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ROLE OF WINDFALL MICROSITES COMPLEXES IN REGENERATION OF TREE SPECIES AND IN MAINTENANCE OF BIOLOGICAL DIVERSITY OF NATURAL BREECH AND DARK CONIFEROUS BREECH FORESTS IN THE UKRANIAN CARPATHIANS

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Abstract. Understanding of maintaining biological diversity mechanisms is important for elaborating methods for the restoration of natural forests that most fully implement ecosystem functions. The objectives of work are: to identify intact beech and dark coniferous-beech forests of the Carpathians on the basis of analyzing history of nature management and field studies; to characterize the population structure of the main tree species in the intact forests of the Carpathians; to determine the renewal of various species of trees, shrubs, herbs and bryophytes to treefall microsites in the forest types studied. The objects of the research are monodominant beech forests and mixed (dark coniferous-beech) forests of the Ukrainian Carpathians, in which beech (*Fagus sylvatica*), white fir (*Abies alba*) and European spruce (*Picea abies*) are the main dominant of tree sinusia. Monodominant beech forests (the age of stands 250–350 years) were studied on 9 sample plots (from 1 to 1.05 ha) laid in the Ugolsky forest range of the Carpathian Biosphere Reserve at an altitude of 600 to 1000 m above sea level, and also on the 2 sample plots (from 1 to 1.09 hectares) laid in the Lower Volovets forestry at an altitude of 600–800 meters above sea level. Uneven-aged dark coniferous-beech forest (the age of forest stands is 250–300 years old) was explored on one sample plot (1.2 ha) laid in the Podlisnivsky forestry of the Carpathian National Park at an altitude of 750 m above sea level. Population analysis of the main tree and shrub species as well as geobotanical releves was made on the sample plots. Treefall microsite complexes were investigated to identify the peculiarities in the location of tree undergrowth, herb and moss species in beech and mixed forests. The following elements of treefall microsite complex were singled out: treefall pit, treefall mound and tree trunk. At each treefall microsite complex the research was carried out according to the following scheme: an estimate of the age of treefall; measurement of the size of elements of treefall; analysis of the renewal of trees and shrubs, herbs and mossy species on treefall microsites. All investigated beech and dark coniferous-beech forests belong to suballiance *Symphyto cordati-Fagenion* Vida 1963, alliance *Asperulo-Fagion* Tx. 1955, order *Fagetalia sylvaticae* Pawł. in Pawł., Sokol. Et Wall. 1928 class *Querco-Fagetea* Br.-Bl. et Vlieger 1937. The study of the spatial structure of uneven-aged monodominant and dark coniferous-beech forests made it possible to characterize the mosaic associated with the appearance and development of treefall microsites within the treefall gaps. These elements of the mosaic of the uneven-aged forests represent regeneration niches for many species of trees, shrubs and grasses that determine the ability to maintain a high level of species diversity. The location of tree species and herb cover in the treefall gaps of monodominant beech and dark coniferous-beech forests is associated with the dynamics of treefall microsite complexes. The species diversity of vascular plants and bryophytes increases in the treefall gaps and, ultimately, it is supported by the ongoing process of forming the treefalls. The distribution of tree undergrowth, herbs and mosses on treefall microsites where different environmental conditions are created depends on the ecological properties of these species and the age of the treefall.

Key words: treefalls, treefall microsites, regeneration of trees, biodiversity, *Fagus sylvatica* forests, dark coniferous-beech forests, the Carpathians.