

SEASONAL NUMERICAL CHANGES OF APHIDS IN UNCULTIVATED HABITATS OF AGRICULTURAL LANDSCAPE IN WIELKOPOLSKA

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Abstract. Results of two-year studies on the aphids number in different uncultivated habitats (field boundaries, roadsides, field shrubs and forest margins) are presented. The analysis of data permitted to distinguish two basic types of change in the aphids number in a vegetation season.

Key words: *Aphidodea*, numerical changes, uncultivated habitats, faunistics, Poland

I. INTRODUCTION

Uncultivated habitats like field afforestations and shrubs, roadsides or field boundaries overgrown with diversified vegetation have a stabilising effect on the entomofauna in the agricultural landscape.

A successive stage of studies, after the identification of the species composition of aphidofauna (Wilkaniec et al. 1999), was the observation of the seasonal changes in the number of aphids in these habitats.

II. MATERIAL AND METHODS

The studies were carried out in the period from May to October in two seasons: in 1996 and 1998. The applied method consisted in the catching of alatae imagines into Moericke's catching traps, and in the direct observation of the insects on the plants.

The aphids were caught in four types of habitats not utilised agriculturally and neighbouring with arable fields: in the field boundaries, roadsides, field shrubs and forest margin; in three localities. Two localities: in Rosnówko and Puszczykowo, were localised on the edges of Wielkopolski National Park, and the third locality was in Strzeszyn near Poznań.

In each locality, and in each of the four types of habitats, five Moericke's traps were distributed, and the caught insects were collected in 10-day intervals.

III. RESULTS AND DISCUSSION

Totally, in the investigated habitats, in two vegetation seasons (1996 and 1998), the occurrence of 70 aphid species, representatives of 7 families was found. In the particular

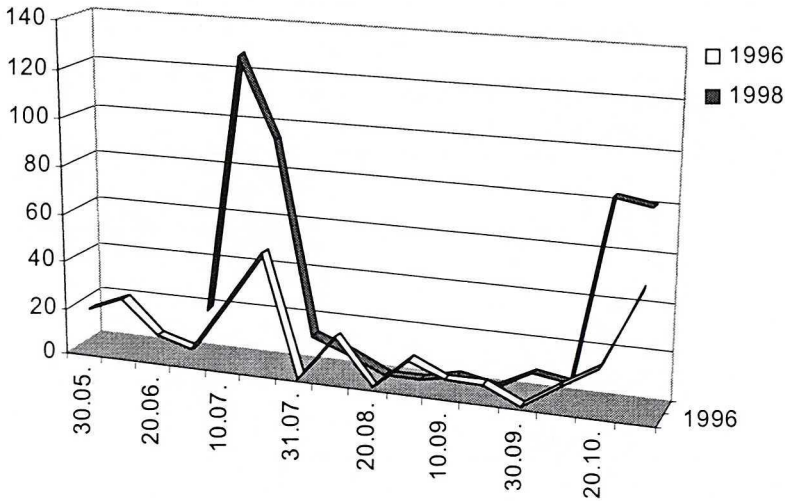


Fig. 1. Numerical changes of aphids caught in uncultivated habitats in Puszczykowo in 1996 and 1998

localities, from about 20 to 43 aphid species were caught per year. The number of insects caught in these localities ranged from 283 to 1615 individuals.

The analysis of the intensity of aphids occurrence in the uncultivated habitats of the agricultural landscape in the vegetation season permitted to distinguish two basic types of the occurrence courses.

The first one, most frequently encountered in the investigated habitats, consisted in the occurrence of two distinct abundance peaks of aphids: in the spring and in the autumn, followed by a significant decrease during the summer. Significant drops in the number of aphids visible from mid-July can be explained by the termination of the heteroecious aphid species migration from the primary hosts to the secondary ones; while the repeated increase in the aphid number in the second half of September is the result of the appearance of the autumnal morphs of aphids: gynoparae and males. Such course of the insect number variability proves the domination of one or more heteroecious species, being confirmed by the detailed analysis of the present studies. The course of this type of the seasonal changes in the number of aphids in uncultivated habitats was observed in Puszczykowo in both years of studies; in Rosnówko, it was seen in 1996; and in Strzeszyn, it occurred in 1998 (Fig. 3). The phenomenon of the intensive aphids occurrence in 1996 in Puszczykowo was caused by the domination of the heteroecious species: *Rhopalosiphum padi* (L.) and *Phorodon humuli* (Schrk.) (Tab. 1); in Rosnówko, the reason was the domination of *Rhopalosiphum padi* and *Aphis fabae* Scop. (Tab. 2) and in Strzeszyn, in 1998, it was caused by *Rhopalosiphum padi* and *Anoecia corni* (F.) (Tab. 3).

Usually, the autumn abundance peak of aphids is higher than the spring one. Slightly different was the situation in Puszczykowo in 1998, where next to *Rhopalosiphum padi*, there dominated the monoecious species *Drepanosiphum platanoidis* (Schrk.) showing a high activity in the spring of the discussed year (Tab. 4).

Number of aphids gathered by Moericke trap method in Puszczykowo in 1996

Species of aphid	Number of aphids in decade of month													Total
	May	June			July		August		September		October			
	III	I	II	III	I	II	I	III	I	II	I	II	III	
<i>Rhopalosiphum padi</i> (L.)	5	3	1	3	2	8	12	2		1	8	15	43	103
<i>Phorodon humuli</i> (Schrk.)	1	10	4			1				1			8	26
<i>Cavariella aegopodi</i> (Scop.)	3	1					1							5
<i>Pemphigus</i> sp.				1										1
<i>Hyalopterus pruni</i> (Geoff.)				2	4	2	1							9
<i>Phyllaphis fagi</i> (L.)	6	2	1		1									10
<i>Aphis fabae</i> Scop.	1		2			4								7
<i>D. platanoidis</i> (Schrk.)	1	2	1											4
<i>Myzocalis castanicola</i> Baker	1													1
<i>Periphyllus</i> sp.	1	1												2
<i>Calaphis flava</i> Mordv.		1												1
<i>Hayhurstia atriplicis</i> (L.)		1			5	12								18
<i>Kaltenbachiella pallida</i> (Hal.)						1								1
<i>Euceraphis punctipennis</i> (Zett.)									1			1		2
<i>Acyrtosiphon pisum</i> (Harris)						12								12
<i>Aphis</i> spp.		1			5	3	2	1						12
<i>Metopolophium dirhodum</i> (Walk.)		2			1	3								6
<i>Brachycaudus</i> sp.		1			1					1				3
<i>Brachycaudus lychnidis</i> (L.)		2												2
<i>Aphis idaei</i> V. D. Goot					1									1
<i>Myzus cerasi</i> (Walk.)					2									2
<i>Anocia corni</i> (F.)					1		2	2	5	3	2	1	1	17
<i>Sitobion avenae</i> (Fabr.)						2	4							6
<i>Thecabius affinis</i> (Kalt.)						1								1
<i>Aphis sambuci</i> L.				1	2	1	4	1						9
<i>Impatientinum asiaticum</i> (Nevsk.)							4	2	2			1		9
<i>Rhopalosiphum insertum</i> (Walk.)								2						2
<i>Dysaphis</i> sp.			2				1	1						4
<i>Therioaphis trifolii</i> (Mon.)								1						1
Others		1			3	1		1						6
Total	19	28	11	7	28	51	31	13	7	7	10	19	52	283

Table 2

Number of aphids gathered by Moericke trap method in Rosnówko in 1996

Species of aphid	Number of aphids in decade of month															Total	
	May	June			July			August			September			October			
	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II		III
<i>Rhopalosiphum padi</i> (L.)	6	2	15		3	10		2		1	15	2	12	2	7	6	83
<i>Acyrtosiphon pisum</i> (Harris)	1				1	9		1									12
<i>Myzocallis castanicola</i> Baker	4		1														5
<i>Dysaphis</i> spp.			1										2	1	1		5
<i>Euceraphis punctipennis</i> (Zett.)	2		1			3											6
<i>Phorodon humuli</i> (Schrk.)	1	3	1		1												6
<i>Rhopalosiphum insertum</i> (Walk.)	1														2	1	4
<i>Cavariella pastinaceae</i> (L.)			1														1
<i>Aphis fabae</i> Scop.		2			1	96		2			1						102
<i>Aphis pomi</i> De Geer		1															1
<i>Cavariella aegopodii</i> (Scop.)		1															1
<i>Aphis nasturtii</i> Kalt.		1															1
<i>Hyperomyzus lactucae</i> (L.)		1															1
<i>Eriosoma ulmi</i> (L.)		1	1											2	1		2
<i>Aphis</i> spp.		1	8											2	1	1	13
<i>Pemphigus</i> sp.			1														1
<i>Rhopalosiphum</i> sp.			2														2
<i>Aphis sambuci</i> (L.)			1														1
<i>Sitobion avenae</i> (Fabr.)			3	2	4	5		10		1							25
<i>Hyalopterus pruni</i> (Gcoff.)					2	4		1									7
<i>Pterocallis alni</i> (De Geer)					1												1
<i>Myzus cerasi</i> (Walk.)					1												1
<i>Hyperomyzus pallidus</i> H.R.L.						1											1
<i>Metopolophium dirhodum</i> (Walk.)								2									3
<i>Drepanosiphum platanoidis</i> (Schrk.)								1							1		1
<i>Macrosiphum euphorbiae</i> (Thom.)								1									1
<i>Hyahurstia atriplicis</i> (L.)								1									1
<i>Tinocallis platani</i> (Kalt.)								1									1
<i>Lipaphis erysimi</i> (Kalt.)								1									1
<i>Caricosipha paniculatae</i> Börn.									1								1
<i>MelanAphis pyrararia</i> (Pass.)									1								1
<i>Uromelan</i> sp.									1								1
<i>Impatientinum asiaticum</i> (Nevsk.)										2							2
<i>Anoecia corni</i> (F.)										2							10
Total	15	13	36	2	14	128	7	19	0	6	16	5	15	5	15	9	306

Table 3

Number of aphids gathered by Moericke trap method in Strzeszyn in 1998

Species of aphid	Number of aphids in decade of month										Total
	June	July		August		September		October			
	III	I	II	II	III	I	II	III	I	II	
<i>Aphis</i> spp.	4	3									7
<i>Anoecia corni</i> F.	1		5	5	7	5	1	16	2	4	46
<i>Metopolophium dirhodum</i> (Walk.)	1	1									2
<i>Myzus persicae</i> (Sulz.)	1										1
<i>Hyalopterus pruni</i> (Geoff.)	1	3	2								6
<i>Sitobion avenae</i> (Fabr.)	4	5									9
<i>Acyrtosiphon pisum</i> (Harris)		3									3
<i>Dysaphis</i> sp.		1									1
<i>Hyperomyzus lactucae</i> (L.)		1							3	1	5
<i>Calaphis betulicola</i> (Kalt.)		1									1
<i>Rhopalosiphum padi</i> L.		5		1		1	122	6	3	26	166
<i>Brachycaudus cardui</i> (L.)			1								1
<i>Drepanosiphum platanoidis</i> (Schrk.)		26	2								28
<i>Neonasonovia picridis</i> (Börn.)			1						2		3
<i>Therioaphis riehmi</i> (Börn.)		1									1
<i>Therioaphis trifolii</i> (Mon.)	1										1
<i>Phyllaphis fagi</i> (L.)	1										1
<i>Impatiensium asiaticum</i> (Nevsk.)			5	1							6
<i>Phorodon humuli</i> (Schrk.)								1			1
<i>Hyperomyzus pallidus</i> H.R.L.									6		6
<i>Brachycaudus</i> sp.										1	1
Total	12	51	14	11	8	6	123	23	16	32	296

Table 4

Number of aphids gathered by Moericke trap method in Puszczykowo in 1998

Species of aphid	Number of aphids in decade of month										Total
	June	July		August		September		October			
	III	I	II	III	I	I	III	I	II	III	
<i>Aphis</i> spp.	6	6	1							2	15
<i>Acyrtosiphon pisum</i> (Harris)	2	3									5
<i>Cavariella</i> sp.	1		1								2
<i>Brevicoryne brassicae</i> (L.)	1										1
<i>Myzus persicae</i> (Sulz.)	1										1
<i>Sitobion avenae</i> (Fabr.)	8	15	1								24
<i>Drepanosiphum platanoidis</i> (Schrk.)		87	83	10							180
<i>Hyalopterus pruni</i> (Geoff.)		2	2								4
<i>Hyperomyzus lactucae</i> (L.)		1					2	1			4
<i>Phorodon humuli</i> (Schrk.)		3							1	13	17
<i>Rhopalosiphum padi</i> (L.)		10	5			1	3	5	80	63	167
<i>Therioaphis riehmi</i> (Börn.)			1	1							2
<i>Calaphis betulicola</i> (Kalt.)				2							2
<i>Anoecia corni</i> F.					5	1			2	1	9
<i>Euceraphis punctipennis</i> (Zett.)					2						2
<i>Mineuria ulmiphila</i> (Del.Gu.)						1					1
<i>Phorodon cannabis</i> Pass.							3				3
<i>Nasonovia ribisnigri</i> (Mosl.)										1	1
Total	19	127	94	13	7	3	8	6	83	80	440

<i>Hyalopterus pruni</i> (Gcoff.)			1	2	1	2	1											7
<i>Lipaphis erysimi</i> (Kalt.)			1															1
<i>Anoecia corni</i> F.				1	1	2		3	1	2	6	2	4	2	4	4	4	32
<i>Acyrtosiphon pisum</i> (Harris)				1	1	2	1											5
<i>Sitobion avenae</i> (Fabr.)					4	2	2	8				2						18
<i>Macrosiphum euphorbiae</i> (Thom.)					1													1
<i>Brachycaudus helichrysi</i> (Kalt.)					1								1					2
<i>Hyperomyzus lactucae</i> (L.)					1									2		1		4
<i>Atheroides serrulatus</i> Hal.					1													1
<i>Pemphigus</i> sp.							1											1
<i>Methopolophium dirhodum</i> (Walk.)								2									1	3
<i>Tetraneura ulmi</i> (L.)										1								1
<i>Impatientinum asiaticum</i> (Nevsk.)								1										1
<i>Rhopalosiphum maidis</i> (Fitch.)								1										1
<i>Myzus certus</i> (Walk.)								1										1
<i>Neonasonovia picridis</i> (Börn.)								3										3
<i>Subsaitusaphis</i> sp.								1										1
<i>Cavariella theobaldi</i> (Gil.)									1									1
<i>Izyphyta</i> sp.								1										1
<i>Periphyllus</i> sp.																5	61	66
<i>Rhopalosiphum insertum</i> (Walk.)																		1
<i>Cinara</i> sp.																		1
Others			5											3	1		1	10
Total	106	40	45	7	174	35	21	105	28	269	93	25	209	97	114	248	1615	

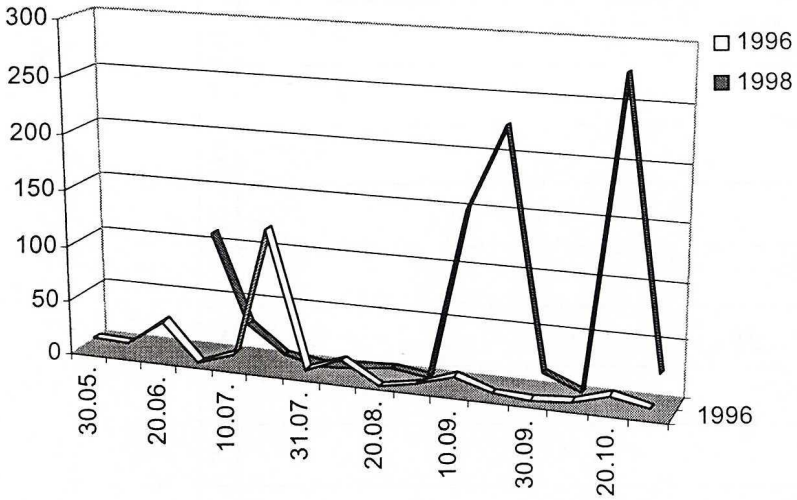


Fig. 2. Numerical changes of aphids caught in uncultivated habitats in Rosnówko in 1996 and 1998

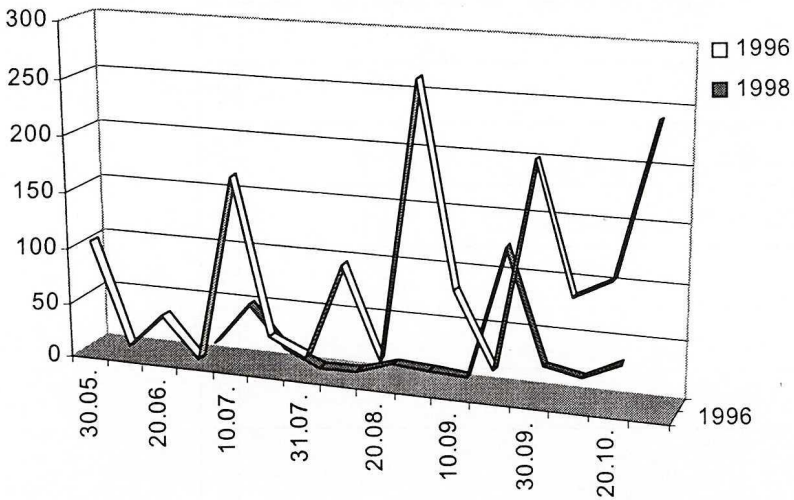


Fig. 3. Numerical changes of aphids caught in uncultivated habitats in Strzeszyn in 1996 and 1998

The second type of changes in the aphids number is characterised by the maintenance of a high number of these insects throughout the whole vegetation season. This indicates the domination of one or more monoecious species. This hypothesis is confirmed by a detailed analysis of the caught insects. It may be exemplified by the intensity of aphids occurrence in Strzeszyn in 1996 (Tab. 5). That locality supplied the greatest number of insects with the richest species composition among all analysed samples. There were 1615 aphids, and this number included 1296 individuals (80.3%) of one species: *Euceraphis punctipennis* (Zett.). It is a monophagous species occurring on birches. This fact

was reflected in the relatively high number of the caught insects maintained throughout the whole season. The observed drop in the number during the season can be explained by the periodically unfavourable abiotic conditions for aphids, like strong winds or rain, limiting the activity of winged morphs.

Aphids represent an important link in the trophic chain of many predacious and parasitizing insects occurring in the agricultural landscape (Gałęcka 1962; 1995; Karg and Szeplińska 1996; Pankanin-Franczyk and Ceryngier 1991). Basically important in the relations: predator- victim or host-parasite is the proper numerical relation occurring in these particular links. Therefore, their recognition is very essential for the different types of habitats encountered in the agricultural landscape.

IV. LITERATURE

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Barbara Wilkaniec

SEZONOWA DYNAMIKA LICZEBNOŚCI MSZYC W ŚRODOWISKACH NIEUPRAWNYCH KRAJOBRAZU ROLNICZEGO WIELKOPOLSKI

STRESZCZENIE

Badania prowadzono przez dwa sezony 1996 i 1998 roku. Mszyce odławiano metodą pułapek chwytnych Moerickego w czterech typach środowisk nieużytkowanych rolniczo, sąsiadujących z polami uprawnymi: miedzy, przydrożu, zakrzewieniach śródpolnych i skraju lasu, w trzech miejscowościach.

Stwierdzono występowanie dwóch podstawowych typów przebiegu sezonowej dynamiki liczebności mszyc w środowiskach nieuprawnych krajobrazu rolniczego. Pierwszy z nich charakteryzował się występowaniem dwóch wyraźnych szczytów liczebności mszyc wiosną i jesienią oraz znacznym jej obniżeniem w okresie lata. Taki przebieg liczebności obserwowano w przypadku dominacji jednego lub kilku gatunków różnodomnych. Drugi typ charakteryzujący się wysoką liczebnością mszyc w ciągu całego sezonu wskazywał na dominację jednego lub kilku gatunków jednodomnych.