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The effect of forestry treatments on forest site, biodiversity and regeneration: the Pilis Forestry Systems Experiment.

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The integration of conservation purposes into the management planning of production forests is crucial for ecologically sustainable forestry. For the implementation of these aims, exploring the effects of different management types on forest site, regeneration and biodiversity is necessary. Within the framework of a multi-taxa study, “Pilis Forestry Systems Experiment”, we studied the effects of different treatments of rotation forestry (clear-cutting, preparation cutting, retention tree group) and continuous cover forestry (gap-cutting) on these variables in a mature sessile oak – hornbeam forest.
Clear-cuts induced extreme microclimatic conditions with high daily temperature maxima and illumination. This habitat became detrimental for soil organisms (enchytraeid worms, crane flies). The understorey cover increased considerably, and was mainly characterized by non-forest species. In gaps, albeit the higher proportion of incoming light, humidity and temperature remained similar to the closed stand, while soil moisture was significantly amplified. It was favorable for soil organisms, just as for the plants. The understorey became denser, but it was still dominated by forest species. Regeneration was successful in clear-cuts and gaps as well; however, in both cases, shade tolerant species could outcompete oaks, and the colonization of oaks is limited in both treatments. Retention tree groups buffered the daily microclimatic extremes, but the mean values were similar to those in clear-cuts, and it was combined with dry soil conditions. This was detrimental for soil organisms, but the shaded conditions kept the original character of the understorey. The preparation cutting changed slightly compared to the original mature forest. The diversity and abundance of spiders and ground beetles were not influenced by the treatments, but their species and trait composition differed among the treatments.

Based on this five-year-old experiment, we can conclude that continuous cover forestry is ecologically more sustainable in this forest type than the shelterwood system, because low intensity interventions (gap-cutting, thinning) only slightly modify the microclimate and the communities of the studied organism groups. Although this management create good conditions for regeneration, shade tolerant species should be controlled for a successful oak regeneration.
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