P O L I S H J O U R N A L O F E N T O M O L O G Y
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Selected insect groups of shrubbery complexes of „Biedrusko" Protected Lanscape. Part I: Aphids (Hemiptera: Aphidoidea)

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ABSTRACT. In the research carried out at „Biedrusko" Protected Landscape Area in the years 2003-2005 in shrubberies of *Rhamno-Prunetea* class 15 species of aphids were found in the shaking method on the bushes. The species most numerously represented were: *Phorodon humuli*, *Aphis fabae, Aphis sambuci* and *Hyalopterus pruni*. 48 taxons were collected by sweeping from herbaceous plants during three years. *Macrosiphoniella artemisiae* obtained the dominant status in 2003, as did *Acyrthosiphon pisum* in the years 2004-2005. The richest finds were collected with the method of Moericke's traps: 118 different aphid species. The results of aphid catchability in colour traps were used in a comparative analysis of aphid fauna of the studied thicket zones – the initial, the terminal and the margin zone.

KEY WORDS: Hemiptera, Aphidoidea, Aphididae, thickets.

INTRODUCTION

A basic cause of landscape changes is the manner of area usage. Human activities resulted in preserving natural plant coverage only in small areas, leaving various types of substitute communities. Within cultural landscape the manner of land cultivation is an essential factor deciding on the direction of change. Depending on habitat conditions and the manner of human impact the dominant plant community changes, so do the composition and structure of phytocenoses and floristic relations, and consequently, changes occur in zoocenoses. The problem of spatial and temporal placement of insect populations in a cultural landscape is

not a new one and as such it has been analyzed by many research teams in the country and abroad (KARG & RYSZKOWSKI 1996, KARG 1989, LETHMAYER 1998, SZWED et al. 1999, BANASZAK & CIERZNIAK 2000, BARRETT 2000, EKBOM 2000, DENNIS 2000, MARINO & LANDIS 2000, RYSZKOWSKI et al. 2001).

At the beginning of the 1990s in Poland biologists faced new prospects of expanding their research onto the areas used in a particular manner, namely military ranges. Those areas, contrary to common opinion, are only to a small extent changed by man and are characterized by a large diversity of flora and fauna.

Biedrusko military range is among particularly valuable areas due to its natural value. In order to protect the area used by the army for over 100 years, in 1995 „Biedrusko" Protected Landscape Area was created. Despite the proximity of the Poznań city, the area is still very valuable in natural terms. No complete research on invertebrate of the Insecta class has been carried out so far. Few studies on the insects of Biedrusko range have been published. The best known insect genus are beetles, studied as early as the beginning of the 20th century. Information on the state of knowledge of Coleoptera of the region was presented by KONWERSKI and SIENKIEWICZ (2004). In another study they presented data on the species of Leiodidae family occurring in the area (KONWERSKI & SIENKIEWICZ 2005). The remaining information on this insect order is fragmentary and consists in locality data for selected and rare beetle species found in the area (RUTA et al. 2004, 2006, JAŁOSZYŃSKI et al. 2005, PRZEWOŹNY et al. 2006, BUNALSKI et al. 2007). Information on Lepidoptera of the Biedrusko range has also been published. Among day butterflies the Papilionoidea and Hesperioidea superfamilies (WALCZAK 2002) were studied. Thus it was decided to start faunistic and ecologic research on selected insect groups connected with shrubberies of *Rhamno-Prunetea* complexes of the range.

MATERIAL AND METHODS

„Biedrusko" Protected Landscape Area is characterized by slight antropogenic transformation of plants, which greatly influences the fauna of the area, which is highly wooded, with forest complexes making up about 35% of the total surface area. The dominant wood species is the pine (70%), second comes the oak tree (12%). Besides woods, thickets are very common, with *Sarothamnus scoparius* playing the main part among them. They grow on vast, forest-free areas in the centre of the range in the complex with thick *Diantho-Armierietum* Krausch swards, rendering it a very characteristic appearance. A significant role is also played by thickets of *Rhamno-Prunetea* Goday et Carb. class. Those complexes in the range's open landscape form dense bushes preserving a full zone system, from initial to terminal thickets. Those very habitats were selected for research on selected insect groups. In terms of phytosociology a characteristic type of thicket was created by a belt of blackthorn bushes, with dominant blackthorn among bushes (*Prunus spinosa)*, and a significant share of elder (*Sambucus nigra*), Midland thorn (*Crataegus laevigata*), common

hawthorn (*C. monogyna*), European spindle (*Euonymus europaeus*) and dog rose (*Rosa canina*). On the range they most often formed a dense and wide belt of thickets a few hundred metres long and some metres wide, where the two above-mentioned zones could be distinguished. In the terminal zone well-formed, thickly growing bushes occurred. On the approaches of the thickets there was the initial zone including the area grown with young bushes, mainly blackthorn, not very dense.

The study presents the results of research on aphids (Hemiptera, Aphidoidea), and its objective was to determine the species composition, number and occurrence dynamics of aphids in the range's shrubbery complexes.

The research was carried out in 2003-2005 on three sites located on the grounds of Biedrusko military range (UTM: XU 32), in Suchy Las commune, north of the city of Poznań (Fig. 1). Two of them were located in the south, next to Złotniki – Biedrusko road (2003 and 2005), other in the north, by Maniewska road (2004).

The first site, where the research in 2003 was conducted, included two belts over ten metres long of dense blackthorn bushes (*Rhamno-Prunetea* class), located about 1 km from one another. From the surroundings of the first shrubbery belt the complexes of *Antriscetum sylvestris* HADAČ and *Rumicetum obtusifolii* KULCZYŃSKI with some nettles were reported. In the vicinity of the other belt of thickets there were phytocenoses of *Convolvulo-Agropyretum repensis* FELFŐLDY.

The second site, penetrated in 2004, located by Maniewska Road, was characterized by well-formed blackthorn bushes with full zone system from initial to terminal thickets. On its outskirts it bordered with a complex of herbaceous vegetation with patches of large-leaved lupine *Lupinus polyphyllus*, which on the range formed characteristic communities with wild chervil *Antriscus sylvestris*.

The zone division of thicket structure was also preserved on the third site, studied in 2005. The basic difference in comparison with the previous site was the occurrence of herbaceous plants among the thickets. They included well-formed stenothermal borders of *Trifolio-Geranietea sanguinei* MŰLL. class, the plants that most often accompany thickets of *Rhamno-Prunetea* class on the range.

In order to determine the aphid fauna a few study methods were applied simultaneously. They consisted in observing host plants, shaking off the bushes, sweeping herbaceous plants and catching insects into Moericke's traps. In the shaking method the sample was the material from 10 randomly chosen branches, when sweeping the sample was the material from 2 series of 50 scoop sweeps each, in the last method mentioned above – a sample of insects from one trap. Every year the research was conducted from May to October. In the thickets the initial and terminal thicket zones were defined (only in 2003 the research was conducted only in the terminal zone) as well as the margin zone spreading between the thickets and the open fields. 5 Moericke's trap were laid out in each zone, 1-1.5 m above the ground. The insects were collected every ten days. Sample insects caught with the other methods were collected at the same intervals in all sites.

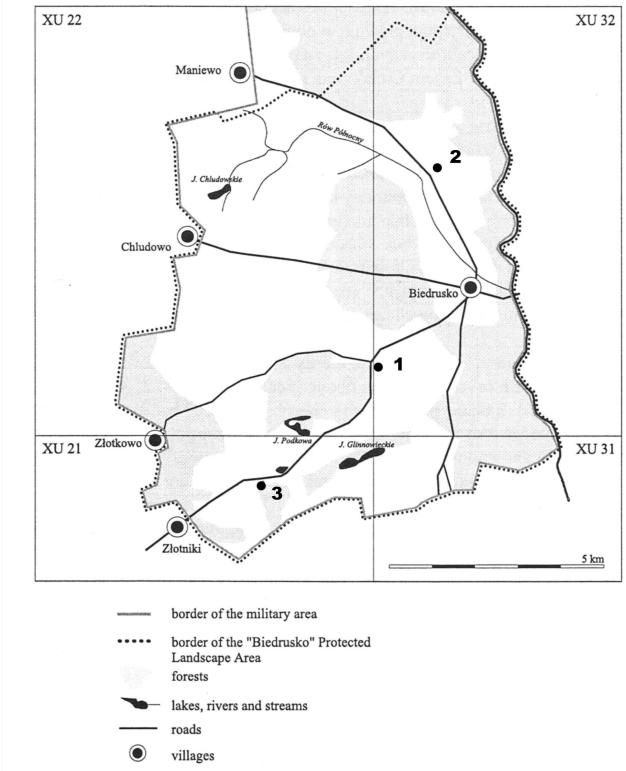

Fig. 1. The map of the investigated area. 1 – locality of studies in 2003; 2 – locality of studies in 2004; 3 – locality of studies in 2005.

The structure of aphid and Hymenoptera communities reported from particular habitats were described on the basis of the following indices:

the number of specimens (*N*)

the number of species (*S*)

the dominant coefficient (*D*),

Shannon's index of general species diversity (*H'*) (SHANNON & WEAVER 1963):

$$H' = -\sum_{i=1}^{S} \frac{n_i}{N} \log_2 \frac{n_i}{N}$$

where: n_i – number of individuals i – of the species in the grouping of N – general number of individuals and consisting of S – number of species.

Pielou's index of evenness of species distribution (1966) (*J'*):

$$J' = \frac{H'}{H_{\max}} = \frac{H'}{\log_2 S}$$

where: S – number of species in the community.

Simpson's species richness index (1949) (*d*):

$$d = \frac{S-1}{\log N}$$

where: S – the number of species in the community; N – general number of individuals in the community.

For comparison of community structure in quality terms Marczewski and Steinhaus' index was used (1959) (*MS*)

$$MS = \frac{c}{a+b-c} \times 100\%$$

where: a and b – the number of species in the first and second community, c – the number of species common for both compared communities.

RESULTS AND DISCUSSION

In the thicket belt 15 aphid species were found directly on the bushes (Table 1). Only 4 species were numerous, among them: *Aphis sambuci* infesting *Sambucus nigra*, *Aphis fabae* on *Euonymus europaeus, Phorodon humuli* reported from *Prunus spinosa* and *Prunus cerasifera* and *Hyalopterus pruni* also on *Prunus spinosa.* Other taxons were reported from the bushes rarely and in single small colonies, mostly on bush leaves.

With the method of shaking off the bushes the occurrence in the blackthorn of *A. fabae, A. sambuci, P. humuli* and *H. pruni* was confirmed. The results obtained with this method were unsatisfactory. A small number of data collected rendered it impossible to use them in the quantity analysis of the material.

As a result of sweeping herbaceous plants in particular seasons a similar number of species was obtained: 23 in the seasons 2003 and 2005 and 21 in 2004 (Table 2). 48 taxons were collected in total during three years. On particular sites differences were found in the species composition of aphid fauna. The main reason was probably a different species composition of plants. On the first site in 2003 the eudominant status was obtained by *Macrosiphoniella artemisiae* (40.2% individuals), while dominants were *Macrosiphoniella oblonga* (20%) and *Uroleucon cirsii* (14.4%). Aphid communities on next two sites were similar. In 2004 and 2005 *Acyrthosiphon pisum* was eudominant, 73.8% and 80% co

llected specimens respectively. Such a high position of the dominant was also preserved in all the thicket zones, i.e. initial, terminal and margin. A full list of species is icluded in table 2. The differences in composition of both aphid communities concerned a high share of *Sitobion avenae* and *Rhopalosiphum padi* in 2004, which proves a high share of graminaceous plant in the community and numerous occurrence of *Therioaphis luteola* iand-*Therioaphis trifolii* in 2005, the species connected with papilionaceus plants. In 2004 the most aphids were collected in the margin zone, in the next year the numbers of aphids in all the zones were similar (Table 3). The number of species in particular zones in both years was similar. During the season the maximum number of aphids in herbaceous plants was observed on the break of June and July.

The richest insect material was obtained with Moericke's traps method, however, it was not easy to interpret the results. Colour traps catch aphids both from bushes and herbaceous plants. The results may be subject to some error resulting from the fact that some aphids from outside the studied habitat may have been caught. We tried to reduce the error by not including autumn catches in the analysis, as they take place during mass aphid migration due to host change. At that time traps in all the habitats catch great numbers of mainly *Rhopalosiphum padi*, the species developing in grasses and crops (in 2004 – 70.8% material from the traps, in 2005 – 79.3%, caught mainly from the second ten-day period of September to the end of research season). A full list of species caught along with the size of taxons is presented in table 4. During three years in the range's bushes complexes 118 aphid species or groups of species were caught with this method. In terms of quantity and quality the material collected in 2004 was particular, as that year over 7,000 individuals of 76 taxons were caught in the traps.

The analysis of materials carried out without the results from the period of mass autumn migration to a great extent confirms the results obtained with the methods described earlier. Among the species represented in largest numbers on particular sites were both the taxons reported as the most numerous on the bushes (*P. humuli, A. fabae and H. pruni)* and on herbaceous plants (*A. pisum*, *A. corni*, *S. avenae* and *R. padi)* in the studied communities (Table 5).

The results of aphid catchability in Moericke's traps were used in a comparative analysis of aphid fauna of the three studied thicket zones in 2004 and 2005 (Table 6).

The highest species diversity was found in those years in the margin zone, where the largest number of species was reported. Such a species diversity was confirmed by the values of SIMPSON'S species richness index (d), which reached the highest values on the thicket outskirts.

Analysing the value of Shannon-Weaver's index of general species diversity (H) it was found that the quality and quantity structure of aphid communities of the studied habitats was diversified on the site, more in 2004 than in 2005.

When comparing the values of PIELOU'S index of the evenness of species distribution (J) it was found that the aphid community with the highest value of the index in 2004 was

in the margin zone, while in 2005 in terminal thickets. This proves that species of more even number distribution occurred in those communities than in others.

When comparing aphid communities and quality terms with the use of MARCZEWSKI-STEINHAUS' coefficient (MS) it was found that on site two in 2004 the communities in initial and terminal thickets showed more similarity (47.2%) than the communities of initial thickets and margin zone or terminal thickets and margin zone, where the indices were 43.4% and 40% respectively. On site three in 2005 the communities did not differ much in this respect. MS index for initial and terminal thickets was 39%, initial and margin one - 42%, and terminal and margin was 38%.

The three-year study conducted in shrubberies of the Protected Landscape Area of Biedrusko range proved the occurrence of numerous aphid fauna in the area. The thickets of *Rhamno-Prunetea* class forming dense thickets in the range's open landscape while also preserving a full zone structure from initial to terminal thickets create development opportunities for many species of the insects in question. Those well-formed shrubbery complexes may even be deemed model in comparison with similar plant complexes in agricultural landscape. Those habitats may constitute reserves and dispersion centres for entomofauna that provide it with food sources alternative to cultivations. As such, tickets have been studied before (BARCZAK et al. 2000, WILKANIEC et al. 2000, 2006, WILKANIEC 2001, BARCZAK et al. 2002). Much richer composition of aphid fauna in blackthorn bushes of the range in comparison with other kinds of mid-field thickets on field borders, various types of bushes, road sides, wood borders of field patches in agricultural landscape results mainly from the richness and diversity of plant complexes. As was proved by the research, the bushes themselves provide development opportunity for at least 15 aphid species. The comparison of aphid fauna connected with bushes of *Rhamno-Prunetea* class with communities infesting similar, though much poorer in their structure communities in agricultural landscape indicates clearly higher species richness of this group while reporting much lower numbers of particular taxons on the range. Such a community structure proves a significant stability of the studied insect group of the area.

Table 1. Aphids occurring on shrubs collected by shaking method at „Biedrusko" Protected Landscape Area in 2003-2005.

Plant species	Aphid species
-1-	-2-
Prunus spinosa L.	*Phorodon humuli* (SCHRK.)
	Hyalopterus pruni (GEOFF.)
	Rhopalosiphum nymphaeae (L.)
	Brachycaudus cardui L.
Crataegus laevigata (POIR.) DC	*Aphis pomi* De GEER
	Dysaphis crataegi KALT
	Ovatus crataegarius (WALK.)
Sambucus nigra L.	*Aphis sambuci* L.

-1-	-2-
Euonymus europaeus L.	*Aphis fabae* SCOP.
Prunus cerasifera EHRH.	*Hyalopterus pruni* (GEOFF.)
	Phorodon humuli (SCHRK.)
	Brachycaudus helichrysi
Rosa canina L.	*Macrosiphum rosae* L.
	Metopolophium dirhodum (WALK.)
Rubus sp.	*Macrosiphum funestum* (MACCH.)
	Amphorophora rubi (KALT.)
Rhamnus catharticus L.	*Aphis nasturtii* KALT.

Table 2. List of aphid species collected by sweeping herbaceous plants in shrubbery complexes of „Biedrusko" Protected Landscape Area in 2003-2005.

Aphid species	Year		
	2003	2004	2005
-1-	-2-	-2-	-3-
Acyrthosiphon pisum (HARRIS)	•	•	•
Amphorophora rubi (KALT.)	•		
Anoecia corni (F.)	•	•	•
Aphis craccivora KOCH			•
Aphis fabae SCOP.		•	•
Aphis sambuci L.		•	
Brachycaudus sp.			•
Brevicoryne brassicae (F.)	•		
Cavariella archangelicae (SCOP.)			•
Ceruraphis eriophori (WALK.)		•	
Dysaphis sp.		•	
Forda formicaria HEYD.			•
Hyadaphis sp.			•
Hyperomyzus picridis (BŐRN.)	•		
Macrosiphoniella artemisiae (B.de F.)	•		
Macrosiphoniella millefolii (De GEER)	•	•	
Macrosiphoniella oblonga (MORDV.)	•	•	
Macrosiphoniella persequens (WALK.)	•	•	
Macrosiphoniella sp.		•	
Macrosiphoniella tanacetaria (KALT.)	•	•	
Macrosiphum euphorbiae (THOM.)	•		•
Megoura vicia BUCKT.	•	•	
Megourella purpurea H.R.L.	•		
Metopeurum fusciviride STROYAN	•		
Metopolophium dirhodum (WALK.)			•
Microlophium carnosum (BUCKT.)		•	
Myzus cerasi (F.)	•	•	

-1-	-2-	-2-	-3-
Myzus persicae (SULZ.)			•
Neotrama caudata (del GU.)			•
Paraschizaphis scirpi (PASS.)			•
Pemphigus sp.			•
Phorodon humuli (SCHRK.)		•	
Rhopalosiphum nymphaeae (L.)		•	
Rhopalosiphum padi (L.)	•	•	•
Sipha maydis KALT.	•		
Sitobion avenae (F.)	•	•	•
Sitobion fragariae (WALK.)	•		
Smynthurodes betae WEST.			•
Subsaltusaphis sp.			•
Tetraneura ulmi (L.)			•
Therioaphis luteola (BŐRN.)			•
Therioaphis riehmi (BŐRN.)	•		
Therioaphis trifolii (MON.)	•		•
Uromelan campanulae (KALT.)		•	
Uroleucon cichorii (KOCH)	•		
Uroleucon cirsii (L.)	•		
Uroleucon jaecae (L.)	•	•	
Uroleucon spp.		•	•

Table 3. Result of sweeping herbaceous plants in three zones of thickets (I – initial zone, T – terminal zone, M – margin zone) of „Biedrusko" Protected Landscape Area in 2004-2005.

Number of aphids	2004			2005		
	I	T	M	I	T	M
individuals	107	103	192	588	710	451
species	14	12	12	15	15	15

Table 4. List of aphid species and their total number in each year in shrubbery complexes collected by Moericke traps at „Biedrusko" Protected Landscape Area.

No	Aphid species	Year		
		2003	2004	2005
-1-	-2-	-3-	-4-	-5-
1.	*Acyrthosiphon pisum* (HARRIS)	6	11	29
2.	*Acyrthosiphon* sp.		1	
3.	*Adelges* sp.		8	3
4.	*Amphorophora rubi* (KALT.)			1
5.	*Anoecia corni* (F.)	849	351	168
6.	*Anuraphis subteranea* (WALK.)	1		

-1-	-2-	-3-	-4-	-5-
7.	*Aphis craccivora* KOCH	5	28	22
8.	*Aphis fabae* SCOP.	12	82	111
9.	*Aphis idaei* V.D. GOOT	7	1	1
10.	*Aphis nasturtii* KALT.		1	
11.	*Aphis pomi* De GEER	5	3	5
12.	*Aphis rumicis* L.			1
13.	*Aphis sambuci* L.	5	30	3
14.	*Aphis* spp.	9	31	45
15.	*Aspidaphis adjuvans* (WALK.)			1
16.	*Aulacorthum circumflexum* (BUCKT.)	1	2	
17.	*Brachycaudus cardui* (L.)	2	2	
18.	*Brachycaudus helichrysi* (KALT.)		8	
20.	*Brachycaudus schwartzi* BÖRN.		8	
21.	*Brachycaudus* sp.	1	30	78
22.	*Brevicoryne brassicae* (F.)	27		8
23.	*Callipterinella calliptera* (HART.)			1
24.	*Capitophorus elaeagni* (Del GU.)	2	5	55
25.	*Capitophorus hippophaes* (WALK.)		1	
26.	*Capitophorus similis* V.D.GOOT		1	
27.	*Cavariella aegopodii* (SCOP.)	1	16	4
28.	*Cavariella konoi* TAKAH.			1
29.	*Cavariella pastinaceae* (L.)		2	1
30.	*Cavariella theobaldi* (GILL et BRAGG)		1	
31.	*Ceruraphis eriophori* (WALK.)	1	3	5
32.	*Chaetosiphon potentillae* (WALK.)		2	1
33.	*Chaitophorus leucomelas* KOCH			4
34.	*Cinara* sp.	1	1	1
35.	*Cryptaphis poae* (HARDY)			2
36.	*Cryptomyzus galeopsidis* (KALT.)	2	6	
37.	*Cryptomyzus ribis* (L.)		1	2
38.	*Cryptosiphum artemisiae* BUCKT.		2	3
39.	*Drepanosiphum aceris* KOCH		1	
40.	*Drepanosiphum platanoidis* (SCHRK.)	7	7	4
41.	*Dysaphis plantaginea* (PASS.)	2	16	25
42.	*Dysaphis* sp.	3	38	23
43.	*Eriosoma ulmi* (L.)		8	5
44.	*Eriosoma* sp.			1
45.	*Eucallipterus tiliae* (L.)	1	1	1
45.	*Euceraphis betulae* (KOCH)	2	1	20
46.	*Eulachnus agilis* (KALT.)		1	
47.	*Eulachnus* sp.		1	3
48.	*Forda formicaria* HEYD.			3
49.	*Geoica utricularia* (PASS.)		1	
50.	*Hayhurstia atriplicis* (L.)			1
51.	*Hayhurstia cucubali* (PASS.)			1
52.	*Hormaphis betulae* (MORDV.)	1		
53.	*Hyadaphis foeniculi* (PASS.)	2		11
54.	*Hyalopterus pruni* (GEOFF.)	6	64	40

-1-	-2-	-3-	-4-	-5-
55.	*Hyperomyzus lactucae* (L.)			8
56.	*Hyperomyzus lampsanae* (BŐRN.)		1	
57.	*Hyperomyzus pallidus* H.R.L.	7		
58.	*Hyperomyzus picridis* (BŐRN.)			18
59.	*Impatientinum asiaticum* NEVSKY	4		
60.	*Kaltenbachiella pallida* (HAL.)	1	4	3
61.	*Lipaphis erysimi* (KALT.)	4	7	1
62.	*Longicaudus trirhodus* (WALK.)			1
63.	*Macrosiphoniella artemisiae* (B de F.)	7	1	
64.	*Macrosiphoniella millefolii* (De GEER)	3		
65.	*Macrosiphoniella persequens* (WALK.)	2	1	
66.	*Macrosiphoniella tapuskae* HOTT. et FRIS.		1	
67.	*Macrosiphum cholodkovskyi* (MORDV.)	1		
68.	*Macrosiphum euphorbiae* (THOM.)	2		1
69.	*Macrosiphum funestum* (MACCH.)		1	2
70.	*Macrosiphum rosae* (L.)			1
71.	*Megoura viciae* BUCKT.			1
72.	*Megourella purpurea* H.R.L.	3		
73.	*Melanaphis pyraria* (PASS.)		1	
74.	*Metopeurum fusciviridae* STROYAN	7		
75.	*Metopolophium albidum* H.R.L.		1	
76.	*Metopolophium dirhodum* (WALK.)	8	1	35
77.	*Microlophium carnosum* (BUCKT.)	2	13	
78.	*Mimeuria ulmiphila* (Del GU.)			1
79.	*Muscaphis escherichi* (BŐRN.)		1	
80.	*Muscaphis musci* (BŐRN.)		1	
81.	*Myzocallis castanicola* BAKER			1
82.	*Myzus cerasi* (F.)		67	16
83.	*Myzus lythri* (SCHRK.)		6	5
84.	*Myzus persicae* (SULZ.)	21	4	69
85.	*Ovatus crataegarius* (WALK.)		5	9
86.	*Ovatus insitus* (WALK.)	1		3
87.	*Pemphigus* sp.	7	7	7
88.	*Periphyllus aceris* (L.)		1	
89.	*Periphyllus hirticornis* (WALK.)		1	
90.	*Periphyllus testudinaceus* (FERN.)	1	1	9
91.	*Phorodon humuli* (SCHRK.)	19	1082	101
92.	*Phyllaphis fagi* (L.)	1	9	
93.	*Phylloxera* sp.			17
94.	*Plocamaphis amerinae* (HARTIG)	1		
95.	*Prociphilus pini* (BURM.)	1	1	
96.	*Pterocallis alni* (De GEER)		5	4
97.	*Rhopalomyzus lonicerae* (SIEB.)			1
98.	*Rhopalomyzus poae* (GILL.)			1
99.	*Rhopalosiphoninus ribesinus* (V.D.GOOT)	1		1
100.	*Rhopalosiphoninus staphyleae* (KOCH)	1	3	1
101.	*Rhopalosiphum insertum* (WALK.)	1	1	1
102.	*Rhopalosiphum nymphaeae* (L.)	8	2	14

-1-	-2-	-3-	-4-	-5-
103.	*Rhopalosiphum padi* (L.)	404	5216	4151
104.	*Sipha maydis* KALT.	2		
105.	*Sitobion avenae* (F.)	45	91	27
106.	*Sitobion fragariae* (WALK.)		1	3
108.	*Smynthurodes betae* WEST.			1
109.	*Subsaltusaphis* sp.		1	
110.	*Tetraneura ulmi* (L.)	2	6	10
111.	*Thecabius affinis* (KALT.)			1
112.	*Thelaxes dryophila* (SCHRK.)		2	1
113.	*Therioaphis riehmi* (BÖRN.)	1		
114.	*Therioaphis trifolii* (MON.)	2	3	4
115.	*Tinolalis platani* (KALT.)		1	
116.	*Uroleucon cichorii*	8		
117.	*Uroleucon jaceae* (L.)	9		
118.	*Uroleucon* sp.	3	1	
Total number of specimes		**1551**	**7361**	**5233**
Number of species		**60**	**76**	**75**

Table 5. Species represented in largest numbers in shrubbery complexes by Moericke traps at „Biedrusko" Protected Landscape Area in 2003-2005.

Aphid species	**Percentage of participation of species in year**		
	2003	**2004**	**2005**
Acyrthosiphon pisum (HARRIS)			18.7
Aphis fabae SCOP.	3.5		
Brachycaudus sp.			4.9
Brevicoryne brassicae (F.)			3.4
Hyalopterus pruni (GEOFF.)		3.3	
Myzus cerasi (F.)		3.2	
Myzus persicae (SULZ.)	6.3		
Phorodon humuli (SCHRK.)	3.1	55.3	
Sitobion avenae (F.)	16.0		8.0
Rhopalosiphum padi (L.)		10.6	

Table 6. Biocenotic indices characterising communities of aphids caught in shubbery complexes of "Biedrusko" Protected Landscape Area in 2004-2005.

Environment	Number of samples (n)	Number of specimens (N)	Number of species (S)	d	H '	H_{max}	J '
2004							
Initial zone	60	406	38	14.23	2.92	5.24	0.55
Terminal zone	60	962	33	10.67	1.99	5.04	0.39
Margin zone	60	579	64	22.50	4.21	6.00	0.70
2005							
Initial zone	75	93	25	12.2	3.71	4.64	0.80
Terminal zone	75	78	23	11.6	3.70	4.52	0.82
Margin zone	75	138	33	15.0	3.08	5.04	0.61

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