INTERFERENCE OF CARABID COMMUNITIES IN A FLOODPLAIN RESERVE WITH NEIGHBORING ECOSYSTEMS

ŠUSTEK Zbyšek, PORHAJAŠOVÁ Jana

Abstract. The Carabid fauna of the Žitavský luh Nature Reserve consisted of 51 species. Most of them were characteristic to arable land forming communities in different types of crops. Only a minor part of them were species characteristic for shores of standing water bodies or floodplain forests. This feature was predominant even in the preserved strip of a floodplain forest along the preserved part of the original Žitava riverbed. The executed investigation has shown that, in spite of the regular simulation of floods in the reserve, the reserve is able to maintain the characteristic fauna only to a very limited degree. At the same time, the communities in different parts of the reserve showed a high temporal stability during the years 2003-2005. The limited representation of characteristic hydrophilous floodplain species in the whole reserve and a relatively high representation of mesohydrophilous forest species in the remnant of the floodplain forests shows that the most natural parts of the reserve are similar to the most degraded floodplain ecosystem in Central Europe. But even in these conditions the reserve is able to act as a significant biocentre in the deforested, purely agricultural landscape of South Slovakia.

Keywords: Carabidae, communities, floodplains, Žitavský luh Nature Reserve, nature protection.

Rezumat. Interferenţa cenozelor de carabide dintr-o rezervaţie de luncă cu ecosistemele vecine. Fauna carabidelor din Rezervaţia Naturală Žitavský luh (Lunca râului Jitava) este constituită din 51 de specii. Majoritatea lor au fost specii caracteristice pentru cenoze din diferite tipuri de agroecosisteme. Numai o mică parte a speciilor au fost specii caracteristice pentru malurile apelor stagnante sau pentru păduri de luncă. Această relaţie a caracterizat şi cea mai conservată parte a rezervaţiei – restul pădurii de luncă pe lângă vechiul braţ al râului Žitava. Cercetările noastre au arătat că, în ciuda simulării regulate a inundaţiilor în rezervaţie, posibilitatea ecositemului de a menţine o faună caracteristică pentru lunci naturale este foarte limitată. În afară de asta, structura cenozelor din diferite părţi ale rezervaţiei a fost foarte stabilă în cursul anilor 2003-2005. O reprezentare minoră a speciilor hidrofile sau de luncă în întreaga rezervaţie şi abundenţa relativ ridicată a speciilor mezohidrofile de pădure în restul pădurii de luncă, arată că rezervaţia este similară celor mai degradate ecosisteme de luncă din Europa Centrală. Dar chiar în această stare, rezervaţia funcţionează ca un biocentru important în peisajul defrişat, pur agricol, al Slovaciei de Sud.

Cuvinte cheie: carabide, cenoze, lunci, Rezervaţia Naturală Žitavský luh, ocrotirea naturii.

INTRODUCTION

The floodplain ecosystems persist in Central European landscape in form of remnants suffering often a considerable fragmentation and other anthropogenous interventions. They represent a wide scale of habitat types starting from the habitats dependent on permanent presence of water to habitats forming a contact zone with the mesohydrophilous ecosystem on the floodplain margin. The floodplain ecosystems are also characterized by remarkable dynamics resulting from cyclical disturbances in the most exposed parts along riverbanks or from fluctuations of hydrological regimen in the more remote parts of floodplain. Correspondingly, there exists a remarkable diversity of species of different ecological requirements inhabiting individual patches of the floodplain landscape mosaic and dynamically migrating between them, according to momentary hydrological conditions. In the cultural landscape, the floodplains are subjected to enormous transformations due to the building of protecting dikes and drainage canals. In this way, in a part of floodplain the floods are completely eliminated, the soil can be supplied by water only by increased level of ground water table and the ecosystem slowly turn into mesohydrophilous ones. On other hand, the within dike parts are potentially exposed to a more intensive mechanical impact of floods concentrated into a relatively narrow zone. In both cases, an unnatural state arises and the fluent transition between most hydrophilous and mesohydrophilous habitats is liquidated. In Carabids such situations were described by ŠUSTEK (2000, 2001)

The aim of this paper is to show how the Carabid fauna forms in a nature reserve of a small river floodplain subjected to recent anthropogenous changes and maintains in its form just due to an artificially simulated flood regimen. A similar situation was recently studied by PORHAJAŠOVÁ et al. (2010) in other part of the Žitava river floodplain, in a narrow within-dike zone.

MATERIAL AND METHODS

The Carabids were pitfall trapped at six study sites in the growing seasons of 2003 - 2004. The glass jars with diameter of 10 cm and volume 1 l filled with 4% formalin served as traps. In each site six traps were installed from early April to late October, being emptied once a month. The analysed material consists of 1,316 individuals. The beetles were identified using the key of HŮRKA (1995). The ecological data on species were taken form BURMEISTER (1939), LINDROTH (1949) and HŮRKA (1995). The unweighted average linkage method using the Chord distance as similarity measure served for hierarchical classification of the one year samples from each site, while the Decorana algorithm was used for their ordination. All calculations were executed by the program CAP. The relationship of

species to vegetation cover and humidity was expressed by a semiquantitative scales proposed by ŠUSTEK (2004). The heliophilous, open landscape species are characterized by 1, while the species requiring the complete shadowing by tree vegetation by 4, the ripicolous species are characterized by 5. The extremely xerophilous species are characterized by 1, the mesohydroplilous by 4 or 5 and the extremely hydrophilous by 8. The whole community preference for vegetation cover or humidity is calculated as arithmetic average of preferences of all species weighted by abundance of each species. These values are used for indirect ordination of the communities.

Study Sites

The nature reserve Žitavský luh is situated southeasterly of Michal nad Žitavou villages and represents a remnant of an extensive complex of wetlands in the Žitava river floodplain profoundly affected in 1980-1981 by the regulation of the river. Its area was reduced from about 200 ha to 74 ha. At present, it consists of four characteristics habitats – permanent open water table in the southeastern part bordered by a strip of reed stands which is gradually replaced at its northwestern margin by water-lodged stands of *Carex* (order Magnocaricetalia*)* into water-lodged regularly mown meadows (alliances *Cnidion Alopecurion pratensis, Arrhebatherion*). These formations cover about half of the reserve area. The southern part, at an artificial dike, is covered by a narrow remnant of flood plain forest (alliance *Salicion albae*) along the original branch of the Žitava river. The natural flood regime is simulated artificially. The whole reserve is surrounded by intensively managed arable land, but northwesterly, in a distance of about 250-391 m is situated a 700 long and 100-150 wide strip of poplar monoculture bordered with remnants of willow riverbank stands along the former Žitava river bank. The altitude ranges from 137 to 138 m. a.s.l. The detailed characteristics of the studied area are given by NOSKOVIČ et al. (2010). Brief characteristics of sampling sites (Fig. 1) are presented bellow:

A – a meadow stand in the northwestern corner of the reserve, the soil is dry, not water lodged (48°10'55.71"N, 18°17'40.12"E);

B – a Carex meadow close to the protective dike at the margin of the nature reserve (48°10'41.58"N, 18°17'26.1"E);

C – a remnant of floodplain forest along the original Žitava river bed (48°10'39.10"N, 18°17'23.13"E);

D – a grassy stand with dispersed shrubs between the shores of the permanent water table and the in the southeastern corner of the reserve, close to the outlet of the original river bed (48°10'28.57"N, 18°17'34.97"E);

E – a grassy and shrubby stand at margin of a reed stand bordering the permanent water table in the southeastern part of the reserve (48°10'38.03"N, 18°18'3.14"E);

F – a grassy habitat at transition between surrounding dry meadow habitats and the to margin of a reed stand bordering the permanent water table in the northeastern corner of the reserve (48°10'51.21"N, 18°18'4.58"E).

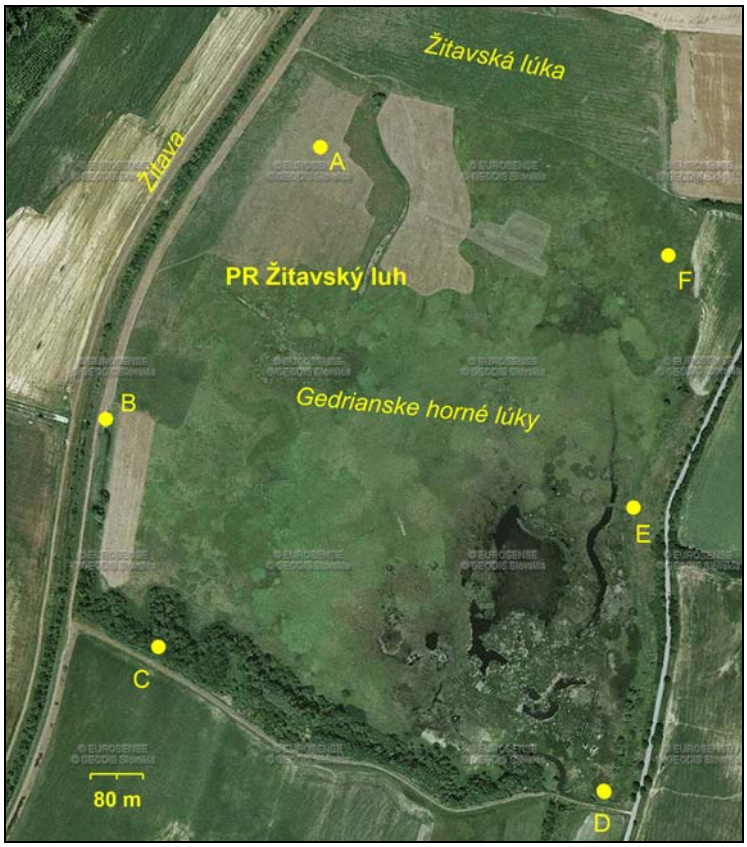

Figure 1. The Žitavský luh Nature Reserve and position of study sites (abbreviations as in table 1).
Figura 1. Rezervația Žitavský luh şi poziția localităților studiate (abrevieri ca în tabelul 1).

RESULTS

Altogether 51 species were found in the entire reserve. In individual sites and years, species number ranged from 6 to 24, but there was a general tendency to decreasing of number from the first year of investigations to the last year (from 41 to 35 and 28 in all six sites, in average from 15.93 to 8.50 species per site). However these changes occurred predominantly within 34 species individually represented species. Only three subdominant species (*Poecilus cupreus* (LINNAEUS, 1758), *Amara similata* (GYLLENHAL, 1810) and *Pterostichus anthracinus* (ILLIGER, 1798)) disappeared in the second or third year of the investigations. Among the 51 species only one species, *Pseudoophonus rufipes* (DE GEER, 1774), an expansive, open landscape species was recorded in all sites and years. Two further species, the tolerant forest species, *Carabus scheidleri* (DE GEER, 1774) and *Carabus violaceus*, were euconstant, while three species *Carabus ullrichi* (GERMAR, 1824), *Pterostichus cylindricus* (HERBST, 1784) and *Pterostichus melanarius* (ILLIGER, 1798) were constant, 12 species were accessory and 33 accidental (Table 1) and occurred only in one or two sites and years.

The species spectrum consisted predominantly of species typical for arable land of lowlands and constituting in varying proportions fauna in different crops. Only a minor part of the species were typical hydrophilous species of floodplain forests and shores of various wetland habitats (*Drypta dentata* (ROSSI, 1790), *Chlaenius nigricornis* (FABRICIUS, 1787), *Chlaenius tristis* (SCHALLER, 1783), *Pterostichus anthracinus, Pterostichus niger* (SCHALLER, 1783), *Pterostichus quadrifoveolatus* (LETZNER, 1852), *Carabus granulatus* (LINNAEUS, 1758)) or are eurytopic, with abundant occurrence in a very variable types of natural and artificial habitats (*Pterostichus melanarius*). A special, but relatively abundantly represented part consisted of mesohygrophilous species characteristic to the forests in lowlands (*Carabus ullrichi, Carabus coriaceus* (LINNAEUS, 1758) or uplands (*Carabus violaceus, Carabus scheidleri*), which also inhabit the driest types of natural floodplain forests (groups of geobiocoens *Ulmi Fraxineta carpinea* RAUŠER & ZLATNÍK 1966) or, according to local conditions, use to colonize, often in huge numbers of individuals, various types of anthropogeneously degraded floodplain forests.

Most of rarely occurring species were typical species of wetlands and their occurrence confirmed that they survive in this nature reserve in spite of its considerably changed character.

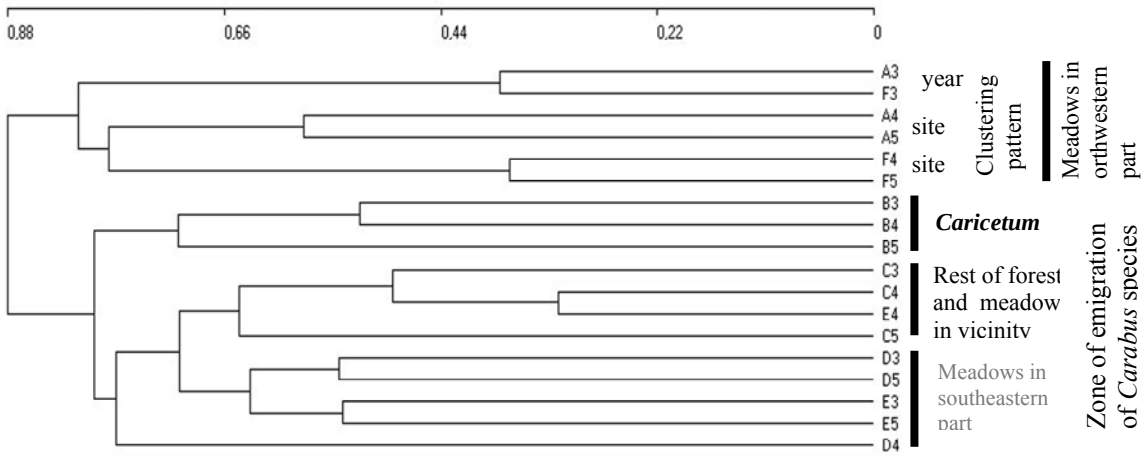

Figure 2. Hierarchical classification of the Carabid communities from the Žitavský luh Nature Reserve based on chord distance (abbreviations as in table 1).

Figura 2. Clasificarea ierarhică a cenozelor de carabide din Rezervaţia Žitavský luh pe baza distanţei proporţionale (abrevieri ca în tabelul 1).

Classification of the communities

The communities form two major clusters at Chord distance 0.88 (Fig. 2), which perfectly reflect the position of the study sites within the reserve and the humidity gradient created by the regulation of the Žitava river alluvium and reduction of size of alluvial meadows. The first cluster includes the samples from the drier sites A and F. It arises due to the common presence of the open landscape species *Harpalus punctatulus* (DUFTSCHMIDT, 1812), *Brachynus crepitans* (LINNAEUS, 1758) and *Brachynus explodens* (DUFTSCHMIDT, 1812) and simultaneous absence or low representation of *Carabus scheidleri, Carabus violaceus* and *Carabus ullrichi*. It consists of two subclusters: one including all samples from the site A and the sample from the site F from 2003 and other including samples from the site F from 2004 and 2005. The separation of these two sampler results emphasizes the appearance of a high number of individuals of the rare hydrophilous *Pterostichus angustatus* in this site in 2004 and 2005 (Table 1). This change obviously results from the fluctuation of the water table and varying humidity in individual years.

The second major cluster includes samples from the sites B, C, D and E. Within this cluster, at the approximate distance 0.7 three subclusters are differentiated. The first one includes samples from the water-lodged part of the meadow at the inlet channel at the western margin of the reserve (samples B3-B5). The second one includes samples from the remnant of the flood plain forest (C) and from the site E from 2004. This clustering pattern results from a

relatively high representation of *Carabus scheidleri* and proportionally similarly low representation of *Carabus ullrichi, Carabus violaceus* and *Pseudoophonus rufipes*. The third subcluster includes the samples from the site E from 2003 a 2005 and from the site B from 2005. It is characterized by a high relative abundance of *Pseudoophonus rufipes* and low relative abundance or absence of *Carabus scheidleri* and *Calathus fuscipes* (GOEZE, 1777). The fourth subluster includes only samples from the site B from 2003 a 2005. It arises due a high relative abundance of *Pterostichus niger, Pterostichus melanarius, Synomus obscuroguttatus* (DUFTSCHMIDT, 1812) and presence of *Carabus coriaceus*.

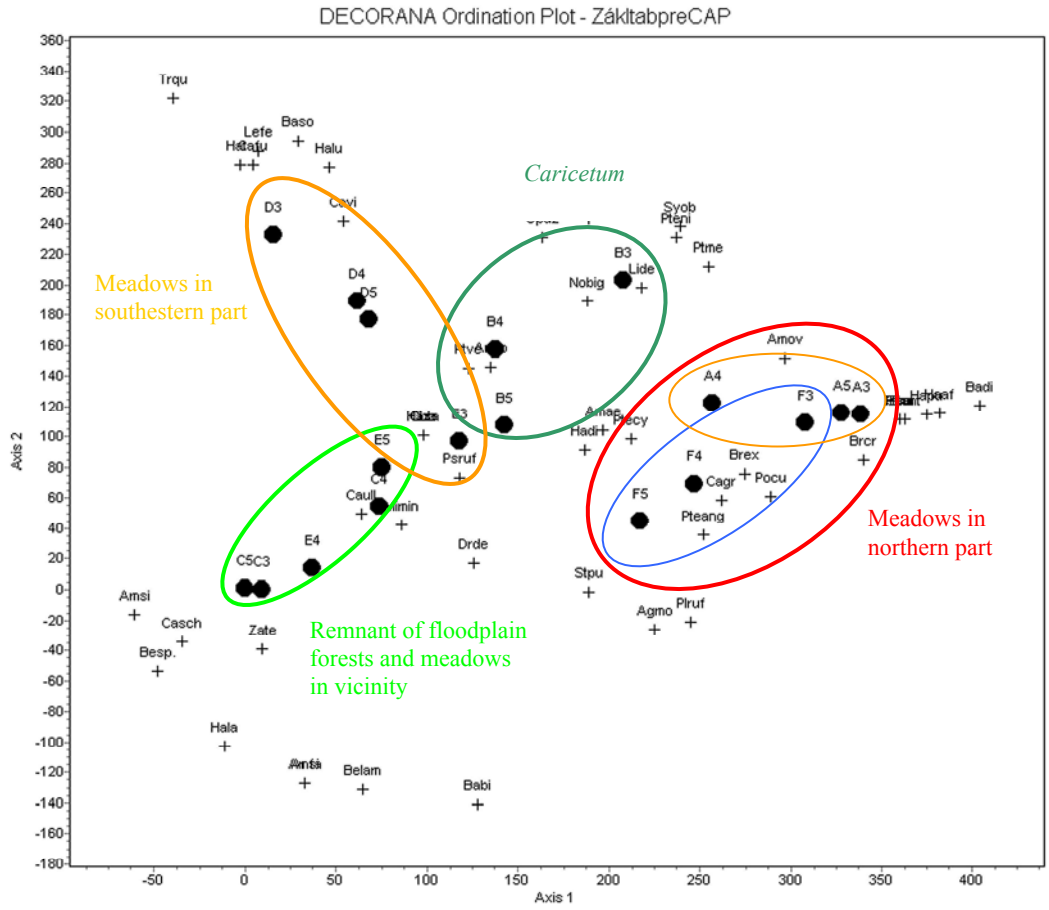

Figure 3. DCC ordination of Carabid communities and species from the Žitavský luh Nature Reserve (abbreviations of samples as in table 1; abbreviations of the species name consist of the first two letters of the generic name and the first two letters of specific name presented in table 1; abbreviations as in table 1).
Figura 3. Ordonarea DCC a cenozelor de carabide din Rezervația Žitavský luh pe baza distanței proporționale (abrevierea localităților ca în tabelul 1; abrevierea speciilor constă din primele două litere ale numelui genului și primele două litere ale numelui speciei).

In the DCA ordination diagram (Fig. 3) the communities are arranged along the first axis from left to right according to decreasing humidity from the remnant of the floodplain forests (site C) to the sites A and F on the dike external site and according to decreasing shadowing from floodplain forests (site C) down upwards (site D). The position of individual species in the ordination diagram is mostly occasional due to individual occurrence of most species and ecotonal character of the whole studied area. A position clearly associated with the character of a site is occupied by *Carabus scheidleri* (site C), *Calathus fuscipes* (site D), *Poecilus cupreus, Pterostichus quadrifoveolatustus*, *Brachynus crepitans, Brachinus explodens* (the sites A and E). A neutral position in the centre of the ordination diagram is occupied by *Pseudoophonus rufipes* occurring in all sites and years. Most of the other species took an accidental position connected just with their momentary presence in a habitat, but not with its character. The most characteristic case is the presence of two individuals of *Carabus coriaceus* in the open meadow habitat B, situated close to the remnant of the floodplain forest.

Similarly, the direct ordination according to preference of vegetation cover and humidity (Fig. 4) also differentiates the communities from the drier sites A and E, being concentrated in the left lower part of the diagram, and those from the more humid southeastern part concentrated in the upper right part of the diagram. Some of them (B, C, D) are situated in the proximity of the remnant of the floodplain forest. Within this general pattern shifts of some samples are visible. The site C (remnant of the floodplain forest) from 2005 was characterized by increased abundance

of two forests species, *Carabus scheidleri* and *Carabus ullrichi*. In contrast, the site B (wet meadow) from 2005 was characterized by an increased presence of the open landscape species *Pseudoophonus rufipes* and a strong decline of two moderately hydrophilous species *Pterostichus niger* and *Pterostichus melanarius*. The position of the site F (margin of the water-lodged area) from 2003 in relation to its position in 2004 and 2005 was caused first of all by increased abundance of more xerophilous *Brachynus crepitans* and *Harpalus punctatulus* in 2003 and by an occurrence of large number of individuals of the hydrophilous *Pterostichus quadrifoveolatus* in 2004 and 2005. The position of the site E (a grassy and shrubby stand) from 2004 emphasizes the increased abundance of *Carabus scheidleri*, probably due to its emigration from the adjacent remnant of the floodplain forest (site C). This species is known to emigrate from remnants of forests to considerable distance into adjacent non-forests ecosystems (ŠUSTEK, 1994c, PORHAJAŠOVÁ et al., 2008).

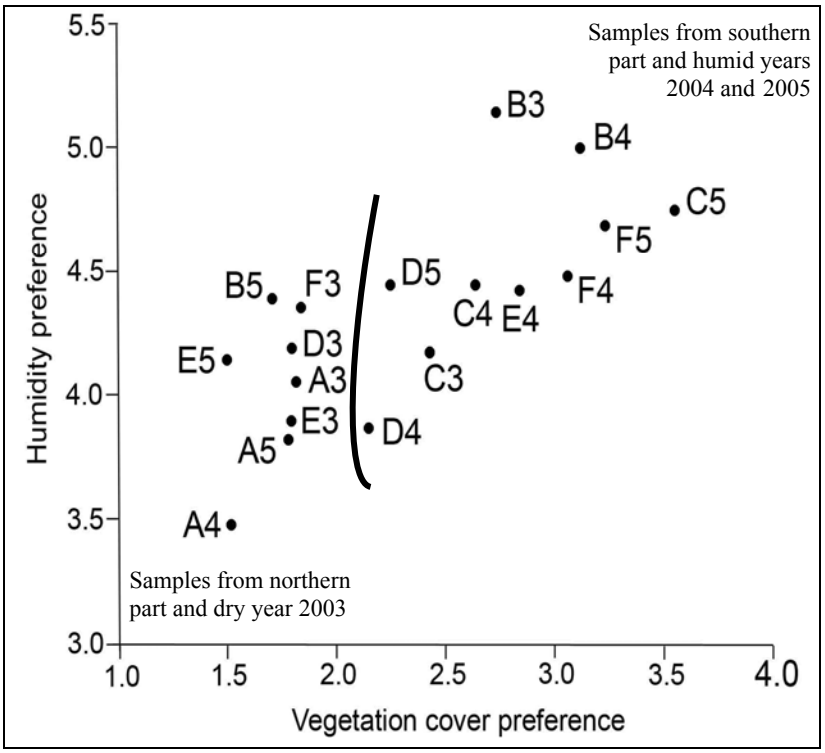

Figure 4. Direct ordination of Carabid communities from the Žitavský luh Nature Reserve according to the preference of humidity and vegetation cover (abbreviations as in table 1).
Figura 4. Ordonarea directă a cenozelor de carabide din Rezervaţia Žitavský luh pe baza distanţei proporţionale (abrevieri ca în tabelul 1).

DISCUSSIONS

In spite of the occasional occurrence of the major part of species, all analyses indicate that the communities showed predominantly a remarkable spatial and temporal stability of their structure, but to a certain degree they flexibly reacted to the annual changes in the humidity and extent of the permanent water tables in the southeastern part of the nature reservation. However, this stability has little to do with the ecosozological value of the studied Carabid communities. The Carabid fauna of the Žitavský luh nature reserve shows that the major part of the reserve is inhabited by fauna typical rather for arable land than for a wetland nature reserve. This feature is observable in all six study sites, but most obvious is in the northwestern part of the reserve, being more distant from the permanent water table. In the more humid or shadowed southern parts it preserves elements of the fauna typical for floodplain forests. These elements are concentrated, of course, especially in the remnant of the floodplain forest in the southernmost part of the reserve, but they also emigrate to the adjacent open parts and positively influence their communities.

Generally it can be concluded that the reserve plays a role of biocentrum for Carabids only to a limited degree. Its composition strongly differs from natural Carabid communities in floodplains (ŠUSTEK, 1994a, 1994b, 2010). However, its ecological real role is to be evaluated in regard to the fact that this reserve is isolated in the intensively used agricultural landscape of South Slovakia. Under such circumstances any remnant of the original landscape has a significant ecologically stabilizing role. The ecosozological value of the Carabid communities in the Žitavský luh and its landscape stabilizing role are very similar to those observed in other parts of the Žitava river floodplain (PORHAJAŠOVÁ et al., 2010). The considerable interference between the floodplain and arable land fauna confirm the hypothesis that the recent Carabid fauna of arable land in Europe originates from fauna of drier parts of naturally deforested floodplains (THIELE, 1977). The Žitavský luh is a good example that a nature reserve can play very different roles for individual groups of organisms. In this case its role for birds or some plants (NOSKOVIČ et al., 2010) is much higher than that for the Carabids.

CONCLUSIONS

The Carabid communities in the Žitavský luh indicate that this Nature Reserve represents just a seminatural ecosystem strongly influenced by extensive human interventions from 1980-s, connected with the Žitava river regulation. It shows a considerable degree of interference with the fauna of the surrounding agroecosystems. Its present state gives an evidence that the measures usually taken in order to preserve small segments of the original ecosystem in a floodplain landscape affected by various human intervention into their original hydrological regime are insufficient to maintain natural animal communities in such segments. Such measures give only a limited chance to some hygrophilous wetland species to survive in the protected segments. However, the Žitavský luh plays, even in its present state, a significant role of refuge for many species in the almost completely deforested and intensively exploited surrounding landscape and contributes to its ecological stability.

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Table 1. Abundance of individual Carabid species in the six sites in the Žitavský luh Nature reserve in 2003 - 2005 arranged decreasingly according the total abundance of each species and their ecological requirements (H - relation to humidity, V - relation to vegetation cover, Ind. - total number of individuals of each species, P - presence in %, sites codes - abbreviation of site + the last digit of the year, e. g. A3 - site A in 2003).

Tabel 1. Abundența speciilor de carabide în șase localități din Rezervația Žitavský luh în anii 2003 - 2005 aranjată descendent după abundența totală a fiecărei specii și caracteristicile lor ecologice (H - relația cu umiditatea, V - relația cu vegetația, Ind. - numărul total de indivizi pentru fiecare specie, P - prezența în %, codul localității - abrevierea localității + ultima cifră a anului, de pildă A3 - localitatea A în 2003).

Species	Ecology		Study sites and years																		Ind.	P %
	H	V	A3	A4	A5	B3	B4	B5	C3	C4	C5	D3	D4	D5	E3	E4	E5	F3	F4	F5		
Pseudoophonus rufipes (DE GEER, 1774)	4	1	5	3	2	4	4	14	6	8	14	3	1	11	16	5	24	12	6	2	140	100.0
Carabus violaceus (LINNAEUS, 1758)	5	4				1	3		37	19	104	6	2	3	5	20	6		1	9	216	72.2
Carabus scheidleri (PANZER,1799)	5	4	1			7	2		3	12	3	8	3	14	3	3		1	1		61	72.2
Carabus ullrichi (GERMAR, 1824)	4	4		1			5	5	1		16	1	2		7	1			1	6	46	61.1
Pterostichus cylindricus (HERBST, 1784)	4	1	11		1				6	3		1		4	3	1		2		1	33	55.6
Pterostichus melanarius (ILLIGER, 1798)	5	2	6			20	3	6	1	1		3						18	5	3	66	55.6
Brachinus explodens (DUFTSCHMIDT, 1812)	3	1	3	2						2			1			1		7	10	1	27	44.4
Calathus fuscipes (GOEZE, 1777)	4	1	1						1		2	9	5	1	2		5				26	44.4
Harpalus punctatulus (DUFTSCHMIDT, 1812)	4	2	119	8	17					1								76	6	6	233	38.9
Brachinus crepitans (LINNAEUS, 1758)	3	1	6	2	10													13	3	7	41	33.3
Microlestes minutulus (GOEZE,1777)	2	1							3	1		1			1	1		2			9	33.3
Poecilus cupreus (LINNAEUS, 1758)	4	1	8						1	3					8	1		26			47	33.3
Pterostichus niger (SCHALLER,1783)	6	4	1		3	13	7	1										2			27	33.3
Carabus granulatus (LINNAEUS, 1758)	7	2		1		1												1	1	4	8	27.8
Harpalus latus (LINNAEUS, 1758)	4	1							5	2	3					3		1			14	27.8
Licinus depressus (PAYKUL, 1790)	2	1			1								2	1		1			7		12	27.8
Ophonus azureus (FABRICIUS, 1799)	2	1		5						1		2			3	1					12	27.8
Trechus quadristriatus (SCHRANK, 1781)	4	1									3	25	1	6	2						37	27.8
*Amara ovata (*FABRICIUS, 1792)	3	1				1									1			5	1		8	22.2
Harpalus luteicornis (DUFTSCHMIDT, 1812)	5	2					1					1		1	1						4	22.2
Pterostichus quadrifoveolatus (LETZNER, 1852)	5	2				1					4								67	44	116	22.2
Pterostichus vernalis (PANZER., 1796)	8	5						1		1			1						1		4	22.2
Stomis pumicatus (PANZER, 1796)	6	2						2	1	1								2			6	22.2
Syntomus obscurogutatus (DUFTSCHMIDT, 1812)	5	2	1			7	2											1			11	22.2
Amara similata (GYLLENHAL, 1810)	3	1							15			1			1						17	16.7
Anchomenus dorsalis (PONTOPPIDAN., 1763)	3	1						11					3							1	15	16.7

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Species	Ecology		Study sites and years																		Ind.	P %
	H	V	A3	A4	A5	B3	B4	B5	C3	C4	C5	D3	D4	D5	E3	E4	E5	F3	F4	F5		
Badister sodalis (DUFTSCHMIDT, 1812)	7	2					1					1		1							3	16.7
Bembidion lampros (HERBST, 1784)	3	1								4						1				1	6	16.7
Harpalus tardus (PANZER, 1797)	2	1								1		1	2								4	16.7
Zabrus tenebrioides (GOEZE, 1777)	3	1							7						1			1			9	16.7
Agonum moestum (DUFTSCHMIDT, 1812)	8	4								1								1			2	11.1
Amara aenea (DE GEER, 1774)	3	1													5			2			7	11.1
Badister bipustatulus (BONELLI, 1813)	6	2														1				1	2	11.1
Bembidion sp.									3								1				4	11.1
Carabus coriaceus (LINNAEUS, 1758)	5	4				2	2														4	11.1
Harpalus affinis (SCHRANK, 1781)	3	1	1															1			2	11.1
Harpalus distinquendus (DUFTSCHMIDT, 1812)	3	1		1													1				2	11.1
Notiophilus biguttatus (FABRICIUS, 1799)	4	2				1		1													2	11.1
Pterostichus anthracinus (ILLIGER, 1798)	8	4	1															15			16	11.1
Amara familiaris (DUFTSCHMIDT, 1812)	3	1								1											1	5.6
Anisodactylus signatus (PANZER, 1797)	3	1								1											1	5.6
Badister dilatatus (CHAUDOIR, 1837)	8	2	1																		1	5.6
Cicindela campestris (LINNAEUS, 1758)	4	1													1						1	5.6
Drypta dentata (ROSSI, 1790)	8	1						3													3	5.6
Harpalus atratus (LATREILLE, 1804)	4	4																1			1	5.6
Harpalus saxicola (DEJEAN, 1829)	2	1													2						2	5.6
Chlaenius nigricornis (FABRICIUS, 1787)	8	5																1			1	5.6
Chlaenius tristis (SCHALLER, 1783)	8	5													1						1	5.6
Leistus ferrugineus (LINNAEUS, 1758)	4	3											2								2	5.6
Platyderus rufus (DUFTSCHMIDT, 1812)	3	4																		1	1	5.6
Pterostichus macer (MARSHALL, 1802)	4	1																1			1	5.6
Number of individuals			165	23	34	58	30	44	90	63	149	63	25	42	63	40	37	193	110	87		
Number of species			14	8	6	11	10	9	14	18	8	14	12	9	18	13	5	24	13	14		