

## HETEROPTERA OCCURRING ON *ACHILLEA MILEFOLIUM* L.

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*Accepted: September 20, 2001*

**Abstract:** In the years 1977–1979 and 2000 the bugs (*Heteroptera*) were collected from yarrow, well-known herbaceous plant. It turned out that the bugs made up to 30% on average of all arthropods collected from yarrow. The most numerous were phytophagous bugs (79–96%), among them the known pest of genera *Lygus* and *Plagiognathus*. Among zoophagous bugs the most numerous were genera *Nabis* and *Orius*. Both of phytophagous and zoophagous bugs of these genera had their life cycle on yarrow. For comparison *Heteroptera* from yarrow growing in the wild were also collected.

**Key words:** yarrow – *Achillea millefolium*, occurrence, *Heteroptera*

### I. INTRODUCTION

Yarrow (*Achillea millefolium* L.) is perennial plant belonging to family *Compositae* (*Asteraceae*). *A. millefolium* grows in all Europe, Siberia, Caucasus and Himalayas; it had been introduced to North America, New Zealand and South Australia (Szwejkowscy A. and J. 1993). In Poland *A. millefolium* occurs on meadows, balks, pastures, lawns besides the roads and at the forest edges; it is very common in whole country and has many varieties (Mowszowicz 1983). In Poland yarrow is cultivated for its medicinal uses. The resource parts used in pharmacy are the upper parts of stem (pharmaceutical name – *Herba Millefolii*) and flowers (*Anthodium millefolii*) (Ożarowski 1976). The yarrow herb contains 0.25–0.5% of volatile oil (azulens, thujone, pinenes, borneol) (Figueiredo et al. 1996), flavonoids, organic acids, magnesium, alkaloids and bases (e.g. achilleine, stachydrine), tannin and many others (Mowszowicz 1983).

Yarrow herb is used internally – as an antihemorrhagic, diaphoretic, hepatic, stimulating digestion and strengthening medicine (Podlech 1994); externally – as anti-inflammatory agent and in hair cosmetics. Yarrow volatile oil is used for production of cosmetics and liquors. Yarrow is also a very good pasture plant, especially in meadow hay (Mowszowicz 1983).

Since *A. millefolium* is commonly used in medicine as a healing herb therefore the results of many years observations on the bugs occurrence on this plant seemed interesting and important for its cultivation, especially that the publications concerning the bugs on medicinal crops in Poland are very scarce. The authors studied occurrence of bugs on the following plants: coriander (*Coriandrum sativum*), fennel (*Feniculum vulgare*), caraway

(*Carum carvi*) (Obarski 1964; 1964a) and gralian and common foxglove (*Digitalis* sp.) (Korcz 1998). No foreign publications concerning occurrence of bugs on *A. millefolium* were found.

## II. METHODS

In the years 1977–1979 in Plewiska near Poznań and for comparison in 2000 in Gostyń in Wielkopolska region (Fig. 1), all arthropods occurring on the plantations of *A. millefolium* were captured with entomological net. Samples were collected during growing season from June to September. One sample was based on  $4 \times 25$  or  $2 \times 25$  captures with entomological net depending on size of the experimental field. The aim of the studies was not only to show the number and species composition of the bugs occurring on yarrow but also to determine the percentage of these insects in comparison to the rest of mostly entomological material collected (since there were also single arachnids therefore collected material was related to all arthropods). Besides, in 1980 and 2000 the bugs were collected from *A. millefolium* growing in wild on meadows, in ditches and in urban environment in different regions of Poland to compare species composition of these insects with those collected from plantations. The bugs were determined on the basis of key guide by Wagner (1952; 1966; 1967). Location of the sites where the insects were collected were marked on the map of Poland (Fig. 1) using Universal Transverse Mercator (U.T.M) grid (Heath 1971; Bogucki and Stepczak 1974).

## III. RESULTS AND DISCUSSION

In 1977–1979 the bugs from the yarrow plantations in Plewiska near Poznań were collected (XU 12) (Fig. 1). In 1977 in 3 samples 585 individuals, including 12 species belonging to 4 families *Pentatomidae*, *Nabidae*, *Anthocoridae* and *Miridae* were collected (Tab. 1). In 1978 in 10 samples 1,053 individuals, including 20 species of the same families as in 1977 and one individual of *Lygaeidae* family were collected. In 1979 in 6 samples 300 individuals, including 15 species were collected (Tab. 1).

In 2000 from the yarrow plantation in Gostyń (XT 53) (Fig. 1) 235 individuals in 2 samples were collected, including 11 species of the same families as entomological material collected in 1977–1979, and also 2 species belonging to *Rhopalidae* (*Corizidae*) family – *Stictopleurus abutilon* (Rossi) and *S. crassicornis* (L.) (Tab. 1).

During all the years of the studies totally 33 *Heteroptera* species were collected, and some of them occurred only once in single representative so they may be considered as random. Such cases include e.g. *Aelia acuminata* (L.), *Stygnocoris rusticus* (Fall.), *Anthocoris nemoralis* F., *A. sibiricus* Reut., *Adelphocoris lineolatus* (Gz.) and *Campylomma verasci* (Mey.-D.) (Tab. 1). Other species occurred at least twice during two different years of studies and in higher number of individuals.

In all years of studies the most numerous were the phytophagous bugs, mostly of *Miridae* family. In different years they made up from 79.1% to 94.8% of all material col-

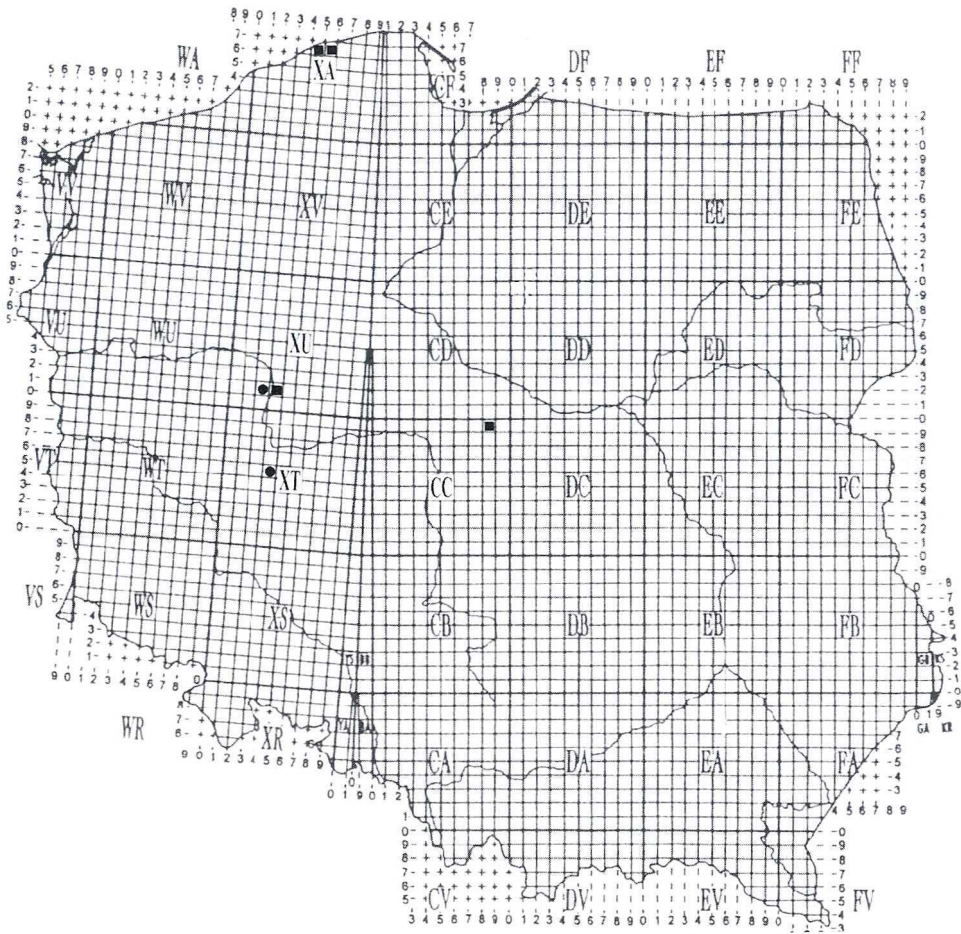


Fig. 1. Location of sampling plots at UTM-grid system  
The samples of *Heteroptera* collected from ■ wild yarrow and ● cultivated yarrow

lected from *Heteroptera* (Fig. 2). The most numerous was genus *Lygus* with species *L. rugulipennis* Popp., *L. gemellatus* (H.S.) and *Lygocoris lucorum* (Mey. D.). These species made up 43.8–85.9% of all *Heteroptera* collected in different years. The most numerous and the most frequent species per sample was *L. rugulipennis* (Tab. 1). Among phytophagous bugs occurring in high number on yarrow was also genus *Plagiognathus* (11.3%; 6.6%; 12.8% in different years of studies) especially species *P. chrysanthemi* (Wff.) and *Megalocoleus molliculus* (Fall.) (1.4%; 2%; 3.7%; 11.5% of all *Heteroptera* in different years) (Tab. 1). The most numerous bugs of aforementioned genera had their life cycle on yarrow as their larvae were also found (Tab. 1).

The interesting finding was also a quite numerous group of zoophagous *Heteroptera*. In different years they made up 5.2 to 20.9% of all collected bugs (Fig. 2). There were 2 families: *Nabidae* with species *Nabis ferus* L. and *N. pseudoferus* Rm. and *Anthocoridae*

Table 1

*Heteroptera* collected in 1977–1979 and 2000 from *Achillea millefolium* L. cultivated in the fields

Family/species	Number and percent in the years										
	1977		1978		1979		2000		Total	Nutrition group	
	Number	%	Number	%	Number	%	Number	%			
1	2	3	4	5	6	7	8	9	10	11	
I. <i>PENTATOMIDAE</i>											F
1. <i>Aelia acuminata</i> (L.)							1	0.4	1		F
2. <i>Dolycoris baccarum</i> (L.)	1	0.2					1	0.4	2		F
3. <i>Eurydema oleraceum</i> (L.)			2	0.2					2		F
<i>Pentatomidae</i> – larvae	1	0.2	2	0.2					3		F
II. <i>RHOPALIDAE</i> ( <i>Corizidae</i> )											
4. <i>Strictopleurus abutilon</i> (Rossi.)							1	0.4	1		F
5. <i>S. crassicornis</i> (L.)							5	2.1	5		F
III. <i>LYGAEIDAE</i>											
6. <i>Nysius thymi</i> (Wolff.)							14	6.0	14		F
7. <i>Stygnocoris rusticus</i> (Fall.)			1	0.1					1		F
<i>Lygaeidae</i> – larvae					2	0.7			2		F
IV. <i>NABIDAE</i>											
8. <i>Nabis ferus</i> (L.)	3	0.5	2	0.2					5		Z
9. <i>Nabis pseudoferus</i> (Rm.)	1	0.2	2	0.2	2	0.7	7	3.0	12		Z
<i>Nabis</i> spp.– larvae	2	0.3	12	1.1			2	0.8	16		Z
V. <i>ANTHOCORIDAE</i>											
10. <i>Anthocoris nemoralis</i> (F.)			1	0.1					1		Z
11. <i>Anthocoris sibiricus</i> (Reut.)			1	0.1					1		Z
12. <i>Orius majusculus</i> (Reut.)			14	1.3					14		Z
13. <i>Orius minutus</i> (L.)	11	1.9	8	0.7	10	3.3			29		Z
14. <i>Orius niger</i> (Wfl.)	49	8.4	15	1.4	13	4.3	25	10.6	102		Z
<i>Orius</i> spp. – larvae					2	0.7	15	6.4	17		Z

1	2	3	4	5	6	7	8	9	10	11
VI. <i>MIRIDAE</i>										
15. <i>Stenodema calcaratum</i> (Fall.)			2	0.2					2	F
16. <i>Stenodema laevigatum</i> (L.)			1	0.1	1	0.3			2	F
17. <i>Stenodema virens</i> (L.)			1	0.1					1	F
18. <i>Trigonotylus coelestialium</i> (Kirk.)					2	0.7			2	F
19. <i>Adelphocoris lineolatus</i> (Gz.)	1	0.2							1	F
20. <i>Calocoris norvegicus</i> (Gmel.)			6	0.6	4	1.3			10	F
<i>Calocoris norvegicus</i> – larvae			4	0.4					4	F
21. <i>Lygocoris lucorum</i> (Mey. D.)	18	3.1	268	25.5	12	4.0			298	F
<i>Lygus</i> spp. – larvae	19	3.2	218	20.7	23	7.7			260	F
22. <i>Lygus gemellatus</i> (H.S.)	13	2.2	4	0.4	5	1.7			22	F
23. <i>Lygus rugulipennis</i> (Popp.)	453	77.3	339	32.2	108	61.3	46	19.7	1,022	F
<i>L. rugulipennis</i> – larvae							57	24.3	57	F
24. <i>Orthops campestris</i> (L.)			1	0.1	5	1.7			6	F
25. <i>Orthops kalmi</i> (L.)					1	0.3			1	F
26. <i>Orthotylus flavosparsus</i> (Shlbg.)					2	0.7			2	F
27. <i>Plagiognathus albipennis</i> (Fall.)	4	0.7					5	2.1	9	F
<i>Plagiognathus</i> spp. – larvae			48	4.6	2	0.7	19	8.1	69	F
28. <i>Plagiognathus arbutrorum</i> (F.)			41	3.9					41	F
29. <i>Plagiognathus chrysanthemi</i> (Wff.)			30	2.8	18	6.0	6	2.6	54	F
30. <i>Campylomma verbasci</i> (Mey.-D.)					1	0.3			1	Z – F
31. <i>Chlamydatus pulicarius</i> (Fall.)							4	1.7	4	F
32. <i>Chlamydatus pullus</i> (Reut.)	1	0.2	10	0.9					11	F
33. <i>Megalocoleus molliculus</i> (Fall.)	8	1.4	20	1.9	11	3.6	17	7.2	56	F
<i>M. molliculus</i> – larvae							10	4.2	10	F
Total	585	100	1,053	100	300	100	235	100	2,173	

F – Phytophagous      Z – Zoophagous

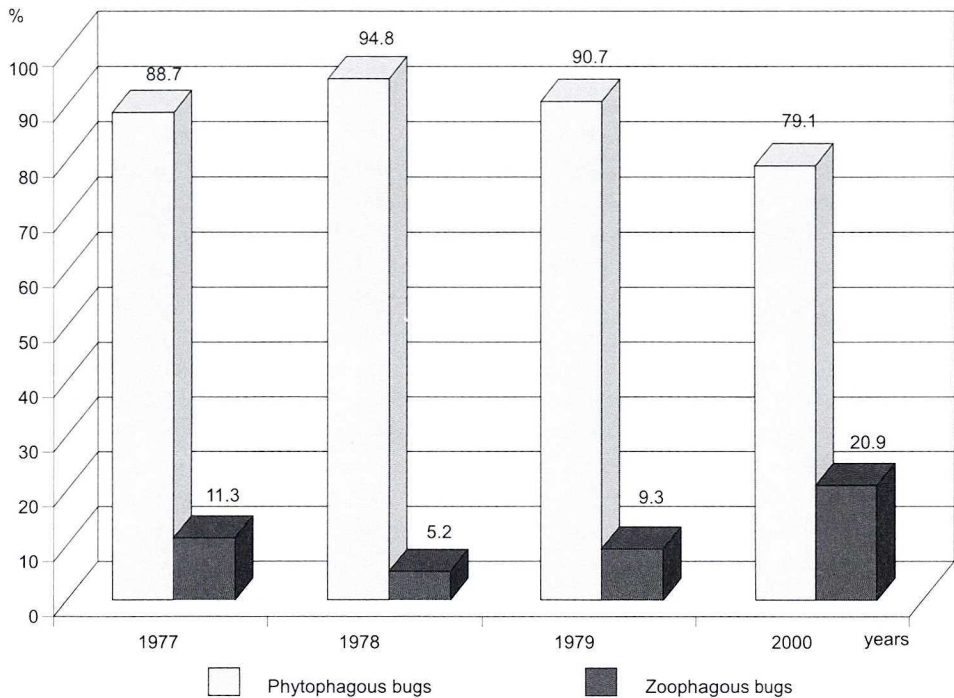


Fig. 2. Occurrence of phytophagous vs. zoophagous bugs on yarrow

with species *Orius minutus* L. and *O. niger* (Wff.). In all of these cases the larvae were also found on the plants. The presence of the larvae of these species prove that these bugs not only occur on *A. millefolium* but also have their life cycle on this plant (Tab. 1).

When the entomological material collected in 1977–1979 and in 2000 was compared no important differences in *Heteroptera* fauna was found. The most numerous species both in phytophagous and zoophagous group were the same in individual years. The only difference was that in 2000 the main species of *Lygus* genus was *L. rugulipennis*, but this species occurs also on many other plants and for the last 20 years it had been dominating over other pest species not only of *Lygus* genus but also of other *Heteroptera* genera on many crops (Korcz 1987).

In samples collected in 2000 the occurrence of mainly 2 species was observed: *Stictopleurus crassicornis* of *Rhopalidae* family and *Nysius thymi* (Wolff.) of *Lygaeidae* family, which were not found in the end of 1970<sup>th</sup>. They are phytophagous bugs occurring mostly on soil among grass and they should be considered on yarrow as random.

During all the years of the studies all the arthropods captured with entomological network (besides few arachnids there were mostly insects) were collected in aim to determine the ratio of bugs to other arthropods occurring on yarrow. *Heteroptera* made up from 29.3% to 34.3% in different years of studies (Fig. 3). These results confirm that *Heteroptera* are important insect group on yarrow. Although detailed observations on the harmfulness of

*Heteroptera* occurring on yarrow were not carried out but having detailed current knowledge of the fauna of these insects it may be assumed that this group is not neutral to this plant.

To compare the *Heteroptera* species occurring on yarrow growing in the wild in 1980 these insects were collected from yarrow growing at balks and in ditches in Raciborów and Głogowiec near Kutno (CC 98), and in 2000 from ruderal plants in Poznań (XU 12) and on meadows in Słowiński National Park in Smoldzino and Kluki (XA 46 i 56) (Fig. 1). In 1980 135 individuals of 5 families (*Rhopalidae*, *Lygaeidae*, *Nabidae*, *Anthocoridae* and *Miridae*) including 15 species were collected (Tab. 2). In 2000 only 26 individuals of 6 families (additional family – *Pentatomidae*) were collected (totally 13 species) (Tab. 2).

Capturing bugs from the yarrow growing in the wild is not easy because it occurs in small tufts usually among other plants. Therefore only limited number of bugs was collected. However, when individuals from wild yarrow were compared to those from cultivated yarrow it was found that the most numerous group was the same. In all studies on the wild yarrow the most numerous phytophagous bugs were these of genera *Lygus* (22.7%) and *Plagiognathus* (3.7%) and besides species *Megalocoleus molliculus* (40.3%). Moreover, quite numerous was *Dicyphus globulifer* (Fall.) (10.3%) occurring on *Melandrium* and *Lychnis* (these plants were in immediate neighborhood of yarrow and probably therefore the insects occurring on these plants were captured to entomological net). There were also more species of *Pentatomidae* family since around wild yarrow there were more grasses and other herbs. Zoophagous bugs were represented by the same families – *Nabidae* and *Anthocoridae*, except that in the second one there were more species found than in case

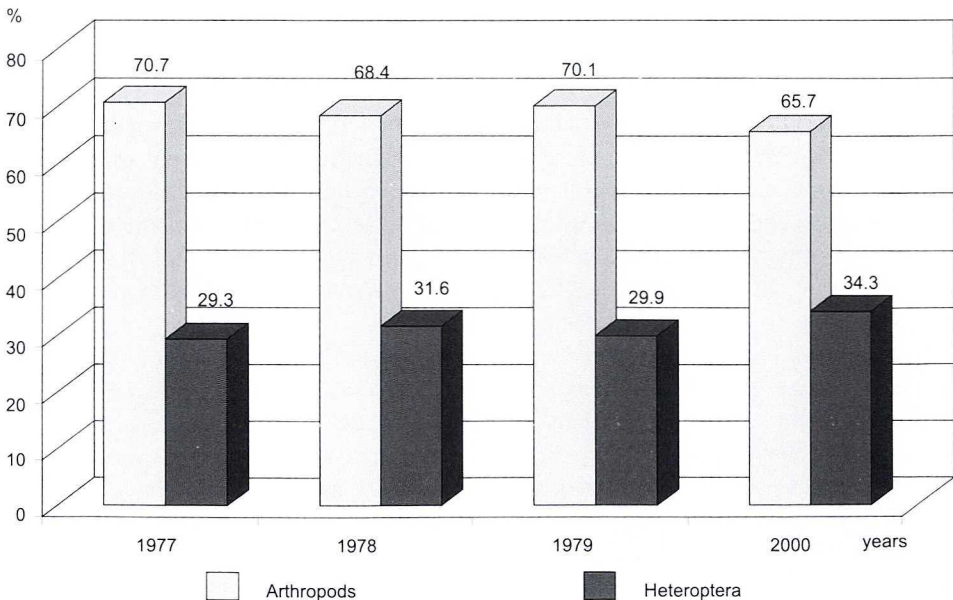


Fig. 3. Occurrence of *Heteroptera* vs. other arthropods collected on yarrow

Table 2

**Heteroptera collected in 1980 and 2000 from *Achillea millefolium* L. growing in the wild**

Family/species	1980 number	2000 number	Total	%	Nutrition group
1	2	3	4	5	6
I. <i>PENTATOMIDAE</i>					
1. <i>Aelia acuminata</i> (L.)		1	1	0.6	F
2. <i>Carpocoris fuscispinus</i> (Boh.)		5	5	3.1	F
3. <i>Eurydema oleraceum</i> (L.)		1	1	0.6	F
4. <i>Picromerus bidens</i> (L.)		1	1	0.6	Z
II. <i>RHOPALIDAE</i> ( <i>Corizidae</i> )					
5. <i>Rhopalus parumpunctatus</i> (Schill.)		1	1	0.6	F
6. <i>Myrmus miriformis</i> (Fall.)	2		2	1.2	F
III. <i>LYGAEIDAE</i>					
7. <i>Stygnocoris rusticus</i>	8		8	5.1	F
IV. <i>NABIDAE</i>					
8. <i>Nabis pseudoferus</i> (Rm.)		2	2	1.2	Z
<i>Nabis</i> sp. – larvae	1		1	0.6	Z
V. <i>ANTHOCORIDAE</i>					
9. <i>Anthocoris nemoralis</i> (F.)	1		1	0.6	Z
10. <i>Orius niger</i> (Wff.)	1	3	4	2.5	Z
11. <i>Xylocoris galactinus</i> (Fieb.)		1	1	0.6	Z
VI. <i>MIRIDAE</i>					
12. <i>Dicyphus globulifer</i> (Fall.)	12	4	16	10.3	F
13. <i>Stenodema virens</i> (L.)		1	1	0.6	F
14. <i>Notostira erratica</i> (L.)		1	1	0.6	F
15. <i>Adelphocoris lineolatus</i> (Gz.)	2		2	1.2	F
16. <i>Calocoris norvegicus</i> (Gmel.)	1		1	0.6	F
17. <i>Lygocoris lucorum</i> (Mey.- D.)	17		17	10.5	F
18. <i>Lygus gemellatus</i> (H.S.)	2		2	1.2	F
19. <i>Lygus rugulipennis</i> (Popp.)	15	4	19	11.8	F
20. <i>Plagiognathus albipennis</i> (Fall.)	1		1	0.6	F
21. <i>P. arbustrorum</i> (F.)	3		3	1.9	F
22. <i>P. chrysanthemi</i> (Wff.)	2		2	1.2	F
23. <i>Chlamydatus pulicarius</i> (Fall.)	3		3	1.9	F
24. <i>Megalocoleus molliculus</i> (Fall.)	64	1	65	40.3	F
Total	135	26	161	100.0	

F – Phytophagous, Z – Zoophagous

of cultivated yarrow (Tab. 2). It might have been caused by the presence of other herbal plants and trees around wild yarrow. Totally, zoophagous *Heteroptera* made up to 6.1% of all collected individuals, so there were in the same ratio to phytophagous bugs as on the cultivated yarrow.



## IV. CONCLUSIONS

Occurrence of *Heteroptera* on yarrow as a group making up to 30% of all arthropods confirms that this group of insects is very important for this plant. The faunistic studies of these bugs showed that in spite of quite numerous occurrence of zoophagous bugs on yarrow the main group were phytophagous *Heteroptera* (79–95%). Among phytophagous *Heteroptera* a numerous occurrence of known pest occurring on many host plants were observed, especially of genera *Lygus* and *Plagiognathus*. These bugs not only occur on yarrow but their life cycle takes place on this plant. Until now nobody carried out these kind of studies and nobody observed the extent of damage caused by the bugs on yarrow herb. Maybe the farmers in their observation had not consider the bugs so far since *Heteroptera* are not well-known pests for farmers of herbaceous plants. Therefore the results obtained in the presented studies seem to be interesting and important.

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## VI. POLISH SUMMARY

### PLUSKWIAKI Z RZĘDU RÓZNOSKRZYDŁYCH (*HETEROPTERA*) WYSTĘPUJĄCE NA KRWAWNIKU POSPOLITYM (*ACHILLEA MILEFOLIUM* L.)

Krwawnik (*Achillea millefolium*) jest rośliną wieloletnią należącą do rodziny złożonych, zwanych też astrowatymi (*Compositae*, *Asteraceae*). Krwawnik rośnie dziko w całej Europie, na Syberii, w rejonach Kaukazu i Himalajów oraz jako zawleczony – w Ameryce Płn., Nowej Zelandii i pld. Australii. W Polsce krwawnik rośnie dziko: na łąkach, miedzach, pastwiskach, przy drogach i brzegach

lasów. Ponadto w Polsce krwawnik jest rośliną uprawną, ze względu na jej właściwości lecznicze. Ziele krwawnika stosowane jest jako środek przeciwkrwotoczny, wzmacniający, pobudzający apetyt oraz w schorzeniach wątroby i dróg żółciowych. Jest to ważna roślina lecznicza, powszechnie stosowana w medycynie.

W związku z tym wyniki wieloletnich badań prowadzonych nad występowaniem pluskwiaków różnoskrzydłych (*Heteroptera*) na *Achillea millefolium* wydają się interesujące, a jednocześnie mogą być przydatne w uprawie polowej tej rośliny. Okazało się bowiem, że *Heteroptera* stanowiły od 29,3 do 34,3% całego zebranego materiału głównie entomologicznego (choć zdarzały się również pojedyncze pajęczaki).

Pluskwiaki zbierano na uprawach krwawnika w latach 1977–1979 w Plewiskach k. Poznania oraz w 2000 r. w Gostyniu w woj. wielkopolskim. Ogółem zebrano 2173 osobniki, z których wyodrębniono 33 gatunki należące do 6 rodzin (*Pentatomidae*, *Rhopalidae*, *Lygaeidae*, *Nabidae*, *Anthocoridae* i *Miridae*). Najliczniej występowały pluskwiaki roślinożerne (79–95%), i to głównie z rodziny *Miridae*. Przy czym wśród fitofagów obserwowano liczne występowanie znanych polifagicznych szkodników zwłaszcza z rodzaju *Lygus* i *Plagiognathus* oraz gatunek *Megalocoleus molliculus* (Fall.), które na tej roślinie przechodziły także cykl rozwojowy.

Na uwagę zasługują zebrane z krwawnika pluskwiaki drapieżne z rodziny *Nabidae*: *Nabis ferus* L. i *N. pseudoferus* Rm. (i ich larwy) oraz z rodziny *Anthocoridae*: *Orius minutus* L. i *O. niger* (Wff.) oraz *Orius* spp. – larwy. Występowanie na krwawniku larw wymienionych wyżej gatunków wskazuje na to, że przechodziły one na tej roślinie cykl rozwojowy. Pluskwiaki te stanowiły w poszczególnych latach badań od 5,2 do 20,9% całego materiału heteropterologicznego.

Dla porównania zbierano również *Heteroptera* z roślin krwawnika dzikorosnącego. Analiza zebranego materiału heteropterologicznego nie wykazała istotnych różnic.

Nie badano uszkodzeń powodowanych przez pluskwiaki na krwawniku. Biorąc pod uwagę jednak tak liczne występowanie fitofagicznych pluskwiaków na tej roślinie, w tym tak znanych szkodników jak zmieniki (*Lygus* spp.), należy przypuszczać, że takie uszkodzenia są, jednak albo nie zostały dostrzeżone przez plantatorów krwawnika, albo były przypisywane innym szkodnikom np. mszycom.