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ТА ДАВНІ БУКОВІ ЛІСИ ЄВРОПИ: ПРОБЛЕМИ ЗБЕРЕЖЕННЯ
ТА СТАЛОГО ВИКОРИСТАННЯ

МАТЕРІАЛИ
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Букові праліси та давні букові ліси Європи: проблеми збереження та сталого використання. Матеріали Міжнародної науково-практичної конференції (Україна, м. Рахів, 16–22 вересня 2013 року) / [редкол.: Гамор Ф.Д. (відп. ред.) та ін.]. – Ужгород: КП «Ужгородська міська друкарня», 2013. – 378 с.

Матеріали збірника присвячені аналізу проблем збереження та сталого використання букових пралісів і давніх букових лісів Європи. Розглянуто їх роль у збереженні біологічного різноманіття, значення для пом'якшення впливу глобальних кліматичних змін, впровадження екологічних моделей сталого лісокористування та використання у наукових, освітніх та екотуристичних цілях.

Для науковців, фахівців з охорони природи, спеціалістів у галузі екологічної освіти, туризму й рекреації, працівників органів влади, студентів та широкого кола читачів.

Матеріали учасників конференції подаються в авторській редакції.

Primeval and Ancient Beech Forests of Europe: Problems of Protection and Sustainable Use. Proceedings of the International Conference (Ukraine, Rakhiv, September 16–22, 2013) / [Editorial Board: Fedir Hamor (executive editor) et al.]. – Uzhhorod: CE "Uzhhorod City Publishing House", 2013. – 378 p.

The materials of the given Volume of Proceedings are dedicated to conservation and sustainable use of the European primeval and oldgrowth beech forests. Their role in biodiversity conservation is considered, together with their importance for the global climate change mitigation, implementation of ecological models in forest management, and also their use with scientific, educational and ecotourism purposes is illustrated here.

For scientists, specialists in nature conservation and ecological education, tourism and recreation, authorities, students and wide readership.

Ministry for Ecology and Natural Resources of Ukraine

Carpathian Biosphere Reserve

PRIMEVAL AND ANCIENT BEECH FORESTS OF EUROPE: PROBLEMS OF PROTECTION AND SUSTAINABLE USE

PROCEEDINGS
of the International Conference
Ukraine, Rakhiv, September 16–22, 2013

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PREFERENTIAL BROWSING IMPACT IN AN UNEVEN-AGED BEECH FOREST IN HUNGARY

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Katona K., Hajdu M., Farkas A., Szemethy L. **Preferential browsing impact in an uneven-aged beech forest in Hungary.** Because of selective feeding of ungulates diverse uneven-aged forests (e.g. virgin beech forests) are probably more resistant to browsing impacts than even-aged ones. Browsing impact of ungulates was revealed to be low and preferential in an uneven-aged beech forest in Hungary. Beech saplings were almost entirely unbrowsed and economically less important woody species were highly selected by browsing ungulates.

Катона К., Гайду М., Форкош А., Семеті Л. **Вплив преференційного випасу худоби в різновіковому буковому лісі в Угорщині.** Через селективне випасання копитними різновікові ліси (наприклад букові праліси), ймовірно, є більш стійкими до впливів випасу, ніж старовірові ліси. Вплив від випасу копитними виявився нижчим і преференційним в різновіковому буковому лісі в Угорщині. Паростки бука були майже не об'їдені, а економічно менш важливі види деревних були найбільш пошкоджені копитними.

Introduction. Selective browsing effects of ungulates, e.g. deer species, can both stabilize or destabilize forest ecosystems and influence biodiversity (Gordon and Prins 2008). Deer impacts on forest biodiversity are generally considered to be negative. Excessive effects of deer populations can negatively influence different plant and animal species. In turn other studies reveal that intense actions taken to regulate deer densities could reduce local diversity. It is clear that herbivorous populations impact forest habitat quality, vegetation composition and dynamics, but also habitat quality (especially plant food supply in the understory) impacts the population dynamics and feeding behaviour of large herbivores.

Even-aged timber management is still common in Central Europe. It homogenises forest habitats, which will be more sensitive to other human and natural impacts, such as the effect of large herbivores. In a homogeneous even-aged forest with closed canopy and scarce or removed understory vegetation deer has no chance to follow its optimal food selection rules. In the lack of diverse understory and mixed-species plantations or regeneration sites saplings of the main target tree species will be primarily damaged.

The total forest cover of Hungary is 20,7 %; most of it (> 90 %) is managed by clearcutting. One of the most important forest tree species for forest management is European beech (*Fagus sylvatica*) (5,9 %). Species

distribution models show considerable agreement in the dramatic decrease of climatic suitability for this native tree species in the coming decades in Hungary due to increasing droughts (Katona et al. 2013).

However, the long-term sustainability of forests dominated by drought-sensitive native species, such as beech, depends also on the management practices involved. Diverse uneven-aged forest ecosystems will probably be more resistant to climate change effects (Milad et al. 2012) and herbivory impacts (Katona et al. 2013).

We, therefore, investigated the ungulate browsing impact in an uneven-aged beech forest area, which is a rare example in Hungary still overdominated by even-aged forestry system.

Study area. The study area was situated in Pilis Mountains at Pilisszentkereszt Forestry, Hungary. There single-tree and group selection dominates the forested area of more than 1500 ha including mainly beech stands. The difference between even-aged and this beech forest is obvious. A mixed use of single tree and group selection results in a less closed overstory. It enables more seedlings to emerge, which later compose a very dense evenly distributed layer of beech saplings. The dominant ungulate species of the area is red deer (*Cervus elaphus*), but roe deer (*Capreolus capreolus*), mouflon (*Ovis musimon*) and wild boar (*Sus scrofa*) are also present in the area.

Methods. Our seasonal investigations were carried out between 2008 and 2011. One permanent sampling line of 1 km length with 100 sampling point in every 10 meters was designated in the area. At the sampling points we counted the number of sprouts of all woody species available and accessible to large herbivores and the number of browsed ones in the understory layer. We had four height categories: between 0 and 50, 50 and 100, 100 and 150, 150 and 200 cm from the ground surface. We counted the number of sprouts available and browsed in a three-dimensional sample unit of 50 cm high, 50 cm wide and 30 cm deep within all vertical levels. Four sampling units placed on top of each other at every sampling point made it possible for us to count sprouts easily and reliably. Generally woody plants were identified to species, but in some cases only the genus was registered. Based on our earlier observations on herbivore browsing, one sprout item was defined as the final ramification of the plant individual, which is longer than 3 cm and obtains leaves in the vegetation period. In case of blackberry (*Rubus* spp.) the compound leaves were identified as the subject unit of browsing. We registered only the relatively fresh damage caused by ungulates.

We also harvested plant material from each species at the diameter where it was generally bitten in that season and we estimated the amount of optimal forage biomass provided in the understory.

Results. Density of naturally growing beech sapling was very high (between 30000 and 60000 saplings per hectare), meanwhile browsing impact of ungulates on beech saplings was negligible (94 % of saplings was unbrowsed) (Fig.1).
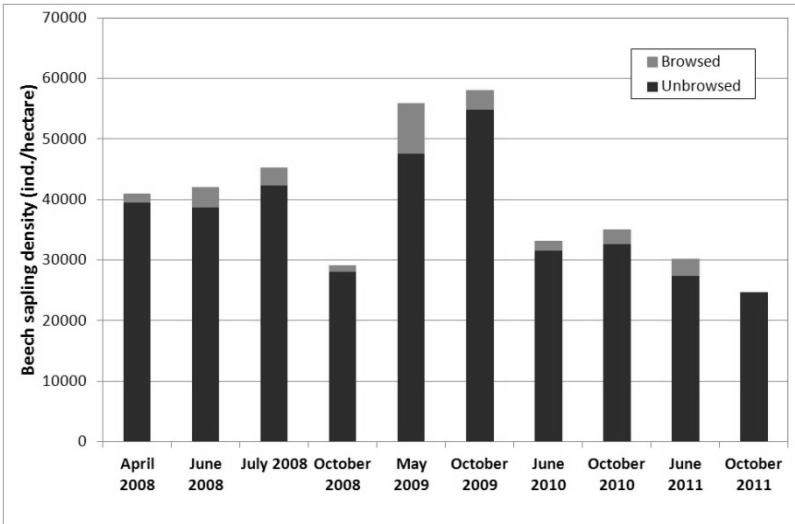
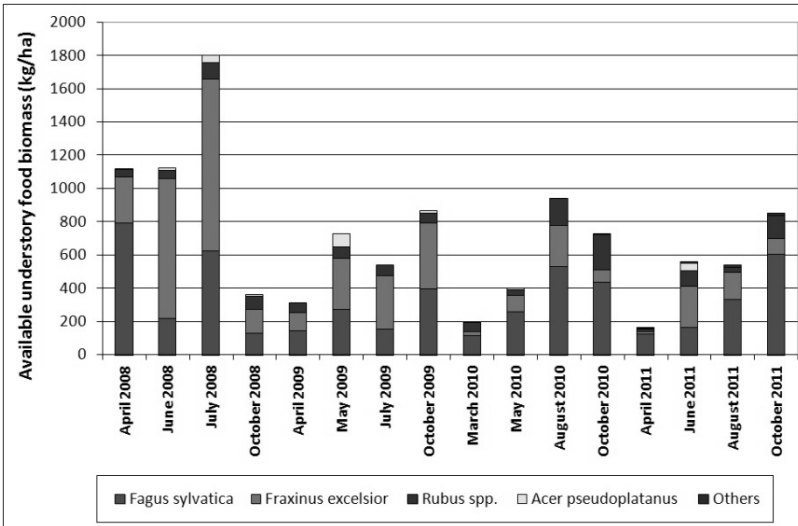Fig.1. Density of and browsing impact on beech saplings.

Fig.2. Available food biomass of different woody species in the understory.

The proportion of beech sprouts was much larger than that of other woody species (European ash, *Fraxinus excelsior*; blackberry; sycamore maple, *Acer pseudoplatanus* and others) in the understory food supply. But calculating the forage biomass provided by different species, ash biomass

exceeded beech biomass in several cases (Fig.2). The total estimated seasonal forage biomass in the understory during the study period was between 158 and 1800 kilograms per hectare. The estimated understory biomass consumed by ungulates was generally lower than 5 %.

Considering the selection of ungulates among understory species browsing on European ash (*Fraxinus excelsior*) and blackberry (*Rubus* spp.) were conspicuous, meanwhile beech was avoided. Proportion of beech in the understory biomass removed by ungulate browsing was negligible; mainly ash and sometimes blackberry dominated the consumption.
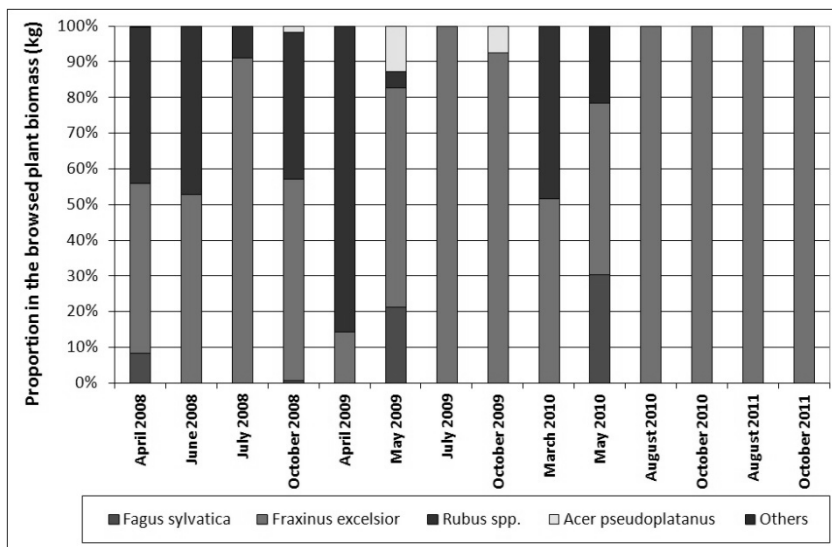

Fig.3. Proportion of different woody species in the understory biomass removed by ungulate browsing.

Discussion. Advantages of an uneven-aged forestry system against even-aged one from the point of view of forest biodiversity conservation are clear. But in addition it seems that close to nature management of beech forest can be also profitable by several reasons. Lack of fences against large game species, which is used typically around clear-cut areas of even-aged forests, is a main factor in diminishing the costs of forest management. Other important fact is the dense natural regeneration of beech with very low mortality caused by deer. It means that no expense for artificial renewal of the stand is needed. Finally it is very important that ungulate browsing impact is not evenly distributed on different woody species. Large herbivores select among different plant foods; in this area they mainly browsed European ash and blackberry and did not consume beech leaves and sprouts. We can interpret this selective effect as a natural supporting mechanism of ungulates saving

money to forest managers by retarding the competitor tree and shrub species of beech. Selective impact of ungulates should also be essential in the long-term dynamics of virgin beech forests.

1. Gordon, I.J., Prins, H.H.T. (Eds.) (2008): The ecology of browsing and grazing. Ecological Studies 195. Springer. 328 pp.
2. Katona, K., Kiss, M., Bleier, N., Székely, J., Nyeste, M., Kovács, V., Terhes, A., Fodor, Á., Olajos, T., Rasztovits, E., Szemethy, L. (2013): Ungulate browsing shapes climate change impacts on forest biodiversity in Hungary. Biodiversity and Conservation, 22(5):1167-1180. doi: 10.1007/s10531-013-0490-8.
3. Milad, M., Schaich, H., Konold, W. (2012): How is adaptation to climate change reflected in current practice of forest management and conservation? A case study from Germany. Biodiversity and Conservation. doi:10.1007/s10531-012-0337-8.