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Thrips (*Thysanoptera*, *Insecta*) recorded from the selected plant species of the *Fabaceae* family in the city of Lublin

Wciornastki (*Thysanoptera*, *Insecta*) stwierdzone na wybranych gatunkach roślin z rodziny *Fabaceae* w Lublinie

SUMMARY

In the years 2001–2003 research on thrips (*Thysanoptera*) was conducted in the city of Lublin (south-eastern Poland). 15 study sites were determined in the different part of the city. The insects were collected by shaking from plants representing the legume (*Fabaceae*) family. As a result, 42 thrips species were recorded. The highest numbers (more than 20) were found on: *Lathyrus pratensis*, *Vicia cracca*, *Trifolium pratense*, *T. repens*, *Lotus corniculatus* and *Medicago falcata*. The lowest numbers of *Thysanoptera* – less than 5 – were found on *Lathyrus tuberosus*, *Trifolium medium*, *T. rubens*, *Chamaecytisus ratisbonensis* and *Vicia villosa*. In the whole collected material *Frankliniella intonsa* and *Thrips flavus* belonged to dominants. Less numerous were *Odontothrips confusus*, *O. loti*, *Thrips atratus*, *T. fuscipennis* and *T. tabaci*.

STRESZCZENIE

W latach 2001–2003 prowadzono badania nad wciornastkami (*Thysanoptera*) w Lublinie (południowo-wschodnia Polska). Wyznaczono 15 stanowisk położonych w różnych częściach miasta. Owady zbierano poprzez otrząsanie roślin z rodziny motylkowych *Fabaceae*. W wyniku badań stwierdzono występowanie 42 gatunków wciornastków. Najwięcej – ponad 20 gatunków *Thysanoptera*, stwierdzono na: *Lathyrus pratensis*, *Vicia cracca*, *Trifolium pratense*, *T. repens*, *Lotus corniculatus* oraz *Medicago falcata*. Najmniej – poniżej 5 gatunków *Thysanoptera*, znaleziono na: *Lathyrus tuberosus*, *Trifolium medium*, *T. rubens*, *Chamaecytisus ratisbonensis* oraz *Vicia vil-*

losa. W całym materiale dominowały *Frankliniella intonsa* i *Thrips flavus*. Mniej licznie zbierano *Odontothrips confusus*, *O. loti*, *Thrips atratus*, *T. fuscipennis* i *T. tabaci*.

K e y w o r d s: *Thysanoptera*, thrips, *Fabaceae*, Lublin.

INTRODUCTION

Thrips (*Thysanoptera*) are insects trophically associated with different plant species thus they provide numerous entomofaunal component inhabiting plant associations. Most data refers to the occurrence of thrips on cultivated plants as host plants. The aim of the paper is to establish the composition species of these pest insects on the selected plants of the *Fabaceae* family.

THE STUDY AREA AND METHODS

The Lublin city is situated in the northern part of the Lublin Upland. It is the biggest city (360,000 residents) on the eastern site of the Vistula River (10).

Strong changes of abiotic conditions within cities influence alterations of vegetation covers. They are the results of direct activities of a human being as well as indirect changes of climate, soil and water degradations (3).

In the Lublin city the essential element of the vegetation cover are: parks, allotments, urban and road greens. The origins of these habitats are anthropogenic ones, nevertheless, on the edges of the city some valuable fragments have remained in the shape of semi-natural vegetation communities (10).

The research was conducted in the years 2001–2003 from April to October at 15 selected study sites in two-year cycle at the each site. The insects were collected in two-week intervals by shaking from plants representing the *Fabaceae* family (Table 1). So called small bag method was used and the insects were picked up in the laboratory. The determined study sites were included to semi-natural ones – with low anthropopressure, situated in the outskirts (fresh, dry and moist meadows, as well as xerothermic communities) and anthropogenic ones – ruderal communities (dominating in the urban landscape) and park green. Those were situated in the centre of the city or in the neighbourhood of housing estates as well as motorways and railroads.

RESULTS

Thrips were collected from 19 plant species from the legume family. In the result of shaking flowering plants, 11,170 specimens of *Thysanoptera* belonging to 42 species from the families *Aeolothripidae*, *Thripidae* and *Phlaeothripidae* were collected (Table 1).

Qualitative contribution of particular thrips species on the collected herbaceous plant species was uneven. The highest number of species (21–25 species) was found on the plants: *Lathyrus pratensis*, *Vicia cracca*, *Trifolium pratense*, *T. repens*, *Lotus corniculatus* and *Medicago falcata*.

Table 1. *Thysanoptera* collected by shaking from the chosen species of the *Fabaceae* family at the study sites in Lublin

No.	Plants / *Thysanoptera*	*Zoogeographic elements*	*Ecological characteristic*	*Fabaceae*																		
				Coronilla varia	*Lathyrus pratensis*	*Lathyrus tuberosus*	*Lotus corniculatus*	*Lupinus polyphyllus*	*Trifolium medium*	*Trifolium repens*	*Trifolium rubens*	*Trifolium pratense*	*Medicago lupulina*	*Medicago falcata*	*Medicago sativa*	*Melilotus alba*	*Melilotus officinalis*	*Chamaecytisus ratisbonensis*	*Ononis arvensis*	*Vicia villosa*	*Vicia sepium*	*Vicia cracca*	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Aeolothripidae																						
1	*Aeolothrips intermedius* Bagnall, 1934	Pal	z	3	26		23	4	1	3		16	1	22	8	20	7				1	8	143
	Thripidae																						
2	*Anaphothrips obscurus* (Müller, 1776)	Co	g		1		1			3		3	1	5		4			1			24	43
3	*Aptinothrips elegans* Priesner, 1924	P-M	g					2									1						3
4	*Aptinothrips rufus* Haliday, 1836	Co	g									2					1						3
5	*Aptinothrips stylifer* Trybom, 1894	Co	g							1		1	1	1								1	5
6	*Chirothrips ambulans* Bagnall, 1932	Eur	g	1			1							1			1					4	8
7	*Chirothrips hamatus* Trybom, 1895	Hol	g							1		1										2	4
8	*Chirothrips manicatus* Haliday, 1836	Hol	g	2	1		2	1		6		8	2	5		2			2		1	15	47
9	*Chirothrips pallidicornis* Priesner, 1925	Eur	g										1									1	2
10	*Frankliniella intonsa* (Trybom, 1895)	Hol	h	92	517	2	386	283	3	1075		926	13	596	259	97	318	1	600		11	1286	6465
11	*Frankliniella tenuicornis* (Uzel, 1895)	Hol	h					3		1		1	1				1		1				8
12	*Limothrips consimilis* Priesner, 1926	E-S	g		1		4			2			1	7								11	26

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
13	*Limothrips denticornis* Haliday, 1836	Hol	g									3										2	5
14	*Neohydatothrips gracilicornis* (Williams, 1916)	Pal	fl		2		1					1		1								18	23
15	*Odontothrips biuncus* John, 1921	Hol	fl		1		1					1		20	2	1	1					160	187
16	*Odontothrips confusus* Priesner, 1926	E-S	fl		8		1						14	254	74	1	2		3			2	359
17	*Odontothrips loti* (Haliday, 1852)	Hol	h	96	2		356	16	4		10	70		3	2	94	83	36	4		2	19	797
18	*Odontothrips meliloti* Priesner, 1951	E-S	fl													83	8						91
19	*Odontothrips phaleratus* (Haliday, 1836)	E-S	fl	1	32																	1	34
20	*Platythrips tunicatus* (Haliday, 1852)	Eur	h										1										1
21	*Rubiothrips silvarum* (Priesner, 1920)	E-S	fl		1																		1
22	*Sericothrips bicornis* (Karny,1910)	E-S	fl				1			5		2		1									9
23	*Taeniothrips picipes* (Zetterstedt, 1828)	Pal	h		1																		1
24	*Tenothrips frici* (Uzel, 1895)	W-Pal	h		1																		1
25	*Thrips albopilosus* Uzel, 1895	Hol	fl							1						1							2
26	*Thrips angusticeps* Uzel, 1895	W-Pal	h					3															3
27	*Thrips atratus* Haliday, 1836	Hol	h		2		1	41		7		13		4	6	1			13			125	213
28	*Thrips flavus* Schrank, 1776	Pal	h	1	377	2	20	52		28		33	1	60	127	38	9		74		2	204	1028
29	*Thrips fuscipennis* Haliday, 1836	Hol	h	3	12		6	9	1	116		32	1	10	14	11	2		1	8		226	452
30	*Thrips major* Uzel, 1895	Pal	h	6	7		1	9		4		13	1	17	6	25	3					53	145
31	*Thrips nigropilosus* Uzel, 1895	Pal	h		1										1								2
32	*Thrips physapus* Linnaeus, 1758	Pal	h	6	32		51	7		3		25	2	7	1	16	2		2		1	42	197
33	*Thrips pillichi* Priesner, 1924	Eur	fl											1									1
34	*Thrips tabaci* Lindeman, 1889	Co	h	1	9		13	19		3		36	7	24	14	352	53			4	2	20	557
35	*Thrips trehernei* Priesner, 1927	Hol	h	1	5		8	1		2		1		3	1	2	5				1	8	38

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
36	*Thrips validus* Uzel, 1895	Hol	fl	1	14		6	1		2		3		7	1	2						6	43
Phleothripidae																							
37	*Haplothrips aculeatus* (Fabricius, 1803)	Pal	g		2		2	1				12		6	3	2						4	32
38	*Haplothrips kurdjumovi* Karny, 1913	Hol	fo																			1	1
39	*Haplothrips leucanthemi* (Schrank, 1781)	Hol	fl		1		1			47		30											79
40	*Haplothrips niger* (Osborn, 1883)	Hol	fl							75		31											106
41	*Haplothrips subtilissimus* (Haliday, 1852)	E-S	fo							4													4
42	*Haplothrips setiger* Priesner, 1921	W-Pal	h		1																		1
Specimens number		–	–	214	1057	4	886	452	9	1389	10	1264	48	1055	519	752	497	37	701	12	21	2243	11170
Species number		–	–	13	25	2	21	16	4	21	1	24	15	22	15	18	16	2	10	2	8	25	42

Abbreviations: Co – cosmopolitan, Eur – European, Hol – Holarctic, P-M – Pontian-Mediterranean, E-S – Euro-Siberian, Pal – Palearcic, W-Pal – West-Palearctic; fl – floricolous, fo – foliicolous, g – graminicolous, h – herbicolous, z – zoophagous species.

The lowest number of species (1–4 species) was recorded from *Lathyrus tuberosus*, *Trifolium medium*, *T. rubens*, *Chamaecytisus ratisbonensis* and *Vicia villosa*.

In the whole material, the dominating species were definitely *Frankliniella intonsa* (6465 exx) and *Thrips flavus* (1028 exx). *Odontothrips confusus*, *O. loti*, *Thrips atratus*, *T. fuscipennis* and *T. tabaci* were collected less numerously (213–797 exx).

Among 42 collected species two trophic groups were distinguished – zoophagous and phytophagous ones. *Aeolothrips intermedius* from the *Aeolothripidae* family, quite numerous one (143 exx), was the only species included to the zoophagous group. According to Sęczkowska (6) this species is not dependent on host plants. It occurs together with aphids and thrips larvae on which it feeds.

The phytophagous group contained of 16 herbicolous species, 12 floricolous species, 11 graminicolous species and 2 folicolous species – table 1.

The most numerous group was phytophilous polyphagous species comprised 82% of all the collected thrips specimens. To dominants belonged common species as follows: *Frankliniella intonsa*, *Thrips flavus*, *Th. tabaci*, *Th. fuscipennis*, *Th. major* and *Th. physapus*. Among oligophagous species the dominants were meadow species, trophically associated with the plants of the *Fabaceae* family: *Odontothrips loti* (840 exx), *O. confusus* (359 exx) – thermophilous species inhabiting *Medicago falcata*, *O. biuncus* (187 exx) associated with *Vicia sp.* and *Lathyrus sp.* as well as *Haplothrips niger* (106 exx) – occurring on *Trifolium sp.*

Moreover 5 monophagous species were found. The most numerous among them were *Haplothrips leucanthemi* (79 exx) recorded mainly from *Trifolium repens* and *T. pratense* as well as *Odontothrips meliloti* (91 exx) associated with *Melilotus sp.* The remaining monophagous species were less numerous. Those were: *Limothrips consimilis* (26 exx) and *Chirothrips ambulans* (8 exx) – collected mainly from *Vicia cracca* as well as *Thrips albopilosus* (2 exx) collected from *Trifolium repens* and *Melilotus alba*.

Among collected insects 11 species occurring on monocotyledonous plants were discovered: *Anaphothrips obscurus, Aptinothrips elegans*, *A. rufus*, *A. stylifer*, *Chirothrips ambulans*, *Ch. hamatus, Ch. manicatus*, *Ch. pallidicornis*, *Limothrips consimilis*, *L. denticornis* and *Haplothrips aculeatus*.

The highest numbers of imaginal stages were obtained in May, July and August. In June, July and September the larvae were quite numerous, however, they were not determined due to the lack of the identification key thus they were not included in the analysis.

The studies showed the highest species diversity of the thrips at semi-natural study sites with low influence of anthropopression. Those were the sites situated on the outskirts in the north- and south-eastern part of the city. It resulted from the species richness of the plants from the *Fabaceae* family. The lower number of species were found at study sites situated in the centre of the city or in the neighbourhood of housing estates and motorways, and railroads.

Among collected thrips, most species belonged to eurytopes (22 species – 52.4%). This group was also characterized by the highest numbers (92%) due to the presence of *Frankliniella intonsa* and *Thrips flavus*. The species contribution of politopes (10 species – 23.8%) and oligotopes (9 species – 21.4%) was similar, as for stenotopes – it was the smallest one (1 species – 2.4%).

The collected insects were classified to 7 zoogeographic elements (Table 1). They were distinguished on the basis of the division proposed by zur Strassen (11) and Schliephake, Klimt (5). The most species represented Holarctic (15 species – 35.7%), Palearctic (8 species – 19%) and Euro-Siberian (7 species – 16.6%) elements. The highest numbers referred to Holarctic elements (8,447 exx – 75.6%). The lowest numbers of species were found among cosmopolitan and European species – each with 4 species and 9.5% as well as west-Palearctic (3 species – 7.1%) and the only one Pontian-Mediterranean species. Among them the highest quantitative contribution was reached by cosmopolitan elements (5.4%) which was influenced by the occurrence of eurytopic *Thrips tabaci*.

SUMMARY AND DISCUSSION

In entomological references there are only a few papers (1, 2, 7) referring to the occurrence of *Thysanoptera* in the flowers of the *Fabaceae* family. The research that has been conducted so far focuses on natural plant communities or agrocenoses.

During three-year studies carried out in different vegetation communities, 11,170 specimens of *Thysanoptera* belonging to 42 species were found on the legume family. Some plant species were not numerous thus the obtaining the similar number of flowers was not always possible. The highest diversity of thrips species composition (21–25 species) was found on *Lathyrus pratensis*, *Lotus corniculatus*, *Trifolium repens*, *T. pratense*, *Medicago falcata* and *Vicia cracca*. In the blooming period thrips were migrating in order to find food. Due to very small sizes of the discussed insects the space for a living they need – flowers in this case – can be very small (2). Flowers also provide shelter for thrips.

In the area of Pagóry Jaworznickie on the Śląsk Upland SIERKA (7) collected 16 thrips species on the plants of the *Fabaceae* family. The highest number – 10 species – was obtained from *Medicago falcata*, 8 species for each *Coronilla varia* and *Vicia villosa* as well as 7 species for each *Medicago sativa*, *Melilotus alba*, *M. officinalis* and *Ononis arvensis*. The lowest number of species ranged from 2 to 3 and was found on *Lathyrus pratensis*, *Trifolium medium* and *T. repens*. Comparing those results with the material collected in Lublin most thrips species were collected on *Lathyrus pratensis* (25 species), *Medicago falcata* (22 species) and *Trifolium repens* (21 species). The lowest number of species was catched on *Trifolium medium* (4 species) and *Vicia villosa* (2 species). The number of thrips species occurring on flowers of other plant species ranged from 10 to 18.

JENSER (1) during thrips studies on the selected legume plants situated on the peripheries of Budapest recorded 12 species of those insects. Only three of them were not found in Lublin – *Aeolothrips ericae* occurring on *Vicia tenuifolia*, *Kakothrips robustus* mainly on *Lathyrus tuberosus* and *Frankliniella occidentalis*. The author collected thrips in the largest numbers from *Melilotus officinalis*, mainly *Odontothrips loti* and *Frankliniella intonsa*, from *Medicago falcata* and *M. sativa* – the most numerously *Odontothrips confusus* and from *Trifolium repens*, *T. pratense* – mainly *Frankliniella intonsa*. From the most of the studied plants *Aeolothrips intermedius*, *Frankliniella intonsa*, *Odontothrips loti* and *Thrips tabaci* were picked up. In Lublin, the mentioned species were also very numerous, among them the most numerous *Frankliniella intonsa* obtained from the majority of examined plants.

GROMADSKA (2) researched thrips of the flowers of a dune biotope. Among 27 analysed plant species the following legume species were taken into account: *Lotus corniculatus*, *Trifolium arvense*, *T. minus* and *T. repens*. *Thrips tabaci* and *Haplothrips acanthoscelis* were dominating species on those plants, less numerous were *Aeolothrips fasciatus*, *Frankliniella tenuicornis* and *H. setiger*. Except for *Trifolium repens*, where all thrips species mentioned above were found, the remaining plant species were inhabited by 2 or 3 species. According to the data of Gromadska (2), thrips inhabited flowers of melliferous plants pollinated by hymenopterans more numerously. These flowers have peculiar depth thus they can be a shelter for thrips. The legume plants providing pollen for insects are as follows: *Trifolium sp.*, *Melilotus alba*, *M. officinalis* and *Vicia sp.* (9). They have flowers with well hidden nectaria to which the access is possible only for an adapted insect. Their flowers are mainly white or yellow, also red and blue and they are searched for by bumblebees and bees. In Lublin the species diversity of thrips on those flowers was high (Table 1). They stay on calyx sepals, corolla petals, androecia or other parts of a flower. The number of

collected species in Lublin showed that the best living conditions in the urban environment were found by eurytopes, with wide range of the occurrence, like *Frankliniella intonsa*, *Thrips flavus* and *Odontothrips loti* among others. In all of the examined environments Holarctic species were in majority, next Palearctic and Euro-Siberian ones. These are the species with wide ecologic valence inhabiting many varied environments – from the extreme dry meadows to more or less moist meadows (12).

Less numerous are species with low adaptive abilities and smaller geographic ranges (12). In Lublin those were: *Chirothrips ambulans* – a monophagous species inhabiting *Poa pratensis*, oligotopic species *Ch. pallidicornis* on *Dactylis glomerata*, *Melica sp.*, *Poa nemoralis* and *Platythrips tunicatus* mainly on *Galium mollugo*, a polytopic species *Thrips pillichi* and eurytopes like *Tenothrips frici*, *Thrips angusticeps* and *Haplothrips setiger.*

According to Winiarska (12) the smallest group of insects occurring in town environments are stenotopic, hygrophilous and thermophilous species, with Sub-Atlantic and Mediterranean origins. 5 thermophilous species were collected in Lublin. However, only *Aptinothrips elegans* was a stenotopic species with Pontian-Mediterranean origins. The remaining species are polytopic and oligotopic ones with a wide range of geographic distribution: *Limothrips consimilis*, *Neohydatothrips gracilicornis*, *Odontothrips confusus* and *Rubiothrips silvarum*. Among hygrophilous species occurred *Chirothrips hamatus* – graminicolous, polytopic and Holarctic species.

Greater species diversity of thrips was found at semi-natural study sites situated in the outskirts and rich in herbaceous vegetation and trees. 40 species were collected in here. At study sites with ruderal vegetation 32 thrips species were found. The lowest species diversity was found on park green – 23 species. It resulted from mowing of poor vegetation, treading or flooding on wet sites.

The conducted research showed that urban environments are quite rich with regard to species diversity of thrips. The considerable number of caught species indicated their tolerance of moderately unfavourable conditions in urban agglomerations. The most important factor influencing the occurrence of thrips in the city is the access to suitable food.

On the basis of great numbers of thrips in flowers it can be concluded that flowers of different species fulfilled their food requirements and provided shelter for them (2). They use nectar, pollen and fluids of different part of a flower. They are the pollinator too.

Insects inhabiting urban areas contribute to matter circulation and energy flow, stimulate soil-forming processes, limit the number of phytophagous species and maintenance the ecologic balance in urban zoocenoses. Their presence is necessary in the urban environment (12).

The main reason of insect extinction is vanishing of the habitats in which they occur. The areas with weak anthropopressure are of great importance for the occurring of valuable species in terms of nature. The reaction of insects in case of extremely strong anthropopression is definite and unambiguous; when anthropopressure is weaker the reactions are varied and with different intensity (8). The influence of different anthropopressure and overgrowing of wastelands cause gradual withdrawal of insects from the sites they inhabit and consequently their extinction (4).

REFERENCES

1. Gromadska M. 1954. Przylżeńce kwiatów biotopu wydmowego (Próba analizy ekologicznej). Ekologia Polska, Warszawa, 93–137.
2. Jackowiak B. 1990. Antropogeniczne przemiany flory roślin naczyniowych Poznania. Wyd. Naukowe UAM, Poznań, 232 pp.
3. Jenser G. 1990. Host preference of some *Thysanoptera* species living in *Fabaceae* flowers. In: The Third International Symposium on *Thysanoptera*. Kazimierz Dolny 11–16. 06.1990. Wyd. SGGW, Warszawa, 83–89.
4. Kucharczyk H. 2002. Rzadkie oraz zagrożone wyginięciem w Polsce gatunki wciornastków (*Thysanoptera*). In: Konferencja naukowa „Ochrona owadów w Polsce – ekologiczne i gospodarcze konsekwencje wymierania i ekspansji gatunków", Olsztyn 21–23.09.2002. Wyd. PTE, Poznań i UWM, Olsztyn, 21.
5. Schliephake G., Klimt K. 1979. *Thysanoptera* Fransenflügler. Gustav Fischer Verlag, Jena, 71–477.
6. Sęczkowska K. 1956. Badania nad przylżeńcami (*Thysanoptera*) stwierdzonymi na polach śródleśnych w okolicach Wandzina. Ann. UMCS, Lublin, sec. C, 11: 183–221.
7. Sierka W., Sierka E. 2004. *Thrips* (*Insecta*, *Thysanoptera*) of the selected plant communities of the Jaworznickie Hills (Silesian Upland, Poland) Acta Phytopathologica et Entomologica Hungarica, Hungary, 39 (1–3): 281–299.
8. Skibińska E., Chudzicka E. 1999. Owady w monitoringu przyrodniczym. In: Konferencja naukowa „Ochrona owadów w Polsce u progu integracji z Unią Europejską", Kraków 23–24 września 1999, PTE, Poznań–Kraków, 17–18.
9. Šomšak L. (ed.). 1997. Świat roślin, skał i minerałów. Wyd. Multico, Warszawa, 400 pp.
10. Stochlak J. (ed.). 1993. Raport o stanie środowiska miasta Lublina. ZKW, Laser Graf, Lublin, 349 pp.
11. Strassen zur R. 2003. Die terebranten Thysanopteren Europas. Goecke & Evers, Keltern, 277 pp.
12. Winiarska G. 1999. Owady w mieście – wybrane zagadnienia dotyczące znaczenia entomocenoz w ekosystemie miejskim, ich zagrożenia i problemów ochrony. In: Konferencja naukowa „Ochrona owadów w Polsce u progu integracji z Unią Europejską", Kraków 23–24 września 1999, PTE, Poznań–Kraków, 10–11.