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## PRELIMINARY EVALUATION OF *CARABIDAE* (COLEOPTERA) IN AN EXPERIMENTAL AREA NEAR HODONÍN

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### ABSTRACT

An experimental area to study the effects of extremely dry conditions on the growth of selected species of grasses and trees was established near Hodonín. Species composition of ground beetles (*Carabidae*) with regard to their ecological requirements was also investigated there. Research has been started in 2008. Catching of ground beetles were conducted with pitfall traps in three lines: own experimental area, the edge of humid deciduous forest vegetation, and sandy edge of the pine plantation. For the four years study, 8,663 individuals of 107 species of ground beetles were registered. The most numerous species were *Pseudoophonus rufipes* (2,680 specimens) and *P. griseus* (1,157 specimens). Three species found are listed in the Red List as vulnerable and two as nearly vulnerable. Predominant adaptable species (47.7%), followed by eurytopic species (43.9%), 7 species (6.5%) belong to the category of sensitive with a narrow ecological valence.

**Key words:** species diversity, arid conditions, ground beetles

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## INTRODUCTION

The way of the landscape management significantly change the landscape as an ecosystem, it can reduce the diversity and influence its autoregulatory ability. The experimental area near Hodonín started from 2008 as recultivation project of habitats with extreme climatic and soil conditions. The project has investigated the possibility of use of soil conditioners, and of some grasses and legumes for soil reclamation in extreme climatic conditions (Straková et al., 2009).

Some groups of epigeic fauna was also evaluate as indicators of biodiversity. The aim was to determine the species diversity of these groups, the speed with which the area is colonized by species with different life strategies and how these species or the whole groups are able to survive in extreme conditions (acid sandy soils with low humidity and nutrient content). One of these investigated groups are the ground beetles which are widely used to assess the habitats quality and extent of their disturbances (Šustek, 1984; Nenadál, 1993; Hůrka et al., 1996; Krejčová et al., 2000, etc.). Results for the four years observation are presented in this contribution.

## MATERIAL AND METHODS

The experimental area is located in the cadastre of Hodonín (48 ° 52'40" N, 17 ° 7'50" E) on sandy soils. The most part is surrounded by agrocenoses, hereafter by monoculture of a pine and mixed forest and in a smaller extent by vegetation of hygrophilous trees.

Sampling was conducted using pitfall traps with 4% formaldehyde solution and addition of a detergent. One line of five traps was located approximately in the middle of the own experimental area (plot 1), the next two lines in the surrounding habitats – the edge of the hygrophilous forest growth (plot 2) and the edge of the cultural pine forest (plot 3). Traps were taken out in monthly intervals. After sampling, the material was transferred to the permanent fixation in 70% ethanol. The determination was made by the second author. The distribution of species into ecological groups A, E, R follows Hůrka et al. (1996).

## RESULTS AND DISCUSSION

During the years 2008 to 2011, 107 species of Carabidae, represented by 8 663 individuals, were registered, of which 58 species with 5 133 individuals in the plot 1, 85 species with 2 107 individuals in the plot 2 and 57 species with 423 individuals in the plot 3. Details, see Table 1. Preliminary results indicate the high species diversity in comparison with the results of other authors dealing with the ground beetles in agrocenoses or in the open landscape (e.g. Krejčová et al., 2000; Šťastná, Bezděk, 2001).

In the meaning of classification of ground beetles according to ecological entitlements (Hůrka et al., 1996) dominated the plot 1 eurytopic species of the group E (30%) which don't have special entitlements to the character or quality of the environment. Three species (*Harpalus modestus*, *Masoreus wetterhalli*, *Ophonus diffinis*) belong to the group R (2.8%), which are species with a narrow ecological valence. These are rare and endangered species of natural and not too disturbed habitats. Other species found (20.5%) belong to the group A, more adaptable species, found in more or less natural habitats. *Poecilus Lepidus* (159 specimens) not been included to the group. In the plot 2, species of the group A predominated (42%), 4 species (*Harpalus progrediens*, *Leistus rufimarginatus*, *Platynus krynickii*, *Pterostichus gracilis*) belong to the group R. In the plot 3, *Masoreus wetterhalli* was the only one species of the group R. Groups A and E were represented evenly.

Farkač et al. (2005) reported *Carabus violaceus* found in all three plots as vulnerable (VU) and *Harpalus modestus* found in the plot 1 as near threatened (NT). *Harpalus progrediens* listed as near

threatened (NT), *Platynus krynickii* and *Pterostichus gracilis* listed as vulnerable (VU), were found in the plot 2.

The most species (85) was found in the plot 2, where the ecological group A dominated, which includes mainly species of forests, meadows, pastures and shore species of lakes and rivers. The most specimens (5 133) were found in the own experimental area (plot 1), where species belonging to the group E predominated, which are species of strongly anthropogenically influenced landscapes and expansive species.

Tab. 1. List of species, ecological groups and number of specimens in each plot

Species	Ecological group	Plot		
		1	2	3
<i>Abax parallelus</i> (Duftschmid, 1812)	A		1	3
<i>Acupalpus meridianus</i> (Linne, 1761)	E	1		
<i>Agonum gracilipes</i> (Duftschmid, 1812)	E		2	
<i>Agonum sexpunctatum</i> (Linne, 1758)	A	1	2	2
<i>Agonum</i> sp.			1	
<i>Agonum viduum</i> (Panzer, 1796)	A	1	7	
<i>Amara aenea</i> (De Geer, 1774)	E	89	1	1
<i>Amara aulica</i> (Panzer, 1796)	E	2	9	2
<i>Amara bifrons</i> (Gyllenhal, 1810)	E	36	8	
<i>Amara communis</i> (Panzer, 1797)	A	1	40	
<i>Amara consularis</i> (Duftschmid, 1812)	E		4	
<i>Amara convexior</i> Stephens, 1828	E	29	38	1
<i>Amara curta</i> Dejean, 1828	A	1		
<i>Amara familiaris</i> (Duftschmid, 1812)	E	263	24	53
<i>Amara fulva</i> (O.F. Müller, 1776)	A	2	16	54
<i>Amara littorea</i> C.G. Thomson, 1857	E	1		
<i>Amara lunicollis</i> Schiödte, 1837	A	1		7
<i>Amara majuscula</i> (Chaudoir, 1850)	E			3
<i>Amara ovata</i> (Fabricius, 1792)	E	1	8	
<i>Amara plebeja</i> (Gyllenhal, 1810)	E	3		
<i>Amara similata</i> (Gyllenhal, 1810)	E	9	1	6
<i>Amara tibialis</i> (Paykull, 1798)	A	1	1	
<i>Anchomenus dorsalis</i> (Pontoppidan, 1763)	E	3	11	2
<i>Anisodactylus binotatus</i> (Fabricius, 1787)	E		5	
<i>Anisodactylus nemorivagus</i> (Duftschmid, 1812)	A		2	
<i>Anisodactylus signatus</i> (Panzer, 1797)	E	1		
<i>Badister bullatus</i> (Schränk, 1798)	A		1	1
<i>Badister collaris</i> Motschulsky, 1844			3	
<i>Badister meridionalis</i> Puel, 1925	A		1	
<i>Bembidion biguttatum</i> (Fabricius, 1779)	A		2	
<i>Bembidion guttula</i> (Fabricius, 1792)	A		1	
<i>Bembidion lunulatum</i> (Geffroy in Fourcroy, 1785)	A		1	
<i>Bembidion obtusum</i> (Audinet-Serville, 1821)	E	1		
<i>Bembidion properans</i> (Stephens, 1828)	E	6	1	
<i>Bembidion quadrimaculatum</i> (Linnaeus, 1761)	E		2	2
<i>Bradycellus harpalinus</i> (Audinet-Serville, 1821)	A		3	
<i>Brachinus crepitans</i> (Linnaeus, 1758)	E	1	2	
<i>Brachinus explodens</i> Duftschmid, 1812	E	8	1	1
<i>Calathus ambiguus</i> (Paykull, 1790)	A	1	12	74
<i>Calathus erratus</i> (C. R. Sahlberg, 1827)	A	447	72	104
<i>Calathus fuscipes</i> (Goeze, 1777)	E	94	32	61
<i>Calathus melanocephalus</i> (Linnaeus, 1758)	E	3	7	8
<i>Calathus micropterus</i> (Duftschmid, 1812)	A		2	7
<i>Carabus granulatus</i> Linnaeus, 1758	E		32	
<i>Carabus hortensis</i> Linnaeus, 1758	A	1	35	1

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<i>Carabus violaceus</i> Linnaeus, 1758	A	4	106	34
<i>Cychrus caraboides</i> (Linnaeus, 1758)	A		9	2
<i>Cymindis angularis</i> Gyllenhal, 1810	A			1
<i>Dolichus halensis</i> (Schaller, 1783)	E	10	5	1
<i>Europhilus micans</i> (Nicolai, 1822)	A		15	
<i>Harpalus affinis</i> (Schränk, 1781)	E	31	5	3
<i>Harpalus anxius</i> (Duftschmid, 1812)	A	427	3	5
<i>Harpalus autumnalis</i> (Duftschmid, 1812)	A	1	1	5
<i>Harpalus distinguendus</i> (Duftschmid, 1812)	E	367	10	3
<i>Harpalus froelichi</i> Sturm, 1818	A	328	23	25
<i>Harpalus latus</i> (Linnaeus, 1758)	A	1	5	2
<i>Harpalus modestus</i> Dejean, 1829	R	4		
<i>Harpalus progrediens</i> Schaubberger, 1922	R		2	
<i>Harpalus pumilus</i> Sturm, 1818	A	37	9	15
<i>Harpalus quadripunctatus</i> Zetterstedt, 1828	A		1	
<i>Harpalus rubripes</i> (Duftschmid, 1812)	E	91	20	15
<i>Harpalus rufipalpis</i> Sturm, 1818	A		1	1
<i>Harpalus serripes</i> (Quensel in Schönherr, 1806)	A	5	5	3
<i>Harpalus signaticornis</i> (Duftschmid, 1812)	E	24		1
<i>Harpalus smaragdinus</i> (Duftschmid, 1812)	A	10		3
<i>Harpalus</i> sp.			1	
<i>Harpalus subcylindricus</i> Dejean, 1829	A	54	6	4
<i>Harpalus tardus</i> (Panzer, 1797)	E	46	86	37
<i>Chlaenius nigricornis</i> Fabricius, 1787	A			1
<i>Chlaenius vestitus</i> Paykull, 1790	A		1	
<i>Leistus ferrugineus</i> (Linnaeus, 1758)	E		7	2
<i>Leistus rufomarginatus</i> (Duftschmid, 1812)	R		4	
<i>Licinus depressus</i> (Paykull, 1790)	A		6	
<i>Masoreus wetterhalli</i> (Gyllenhal, 1813)	R	2		2
<i>Microlestes minutulus</i> (Goeze, 1777)	E	10		
<i>Nebria brevicollis</i> (Fabricius, 1792)	A	2		
<i>Notiophilus palustris</i> (Duftschmid, 1812)	E		10	6
<i>Notiophilus pusillus</i> Dejean, 1826	E	2		
<i>Oodes helopioides</i> (Fabricius, 1792)	A		2	
<i>Ophonus azureus</i> (Fabricius, 1775)	E	2		
<i>Ophonus diffinis</i> (Dejean, 1829)	R	1		
<i>Ophonus nitidulus</i> Mannerheim, 1825	A		2	
<i>Oxypselaphus obscurus</i> (Herbst, 1784)	A		86	1
<i>Panageus bipustulatus</i> (Fabricius, 1775)	A	3	32	3
<i>Paradromius linearis</i> (Olivier, 1795)	E			1
<i>Philorhizus notatus</i> (Stephens, 1827)	A		2	
<i>Platynus krynickii</i> (Sperk, 1835)	R		23	
<i>Poecilus cupreus</i> (Linnaeus, 1758)	E	36	6	17
<i>Poecilus lepidus</i> (Leske, 1785)		159	3	4
<i>Poecilus versicolor</i> (Sturm, 1824)	E			1
<i>Pseudoophonus calceatus</i> (Duftschmid, 1812)	A	462	9	19
<i>Pseudoophonus griseus</i> (Panzer, 1797)	E	927	109	121
<i>Pseudoophonus rufipes</i> (De Geer, 1774)	E	1005	950	725
<i>Pterostichus gracilis</i> (Dejean, 1828)			1	
<i>Pterostichus macer</i> (Marsham, 1802)	A		1	
<i>Pterostichus melanarius</i> (Illiger, 1798)	E	1	15	2
<i>Pterostichus niger</i> (Schaller, 1783)	A		35	9
<i>Pterostichus nigrita</i> (Paykull, 1790)	E		3	
<i>Pterostichus oblongopunctatus</i> (Fabricius, 1787)	A		56	9
<i>Pterostichus strenuus</i> (Panzer, 1797)	E		15	
<i>Pterostichus vernalis</i> (Panzer, 1796)	A		1	
<i>Stenolophus teutonius</i> (Schränk, 1781)	E		2	3

<i>Stomis pumicatus</i> (Panzer, 1796)	A		3	
<i>Syntomus foveatus</i> (Geoffroy in Fourcroy, 1785)	A		2	3
<i>Syntomus pallipes</i> (Dejean, 1825)	A		8	11
<i>Synuchus vivalis</i> (Illiger, 1798)	E		1	1
<i>Trechus quadristriatus</i> (Schrank, 1781)	E	1	7	
<i>Zabrus tenebrioides</i> (Goeze, 1777)	E			3
<b>Součet druhů</b>			<b>107</b>	
<b>Součet jedinců</b>			<b>8663</b>	<b>2176 568 472</b>

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