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WILD BEES (APOIDEA, HYMENOPTERA) CAUGHT WITH GREEN FUNNEL TRAPS IN LITHUANIA

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Abstract. Wild bees (Apoidea, Hymenoptera) were trapped in potato fields, in 42 localities of 22 administrative districts of Lithuania. The data on 18 wild bee species from three families (Halictidae, Anthophoridae, Apidae) are presented. During the period of 1997–1999 the most common bee species were *Anthophora furcata* (48.5%) and *Coelioxys rufescens* (22.1%). The rare species *Bombus semenoviellus* (included into the Red Data Book of Lithuania) was trapped in two new localities. A few new localities of the occurrence of other four species were established. Green Funnel traps can be used for the monitoring of at least *Anthophora furcata* and *Coelioxys rufescens*.
Key words: Halictidae, Anthophoridae, Apidae, regular species, rare species, distribution, agrocenosis

Introduction

The monitoring of pollinators in Eastern Fennoscandia and the Eastern Baltic region including Lithuania was organised by the Finnish Environmental Institute in 1998–1999 (Söderman 1999). Yellow traps as well as the ones of some other colours (white, heaven-blue, red) were used mainly in natural habitats. The monitoring (Söderman 1999) research covered 27 Apidae and 48 solitary bee (Apoidea other families) species from Lithuania. The Apidae list comprises typical forest species. 40% of the Apidae species were caught in traps. The majority (67%) of traps in Lithuania were set in nature protection areas (only three of the monitored sites were agricultural areas with intensive cultivation technologies). In search for potato tuber moth (*Phthorimaea operculella*) in Lithuanian potato fields the Lithuanian State Plant Protection Service carried out the national monitoring using traps for this species (Ostrauskas 2001). Wild bees were found in this kind of traps among other insects.
The aim of this study was to determine wild bee species caught in green Funnel traps operated in potato fields of Lithuania as well as to ascertain regular species.

Material and methods

Funnel traps with Killing strips and dispensers L053 for *Phthorimaea operculella* of AgriSense company (USA) were used during 1997–1999 (Ostrauskas 2001). Traps of this kind were dark green with a red spot in the middle of the lid (a lure carrying cap, 2.5 cm in diameter), the distance between the bucket bottom and the funnel top surface amounted to 18 cm, the funnel top was 16 cm in diameter, the diameter of the funnel bottom gap (hole for insect entrance) measured 3 cm and that of the bucket bottom equaled 11.5 cm (Fig. 1).
The majority of traps were set during July–August but some of them were placed during August–September. Each trap was used for six weeks. 64 traps were operated in 1997, 32 – in 1998, 5 – in 1999 (101 traps was used in total). Funnel traps were hung at a height of 0.5–1 m above ground. Traps were placed in potato fields owned by companies and private owners in 68 localities of 33 administrative districts and were operated by inspectors from the Lithuanian State Plant Protection Service. Locality and district names are abbreviated in the following way: Alytus – Alt, Anykščiai – An, Ignalina – Ig, Jonava – J, Kaunas – K, Klaipėda – Kl, Kaišiadorys – Kš, Marijampolė – M, Molėtai – Ml, Panevėžys – Pn, Prienai – Pr, Pasvalys – Ps, Raseiniai – Rs, Šalčininkai – Šlč, Šilutė – Šlt, Širvintos – Šr, Švenčionys – Šv, Trakai – Tr, Tauragė – Trg, Utena – Ut, Vilnius – V, Zarasai – Z.
Bees were identified in accordance with special keys (Brooks 1988; Ebmer 1970; Erlandsson 1955; Løken 1973; Medvedev 1978; Rasmont 1984; Warncke 1980). Relative species frequency (%) was calculated as a ra-

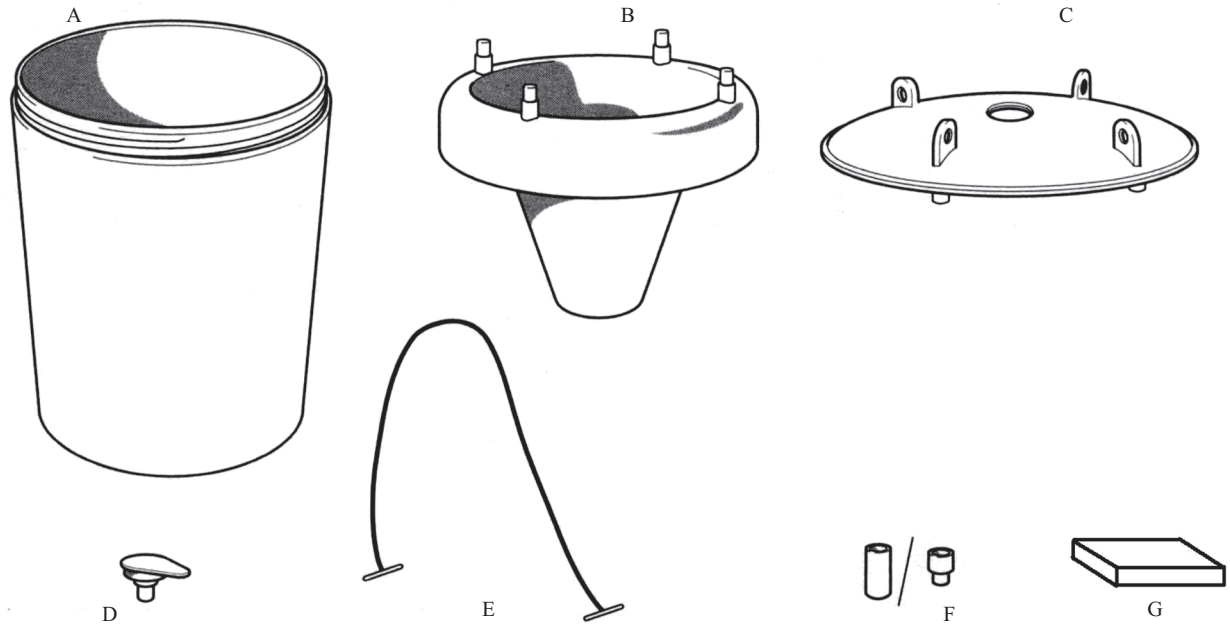

Figure 1. Funnel trap contents: A – bucket, B – funnel, C – Lid, D – lure carrying cap, E – suspension string, F – pheromone dispensers, G – Killing strip (after AgriSense instructions for use).

tio of the number of localities where a certain species was registered to the number of localities investigated. Relative species abundance (%) of solitary (Halictidae, Anthophoridae) and social bees (Apidae) was counted as a ratio of the number of individuals belonging to one species to the total number of all the caught individuals representing either solitary or social species respectively.

Results and Discussion

Wild bees were captured only in 50 out of 101 trap. In total 152 specimens of 18 species were trapped. Traps for Apoidea species were set in 42 localities of 22 districts. The list of the species with the indicated administrative district, locality, date and the number of individuals caught is presented in Table 1.

Anthophora furcata was the most common (relative species frequency 48.5%) wild bee species caught in green Funnel traps (Table 1). This species is rather rare in Lithuania, found in forests, brushwoods, near forests (Monsevičius 1995). However, prior to our study its occurrence was not registered in Klaipėda, Šilutė and Tauragė districts. In other countries *Anthophora furcata* is also known as a forest species (Medvedev 1978), but our research has proved it to be abundant in potato fields in Lithuania.

Second in frequency (22.1%) among wild bee species caught in green Funnel traps (Table 1) was *Coelioxys rufescens* (nest parasite of *Anthophora furcata*). According to the data on the distribution of this species in Lithuania (Monsevičius 1995), the locality in which we tracked it, turned out to be the westernmost for *Coelioxys rufescens* in Lithuania.

Relative frequency of *Anthophora furcata* as well as its nest parasite *Coelioxys rufescens* was very high (in total 70.6%) among the species of the investigated localities. Most probably this is the result of high attraction of green Funnel traps.

Panevėžys district is a new locality of *Megachile versicolor* occurrence. Moreover, it is the nothernmost for this species in Lithuania.

Bombus semenoviellus, a rare species in Lithuania (Balevičius 1992), was registered in two new localities of Širvintos and Molėtai districts.

Bombus cryptarum was detected in Prienai and Tauragė districts, two new localities as well.

All other species from our list are common in agricultural landscape, except *Coelioxys alata*, which is rare all over Lithuania (Monsevičius 1995).

Söderman's (1999) list of monitored species is longer in comparison with our data. That is the result of the impact made by the colour of traps used, the habitat and the investigation period. Söderman's (1999) investigation lasted for six months, whereas the duration of our study was a month and a half. However, there are three species (*Coelioxys alata*, *C. rufescens* and *Anthidium manicatum*: Megachilidae) that were not included into Söderman's (1999) monitoring list. The difference in rela-

Table 1. The list of wild bees caught with green Funnel traps during 1997–1999 in Lithuania.

Family, species	Adminis-trative district	Locality	Date	Number of specimens
Halictidae				
Lasioglossum zonulum (Smith, 1948)	K	Dievogala	09 July–20 August 1998	1♀
Anthidium manicatum (Linnaeus, 1758)	Ig	Dūkštas	05 July–20 August 1999	2♂
Megachile ligniseca (Kirby, 1802)	Šr	Šešuolėliai	17 September 1997	2♀
Megachile versicolor Smith, 1844	Al	Radžiūnai	15 September 1997	1♀
	Pn	Karsakiškis nbh.	1997	1♀
	V	Trakų Vokė	08 July–14 August 1998	1♀
Coelioxys alata Foerster, 1853	Tr	Trakai	11 July–13 August 1998	1♀
	Šv	Naujadvaris	07 July–28 August 1998	3♀
Coelioxys rufescens Lepeletier, 1825	Ig	Kaniūkai	1997	2♀
	Ig	Linkmenys	1997	1♀
	Ig	Alejūnai	07 July–18 August 1998	2♀
	Ig	Dūkštas	05 July–20 August 1999	1♀
	Kš	Gudiena	03 July–24 August 1998	1♀
	Ml	Apankiškiai	07 July–18 August 1998	6♀
	Ml	Radžiūnai	07 July–18 August 1998	1♀
	Ps	Sindriūnai	07 July–18 August 1998	1♀
	Šlč	Jašiūnai	08 July–03 August 1998	2♀
	Šv	Kukiškė	1997	1♀
	Šv	Naujadvaris	07 July–28 August 1998	1♀
	Tr	Trakai	11 July–23 August 1998	2♀
	Trg	Dauglaukis	24 June–18 August 1998	1♀
	Ut	Užpaliai	07July–18 August 1998	4♀
	Ut	Užpaliai	05 July–20 August 1999	3♀
	Z	Rudakiškė	1997	2♀
Anthophoridae				
Anthophora furcata (Panzer, 1798)	An	Ažuožeriai	1997	3♀
	An	Debeikiai	1997	2♀
	An	Vėjeliškiai	1997	3♀
	Ig	Kaniūkai	1997	4♀
	Ig	Linkmenys	1997	1♀
	Ig	Alejūnai	07 July–18 August 1998	4♀
	Ig	Dūkštas	05 July–20 August 1999	2♀
	J	Gečiai	09 July–20 August 1998	1♀
	M	Avikilai	July–August 1997	1♀
	M	Marijampolė	July–August 1997	1♀
	M	Patašinė	July–August 1997	4♀
	Ml	Apankiškiai	07 July–18 August 1998	4♀
	Ml	Radžiūnai	07 July–18 August 1998	6♀
	Ml	Apankiškiai	05 July –20 August 1999	1♀
	K	Dievogala	09 July–20 August 1998	1♀
	Kl	Vėžaičiai	07 July–18 August 1998	1♀
	Kš	Gudiena	03 July–24 August 1998	9♀
	Pn	Karsakiškis nbh.	1997	2♀
	Pn	Krekenava	1997	1♀
	Pr	Išlaužas	08 July–28 August 1998	1♀
	Šlč	Jašiūnai	08 July–03 August 1998	1♀

Table 1 continued

Family, species	Administrative district	Locality	Date	Number of specimens
Anthophora furcata (Panzer, 1798)	Šlt	Pašyšiai	July–September 1997	3♀
	Šr	Šešuolėliai	17 September 1997	6♀
	Šr	Šešuoliai	17 September 1997	1♀
	Šr	Družai	07 July–18 August 1998	1♀
	Šv	Švenčionėliai	1997	1♀
	Šv	Naujadvaris	07 July–28 August 1998	2♀
	Tr	Trakai	11 July–23 August 1998	3♀
	Trg	Dauglaukis	24 June–18 August 1998	1♀
	Ut	Užpaliai	07 July–18 August 1998	1♀
	Ut	Utena	05 July–20 August 1999	1♀
	V	Kabeliai	17 September 1997	1♀
	V	Trakų Vokė	08 July–14 August 1998	2♀
	V	Kiemeliai	07 July–18 August 1998	1♀
	Z	Rudakiškė	1997	3♀
Apidae				
Bombus cryptarum (Fabricius, 1775)	Pr	Išlaužas	08 July–28 August 1998	1☿
	Trg	Dauglaukis	24 June–18 August 1998	1☿
Bombus hortorum (Linnaeus, 1761)	Ml	Radžiūnai	07 July–18 August 1998	1☿
	Pn	Krekenava	1997	1♂
	V	Kabeliai	17 September 1997	1♂
Bombus lapidarius (Linnaeus, 1758)	Šv	Kukiškė	1997	1♂
Bombus pascuorum (Scopoli, 1763)	Trg	Dauglaukis	24 June–18 August 1998	2☿
Bombus semenoviellus (Skorikov, 1909)	Ml	Radžiūnai	07 July–18 July 1998	1☿1♂
	Šr	Šešuoliai	17 September 1997	1☿
Bombus soroeensis (Fabricius, 1777)	V	Kabeliai	17 September 1997	1☿
Bombus subterraneus (Kirby, 1802)	Šr	Šešuolėliai	17 September 1997	1☿
	Šr	Šešuoliai	17 September 1997	3☿
Bombus sylvarum (Linnaeus, 1761)	An	Ažuožeriai	1997	1♂
	Ig	Jankiškė	05 July– August 20 1999	1☿
	Kl	Klaipėda	1997	1☿
	Šlt	Pašyšiai	1997	1☿
	Šr	Šešuolėliai	17 September 1997	1☿
	Šr	Šešuoliai	17 September 1997	1☿1♂
Bombus terrestris (Linnaeus, 1758)	Kl	Vėžaičiai	07 July–18 August 1998	1☿1♂
	Rs	Plikiai	09 07–21 August 1998	1☿
Bombus veteranus (Fabricius, 1793)	M	Trakėnai	1997	1♀
Apis mellifera (Linnaeus, 1758)	Pn	Dembava	1997	1♀
	Ut	Utena	1997	1☿

Note: nbh. – neighbourhood

tive species abundance of *Anthophora furcata* and *Coelioxys rufescens* as established by Söderman (1999) and us is worth mentioning. According to our data, relative species abundance of *Anthophora furcata* amounts to 65.0%, whereas according to Söderman (1999) it equals 0.4% (data counted by H. Ostrauskas and V. Monsevičius). Likewise, relative species abundance of *Coelioxys rufescens* as determined by us was 25.2% while according to Söderman (1999) it equaled 0.0%. Some other species prevailed in Söderman's (1999) investigation (data counted by H. Ostrauskas and V. Monsevičius): *Bombus pascuorum*, *B. schrencki* and *B. lucorum* (Table 2), *Lasioglossum calceatum* (17.2%), *Andrena clarkella* (9.9%), *A. haemorrhoa* (7.4%).

Table 2. Relative abundance (%) of *Bombus* species trapped in Lithuania.

Species	Data of the current research 1997–1999	Data of the 1997–1998 research according to Söderman (1999)
Bombus cryptarum	7.0	2.0
Bombus distinguendus	0.0	0.1
Bombus hortorum	10.3	2.0
Bombus humilis	0.0	0.1
Bombus hypnorum	0.0	1.4
Bombus jonellus	0.0	0.6
Bombus lapidarius	3.4	0.9
Bombus lucorum	0.0	13.4
Bombus magnus	0.0	0.3
Bombus muscorum	0.0	0.1
Bombus pascuorum	7.0	36.4
Bombus pratorum	0.0	7.1
Bombus ruderarius	0.0	0.2
Bombus schrencki	0.0	13.6
Bombus semenoviellus	10.3	0.3
Bombus soroeensis	3.4	9.0
Bombus subterraneus	13.8	0.1
Bombus sylvarum	24.1	0.3
Bombus terrestris	10.3	1.5
Bombus veteranus	3.4	0.1
Apis mellifera	7.0	4.1

Despite some differences in the results obtained from the monitoring carried out using yellow Funnel traps (Söderman 1999) and those of green colour (results of the present research), we conclude that the latter kind of traps can be used for the monitoring of at least *Anthophora furcata* and *Coelioxys rufescens*.

Conclusions

1. Eighteen wild bee species (Apoidea, Hymenoptera) representing three families (Halictidae, Anthophoridae, Apidae) were caught in green Funnel traps in 22 administrative districts of Lithuania during 1997–1999.
2. Some new localities of the occurrence of *Bombus semenoviellus* (rare species included into the Red Data Book of Lithuania), as well as *Bombus cryptarum*, *Anthophora furcata*, *Coelioxys rufescens*, *Megachile versicolor* in Lithuania were established.
3. *Anthophora furcata* occurs in forests, but our research shows that in Lithuania it is also abundant in potato fields.
4. Relative frequencies of *Anthophora furcata* and its nest parasite *Coelioxys rufescens* were very high (48.5% and 22.1% respectively) among the species of the investigated localities. This may be the outcome of high attraction of green Funnel traps.
5. Green Funnel traps can be used for the monitoring of at least *Anthophora furcata* and *Coelioxys rufescens*.

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Laukinės bitės (Apoidea, Hymenoptera), Lietuvoje sugautos žaliomis Funnel gaudyklėmis

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Santrauka

1997–1999 metais Lietuvos bulvių laukuose žaliomis Funnel gaudyklėmis, kurias gamina JAV kompanija Agrisense, sugauta 3 šeimų (Halictidae, Anthophoridae, Apidae) 18 laukinių bičių rūšių. Nustatytos dažniausiai pasitaikančios laukinių bičių rūšys: *Anthophora furcata* (48.5% – santykinis rūšių dažnumas, kuris apskaičiuojamas kaip santykis tarp vietovių, kuriose buvo registruota rūšis, ir visų tirtų vietovių), *Coelioxys rufescens* (22.1%). Išaiškintos *Bombus semenoviellus*, retos, įrašytos į Lietuvos raudonąją knygą rūšies, dvi naujos radavietės. Nustatytos 7 naujos šių rūšių radavietės Lietuvoje: *Anthophora furcata* (3 vietos), *Coelioxys rufescens* (1 vieta), *Megachile versicolor* (1 vieta), *Bombus cryptarum* (2 vietos). Žalios Funnel gaudyklės gali būti naudojamos *Anthophora furcata* ir *Coelioxys rufescens* monitoringui.

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