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CARBON SEQUESTRATION POTENTIAL OF SPRUCE STANDS IN UKRAINIAN CARPATHIANS

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In the conditions of the destructive human impact on natural ecosystems and expectations of global climate changes is redefining the priorities for the use of natural resources, including resources of forest ecosystems.

Climate changes necessitate significantly new approaches for the formation of conceptual framework of the national forest area. Based on the criteria of sustainable forest management, they provide ecological paradigm dominance in the relationship between the human community and the environment.

Spruce forests of Ukrainian Carpathians are rather important object in the direction of research of carbon sequestration function of forests that is interesting for both Ukrainian and European researchers.

According to the state forest account of the Ukrainian, carried out 1.01.2011, Carpathian spruce forests occupy 426.2 thousand hectares (Ivano-Frankivs'ka (49.4%) and Zakarpats'ka (26.9%) regions. Much less them are in L'vivs'ka (11.9%) and Chernivets'ka (11.8%)).

Quantitative basis for assessing the carbon sequestration potential of spruce forests were used as data 37 temporary plots (from the database «Forest phytomass of Ukraine» of Forest Management Department) and materials of relational database «Mensurational characteristics of forests by primary inventory units» of Production Association «Ukrderzhlisproekt».

The research process of carbon sequestration potential of European spruce stands consists of the following stages: 1 – mathematical modeling of conversion coefficients of the phytomass components and test the adequacy of the models; 2 – general static evaluation of quantitative parameters of carbon sequestration function based on phytomass volumes; 3 – development of the regulatory and information tables to assess the dynamics of the deposited carbon and net primary production.

According to the results of the overall assessment of carbon sequestration potential, the amount of deposited carbon in spruce stands of the Ukrainian Carpathians is about 64 million tons, or an average 108 tons per 1 ha of forested land. The highest density of carbon is characteristic for spruce stands s of Zakarpats'ka oblast – 12.2 $kg\cdot(m^2)^{-1}$, which is for 6 % higher than the average number of the forests of the region (11.5 $kg\cdot(m^2)^{-1}$). For the other areas of the region, the quantitative deposited carbon density in spruce stands are respectively 9.9 $kg\cdot(m^2)^{-1}$ in Chernivets'ka, 9.4 $kg\cdot(m^2)^{-1}$ – Ivano-Frankivs'ka and 10.5 $kg\cdot(m^2)^{-1}$ – L'vivs'ka regions.

Net primary production of spruce forests of Ukrainian Carpathians in the carbon equivalent is up to 2.6 million tons $C\cdot yr^{-1}$ with density, an average –

411 $g \cdot (m^2)^{-1} \cdot yr^{-1}$. Within the administrative regions of the Carpathian region variability of NPP is higher than 10 %. Thus, the highest rates were recorded in the Zakarpats'ka oblast – 437 $g \cdot (m^2)^{-1} \cdot yr^{-1}$**,** then in descending order are L'vivs'ka (419 $g \cdot (m^2)^{-1} \cdot yr^{-1}$), Chernivets'ka (397 $g \cdot (m^2)^{-1} \cdot yr^{-1}$) and Ivano-Frankivs'ka (397 $g \cdot (m^2)^{-1} \cdot yr^{-1}$) regions.

In summary, it should be noted that spruce forests are unique structural component of the Carpathian mountain landscape and have significant carbon sequestration potential (2.6 million tons per year), and therefore play an important biosphere role. Proposed in the article the regulatory and information tables of dynamics of deposited carbon and net primary production in the modal spruce stands are scientific tools in the implementation of environmental forecasting and monitoring of forest ecosystems of Ukrainian Carpathians.