

Effect of burning on epigeal beetle (Coleoptera) diversity

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Abstract: In presented work we have focused on biodiversity of epigeic beetles of the hill Výchon at Židlochovice in the areas that had been burned. This location is one of the northernmost outpost (historical and contemporary) of Pannonian biogeographical region, with many species of invertebrates. Although, we are missing a species list of this remarkable locality is missing. The whole Výchon hill was historically a system of small fields, grassland patches, vineyards and orchards, and it is now a Natural Park with an area of 1700 ha, occupying the entire massif Výchon. Current conditions include mostly arable land, growths of non-native trees (*Robinia pseudoacacia*, *Ailanthus altissimus*) and vineyards. The whole hill was terraced for the cultivation of wine, fruit trees and generally arable during end of the last century. We used pitfall traps, always in line of three traps of the hillside terraces. Determination currently underway, but so detected very important species of our steppe fauna were frequently detected, e.g.: *Sisyphus schaefferi*, *Brachinus crepitans* and *Brachinus explorens*. All of these species are important from the rareness point of view. Majority of them are protected by Czech law (as threatened) and some of them are listed under the Red List of Invertebrates of the Czech Republic. Species of the genus *Brachinus* amount the largest proportion of the material. Populations of collected species are large enough, to deserve targeted management.

Key-Words: biodiversity, invertebrates, burning, epigeic beetles

Introduction

There are large differences of opinion regarding the harmful effects of burning vegetation. The degree of harmfulness of burning forests and its impact on biodiversity is mainly due to seasonality. The damage to plants and animals is smaller in winter and early spring, because the plants are in dormant state and animals are hidden. The greatest damage has grass burning in the growing season and autumn. Burning vegetation can have a big impact on animals that move slowly (eg. Molluscs) or insects in sensitive developmental stages (eggs, larvae, pupae). Controlled burning is used in some areas for maintenance xerophilous heaths and meadows. The countryside of south Moravia is characteristic due agricultural intensification followed by loosing of open xerothermic and light forest. Almost all these xeric habitats were terraced for agricultural production (for wine and fruit trees mainly) in the second half of 20th century. At that time it was really negative and sizable transformation of ecosystem and landscape character. It is indisputable, that not only invertebrate fauna changed with these changes. Nowadays the value of the Výchon Hill is in the

character of this landscape, because of a lot of smaller mosaic patches, which guarantee landscape heterogeneity. This heterogeneity is also product of human activities and land use in landscape. Though, landscape character was not disturbed essentially. Výchon Hill has historical, geological and paleontological importance. This locality is one of the northernmost refuges for many invertebrate species of Pannonian biogeographical area. It was the reason of Výchon hill declaration as Nature Park. The Výchon Hill was terraced from south, east and west. Landscape mosaic consist of vineyards, intensive and extensive fruit orchards, small fields and gardens, we can find also steppe habitats there. Occurrence of the invasive *Robinia pseudoacacia* is problematic, which spreads very quickly [1]. My study is focused on epigeic beetles of area mentioned above. Some important invertebrate species were found here, for example Hemiptera [4] or Carabidae [6].

Material and Methods

Experimental localities

Research was conducted on two localities of the

Výhon Hill in faunistic square 6965 [5]. Experimental localities and their basic characteristic:

Fromoušek – locality is characterized by meadow, (fig. 1)

Sad – old plantation with a long apple planting tradition (fig. 2)

Collecting and important species interpretation

Pitfall traps were used as collecting method. Pitfall traps are suitable for epigeic invertebrate fauna collecting, their main advantage is that pitfall traps do not work with a mistake of collector [7]. Pitfall traps presented by [8] were used, covered with wood cover. There was used as a fixative fluid 4% formaldehyde solution. Two lines were installed (each line with 3 pitfall traps) at each locality during growing season (from April to September). Biological material was collected each month. Collected material was conserved in 70% ethanol, then particularly groups of invertebrates were separated. Epigeic Coleoptera were precisely determined.

Results and Discussion

Currently, the collected material is partly determined. First results show important steppe species of our fauna such as *Sisyphus schaefferi* (Linnaeus, 1758). *S. schaefferi* is under low protection (Decree 395/1992Sb. according to 176/2006Sb.) and it is also listed in Red list of invertebrates in the Czech Republic [2] as vulnerable species. It is necessary to mention also *Brachinus crepitans* (Linnaeus, 1758) and *Brachinus explodens* Duftschmidt, 1812, which are both listed under low mentioned above.

Tab.1

Locality	Sad	
	12.5.2014	15.6. 2014
<i>Abax parallelepipedus</i>	2	2
<i>Amara similata</i>		1
<i>Anchomenus dorsalis</i>	8	14
<i>Bembidion properans</i>	3	
<i>Callistus lunatus</i>	1	
<i>Carabus ulrichi</i>	5	2
<i>Drypta dentata</i>	1	1
<i>Harpalus rubripes</i>	2	
<i>Leistus ferrugineus</i>	2	3
<i>Notiophilus aquaticus</i>	1	1
<i>Ophonus azureus</i>	2	1
<i>Poecilus cupreus</i>	1	
<i>Pseudoophonus rufipes</i>	7	10

Tab. 2

Locality	Fromoušek	
	12.5.2014	15.6. 2014
<i>Amara apricaria</i>	1	1
<i>Amara bifrons</i>	2	1
<i>Amara similata</i>		2
<i>Anchomenus dorsalis</i>	12	5
<i>Bembidion properans</i>	1	
<i>Brachinus explodens</i>	10	1
<i>Callistus lunatus</i>	4	8
<i>Carabus ulrichi</i>	2	2
<i>Harpalus rubripes</i>	1	
<i>Harpalus signaticornis</i>	6	
<i>Leistus ferrugineus</i>	1	
<i>Microlestes maurus</i>	3	
<i>Ophonus azureus</i>	6	1
<i>Poecilus cupreus</i>	5	
<i>Pseudoophonus griseus</i>	7	3
<i>Pseudoophonus rufipes</i>	4	10

Here are 3 examples: interesting species of ground beetles:

Carabus ulrichi

Robust convex species. Upper surface usually shiny, coppery, frequently with green hue, underside and appendages black. Central and southeast Europe, from lowlands to foothills in meadows, fields, shrubby formations and open forests. In ČR and SR 2 subspecies [3].

Notiophilus aquaticus

Dark brown-coppery, appendages black, 1st palpomere and 3 basal antennomeres red-brown. Elytra blue or black. Circumboreal. In ČR and SR common in moderately dry to humid habitats: woodland, heaths, lowlands to alpine zone of mountains [3].

Callistus lunatus

Head and underside of body black, head with slight bluish lustre elytral surface yellow, each elytron with 3 black spots: small, round humeral spot, middle spot extending from elytral margin to interval 2, and preapical spot in form of common transverse band in front of yellow apex of elytra, connected to middle spot at lateral margin, pronotum black. West Palaearctic species, reaching Middle Asia, in ČR and SR sporadic to rare, especially in dry, unshaded habitats: pastures, steppe, forest edges, lowlands to foothills, mostly in hills [3].

Fig.1 Situation of landscape mosaic of the surroundings of locality Fromoušek (experimental plot is marks by red colour)



Fig.2 Situation of landscape mosaic of the surroundings of locality Sad (experimental plot is marks by red colour)



Conclusion

In the past, some places on the hill Výhon regularly fired. At present, when the burning is prohibited, many valuable sites overgrown seeding wood and steamed large biomass of grasses. Various diversity of species on the sites shows a large influence of the surrounding areas and the size of burned areas. It turns out that burning small areas has no great influence on the diversity of species, because the damaged area is quickly colonized from unaffected areas. Further data will be available after end of the season 2014.

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