

# **Thrips (*Thysanoptera*, Insecta) Collected in Wooded Areas of the City of Lublin (South-Eastern Poland)**

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The research on the fauna of *Thysanoptera* was conducted in the city of Lublin (south-eastern Poland) in 2001. The thrips were caught by means of an entomological net in four plant communities (mainly in parks) in the city center and on the outskirts (ground cover in an oak wood). 41 species were collected, among them three rare in Poland. The study involved the qualitative and quantitative structure of assemblages, seasonal changes of the number of species and specimens, food preferences, the qualitative similarity of the fauna of thrips of the plant communities under research. The results of the research indicated that the fauna of thrips of green areas of Lublin was quite abundant and diversified, with dominating eurytopic species. It resulted from the poor floral diversity and the mowing of park vegetation, the influence of air and soil pollutions was also possible.

Keywords: Thrips, *Thysanoptera*, park vegetation.

Within the last few decades both the extent and the rate of urbanization have become the cause of intensive research on the city entomofauna. The impact of urbanization on the city entomofauna can vary, depending on the degree of transformation of a natural habitat into an anthropogenic one (Zapparoli, 1997). In Poland, data concerning the species composition, ecological connections and the number of thrips in urban areas are scarce. The first research on the fauna of *Thysanoptera* in the city of Lublin was carried out in the 1960s (Sęczkowska and Gawarecka, 1967) and 1970s (Grudzień, 1977). The studies involved only ruderal communities. The present research was mainly conducted in the park areas of the city of Lublin. The objective of the research was to establish the quantitative composition of *Thysanoptera* fauna, to distinguish habitat groups and to compare the species diversity and the qualitative similarity of the thrips of different sites.

## **Area of Research**

Lublin, inhabited by 360.000 residents is a city in the south-eastern part of Poland, situated in the north of the Lublin Upland. The city is situated in the valleys of the rivers: Bystrzyca, Czechówka and Czerniejówka, on loessal hills and Tertiary chalk hillocks which enhance the natural values of the landscape. The climate in Lublin is moderately

continental, drier and milder, with a majority of westerly winds; the average annual rainfall is about 550 mm; the relative humidity is 79% and the average annual temperature +7.9 °C (Bańkowska-Królikowska et al., 2003).

Thrips were collected in four plant communities, on sites located in the city center and on its outskirts: herbal layer of the oak wood in the biotope of mixed continental forest in Dąbrowa (site 1); park herbaceous community of meadow type (site 2) and of riparian type in Ludowy Park (site 3); and park herbaceous community of meadow type (site 4) and of oak-hornbeam community (site 5) in Saski Park. The green areas where the sites were situated are the most popular relaxation areas for the residents of Lublin. Except for site 1, all the sites were mowed twice or thrice in the course of the research.

## Methods

The research of the fauna of *Thysanoptera* was conducted with two-week intervals from May to October 2001. The material was collected with an entomological net and also by shaking and picking insects from plants. The collected insects were preserved in 60% ethyl alcohol and then placed on microscopic slides. *Thysanoptera* were identified to species level with the use of the keys of Mound et al. (1976), Schliephake and Klimt (1979) and Zawirska (1994). The species diversity index (d) was calculated according to Simpson (Fig. 1). The formula:  $d = S - 1 / \log N$  was used, where: S – number of species in a community, N – number of specimens in a community (Odum, 1982).

The study also involved the quantitative structure of *Thysanoptera* caught in individual months (Figs 2 and 3) and their food preferences in the plant communities (Fig. 4).

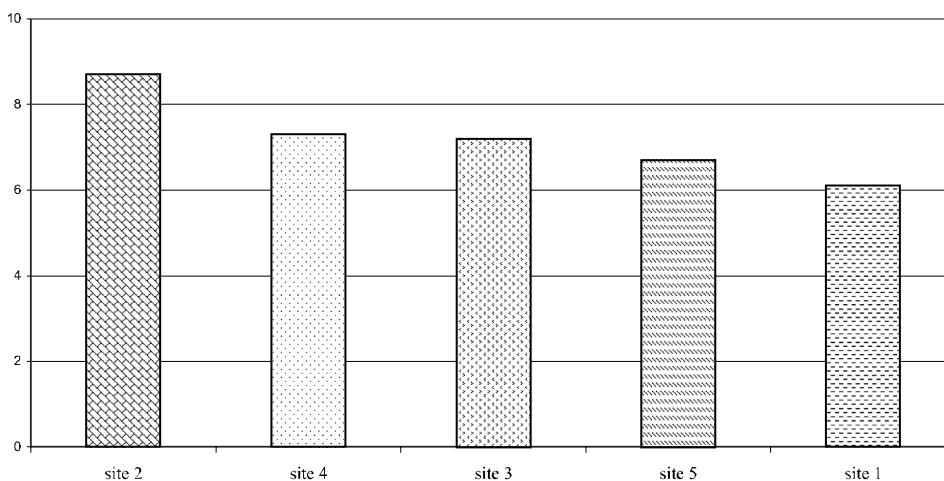


Fig. 1. The index of species diversity of *Thysanoptera* in studied communities according to Simpson  
 Site 1: herbal layer of the oak wood; site 2\*\* : meadow park community;  
 site 3\*\* : riparian type community; site 4\* : meadow park community; site 5\* : oak-hornbeam community  
 \*Saski Park, \*\*Ludowy Park

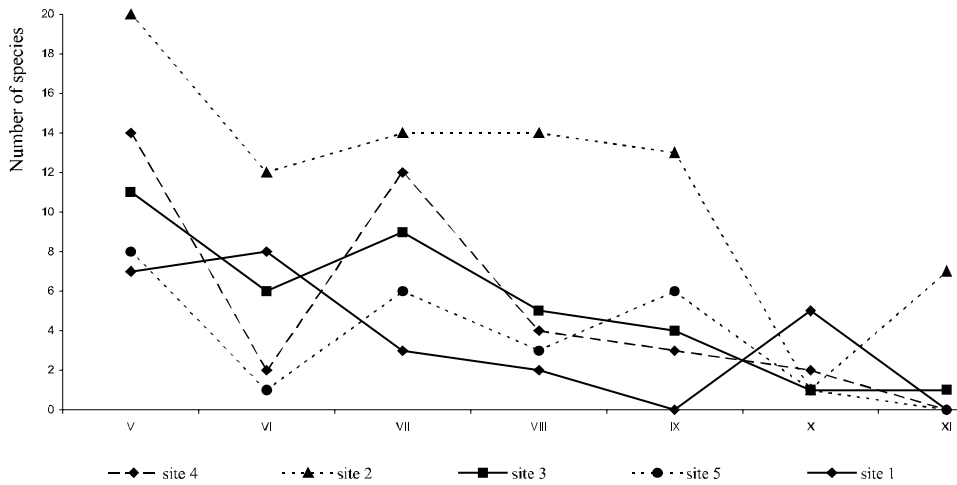


Fig. 2. The number of species of *Thysanoptera* collected in particular months  
 Site 1: herbal layer of the oak wood; site 2\*\*\*: meadow park community;  
 site 3\*\*\*: riparian type community; site 4\*: meadow park community;  
 site 5\*: oak-hornbeam community  
 \*Saski Park, \*\*Ludowy Park

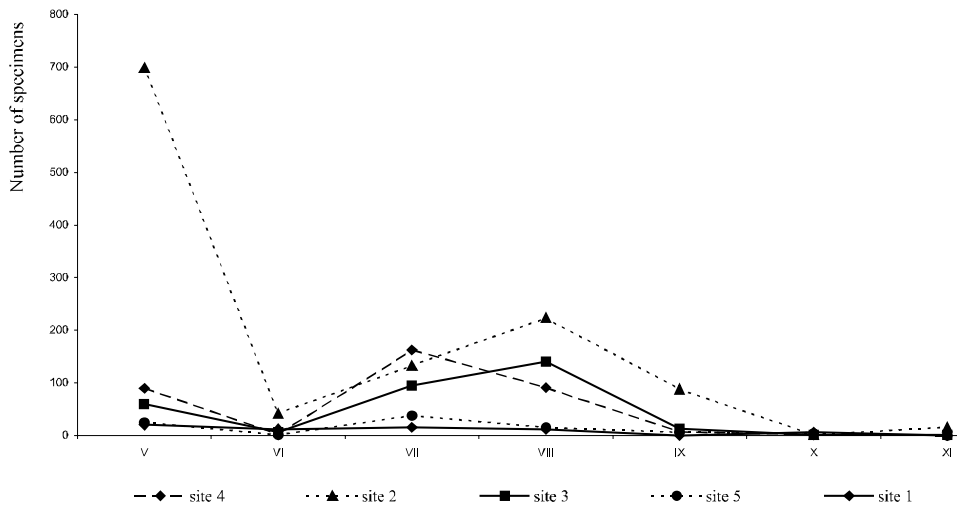


Fig. 3. The number of specimens of *Thysanoptera* collected in particular months  
 Site 1: herbal layer of the oak wood; site 2\*\*\*: meadow park community;  
 site 3\*\*\*: riparian type community; site 4\*: meadow park community;  
 site 5\*: oak-hornbeam community  
 \*Saski Park, \*\*Ludowy Park

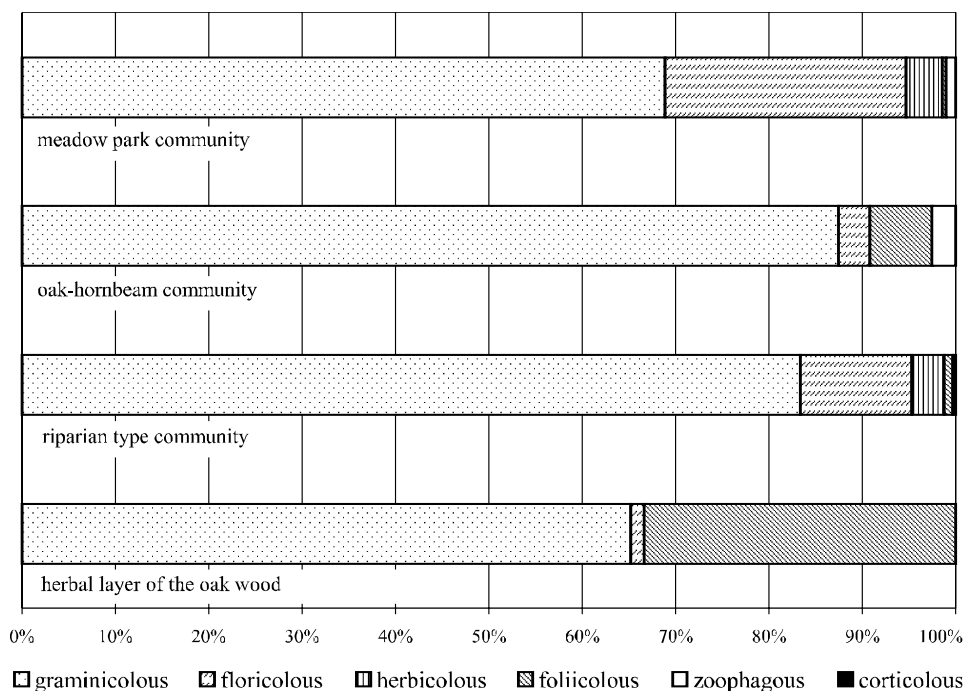


Fig. 4. Percentage of specimens of *Thysanoptera* according to food preferences

## Results

2563 specimens representing 41 different species were caught during the study of the fauna of *Thysanoptera* (Tables 1 and 2). This constitutes about 19% of the fauna of the country. Three of the collected species are rare in Poland: *Dendrothrips degeeri*, *Mycterothrips annulicornis* and *Megalothrips bonannii*.

Four species were common for all the sites; three were graminicolous: *Anaphothrips obscurus*, *Aptinothrips rufus*, *Haplothrips aculeatus* and one floricolous: *Thrips physapus* (Table 1).

The proportion of particular species in plant communities was varied (Fig. 1). The greatest species diversity was characteristic of the fauna of park vegetation of meadow type in Ludowy Park (site 2). 28 species out of a group of 1202 collected specimens were recorded there. Graminicolous species were dominant, among them: *Chirothrips hamatus*, *Anaphothrips obscurus* and *Haplothrips aculeatus*. These species are very common in Poland. Floricolous species were not numerous there, with the exception of *Frankliniella intonsa*. The species characteristic of forest communities were represented by *Oxythrips ajugae* and *Platythrips tunicatus*.

**Table 1***Thysanoptera* collected with an entomological net in wooded areas of Lublin

No.	Site	Ludowy Park			Saski Park	
		Dąbrowa	1	2	3	4
<i>Thysanoptera</i>						
<b><i>Aeolothripidae</i></b>						
1.	<i>Aeolothrips albicinctus</i> HAL.					+
2.	<i>Aeolothrips intermedius</i> BAGN.			+		+
3.	<i>Aeolothrips melaleucus</i> HAL.					+
4.	<i>Aeolothrips versicolor</i> UZ.					+
<b><i>Thripidae</i></b>						
5.	<i>Anaphothrips obscurus</i> (O. F. MÜLL)	+	+++++	+++++	+++++	+++
6.	<i>Aptinothrips elegans</i> PRIES.			+		+
7.	<i>Aptinothrips rufus</i> (GMEL.)	+	++++	+		+
8.	<i>Aptinothrips stylifer</i> TRYB.	+	+			
9.	<i>Baliothrips dispar</i> (HAL.)			+		+
10.	<i>Bolacothrips jordani</i> UZ.			+		
11.	<i>Chirothrips hamatus</i> TRYB.	+	+++++			
12.	<i>Chirothrips manicatus</i> HAL.	+	+			+
13.	<i>Dendrothrips degeeri</i> UZ.					+
14.	<i>Dendrothrips saltatrix</i> UZ.					+
15.	<i>Frankliniella intonsa</i> (TRYB.)		+++++	+	++	+
16.	<i>Frankliniella tenuicornis</i> (UZ.)		+	+		+
17.	<i>Limothrips denticornis</i> HAL.		+	+		+
18.	<i>Mycterothrips annulicornis</i> (UZ.)		+	+		
19.	<i>Mycterothrips salicis</i> (O. M. REUT.)	+				
20.	<i>Odontothrips loti</i> (HAL.)		+			+
21.	<i>Oxythrips ajugae</i> UZ.	+	+	+		+
22.	<i>Platythrips tunicatus</i> (HAL.)		+			
23.	<i>Rubiothrips sordidus</i> (UZ.)		+			
24.	<i>Sericothrips bicornis</i> KARNY		+			
25.	<i>Taeniothrips inconsequens</i> (UZ.)			+	++	+
26.	<i>Thrips atratus</i> (HAL.)		+		+	
27.	<i>Thrips flavus</i> SCHR.		+	+	+	+
28.	<i>Thrips fuscipennis</i> HAL.		+	+	++	
29.	<i>Thrips major</i> UZ.		+	+		
30.	<i>Thrips minutissimus</i> L.	+				
31.	<i>Thrips nigropilosus</i> UZ.			+		
32.	<i>Thrips physapus</i> L.	+	+	+	+	+
33.	<i>Thrips tabaci</i> LIND.		+	+	+	
34.	<i>Thrips trehernei</i> PRIES.		++	+	+	
35.	<i>Thrips validus</i> UZ.		+	+	+	
<b><i>Phlaeothripidae</i></b>						
36.	<i>Haplothrips aculeatus</i> (FABR.)	+	+++++	+	+	+
37.	<i>Haplothrips kurdjumovi</i> KARNY	+				+
38.	<i>Haplothrips niger</i> (OSB.)		+			
39.	<i>Haplothrips subtilissimus</i> (HAL.)	+				
40.	<i>Megalothrips bonannii</i> UZ.			+		
<b>Total species</b>		<b>12</b>	<b>28</b>	<b>19</b>	<b>20</b>	<b>15</b>

+: &lt; 25, ++: 25–50, +++: 50–100, ++++: 100–150, +++++: &gt;150 specimens

Table 2

The number of specimens of *Thysanoptera* collected by shaking method on selected plant species

<i>Thysanoptera</i>	<i>Aeolothrips intermedius</i> BAGN.	<i>Aptinothrips rufus</i> (GMEL.)	<i>Frankliniella intonsa</i> (TRYB.)	<i>Frankliniella tenuicornis</i> (UZ.)	<i>Odontothrips confusus</i> PRIES.	<i>Taeniothrips inconsequens</i> (UZ.)	<i>Thrips atratus</i> (HAL.)	<i>Thrips flavus</i> SCHR.	<i>Thrips fuscipennis</i> HAL.	<i>Thrips major</i> UZ.	<i>Thrips physapus</i> L.	<i>Thrips tabaci</i> LIND.	<i>Thrips trehernei</i> PRIES.	<i>Thrips validus</i> UZ.	<i>Haplothrips aculeatus</i> (FABR.)	<i>Haplothrips niger</i> (OSB.)	Total species
<b>Plants</b>																	
<i>Lotus corniculatus</i> L.	1	18					5	1		1					1		
<i>Medicago sativa</i> L.		39		1		5	72	2	5		1				2		
<i>Leontodon autumnalis</i> L.		6					1				23		13	1			
<i>Trifolium repens</i> L.			4													1	
<i>Trifolium pratense</i> L.		3															1
<i>Vicia cracca</i> L.		2									4						2
<i>Matricaria inodora</i> L.		16					4	6	42								4
<i>Taraxacum officinale</i> WEB.	1	34				1		3		33		96	7				7
<i>Linaria vulgaris</i> MILL.		7													1		2
<i>Cichorium intybus</i> L.		3				4	1	2		5							5
<i>Stellaria nemorum</i> L.						13											1
<i>Sambucus nigra</i> L.					6		1		2		1						4
<b>Total specimens</b>	<b>1</b>	<b>1</b>	<b>129</b>	<b>4</b>	<b>1</b>	<b>6</b>	<b>23</b>	<b>84</b>	<b>14</b>	<b>49</b>	<b>66</b>	<b>2</b>	<b>109</b>	<b>8</b>	<b>4</b>	<b>1</b>	<b>-</b>

On the site in Saski Park (site 4), which is also a park area of meadow type, 355 specimens belonging to 20 species were collected. The dominant species among graminicolous thrips was *Anaphothrips obscurus*, and among the floricolous *Frankliniella intonsa*. The following dendrophilous species were also found: *Dendrothrips degeeri*, *D. saltatrix* and *Taeniothrips inconsequens*, the last one quite common in early spring.

A similar abundance of species diversity (318 specimens belonging to 19 species) was characteristic of the fauna of riparian type in Ludowy Park (site 3). The presence of two rare species is also worth mentioning (thermophilous *Mycterothrips annulicornis* and mycophagous *Megalothrips bonannii*). The species collected on this site were mainly graminicolous and floricolous, mostly *Anaphothrips obscurus*, others were not so frequently found (Table 1). Moreover, two foliicolous species were caught: *Oxythrips ajugae* and *Taeniothrips inconsequens*.

120 specimens belonging to 15 species were collected in the park plant community similar to the of oak-hornbeam community in the Saski Park (site 5). The dominant species were those dependent for food on grass leaves, among them polytopic – *Anaphothrips obscurus* and an eurytopic *Aptinothrips rufus*. The following dendrophilous species were caught: *Oxythrips ajugae*, *Taeniothrips inconsequens* and *Haplothrips kurdjumovi*. Small numbers of polyphagous floricolous species were also recorded.

The smallest number of species (12) and specimens (66) were collected in the herbal layer of the oak wood (site 1). The dominant species were oligotopic feeding on tree leaves: *Mycterothrips salicis*, *Thrips minutissimus* (only in spring), *Haplothrips subtilissimus* (those species were not present on the other sites), *Oxythrips ajugae*, *H. kurdjumovi*. There was little floral diversity – *Asperula odorata* and *Convallaria majalis* were quite common and hence the presence of just one floricolous species *Thrips physapus*. Moreover, few eurytopic graminicolous species were caught.

Two maxima were recorded in the course of seasonal changes of the quantity of species (Fig. 2) and their specimens (Fig. 3) on the studied sites – a slight spring one and a significant summer one; there was a decrease in June and in the autumn months. A significant decrease in the quantity of species and their numbers in June were caused not only by the growth cycle of thrips, but also by the mowing of the grass in the park areas.

502 specimens belonging to 16 species (Table 2) were caught on flower plants by means of the shaking method. Those were mainly polyphagous and eurytopic. The thrips were most frequently found on plants belonging to the *Fabaceae* and *Asteraceae* families. The highest number of species (8) was caught on *Medicago sativa*, predominately *Thrips flavus* and on *Taraxacum officinale* (7 species), predominately *Thrips trehernei*.

In the course of the study six groups of species of particular food preferences were distinguished, according to zur Strassen (1993): graminicolous, floricolous, herbicolous, foliicolous, zoophagous and corticolous. The predominant ones were feeding on inflorescence and grass leaves (graminicolous), much less common were the species feeding on inflorescences and in flowers of dicotyledonous herbaceous plants (floricolous). The herbal layer of the oak wood (site 1) was characterized by the greatest proportion of graminicolous and foliicolous species (Fig. 4).

## Discussion

A lack of data in literature on the *Thysanoptera* fauna in the urban environment makes it impossible to compare the obtained study results. They can only be compared to studies conducted in similar plant communities in the natural environment. Research indicates that urban green areas, including parks, are characterized by a smaller number of insects, compared to natural ecosystems (Banaszak, 1998).

Sęczkowska (1971) recorded 63 *Thysanoptera* species collected on trees and shrubs in natural plant communities in the Lublin Region. 22 of them were found in Lublin. Those were mainly ubiquitous species. During the research carried out in *Tilio-Carpinetum* plant community in the “Bachus” reserve – the Lublin Upland (Kucharczyk and Sęczkowska 1990), 46 species of *Thysanoptera* were present in the herbal layer; only 5 of them were caught in Lublin (Saski Park). In the natural plant communities of the reserve *Kakothrips robustus*, *Thrips minutissimus*, *Haplothrips subtilissimus* were frequently found, but they were not present in the urban environment of the city of Lublin.

The species composition of insects in a given area depends mainly on environmental preferences, the type of habitat and the character of the transformations it undergoes.

In natural plant communities the abundance of vascular plants blooming from early spring to late autumn favours the development of a greater number of thrips species and specimens than in the urban environment. Moreover, urban areas undergo unfavorable anthropogenic transformations of the scarce plant cover. There is also a greater air and soil pollution.

The present research indicates that the greatest species diversity and the largest number of specimens of *Thysanoptera* were recorded in the meadow type park area, characterized by a great floral diversity. The smallest number of species and specimens was present on the semi-natural site in Dąbrowa, situated on the outskirts of the city. Those were mainly dendrophilous species. This was caused by a small proportion of vascular plants and a large proportion of trees and shrubs on the site.

Urbanization pressure influences the species composition and the structure of assemblages of *Thysanoptera*. This results, among others, in a change in the proportion of the prevalent species.

Urban green areas are dominated by insect species of a great ecological valency and a wide geographical range. Species which are less adaptable (oligotopic) and usually have a smaller geographical range are less frequently found (Winiarska, 2000). Among the *Thysanoptera* collected on the studied sites the greatest number of species belonged to oligotopic (18) and eurytopic (17), then polytopic (4) and stenotopic (2). In the fauna of most of the studied plant communities species of a great environmental tolerance (eurytopic) were predominant, only in the oak wood the proportion of dendrophilous oligotopic species was greater, though they were not numerous.

A warmer and drier climate in a city creates better living conditions for a number of thermo- and xerophilous species, which originally come from southern Europe. The number of these species, however does not even up the loss of hydrophilous species, which are unable to adapt to a largely dry urban environment (Pisarski, 1979).

A significant number of thrips caught in the study area belonged to mezohygrophilous species. Only *Baliothrips dispar* and *Mycterothrips salicis* were classified as hygrophilous. A group of xerophilous thrips was represented by *Anaphothrips elegans* and *Mycterothrips annulicornis*, the highest proportion of which was recorded in the meadow park area.

## Conclusion

The present research showed that the fauna of thrips of wooded urban areas is quite abundant and diversified. The distinguishing factors are environmental conditions – mainly access to food and anthropogenic pressure. Eurytopic volant species stand the greatest chance of survival. Insects have an important role to play as indicators of the quality of the environment. They respond in a very clear way to the environmental changes.



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