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JOURNAL OF PLANT PROTECTION RESEARCH
Vol. 45, No. 2 (2005)

HARMFUL *HETEROPTERA* OF *ORTHOPS* GENUS (*MIRIDAE, HETEROPTERA*) OCCURRING ON SOSNOWSKI'S HOGWEED (*HERACLEUM SOSNOWSKYI* MANDEN.) IN POLAND

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Accepted: September 12, 2005

Abstract: The research into the occurrence of herbivorous heteroptera of *Orthops* genus on Sosnowski's hogweed (*Heracleum sosnowskyi* Manden.) was carried out over 1999–2002 in the vicinity of Bydgoszcz. The analysis of the faunistic material collected of *Heteroptera* order showed the occurrence of 3 species where dominant heteroptera were represented by: *Orthops campestris* L. (48.57%) and *Orthops kalmi* L.(44.91%), while *Orthops basalis* Costa was scarce. The maximum abundance of these species coincided with full flowering and the beginning of hogweed fruit formation.

Key words: *Heracleum sosnowskyi* Manden., Sosnowski's hogweed, *Miridae, Heteroptera*, *Orthops campestris* L., *Orthops kalmi* L., *Orthops basalis* Costa

INTRODUCTION

Sosnowski's hogweed (*Heracleum sosnowskyi* Manden.), which originated in the wild flora of Caucasus, is a dangerous weed characterized by a high production of schizocarps, even up to about 40 000 per individual, and its huge leaves heavily shading lower layers of vegetation, forcing out the native flora. Chemical control of hogweed is difficult and does not give desired results (Korniak and Środa 1996; Stupnicka-Rodzynkiewicz and Klima 1996).

The working hypothesis assumes that phytophagous insects feeding on inflorescences limit the development of the fruits being formed, creating an alternative method of development control and regulation of this invasive weed. Research into entomofauna on Sosnowski's hogweed showed the occurrence of *Heteroptera* fauna (Wrzesińska and Błażejewska 2000). The literature available offers few reports on heteroptera infesting Sosnowski's hogweed. Therefore the aim of the present research was to define the species composition of herbivorous heteroptera of *Orthops*

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genus and their harmfulness in a view of potential application to biological control of *Heracleum sosnowskyi*.

MATERIALS AND METHODS

The research was carried out in the vicinity of Bydgoszcz, at Minikowo and at Mochełek, and in 2002 at Topolno, over the vegetation period of 1999–2002. The insects were collected regularly every 7–10 days by scooping from leaves and shaking down from inflorescences into bolting cloth bags. Additionally plant bugs were collected from cut leaves and inflorescences; this was a supplementary method, applied at random. The heteroptera collected were transported to the laboratory of the Department of Applied Entomology of the University of Technology and Agriculture in Bydgoszcz where they were segregated, given quantitative and qualitative characteristics and the species were determined according to the keys (Korcz 1976a, 1994).

The present research covered the dynamics of abundance, biology, number of generations and the kind of damage caused. Also the coefficient of dominance was determined (D), namely the percentage share of a given species on the sites researched (Trojan 1978).

RESULTS AND DISCUSSION

The analysis of the faunistic material collected on Sosnowski's hogweed showed the occurrence of 3 species of heteroptera of *Orthops* genus (*Miridae*): *Orthops campestris* L., *Orthops kalmi* L. and *Orthops basalis* Costa. A total of 9409 individuals of *Orthops* genus was collected, including 4784 – *O. campestris* , 4424 – *O. kalmi* and 201 – *O. basalis*. The first two represented dominant species (exceeded the 5% threshold of abundance) (Table 1). *O. basalis* was less numerous and was an influent, namely a species whose share was below 5%. However out of all the heteroptera of *Miridae* family collected from Sosnowski's hogweed inflorescences, *O. campestris* accounted for 48.57%, *O. kalmi* – for 44.91%, and *O. basalis* – for 2.04%.

The *Miridae* family infesting hogweed, besides *Orthops* genus heteroptera, was also represented by other species of the following genera: *Lygus, Lygocoris, Calocoris, Chlanydatus, Notostira and Orthotylus*, which were mostly accessory species (except for *Lygus rugulipennis* Popp.) (Table 1).

***Orthops campestris* L.**

The first plant bug imagines incursion on hogweed leaves on the sites researched coincided with the first days of June, and starting from the second decade, moved onto the then developing inflorescences. In the second half of June single heteroptera were only caught from leaves. A few days since the incursion of adult heteroptera and oviposition, larvae appeared in the rays of hogweed umbels. In hogweed inflorescences over the vegetation period a single generation of this species developed. Both larvae and the adult forms damaged flowers and fruits being formed.

The maximum abundance of *O. campestris*. was recorded in the second and third decade of June, namely at full flowering and at the beginning of hogweed fruit for-

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Table 1. Breakdown of heteroptera species of the *Miridae* family collected from Sosnowski's hogweed inflorescences over 1999–2002

Item	Species	Number of individuals	%	Dominance index
	Miridae	9850	100	
1	*Orthops campestris* L.	4784	48.57	D
2	*Orthops kalmi* L.	4424	44.91	D
3	*Orthops basalis Costa*	201	2.04	I
4	*Lygus rugulipennis* Popp.	114	1.16	I
5	*Lygus gemelatus* H.S.	83	0.84	A
6	*Lygus punctatus* Zett.	19	0.19	A
7	*Lygus pratensis* L.	59	0.60	A
8	*Lygocoris spinolai* Mey.D.	14	0.14	A
9	*Lygocoris lucorum* Mey.D.	36	0.37	A
10	*Calocoris norvegicus* Gemel.	9	0.09	A
11	*Calocoris roseomaculatus* Deg.	7	0.07	A
12	*Chlanydatus pullus* Rt.	4	0.04	A
13	*Notostira erratica* L.	89	0.91	A
14	*Orthotylus flavosparsus* C.Sb.	7	0.07	A

D – dominants (> 5%)
I – influents (from 1 to 5%)
A – accessory species (< 1%)

mation (Figs. 1, 2, 3). The highest number of plant bugs was collected in 2002 at Minikowo. The lowest number of those phytophagous insects was recorded in 2002 at Topolno in 1999 at Mochełek.

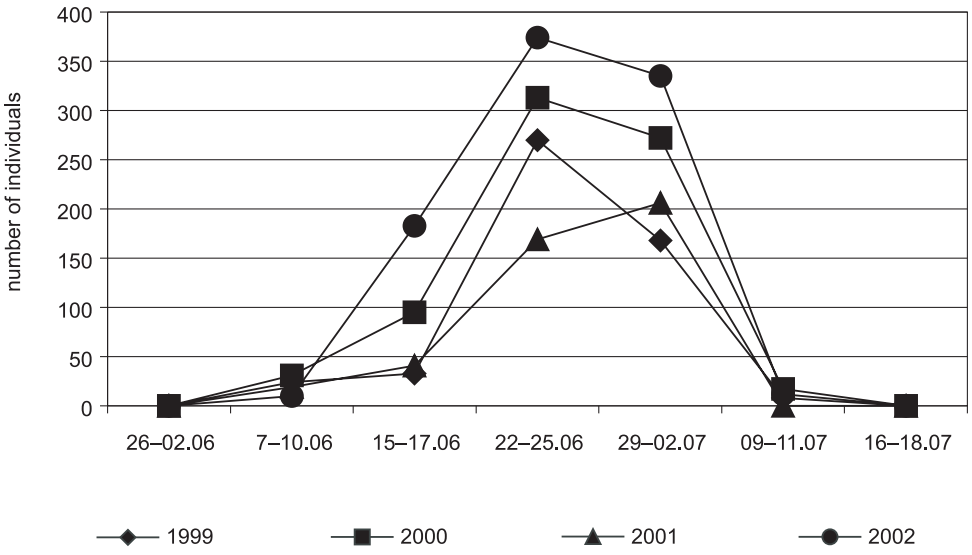

Fig. 1. Dynamics of *Orthops campestris* L. abundance at Minikowo over 1999–2002

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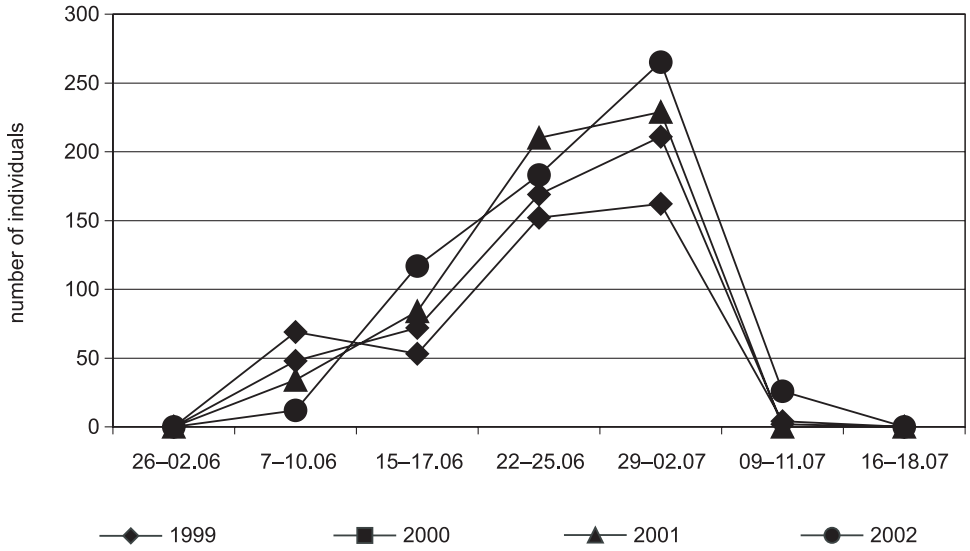

Fig. 2. Dynamics of *Orthops campestris* L. abundance at Mochełek over 1999–2002

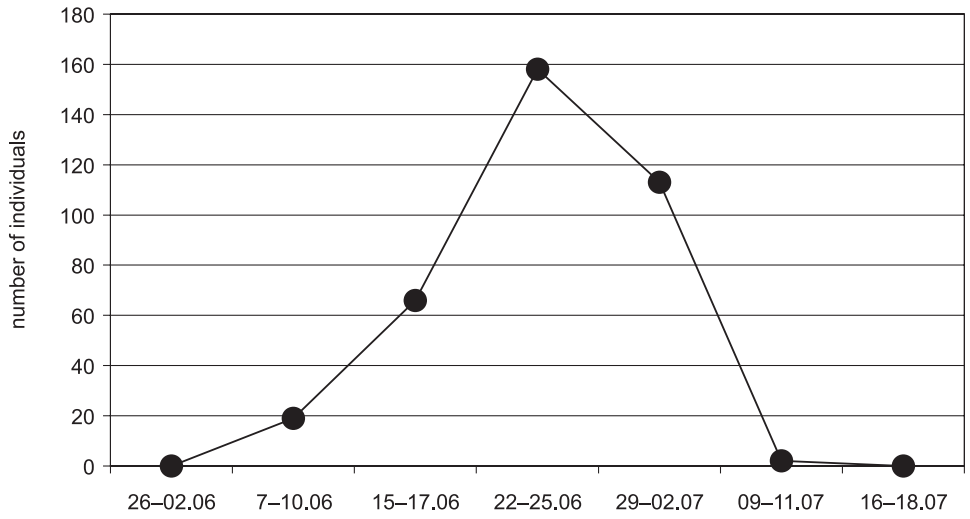

Fig. 3. Dynamics of *Orthops campestris* L. abundance at Topolno in 2002

***Orthops kalmi* L.**

O. kalmi incursion on host plants was recorded at the time of flowering, which is slightly later than the incursion of *O. campestris*. It laid eggs in the rays of umbels and was undergoing development there. Over a single year a single generation of *O. kalmi* developed.

The greatest number of representatives of this species was caught in 2002 at Minikowo (Fig. 4). The maximum abundance coincided with full flowering and the

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beginning of fruit formation. At Minikowo over 1999–2001 and at Mochełek over 2001–2002 and at Topolno in 2002 *O. kalmi* was less numerous (Figs 4, 5, 6). Fol-

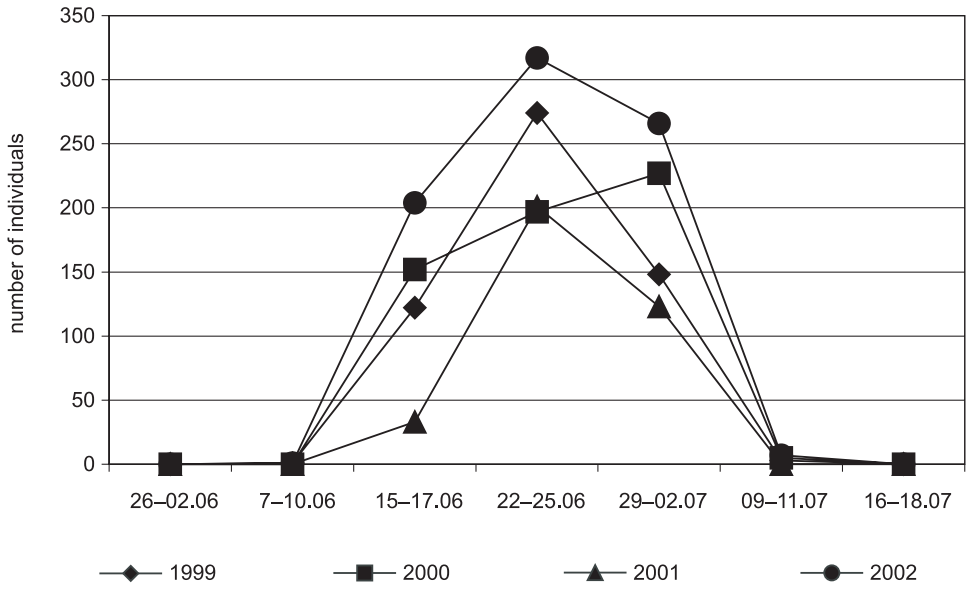

Fig. 4. Dynamics of *Orthops kalmi* L. abundance at Minikowo over 1999–2002

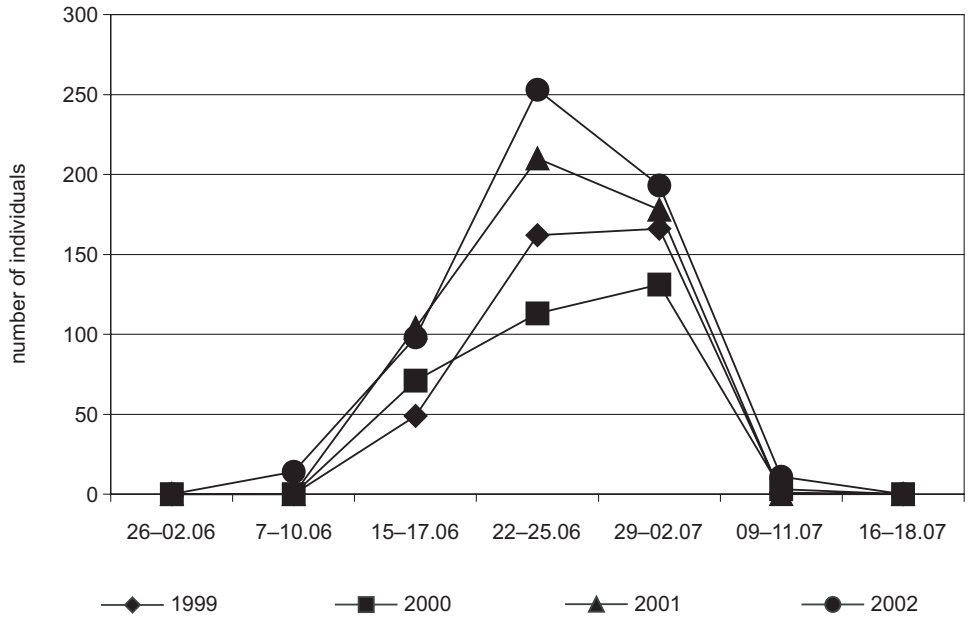

Fig. 5. Dynamics of *Orthops kalmi* L. abundance at Mochełek over 1999–2002

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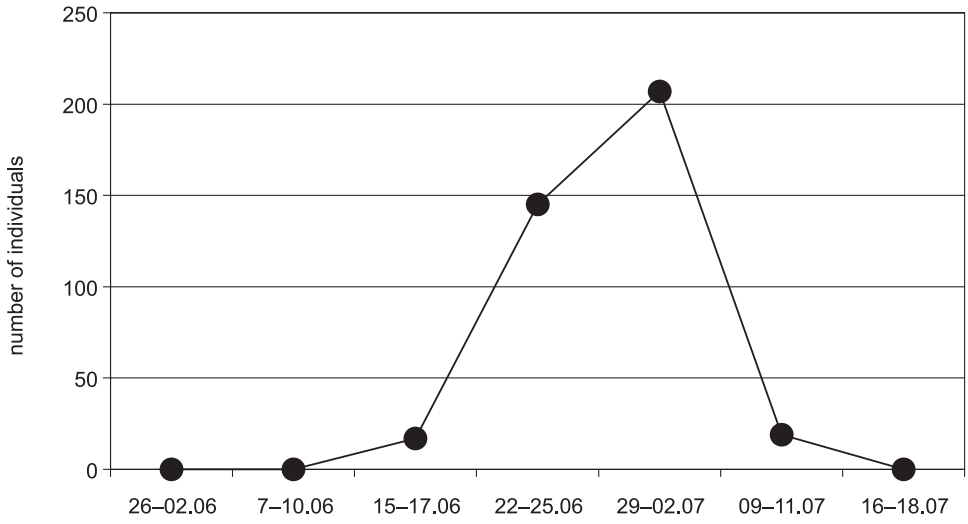

Fig. 6. Dynamics of *Orthops kalmi* L. abundance at Topolno in 2002

lowing the blossom fall and giving fruit, the plants were wilting slowly, and plant bugs left hogweed umbels.

Imagines and larvae of plant bugs feeding on Sosnowski's hogweed were sucking out buds and then fruits, causing damage, and, therefore, they must have helped a decrease in the germinability of hogweed fruit.

Umbellifers germinability being limited by plant bugs was reported by Babczyszyn (1982), Korcz (1976c) and Pohoska (1954) who observed sucking out soft fruit embryos, which leads to the occurrence of the so-called embryoless seeds. Jurek (1990) showed that a high abundance of plant bugs: *O. campestris* and *O. kalmi* on Sosnowski's hogweed, decreased the yield and lowered the fruit germinability, especially over 1982-83, when high temperatures and drought were recorded (fruit yield decreased by 17.9–31.1%, and the germinability by 14.4–29.1%). According to Iwan (1988), the most numerous species on herbaceous plants of Umbelliferae was *Lygus pubescens*, while *O. campestris* came third. In the research carried out on Sosnowski's hogweed in the Kujawy and Pomorze Province, *L. pubescens* was low in abundance. Korcz (1976b, 1976c, 1984a, 1984b, 1987), besides the faunistic composition, carried out also an analysis of the harmfulness of *Lygus* and *Orthops* genera species. The author observed that the species which was most numerous on garden carrot was *O. kalmi* which accounted for 61% of the total heteropterofauna caught, while *O. campestris* and *L. pubescens* were less numerous. However, the entomologic material collected by the author 10 years later, namely in the 80s, from the same plant was dominated by *L. pubescens* which accounted for 38% of all the heteropterous bugs collected, while *O. campestris* and *O. kalmi* were less numerous (Korcz 1987). Similarly Hiczyńska et al. (1961) report on plant bugs being the most numerous group in the community of species which occur on overground umbellifers parts. According to Burdajewicz (1993), on seed plantations of celery, bean, cauliflower, lettuce and onion they accounted for 10.77% of all the entomofauna caught.

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The results reported by this author confirm that *Heteroptera* fauna, whose considerable majority (over 90%) is made up of phytophagous species, posed a serious threat for seed plantations. The fact that it is the plant bugs which constitute the main group of phytophagous bugs on umbellifers is also confirmed by research of other authors (Anasiewicz and Winiarska 1995; Bilewicz-Pawińska 1970; Galambosi and Svab 1981; Obarski 1960, 1961).

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POLISH SUMMARY

SZKODLIWE PLUSKWIAKI Z RODZAJU *ORTHOPS* (*MIRIDAE, HETEROPTERA*) WYSTĘPUJACE NA BARSZCZU SOSNOWSKIEGO (*HERACLEUM SOSNOWSKYI* MANDEN.) W POLSCE

Badania nad występowaniem pluskwiaków roślinożernych z rodzaju *Orthops* na barszczu Sosnowskiego (*Heracleum sosnowskyi* Manden.) prowadzono w latach 1999–2002 w okolicach Bydgoszczy. Analiza zebranego materiału faunistycznego z rzędu *Heteroptera* wykazała występowanie 3 gatunków: zmienika złocieniowca (*Orthops campestris* L.), zmienika baldaszkowca (*Orthops kalmi* L.) i zmienika kminkowca (*Orthops basalis* Costa). Dwa pierwsze należały do gatunków dominujących i stanowiły kolejno: 48,57% i 44,91% ogółu zebranych pluskwiaków z rodzaju *Orthops*. Maksimum liczebności tych gatunków przypadało na pełnię kwitnienia i początek tworzenia owoców barszczu.