

SUMMARY

Title: Effect of active protection (grazing and undergrowth removal) on the structure and species richness of the herb layer and soil seed bank of secondary oak forests.

Oak forests are among Natura 2000 priority natural habitats in the European Union. They are characterized by a very high floral richness of the herb layer, which, in addition to strictly oak stenotopic species, includes grassland species, meadow species, thermophilous thickets and general forest species. Oak forests, due to the above mentioned high floristic value and great diversity, are the subject of many phytosociological studies, where threats to these ecosystems and the need for active involvement of forest services in their protection are also emphasized. Currently, in the literature on the protection of these unique forests, it is believed that since the cessation of traditional forms of animal grazing, carried out for centuries in these luminous stands, has led to a rapidly increasing shading of the forest floor by the spread of undergrowth, only active protection of these communities can stop the process of their regression. Treatments involving the removal of undergrowth, the lightening of the forest floor, together with the introduction of controlled grazing, which is so far prohibited in forest ecosystems, can be an effective method of maintaining the stability of these ecosystems. The work presented here is a detailed analysis of the effects of active protection (undergrowth removal and controlled grazing) on the herb layer and seed bank of a 60-year-old secondary oak forest bordering an oak-hornbeam forest. The study site is located within the Pińczów Forest District (50.4761°N, 20.4939°E) within the Kozubowski Landscape Park in the Nida Basin macro-region.

An ecological experiment was designed in which changes in selected ecological parameters of the herb layer and soil seed bank were observed before, as well as after one- and three-times treatments and compared with data from control plots, also analyzing differences in the effects of individual treatments among themselves.

Research conducted on 12 permanent research plots with an area of 400m² showed that:

- oak patches of secondary origin may be characterized by high species richness and biodiversity of the herb layer and be a habitat for many populations of herbaceous species growing in old forests of natural origin - they are therefore sites where care should be taken to preserve their biodiversity;
- the studied oak forest growing on the edge of the oak-hornbeam forest and farmland was a place of livestock grazing and, as it can be assumed, grazing sustained a high degree of forest clearance, which in turn allowed the development of a lush and species-rich the herb layer;

- in the absence of active protection and the current ban on livestock grazing in forests, the oak forest under study, like many other oak-hornbeam phytocoenoses in Poland, would undergo natural oak-hornbeam regeneration, which would result in the loss of species richness of the herb layer;
- mechanical clearings, removal of part of the shrubs and thinning of the stand performed before the beginning of the experiment had a strong effect on the increase of the species richness and biodiversity of the herb layer and it can be assumed that if it were not for this treatment, the differences between the control plots and plots where treatments were carried out within the experiment would be even greater than those presented in this paper;
- the herb layer under the influence of the three repeated treatments did not change the species structure, but the abundance (frequency) of populations of herbaceous forest species, including oak species and old forest species, clearly increased compared to the control plots
- grazing combined with undergrowth removal had the most stimulating effect on biodiversity and density of old forest species in the herb layer;
- the best results in reducing shading of the herb layer by undergrowth of trees and shrubs were obtained by combining both treatments, but none of these treatments reduced the frequency of oak (*Quercus robur*);
- none of the treatments applied resulted in a rapid increase in the proportion of weed species or alien species of invasive nature in the herb layer;
- the seed bank before and after treatment application was dominated by forest species present in the herb layer;
- the applied treatments significantly increased the number of seeds and the species richness of the soil seed bank of oak species;
- in order to preserve the species richness and biodiversity of the herb layer of the luminous oak forests, active protection is needed by screening the forest floor and maintaining good light conditions through moderate grazing.

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