Endoparasites of wild animals of vineyard and agricultural landscape in the South Moravia

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Abstract: A parasite is an organism that is metabolic and physiological dependent on another organism. The aim of the study was to determine the interrelationships between spectrum of endoparasites and species biodiversity in reporting landscape with focus on selected omnivore, carnivore and herbivore representatives. Together 139 excrement samples of animals were collected in selected localities and were investigated by the flotation and subsequently microscopic examination. In Conclusion parasitic infestation of the hare, deer, pheasant and marten of vineyards and fields was compared. Monitoring was carried out on a total of 6 locations, 3 locations were found in vineyards (site A) and 3 locations in intensive agriculturally use (site B). The total number of species of endoparasites on site A was observed in animals 30, at locations B was 24 species. Prevalence of endoparasites were determined at most in deer - in both locations identically, then in pheasant in area B, the lowest prevalence was captured by hares in area A. Using ecological indices were calculated index for biodiversity area A H = 1.1 and for the site B H = 0.8. Index evenness for site A was E = 0.35, for the site BE = 0.21. Index of species dominance evaluate site A as less anthropogenically influenced, but the differences were not very large in comparison with the location B.

Key-Words: endoparasite, excrement sample, flotation, microscopic examination, vineyards

Introduction

There are many works devoted to anthropogenic impacts on species diversity in the scientific literature. There were monitored primarily charismatic species of mammals, birds, butterflies daily ferrous and large beetles. Diversity of parasites in relation to landscape fragmentation and intense agricultural activity is contrary devoted little attention. It is known, however, that just by parasite species spectra can reveal the negative impacts of anthropogenic activities before they react to these influences by main predators [1].

Studies of biodiversity traditionally focus on charismatic mega fauna. Little is known about parasite biodiversity. Relationships of host specific parasites with their hosts should be common and that parasites may even go extinct before their hosts. Examined the coexistence between parasite diversity and habitat quality have focused on parasites that require intermediate hosts and pathogens that require vectors to complete their life-cycles. It shows that parasite amount correlates with size of environment, even among animals that are locally common. The absence of some ectoparasites genera in small habitats suggests that parasites can go locally extinct even if their hosts persist. It is therefore necessary to preserve fragments habitat for the conservation of biological diversity of parasites, but also its size to maintain not only the host population, but also populations of parasites [2].

Parasites tend to be host-specific [3]. They can be found on only a few or even a single host species [4]. The co-extinction of parasites with their hosts may be common because of this high degree of specificity [5]. Host populations are ‘‘islands’’ and host population size should determine parasite diversity, just as classical island biogeography theory predicts [6].

Parasites interact in complex ways with other stressors. The interaction may lead to a disproportionately negative effect on the host population or the stressor may ameliorate the effects of parasitism. Pollutants may increase parasitism by increasing host and decrease parasitism if infected hosts suffer differentially high mortality. Abundance of parasites attendant is either increased or reduced habitat alterations [7]. The rich communities and high abundance may foster parasitism [8]. The results of the study in the United States suggest that by influencing the community composition of vertebrate hosts for disease-bearing vectors, habitat fragmentation can influence human health. Forest destruction and fragmentation have been shown to reduce mammalian species diversity and to elevate population densities of white-footed mice. It is consequence of reduced species diversity and high mouse density in small fragments is an increase in human exposure to Lyme disease [9].

The aim of this study was to contribute to knowledge in this area.

Material and Methods

Characterization of material

The faeces samples were collected at 6 locations in the South Moravian Region district Brno-Country, Znojmo and Břeclav. At 3 sites designated as localities A is the main agricultural activity viticulture and horticulture, landscape typical of the hilly terrain. On the sunny slopes are cultivated vines, apricots and peaches. We find it significant forest-steppe and steppe communities. These are locations Nosislav, Moravian Krumlov and Kobylí.

Nosislav is located at an average altitude of 192m, the average annual temperature is 9°C, and average rainfall amount is 551mm per year. The site is situated at the river Svratka in Dyjsko-Svratka valley and passes through the territory of the D2 motorway convenient location slopes and warm climate with mild winters want traditional crops in the area - the vine, apricots and peaches. This is a wine-growing village in Velkopavlovické wine region [10].

Moravian Krumlov locates in an altitude of 225m, the average annual rainfall is 500-550mm, the average annual temperature is 9°C. The site lies in a basin that is on three sides wrap river Rokytná. Moravian Krumlov is appealing a varied landscape and impact around the meandering nature of the river Rokytná with rare flora and fauna, as evidenced by a national preserve "Krumlovsko rokytenské conglomerates "in 2005 the number of combinations of abiotic conditions (orientation, slope, humidity, local soil chemistry) in this area has developed a number of communities of different nature, due to which the whole territory acquired by the extraordinary species richness [10]. There is verified 550 species of higher plants. National nature reserve has a warm, dry climate with mild winters and shorter sun shines [11].

Location Kobylí located at an altitude of 205m, the average annual rainfall is 515mm and the average annual temperature is 9°C [11]. Once seabed, the lake basin, together with favorable climatic conditions allow the existence of protected steppe communities. Forest vegetation are insular, discrete, in some parts of the tree vegetation is present only in the form of acacia. Predominant extensive agricultural crops (fields, orchards, vineyards), in recent decades, it was also a lot of terracing slopes. The natural vegetation is preserved spare practically only on steep slopes [10].

At 3 sites designated as B disgust are the main agricultural crop production activities, especially the cultivation of maize, sunflower, cereals and vegetables [9]. Agriculture greatly affects the appearance of the landscape; harvest due to the warm climate takes place twice a year. This is a site Olbramovice, Moutnice and Zaječí [11].

Olbramovice lies at an altitude of 220m. The area is situated between the two areas and a very hot area of T4 and T2 warm area. The average annual temperature is between 8-9°C. The surrounding forests occupy only a tenth of the village, you will find also orchards and vineyards [10].

Moutnice is situated at an altitude of 197m, where the average annual temperature is 9°C, the warmest month is July, where the average temperature is 19.9° C and the coldest month is January, where the temperature is -1.9°C. Average annual precipitation reaches 506mm, the area is among the hottest locations in the country. Due to the proverbial fertility of fields Moutnice the land has always belonged to the basic livelihood of agriculture [10].

The third site is designated as B Zaječí with an average altitude of 187m. The climatic classification of the area is situated in the warm climate of the unit W4 [10], the average annual temperature is between 9-10° C and average annual rainfall is 500-550mm. The site southwest touches the lower reservoir dame system [11].

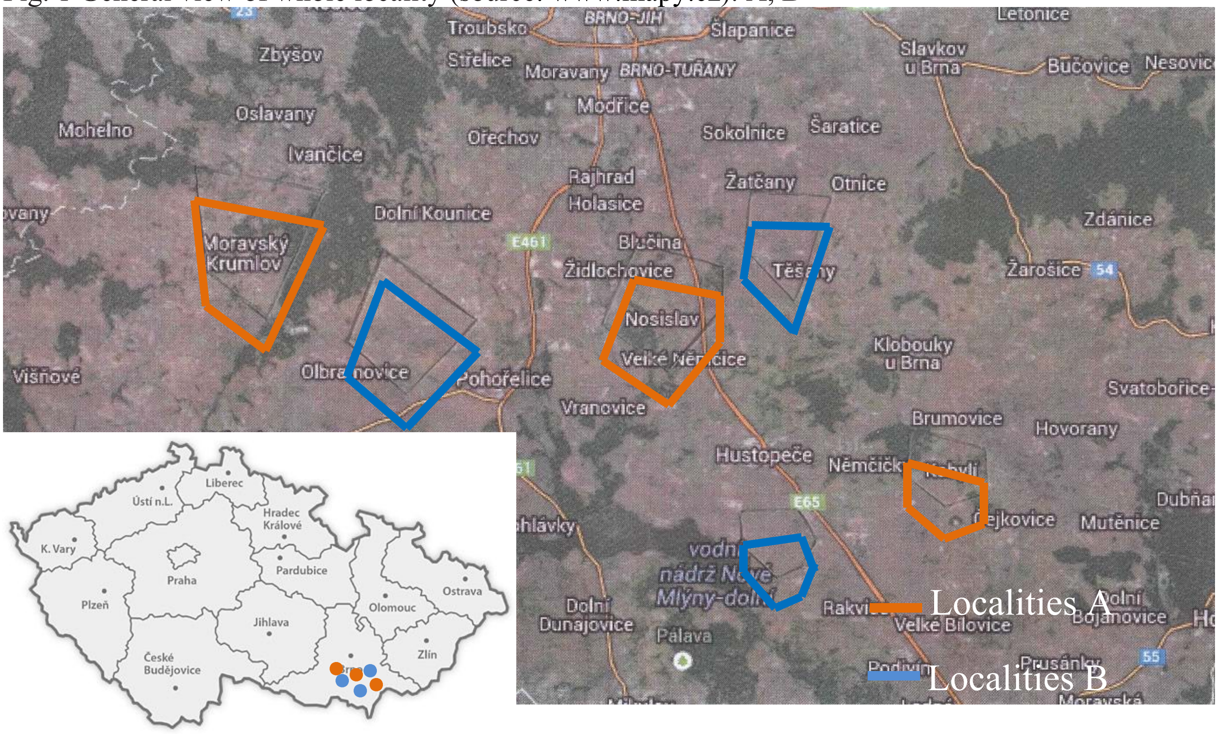
Characterization of method

The faecal samples were collected in the six localities of the South Moravia. Individual sites were all explored and droppings were collected from all parts of the territory.

The faecal specimen was fresh and the collection was done with precautions to reduce the likelihood of transmitting zoonotic infections. The faecal material was stored in the polythene bags. The faecal specimen was inspected visually for consistency, blood, color, mucus, worm segments and undigested food particles first [12].

The faecal samples were investigated by the faecal flotation. This laboratory technique concentrates the eggs present in the faeces into a drop of solution for easy identification. The important factor in the faecal samples is the specific gravity of the flotation solution. Most parasitic stages float at specific gravity of 1.2 to 1.3 [13].

Fig. 1 General view of whole locality (source: www.mapy.cz): A, B



The process of flotation is: Mix 3 – 5g volume of faeces in water in a beaker and stir until faeces are in suspension. Pour the mixture through a 0.5 – 0.8mm sieve into another beaker. Pour the contents into 15 ml centrifuge tube. Centrifuge the tubes at 1500 rpm for 2 minutes. Decant the tubes and fill the tube with flotation solution. Centrifuge the tubes at 1500 rpm for 2 minutes again. Remove the drop from the surface of the centrifuge tube and transfer to microscope slide. Add a cover slip and look for the eggs under the microscope [13].

Results and Discussion

In localities located in southern Moravia were collected faeces samples. Three locations marked as A Nosislav, Moravian Krumlov and Kobylí. Three locations designated as B are Olbramovice, Moutnice and Zaječí. A are locations for a typical hilly landscape of vineyards, fruit and vegetables, vineyards and orchards. In areas are located a significant forest and forest-steppe communities. In areas B is primarily a field where crop production is important that the site and its landscape significantly.

At 3 A locations, a total of 70 fecal samples gathered from the kinds of carnivores, birds and herbivores. A total of 12 faecal samples hare fecal flotation method of detection of 10 parasite species with parasite infestation +, which corresponds to finding 0-4 eggs on microscopic examination of faeces. For the species of deer were collected 18 samples of faeces. There was found 12 species of parasites with prevalence +++, which corresponds to 10 to 14 eggs during microscopic examination. For pheasant were found two species of parasites from the total number of examined samples of faeces 9. Marten was found six species of parasites collected from 31 faecal samples. The location A was gathered a total of 70 fecal samples, which were found 30 species of parasites.

Fig. 2 Prevalence of parasite in localities A and localities B

A localities	Number of samples	Number of parasite species	Prevalence
Hare	12	10	+
Roe	18	12	+++
Pheasant	9	2	++
Marten	31	6	++
Total	70	30	

B localities	Number of samples	Number of parasite species	Prevalence
Hare	10	8	++
Roe	23	11	+++
Pheasant	11	2	+++
Marten	25	3	++
Total	69	24	

In areas designated as B, it was gathered a total of 69 faecal samples. 10 samples hare, 23 samples deer, 11 samples pheasant and 25 samples marten. With hare was found eight species of parasites with prevalence ++, with deer was found 11 species of parasites with prevalence +++, pheasant were found in two species of parasites with prevalence +++ and martens were detected 3 species of parasites with prevalence ++. The total number of species of parasites found in dung in areas designated as B found 24 parasite species.

These results are consistent with the findings of other authors, therefore, that increased anthropogenic activities may negatively affect the species diversity of all parts of the habitat, including endoparasites.

How are they connected parasites with their hosts and the host environment, a study which compare parasite richness on birds from fragmented forests in southern China. It is found that the number of parasites associated with the size of the wood. The absence of certain genera of ectoparasites may be locally extinct, though their hosts are still present. It is necessary to preserve habitat and its fragments of sufficient size for the population of parasites [2].

Also, other authors agree that, the space plays an important role in regulating the population. Heterogeneity has generally positive effects on density and hence the population it is beneficial that improve the best quality habitat at the expense of worst quality habitat [14]. In the presence of spatially structured habitat heterogeneity, increasing local spatial autocorrelation in habitat generally has a beneficial effect on populations, increasing equilibrium population density [15].

More fragmented landscape was detrimental to the parasitic disease invasion and transmission, which implies that the potential of using artificial disturbances as a disease-control agency in biological conservation. Two components of the spatial heterogeneity (the amount and spatial autocorrelation of the lost habitat) formed a trade-off in determining the host–parasite dynamics. It is the possibility of using the spatial arrangement of habitat patches as a conservation tool for guarding focal species against parasitic infection and transmission [16].

It was investigated the influence of condition-specific competition on the specificity of two species of feather lice, that share a host the mourning dove. Humidity restricts the range of one species to the more humid eastern United States. The second species is restricted to drier regions of the western United States. The abiotic factors can determine species distributions. The balance between these factors is subject to change as environmental conditions change, even if the host distribution remains unaffected [17]. Species heterogeneity, species richness, and abundance of final host birds were positively correlated with species heterogeneity, species richness and abundance of trematodes in host snails [8].

I was developed a parasite diversity model based on known host associations with North American carnivores to investigate the spatial heterogeneity of parasite richness, how host composition, its relationship to carnivore richness, and specificity influenced these patterns [18]. Another studies compiled that report data on the relationship between animal population density and island area for individual species and faunas [19].

Conclusion

139 faecal samples were gathered in localities in southern Moravia and examined a total of laboratory equipment. The areas were divided into three locations marked as A and B. These two kinds of sites differ farming, which affects the amount and composition of rainbow endoparasites, which were followed by the species of pheasant, deer, marten and hare. It was found that A locations where the vineyards are more prevalent species represented less than the prevalence of sites designated as B where landscape intensively cultivated. In areas B is a smaller number of species in it with greater prevalence.

It was used True diversity, Richness and Shannon-Wiener index. Prevalence of endoparasites were determined at most in deer - in both locations identically, then in pheasant in B, the lowest prevalence was captured by hares in A. Using ecological indices were calculated index for biodiversity area AH = 1.1 and for the site BH = 0.8. Index evenness for site A was E = 0.35, for the site BE = 0.21. Index of species dominance evaluate site A as less anthropogenically influenced, but the differences were not very large in comparison with the location B.

Although our results are consistent with the findings of other authors, it would still need further monitoring to be able to draw the appropriate conclusions.

Acknowledgement

The research was financially supported by team project of IGA MENDELU Brno No. TP7/2014. In particular, we would like to thank Ing. Vladimir Hula, Ph.D. for all their support in this work.

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