

INVENTORY SURVEY OF GROUND BEETLES (COLEOPTERA: CARABIDAE) IN SELECTED PEATLANDS IN THE JAVOŘICKÁ VRCHOVINA HIGHLANDS NATURAL PARK (SOUTHERN BOHEMIA)*

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Twenty-four species of ground beetles (Coleoptera: Carabidae) were recorded in selected peatlands in the Javořická vrchovina Highlands Natural Park during the years 2004–2006. Two recorded species (*Carabus problematicus problematicus*, *C. scheidleri scheidleri*) belonged to protected species in the Czech Republic. None of the found species are included in the Red list of threatened species in the Czech Republic – Invertebrates. Simpson's index of dominance, Shannon's index of diversity, index stage of anthropogenic degradation were used for environmental assessment of habitats.

faunistic; environmental assessment; Carabidae; Javořická vrchovina Highlands Natural Park; Czech Republic

INTRODUCTION

The area of the Javořická vrchovina Highlands Natural Park has been relatively poorly studied with regards to entomology. However, there are botanically interesting habitats, which some studies have presented during the last years (e.g. Boublík et al., 2005; Chán et al., 2005).

Majority of published research studies refer only marginally to this territory. That applies to invertebrates (e.g. Dvořák, Šumpich, 1995) as well as to other animal communities. Small mammals have been researched here by Zbytovský et al. (2004). Hesoun (2005) and Hesoun, Holuša (2005) studied occurrence of dragonflies in eastern part of the Jindřichův Hradec district. Most of the data have been obtained during survey research projects and have never been published yet. For example, occurrence of amphibians was studied by Dolžal (1999) and consequently by Uhlíková (2006). Křivan (2003) made research of ground-beetles (Coleoptera: Carabidae) near the locality of Horní Pole (6757).

MATERIAL AND METHODS

Study localities are situated in the Javořická Highlands Natural Park. The mires for study sites have been selected, because they are known to host interesting and scarce species. The research was carried out during the years 2004–2006.

The pit-fall traps (with 4% formaldehyde) were used (10 traps per locality). They were emptied approximately once a month during the vegetative season (April to October).

Used nomenclature follows Löbl, Smetana (2003). The species are listed alphabetically. The area is located in the two faunistic squares (6757, 6857) (according to Pruner, Míka, 1996). The data Bohemia mer. and Hana Uhlíková lgt., det. et coll. belong to each record. The Carabidae were indentified using Hůrka (1996).

The species were classified by dominance according to Losos et al. (1984). Simpson's index of dominance, Shannon's index of diversity were calculated using equations described by Losos et al. (1984). The ground beetles were divided into three groups: R (relic), A (adaptable), E (eurytop), according to the range of their ecological valency and their association with the habitat by Hůrka et al. (1996) and community index of ground beetles (IKS) by Nenádál (1998) was considered to assess the stage of anthropogenic degradation. Character data from 2005 did not allow calculating and thus data from the years 2004 and 2006 were considered for indices only.

Characteristics of study area

All localities are situated in the Jindřichův Hradec district, in the Javořická Highlands Natural Park. This district belongs mostly to the slightly warm region and only the highest part of eastern district belongs

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to the cold region. The average temperature is only about 6°C in the highest sites (Albrecht, 2003).

The Javořícká vrchovina Highlands Natural Park hosts variable biotopes ranging from forests to permanent grasslands, arable lands, groves, ponds and streams preserved in natural state. Numerous wetlands and small mires are represented here. The largest of all occur near the Horní Pole village around Karhov pond and the other large ones are Rusko mire beside Horní pole village and Rašeliniště Radlice bog.

1. Horní Pole, Karhov locality [49°12'38"N 15°18'52"E] (6757d)

Locality is situated 672 m above sea-level, about 10 km north-west of the Telč town (Fig. 1). It belongs to Zhejral area (154.1 ha) included in the Natura 2000 network. Several threatened species have been found here, e.g., *Littorella uniflora*, *Naumburgia thyrsiflora*, *Carex diandra*, *Drosera rotundifolia*, *Oxycoccus palustris*, *Dactylorhiza fuchsii*, *D. majalis*, *Parnassia palustris*, *Pedicularis sylvatica*, *Scorzonera humilis*, *Soldanella montana* etc. It is an important habitat for *Rana arvalis*, *R. lessonae*, *Triturus vulgaris*, *Vipera berus* and a lot of bird species (AOPK 2009a).

2. Rašeliniště Radlice bog locality [49°12'22"N 15°17'26"E] (6857d)

Locality is situated about 10 km north-west of the Dačice town 621 m above the sea-level (Fig. 1). The area includes 4.74 ha and consists of the cascade of three small ponds situated in forested landscape. There are peat meadows and small spring mire which are enclosed by wet spruce stands (AOPK 2009b).

3. Horní Pole, Rusko locality [49°7'55"N 15°19'0"E] (6757d)

The locality is situated about 2 km north of the village Studená (Fig. 1). Dominant altitude is 690 m above the sea-level. The area has valuable open habitats, such as sloping spring fens, peat meadows, pastures and wetlands.

RESULTS

During years 2004–2006 altogether 841 specimens of ground-beetles (Coleoptera: Carabidae) representing the 24 species were recorded.

Agonum duftschmidi Schmidt, 1994

Horní Pole env., Karhov (6757d): 5.vi.–4.vii.2004, 1 spec.; Horní Pole env., Rusko (6757d), 1.vi.–17.vii.2005, 1 spec.

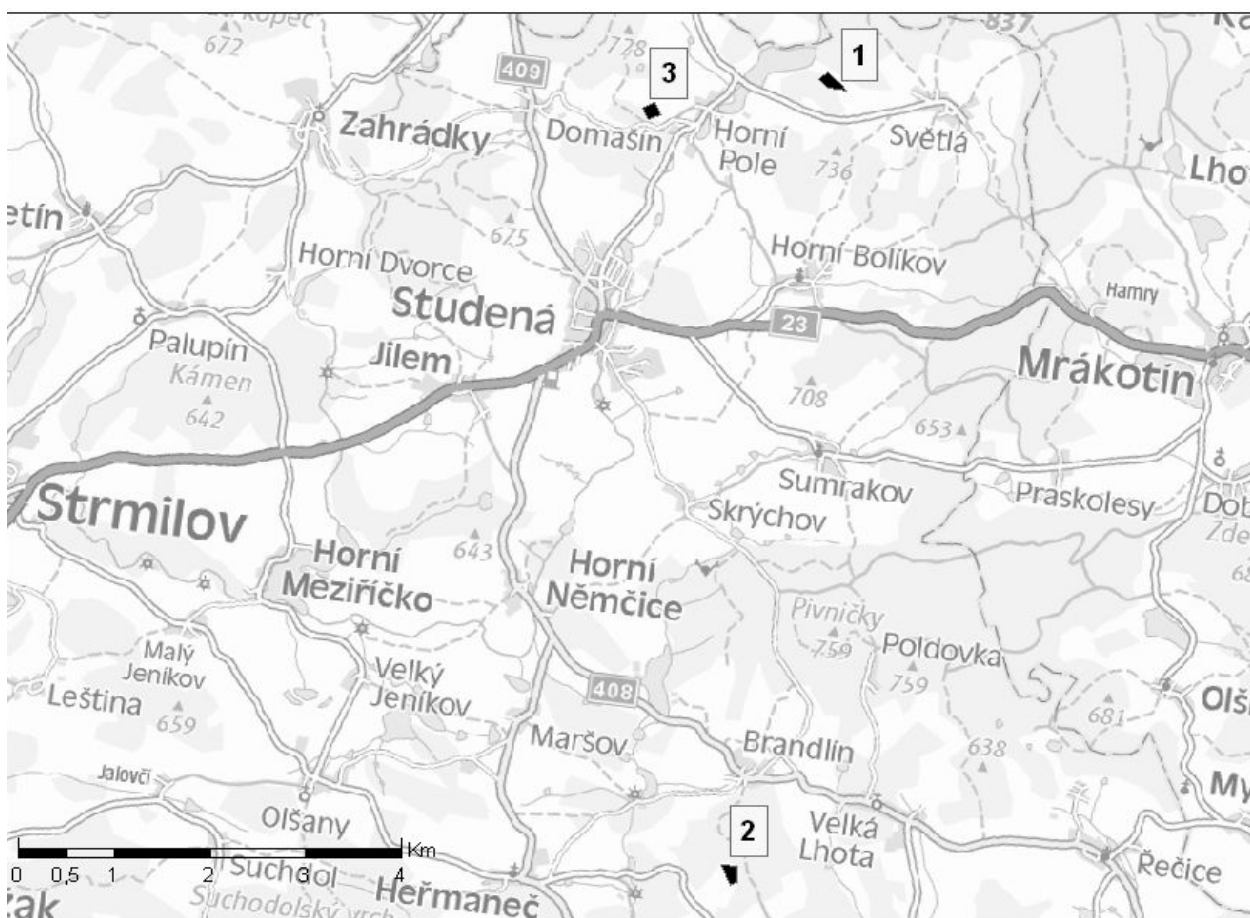


Fig. 1. Map of localities. 1: Horní Pole, Karhov, 2: Rašeliniště Radlice bog, 3: Horní Pole, Rusko

- Agonum fuliginosum* (Panzer, 1809)
Radlice, Rašeliniště Radlice (6857d): 5.vi.–4.vii.2004, 1 spec.; 4.vii.–3.viii.2004, 9 spec.; 3.viii.–8.ix.2004, 3 spec.; 1.vi.–17.vii.2005, 1 spec.; 7.v.–18.vi.2006, 1 spec.; 18.vi.–16.viii.2006, 1 spec.; Horní Pole, Rusko (6757d): 8.v.–5.vi.2004, 2 spec.; 5.vi.–4.vii.2004, 2 spec.; 4.vii.–3.viii.2004, 2 spec.; 3.viii.–8.ix.2004, 1 spec.; 1.v.–1.vi.2005, 2 spec.; 1.vi.–17.vii.2005, 2 spec.
- Agonum gracile* Sturm, 1824
Horní Pole, Karhov (6757d): 18.vi.–12.vii.2006, 1 spec.; Radlice, Rašeliniště Radlice (6857d): 3.viii.–8.ix.2004, 2 spec.; 18.vi.–16.viii.2006, 2 spec.; Horní Pole, Rusko (6757d): 8.v.–5.vi.2004, 7 spec.; 5.vi.–4.vii.2004, 6 spec.; 4.vii.–3.viii.2004, 1 spec.; 3.viii.–8.ix.2004, 1 spec.; 1.v.–1.vi.2005, 11 spec.; 1.vi.–17.vii.2005, 6 spec.; 15.iv.–7.v.2006, 3 spec.; 7.v.–18.vi.2006, 2 spec.; 16.viii.–21.ix.2006, 1 spec.
- Agonum thoreyi* Dejean, 1828
Horní Pole, Rusko (6757d): 1.v.–1.vi.2005, 1 spec.; 1.vi.–17.vii.2005, 1 spec.
- Agonum viduum* (Panzer, 1796)
Horní Pole, Karhov (6757d): 8.v.–5.vi.2004, 1 spec.; 18.vi.–12.vii.2006, 7 spec.; Radlice, Rašeliniště Radlice (6857d): 5.vi.–4.vii.2004, 1 spec.; Horní Pole, Rusko (6757d): 7.iv.–8.v.2004, 3 spec.; 8.v.–5.vi.2004, 25 spec.; 5.vi.–4.vii.2004, 2 spec.; 4.vii.–3.viii.2004, 3 spec.; 3.viii.–8.ix.2004, 2 spec.; 8.ix.–17.x.2004, 2 spec.; 1.vi.–17.vii.2005, 19 spec.; 7.v.–18.vi.2006, 8 spec.; 18.vi.–16.viii.2006, 3 spec.
- Amara plebeja* (Gyllenhal, 1810)
Radlice, Rašeliniště Radlice (6857d): 4.vii.–3.viii.2004, 1 spec.
- Bembidion lampros* (Herbst, 1784)
Radlice, Rašeliniště Radlice (6857d): 7.iv.–8.v.2004, 1 spec.; Horní Pole, Rusko (6757d): 9.iv.–1.v.2005, 1 spec.
- Bembidion mannerheimii* Sahlberg, 1827
Horní Pole, Karhov (6757d): 17.vii.–19.viii.2005, 1 spec.
- Calathus melanocephalus* (Linnaeus, 1758)
Horní Pole, Rusko (6757d): 16.viii.–21.ix.2006, 1 spec.
- Carabus granulatus granulatus* Linnaeus, 1758
Horní Pole, Karhov (6757d): 8.v.–5.vi.2004, 1 spec.; 5.vi.–4.vii.2004, 1 spec.; 4.vii.–3.viii.2004, 2 spec.; 8.ix.–17.x.2004, 2 spec.; 9.iv.–1.v.2005, 1 spec.; 18.vi.–12.vii.2006, 2 spec.; Horní Pole, Rusko (6757d): 7.iv.–8.v.2004, 2 spec.; 8.v.–5.vi.2004, 3 spec.; 5.vi.–4.vii.2004, 7 spec.; 4.vii.–3.viii.2004, 2 spec.; 9.iv.–1.v.2005, 1 spec.; 1.v.–1.vi.2005, 2 spec.; 1.vi.–17.vii.2005, 2 spec.; 18.vi.–16.viii.2006, 1 spec.
- Carabus problematicus problematicus* Herbst, 1786
Horní Pole, Karhov (6757d): 3.viii.–8.ix.2004, 1 spec.; 8.ix.–17.x.2004, 1 spec.
- Carabus scheidleri scheidleri* Panzer, 1799
Horní Pole, Karhov (6757d): 5.vi.–4.vii.2004, 1 spec.
- Carabus violaceus violaceus* Linnaeus, 1758
Horní Pole, Karhov (6757d): 4.vii.–3.viii.2004, 4 spec.; 3.viii.–8.ix.2004, 4 spec.; 18.vi.–16.viii.2006, 1 spec.; 16.viii.–21.ix.2006, 1 spec.; Radlice, Rašeliniště Radlice (6857d): 3.viii.–8.ix.2004, 1 spec.; 16.viii.–21.ix.2006, 1 spec.; Horní Pole, Rusko (6757d): 4.vii.–3.viii.2004, 1 spec.; 3.viii.–8.ix.2004, 1 spec.
- Cychrus caraboides caraboides* (Linnaeus, 1758)
Horní Pole, Karhov (6757d): 3.viii.–8.ix.2004, 1 spec.
- Demetrias monostigma* Samouelle, 1819
Horní Pole, Rusko (6757d): 1.vi.–17.vii.2005, 1 spec.
- Harpalus rufipes* (De Geer, 1774)
Horní Pole, Rusko (6757d): 18.vi.–12.vii.2006, 1 spec.
- Oodes helopioides* (Fabricius, 1792)
Horní Pole, Karhov (6757d): 1.v.–1.vi.2005, 1 spec.; 18.vi.–12.vii.2006, 5 spec.; Horní Pole, Rusko (6757d): 8.v.–5.vi.2004, 2 spec.; 4.vii.–3.viii.2004, 1 spec.; 8.ix.–17.x.2004, 1 spec.; 1.v.–1.vi.2005, 2 spec.; 1.vi.–17.vii.2005, 3 spec.; 7.v.–18.vi.2006, 8 spec.
- Poecilus cupreus* (Linnaeus, 1758)
Horní Pole, Karhov (6757d): 7.iv.–8.v.2004, 1 spec.; 5.vi.–4.vii.2004, 1 spec.; 18.vi.–12.vii.2006, 1 spec.; Radlice, Rašeliniště Radlice (6857d): 4.vii.–3.viii.2004, 1 spec.; 8.ix.–17.x.2004, 1 spec.; 9.iv.–1.v.2005, 1 spec.; 7.v.–18.vi.2006, 1 spec.; Horní Pole, Rusko (6757d): 7.v.–18.vi.2006, 1 spec.
- Pterostichus diligens* (Sturm, 1824)
Horní Pole, Karhov (6757d): 7.iv.–8.v.2004, 3 spec.; 8.v.–5.vi.2004, 3 spec.; 5.vi.–4.vii.2004, 10 spec.; 4.vii.–3.viii.2004, 5 spec.; 8.ix.–17.x.2004, 2 spec.; 1.v.–1.vi.2005, 7 spec.; 17.vii.–19.viii.2005, 1 spec.; 18.vi.–12.vii.2006, 2 spec.; Radlice, Rašeliniště Radlice (6857d): 7.iv.–8.v.2004, 1 spec.; 5.vi.–4.vii.2004, 1 spec.; 4.vii.–3.viii.2004, 3 spec.; 8.ix.–17.x.2004, 2 spec.; 15.iv.–7.v.2006, 1 spec.; 7.v.–18.vi.2006, 2 spec.; 18.vi.–16.viii.2006, 2 spec.; Horní Pole, Rusko (6757d): 7.iv.–8.v.2004, 3 spec.; 8.v.–5.vi.2004, 3 spec.; 5.vi.–4.vii.2004, 10 spec.; 4.vii.–3.viii.2004, 5 spec.; 8.ix.–17.x.2004, 2 spec.; 7.v.–18.vi.2006, 1 spec.; 18.vi.–12.vii.2006, 1 spec.
- Pterostichus minor* (Gyllenhal, 1827)
Horní Pole env., Karhov (6757d): 7.iv.–8.v.2004, 1 spec.; 8.v.–5.vi.2004, 1 spec.; 5.vi.–4.vii.2004, 3

spec.; 4.vii.–3.viii.2004, 1 spec.; 3.viii.–8.ix.2004, 1 spec.; 8.ix.–17.x.2004, 2 spec.; 17.vii.–19.viii.2005, 1 spec.; 19.viii.–23.ix.2005, 1 spec.; 18.vi.–12.vii.2006, 1 spec.; 18.vi.–16.viii.2006, 1 spec.; Horní Pole, Rusko (6757d): 7.iv.–8.v.2004, 2 spec.; 8.v.–5.vi.2004, 3 spec.; 5.vi.–4.vii.2004, 1 spec.; 8.ix.–17.x.2004, 1 spec.; 1.v.–1.vi.2005, 1 spec.; 1.vi.–17.vii.2005, 2 spec.; 19.viii.–23.ix.2005, 5 spec.; 18.vi.–16.viii.2006, 2 spec.; Radlice, Rašeliniště Radlice (6857d): 7.iv.–8.v.2004, 4 spec.; 5.vi.–4.vii.2004, 6 spec.; 4.vii.–3.viii.2004, 5 spec.; 3.viii.–8.ix.2004, 20 spec.; 8.ix.–17.x.2004, 8 spec.; 9.iv.–1.v.2005, 3 spec.; 1.vi.–17.vii.2005, 1 spec.; 15.iv.–7.v.2006, 2 spec.; 7.v.–18.vi.2006, 8 spec.; 18.vi.–12.vii.2006, 10 spec.; 18.vi.–16.viii.2006, 23 spec.; 16.viii.–21.ix.2006, 2 spec.

Pterostichus niger (Schaller, 1783)

Horní Pole, Karhov (6757d): 5.vi.–4.vii.2004, 2 spec.; 4.vii.–3.viii.2004, 3 spec.; 3.viii.–8.ix.2004, 9 spec.; 17.vii.–19.viii.2005, 12 spec.; 18.vi.–16.viii.2006, 2 spec.; Radlice, Rašeliniště Radlice (6857d): 4.vii.–3.viii.2004, 1 spec.; 3.viii.–8.ix.2004, 16 spec.; 16.viii.–21.ix.2006, 1 spec.; Horní Pole, Rusko (6757d): 3.viii.–8.ix.2004, 5 spec.

Pterostichus nigrita (Paykull, 1790)

Horní Pole, Karhov (6757d): 7.iv.–8.v.2004, 32 spec.; 5.vi.–4.vii.2004, 9 spec.; 4.vii.–3.viii.2004, 10 spec.; 3.viii.–8.ix.2004, 9 spec.; 1.v.–1.vi.2005, 13 spec.; 15.iv.–7.v.2006, 11 spec.; 18.vi.–12.vii.2006, 17 spec.; Radlice, Rašeliniště Radlice (6857d): 7.iv.–8.v.2004, 32 spec.; 5.vi.–4.vii.2004, 9 spec.; 4.vii.–3.viii.2004, 10 spec.; 3.viii.–8.ix.2004, 9 spec.; 9.iv.–1.v.2005, 16 spec.; 15.iv.–7.v.2006, 30 spec.; 7.v.–18.vi.2006, 6 spec.; 18.vi.–16.viii.2006, 1 spec.; 16.viii.–21.ix.2006, 1 spec.; Horní Pole, Rusko (6757d): 8.v.–5.vi.2004, 3 spec.; 5.vi.–4.vii.2004, 7 spec.; 4.vii.–3.viii.2004, 2 spec.; 8.ix.–17.x.2004, 3 spec.; 9.iv.–1.v.2005, 3 spec.; 1.vi.–17.vii.2005, 1 spec.; 15.iv.–7.v.2006, 2 spec.; 7.v.–18.vi.2006, 3 spec.; 18.vi.–16.viii.2006, 2 spec.

Pterostichus rhaeticus Heer, 1837

Horní Pole, Karhov (6757d): 8.v.–5.vi.2004, 5 spec.; 5.vi.–4.vii.2004, 1 spec.; 4.vii.–3.viii.2004, 1 spec.; 15.iv.–7.v.2006, 5 spec.; 18.vi.–12.vii.2006, 3 spec.; Radlice, Rašeliniště Radlice (6857d): 7.iv.–8.v.2004, 4 spec.; 5.vi.–4.vii.2004, 8 spec.; 3.viii.–8.ix.2004, 1 spec.; 8.ix.–17.x.2004, 1 spec.; 9.iv.–1.v.2005, 20 spec.; 15.iv.–7.v.2006, 13 spec.; 7.v.–18.vi.2006, 12 spec.; 18.vi.–12.vii.2006, 1 spec.; 18.vi.–16.viii.2006, 5 spec.; 16.viii.–21.ix.2006, 1 spec.; Horní Pole, Rusko

Table 1. Dominance classes of ground beetles (Carabidae) in the years 2004, 2006

Species		Locality					
		Horní Pole, Karhov		Rašeliniště Radlice bog		Horní Pole, Rusko	
		D (%)	CD	D (%)	CD	D (%)	CD
<i>Agonum</i>	<i>duftschmidi</i>	0.49	SRE	–	–	–	–
	<i>viduum</i>	3.90	SDO	0.33	SRE	25.81	ED
	<i>fuliginosus</i>	–	–	5.02	DO	3.76	SDO
	<i>gracilis</i>	0.49	SRE	1.34	RE	10.75	ED
<i>Amara</i>	<i>plebeja</i>	–	–	0.33	SRE	–	–
<i>Bembidion</i>	<i>lampros</i>	–	–	0.33	SRE	–	–
<i>Calathus</i>	<i>melanocephalus</i>	–	–	–	–	0.54	SRE
<i>Carabus</i>	<i>granulatus</i>	3.90	SDO	–	–	8.06	ED
	<i>problematicus</i>	0.98	SRE	–	–	–	–
	<i>scheidleri</i>	0.49	SRE	–	–	–	–
	<i>violaceus</i>	4.88	SDO	0.67	SRE	1.08	RE
<i>Cychrus</i>	<i>caraboides</i>	0.49	SRE	–	–	–	–
<i>Oodes</i>	<i>helopioides</i>	2.44	SDO	–	–	6.45	DO
<i>Poecilus</i>	<i>cupreus</i>	1.46	RE	1.00	RE	0.54	SRE
<i>Harpalus</i>	<i>rufipes</i>	–	–	–	–	0.54	SRE
<i>Pterostichus</i>	<i>diligens</i>	12.20	ED	4.01	SDO	13.44	ED
	<i>minor</i>	5.37	DO	29.43	ED	4.84	SDO
	<i>niger</i>	7.80	DO	6.02	DO	2.69	SDO
	<i>nigrita</i>	47.80	ED	36.12	ED	11.83	ED
	<i>rhaeticus</i>	7.32	DO	15.38	ED	9.68	DO

D(%) – dominance, CD – class of dominance, ED – eudominant (>10%), DO – dominant (5–10%), SDO – subdominant (1–5%), RE – recedent (0.1–1%), SRE – subrecedent (<0.1%)

(6757d): 7.iv.–8.v.2004, 2 spec.; 8.v.–5.vi.2004, 1 spec.; 5.vi.–4.vii.2004, 6 spec.; 3.viii.–8.ix.2004, 2 spec.; 9.iv.–1.v.2005, 3 spec.; 15.iv.–7.v.2006, 3 spec.; 7.v.–18.vi.2006, 2 spec.; 18.vi.–16.viii.2006, 1 spec.; 16.viii.–21.ix.2006, 1 spec.

Trechus secalis (Paykull, 1790)

Horní Pole, Karhov (6757d): 17.vii.–19.viii.2005, 1 spec.

Species dominance are reported in Tab. 1. 2 species were eudominant, 3 dominant, 4 subdominant, 1 recedent and 5 subrecedent in Horní Pole, Karhov locality. In Rašeliniště Radlice bog 3 species were eudominant, 2 dominant, 1 subdominant, 2 recedent and 4 subrecedent. 4 species were eudominant, 3 dominant, 3 subdominant, 1 recedent and 3 subrecedent in Horní Pole, Rusko locality. The results of Simpson's index of dominance and Shannon's index of diversity are shown in Figs. 2 and 3.

During the period 2004–2006 no R-species were recorded in all localities. A- and E-species were observed in all localities despite different ratios. 14 species were adaptable and 2 were eurytop in Horní Pole, Karhov locality. In Rašeliniště Radlice bog 9 species were adaptable and 3 were eurytop. 12 species were adaptable and 6 were eurytop in Horní Pole, Rusko locality (Tab. 2). The index IKS ranked Horní Pole, Karhov locality (23.41) and Rašeliniště Radlice bog (31.10) by category strongly influenced habitat. Horní Pole, Rusko locality (39.25) was ranked by the category influenced habitat (Fig. 4). In this case, index IKS was not corresponded reality well. It is very unlikely that bogs and bog meadows would have the same biological value as small-plots of arable land, gardens, country lanes and orchards. Čapek (2005) indicates similarly controversial findings. He presents research paper summaries of 19 authors, who evaluated the anthropogenic degradation of habitats through IKS. From the overview it is obvious that practical use

of index IKS by Nenádál (1998) can be confusing sometimes. Conflict may cause E-species that occur in all habitats, including anthropogenic uninfluenced. In contrast, the R-species are found only in the anthropogenic uninfluenced localities. For this reason, it would be better to evaluate stage of degradation by adaptable and relict species only. Another problem occurs when the site is species-poor (e.g. bogs) and there is significantly dominant species. In this case it may be a large distortion, particularly in small area with a large marginal effect.

CONCLUSIONS

The highest number of the specimens was recorded in Rašeliniště Radlice bog (369 spec.), the second highest number in Horní Pole, Karhov locality (244 spec.) and the lowest number in Horní Pole, Rusko locality (228 spec.). The highest number of species was recorded in Horní Pole, Rusko (18 species), the second highest in Horní Pole, Karhov locality (16 species), while only 12 species was recorded in Rašeliniště Radlice bog. Mire habitats are characterized by lower abundance in species. E.g., Lempochner (1999) found 14 species of Carabidae on Cínovecké rašeliniště bog locality during the years 1997 and 1998. Mähringová (1993) recorded occurrence of 14 species on the edge of the Červené blato mire National Natural Reserve and 8 species right on the mire.

Species diversity (Shannon's diversity index) and dominance (Simpson's dominance index) were also calculated. *Pterostichus nigrita* (Paykull, 1790) was the most dominant species in Horní Pole, Karhov locality and Rašeliniště Radlice bog and *Agonum viduum* (Panzer, 1796) in Horní Pole, Rusko locality. The lowest value of Simpson's index of dominance was in Horní Pole, Rusko locality (0.13). Slightly increased values were in Horní Pole, Karhov locality (0.26) and Rašeliniště Radlice bog (0.25). Shannon's index of

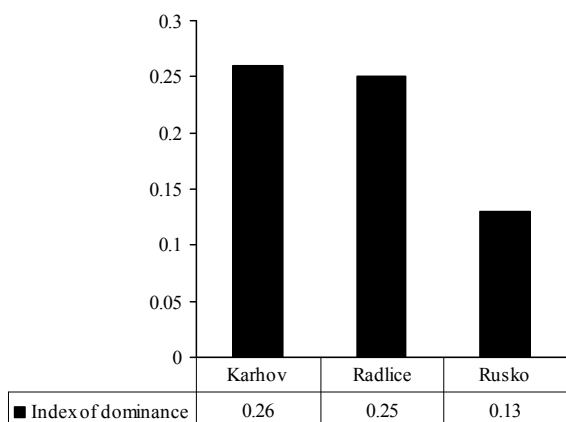


Fig. 2. Results of Simpson's index of dominance by localities in years 2004–2006

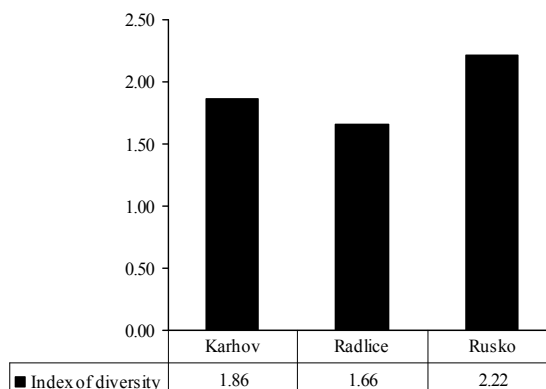


Fig. 3. Results of Shannon's index of diversity by localities in years 2004–2006

Table 2. List of ground beetles (Carabidae) divides into groups: A (adaptable), E (eurytop), according to the range of their ecological valency in years 2004–2006

Species	Locality		
	Karhov	Radlice	Rusko
<i>Agonum duftschmidi</i>	A	–	A
<i>Agonum fuliginosus</i>	–	A	A
<i>Agonum gracilis</i>	A	A	A
<i>Agonum thoreyi</i>	–	–	A
<i>Agonum viduum</i>	A	A	A
<i>Amara plebeja</i>	–	A	–
<i>Bembidion lampros</i>	–	E	E
<i>Bembidion mannerheimi</i>	A	–	–
<i>Calathus melanocephalus</i>	–	–	E
<i>Carabus granulatus</i>	–	–	E
<i>Carabus problematicus</i>	A	–	–
<i>Carabus schedleri</i>	A	–	–
<i>Carabus violaceus</i>	A	A	A
<i>Cychrus caraboides</i>	A	–	–
<i>Demetrias monostigma</i>	–	–	A
<i>Harpalus rufipes</i>	–	–	E
<i>Oodes helopioides</i>	A	–	A
<i>Poecilus cupreus</i>	E	E	E
<i>Pterostichus diligens</i>	A	A	A
<i>Pterostichus minor</i>	A	A	A
<i>Pterostichus niger</i>	A	A	A
<i>Pterostichus nigrita</i>	E	E	E
<i>Pterostichus rhaeticus</i>	A	A	A
<i>Trechus secalis</i>	A	–	–
A/E	14/2	9/4	12/6

diversity was the highest in Horní Pole, Rusko locality (2.22). In Horní Pole, Karhov locality index was lower (1.86) and the lowest value was in Rašeliniště Radlice bog (1.66).

Carabus problematicus problematicus Herbst, 1786 and *C. schiedleri schiedleri* Panzer, 1799, which are protected species (category of threatened species) in accordance with suppl. No. III. to public notice of the Ministry of the Environment of the Czech Republic No. 395/1992 code of law, were recorded. None of the species are registered in the Red list of threatened species in the Czech Republic – Invertebrates (Farkač et al., 2005).

Three tyrphophil species (Hůrka, 1996) were recorded (*Agonum gracile* Sturm, 1824, *Pterostichus diligens* (Sturm, 1824) and *Pterostichus rhaeticus* Heer, 1837). Although Křivan (2003) recorded *Patrobis assimilis* Chaudoir, 1844 in higher altitude compared to this locality, a characteristic species of mire, this species was not recorded. There were no tyrphobiont species (Hůrka, 1996) recorded in this study (e.g. *Carabus menetriesi* Hummel, 1827). In central Europe

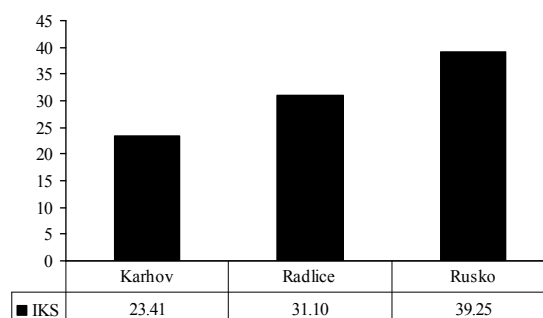


Fig. 4. Results of index IKS assess the stage of degradation by localities in years 2004–2006

it occurs as a glacial relict either in mountains, or in cool, marshy habitats of hills (Hůrka, 1996). There is no confirmed record of *Agonum ericeti* (Panzer, 1809) occurrence either, species known e.g. from the Třeboň Region Protected Landscape Area (Soupy, 2004). Also there is no record of *Carabus menetriesi pacholei* (Sokolář, 1911), which has its closest records from Novohradské hory Mountains (Farkač, pers. com.).

No relict species (Hůrka et al., 1996) were recorded in all localities during the period 2004–2006. 87.5% species were adaptable and 12.5% species were eurytop in Horní Pole, Karhov locality. In Rašeliniště Radlice bog 75.0% species were adaptable and 25.0% species were eurytop. 66.67% species were adaptable and 33.33% species were eurytop in Horní Pole, Rusko locality. Index IKS by Nenadál (1998) did not correspond the reality well. Practical use of index can be confusing for environmental assessment, particularly in small area with a large marginal effect and lower species diversity (e.g. bogs, mires etc.).

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Střevlíkovití (Coleoptera: Carabidae) vybraných rašelinných lokalit přírodního parku Javořická vrchovina (jižní Čechy)

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Na třech lokalitách přírodního parku Javořická vrchovina (6757d, 6857d) bylo celkově v období 2004–2006 odchyceno metodou zemních pastí 841 exemplářů střevlíkovitých (Carabidae) ve 24 druzích. Nejvíce druhů bylo za celé tři roky zjištěno na lokalitě Horní Pole, Rusko (18 druhů), následovala lokalita Horní Pole, Karhov se 16 druhy. Na lokalitě Rašeliniště Radlice bylo zjištěno 12 druhů. Dva druhy zjištěné na lokalitách patří podle vyhl. č. 395/1992 Sb. mezi druhy ohrožené, a to *Carabus problematicus* a *C. scheidleri*. Žádný zjištěný druh není řazen do červených seznamů bezobratlých. Z druhového spektra střevlíkovitých (Carabidae) zjištěného na jednotlivých lokalitách je možné za tyrfofilní druhy považovat *Agonum gracile*, *Pterostichus diligens* a *Pterostichus rhaeticus*. Přestože v roce 2003 byl v horní části lokality Rusko nalezen *Patrobus assimilis*, druh žijící na vlhkých až velmi vlhkých nezastíněných nebo částečně zastíněných stanovištích: rašeliniště, kyselé močálovité louky, močálovité břehy vod, nebyl v této části lokality jeho výskyt potvrzen. Ani výskyt žádného tyrfobionta (jako je např. *Carabus menetriesi*) se nepodařilo potvrdit. Nejdominantnějším druhem střevlíkovitých (Carabidae) byl na lokalitě Horní Pole, Karhov a Rašeliniště Radlice v letech 2004 a 2006 *Pterostichus nigrata*. Na lokalitě Horní Pole, Rusko to byl druh *Agonum viduum*. Pro jednotlivé lokality byly vypočítány indexy diverzity a dominance. Index komunity střevlíkovitých, který má hodnotit zachovalost stanoviště, neodpovídal realitě. Použití tohoto indexu pro hodnocení kvality jednotlivých biotopů v praxi může být mnohdy zavádějící, zvláště u lokalit druhově chudších, s menší rozlohou a velkým okrajovým efektem (např. rašelinné louky, menší rašeliniště apod.).

faunistika; biologické hodnocení; střevlíkovití; přírodní park Javořická vrchovina; Česká Republika

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