanoides* on which in total over 10 thousand specimens were collected, while the smallest, i.e. 3 thousand specimens was observed on *A. pseudoplatanus* (Tab. 1). In the growth season of 2007 aphids settled maples in smaller numbers. Differences in the degree of maple settling were also recorded. The greatest amount of *P. testudinaceus* was registered on *A. pseudoplatanus*, on which in total over 6 500 specimens were collected. The smallest amount of this species was registered on *A. platanoides* which was over 1000 aphids (Tab. 2).

Table 1. *Periphyllus testudinaceus* dynamics on domestic species of maples/ in the Botanical Garden in Poznan in 2006 growth season

Species of maple	Type of morph	Aphid numbers in the monthly decades (individuals/100 leaves)																								Total		
		May			June			July			August			September			October											
		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III									
<i>Acer platanoides</i>	A	36	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	14	58	65	183	
	B	84	55	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	151	
	C	303	4676	1809	1388	775	491	*	*	*	*	*	152	136	108	26	4	0	0	0	0	0	0	0	0	0	0	9868
<i>Acer campestre</i>	A	133	30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	32	48	256	
	B	40	59	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	7	5	134	
	C	72	1181	1789	1346	572	152	*	*	*	*	38	13	10	5	3	1	0	0	0	0	0	0	0	0	0	0	5182
<i>Acer pseudoplatanus</i>	A	34	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	38	21	123	
	B	10	27	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52
	C	39	600	907	410	392	296	*	*	*	*	82	56	43	29	3	3	0	0	0	0	0	0	0	0	0	0	2860

A – wingless morphs,
 B – winged morphs,
 C – aestivating larvae,
 * – no observations

Table 2. *Periphyllus testudinaceus* dynamics on domestic species of maples in the Botanical Garden in Poznan in 2006 growth season

Species of maple	Type of morph	Aphid numbers in the monthly decades (individuals/100 leaves)																		Total				
		May			June			July			August			September			October							
		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III					
<i>Acer platanoides</i>	A	41	25	15	2	0	0	0	0	0	0	0	0	0	0	0	0	9	5	21	33	0	151	
	B	31	33	40	35	21	4	0	0	0	0	0	0	0	0	0	0	1	8	7	1	0	193	
	C	149	172	178	107	56	32	14	20	13	6	4	2	1	0	0	0	0	0	0	0	0	0	754
<i>Acer campestre</i>	A	7	2	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	10	8	51
	B	10	14	20	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	6	16	76	
	C	160	191	213	223	511	290	344	346	258	205	84	44	16	9	5	4	1	0	0	4	1	0	2904
<i>Acer pseudoplatanus</i>	A	41	77	89	88	70	19	0	0	0	0	0	0	0	0	0	0	15	20	23	12	11	465	
	B	32	82	102	91	69	21	0	0	0	0	0	0	0	0	0	0	0	0	1	1	22	12	433
	C	476	1035	1116	744	610	543	289	290	168	92	58	72	115	19	30	14	1	0	0	14	1	0	5672

A – wingless morphs,

B – winged morphs,

C – aestivating larvae

Differences in maples' settling by *P. testudinaceus* may have resulted from the course of meteorological conditions in the spring of 2006 and 2007. The growth season of 2006 had an early and warm spring. The month of May in the season of 2007 was cold and only its second part was warmer (Tab. 3).

Table. 3. Comparison of temperature in May and June, 2006 and 2007

Year of observation	Mean temperature in the monthly decades (°C)					
	May			June		
	I	II	III	I	II	III
2006	14,8	14.9	13.8	12.7	22.4	21.9
2007	11.5	14.3	20.1	19.2	20.9	17.0

In the growth season of 2006 the highest number of wingless and winged specimens was observed in colonies on *A. platanoides*, *A. campestris* and *A. pseudoplatanus* in the first decade of May. Only on *A. pseudoplatanus* was the maximum number of winged morphs observed later, i.e. in the second decade of May. In subsequent observations the number of wingless and winged morphs was decreasing and only on *A. campestris* in the first decade of June were single specimens recorded. Since the beginning of May aestivating larvae were observed on leaves. They occurred singly along the veins on the bottom and upper sides of the leaf blade. On *A. platanoides* their maximum number was recorded in the second decade of May, when more than 4 500 specimens were recorded on a sample of 100 leaves. On *A. campestris* and *A. pseudoplatanus* the greatest number of aestivating larvae was observed slightly later in the third decade of May. In subsequent months the number of aestivating larvae decreased. In mid-September the aestivation was interrupted on maples and only single specimens of wingless morphs were recorded on leaf samples. In October small aphid colonies were recorded. These were oviparous females and males (Tab. 1).

In the season of 2007 the presence of the second generation of *P. testudinaceus* on the domestic species of maples was observed to take place for a longer period of time. Until mid-May an increase of the aphid number in colonies was recorded. The highest number of winged and wingless morphs was recorded in the third decade of May. Only on *A. platanoides* was the number dynamics different and the maximum number was observed not at the end but at the beginning of May. Similarly to the growth season of 2006 aestivating larvae were observed on leaves since the beginning of May. On *A. platanoides* and *A. pseudoplatanus* their highest number was recorded in the third decade of May, and on *A. campestris* in the second decade of June. In the summer, just like in the previous season their number suddenly decreased. On *A. campestris* and

A. pseudoplatanus single aestivating larvae were observed until the end of October. Most aestivating larvae were developing until mid-September. Hence small colonies of oviparous females and males were recorded on leaves (Tab. 2).

Discussion

From the research it follows that *P. testudinaceus* is a common species on domestic maples.

The results are in accordance with research carried out by WILKANIEC & PIEKARSKA-BONIECKA (1996), WILKANIEC (2004) and SZTUKOWSKA & WILKANIEC (2005), who recorded *P. testudinaceus* on maples in the green areas of Poznań. WILKANIEC (2004) states that this aphid settles many different maple species including, the *A. platanoides*, *A. campestris* and *A. pseudoplatanus*. CICHOCKA *et al.* (1998) also pointed out to the presence of this aphid on maples and sycamore maples in Warsaw. Similarly, as stated by WIECZOREK & OSIADACZ (2003, 2005) *P. testudinaceus* occurs on *A. platanoides* and *Acer negundo* L. in the Upper Silesia region.

In the season of 2006 the highest number of winged and wingless aphids was observed on *A. platanoides*, *A. campestris* and *A. pseudoplatanus* usually in the beginning of May, while in the season of 2007 it was observed at the end of May. Weather conditions are likely to have been the cause of this state. Since May until mid-September aestivating larvae were recorded on leaves. These morphs allow living through unfavourable period of draught and high temperature during summer. At the end of summer their number decreased. A similar tendency of changes in the number of aestivating larvae taking place in the growth season was stated by WILKANIEC & PIEKARSKA-BONIECKA (1996).

In the two-year long research it was proved that the settling of *A. platanoides*, *A. campestris* and *A. pseudoplatanus* by aestivating larvae was highly different. For instance, on *A. platanoides* in mid-May in the 2006 season more than 4500 larvae on a 100 leaf sample were recorded, while in the season of 2007 at exactly the same time their number amounted only to 200 larvae. These differences may have resulted from meteorological conditions and predator activity. WILKANIEC & PIEKARSKA-BONIECKA (1996) reached similar conclusions when they stated that the degree of *A. platanoides* infestation by aestivating larvae ranged from 5 000 to 3 000 larvae in a sample of 100 leaves in 1991-1995.

References

- CICHOCKA E., GOSZCZYŃSKI W., SZYBCZYŃSKI K. 1998. Mszyce i ich naturalni wrogowie na klonach w Warszawie [In:] Fauna Miast, Bartczak T., Indykiewicz P. (eds.), Wyd. ART, Bydgoszcz: 83-88.

- OSIADACZ B., WIECZOREK K. 2003. Mszyce (*Hemiptera: Aphidoidea*) wybranych parków Bytomia. *Acta Entomologica Silesiana* Vol.11, No. 1-2: 39-46.
- SZTUKOWSKA K., WILKANIEC B. 2006. Observations of *Hemiptera: Aphidoidea* aphids of the *Periphyllus* genera on maples and sycamores in the Botanical Garden of the University of Poznań. [In:] *Aphids and Other Hemipterous Insects*, vol.12: 167-176.
- WIECZOREK K., OSIADACZ B. 2005. Mszyce dendrofilne (*Hemiptera, Aphidoidea*) urządzonej zieleni miejskiej Katowic – część I parku im. T. Kościuszki. *Acta Entomologica Silesiana* vol.12-13, 155-160.
- WILKANIEC B., PIEKARSKA-BONIECKA H. 1996. Mszyce zasiedlające klon zwyczajny (*Acer platanoides* L.) w warunkach miejskich. *Rocz. AR w Pozn., Ogrodn.*, 288 (24): 93-101.
- WILKANIEC B. 2004. Afidofauna Ogródu Botanicznego w Poznaniu. [In:] *Fauna miast Europy Środkowej 21. wieku*, Indykiewicz P., Barczak (eds.) Wyd. LOGO, Bydgoszcz: 167-177.

Dynamika liczebności *Periphyllus testudinaceus* (Ferne, 1852) /Hemiptera, Aphidoidea/ na rodzimych gatunkach klonu

Streszczenie

W latach 2006-2007 prowadzono na terenie Ogródu Botanicznego w Poznaniu badania nad dynamiką liczebności *Periphyllus testudinaceus* na rodzimych gatunkach klonu. Liczebność mszyc w sezonie oceniano na podstawie zasiedlenia próby 100 liści, zbieranej co dekadę w okresie od maja do października.

W sezonie 2006 roku najliczniejszy pojaw mszyc obserwowano na klonie zwyczajnym. Natomiast w kolejnym sezonie badawczym najwięcej mszyc stwierdzono na jaworze. W maju na liściach obserwowano bezskrzydłe i uskrzydłone morfy. Mszyce te tworzyły kolonie na dolnej stronie blaszki liściowej. Wiosną i latem obserwowano diapauzujące larwy. Występowały one pojedynczo wzdłuż nerwów na górnej i dolnej stronie liści. Ich obecność notowano zwykle do połowy września, kiedy to diapauza została przerwana i następował dalszy ich rozwój. Jesienią obserwowano na liściach małe kolonie mszyc.

