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Slovak University of Agriculture in Nitra
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PERSPECTIVES AND USING WOODY ARTIFICIAL PLANTATIONS FOR HARMONIZATION OF THE NATURAL ENVIRONMENT IN KRYVYI RIH

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There is increasing attention of scientists to the social aspects of forest use in modern cities, as well as the role of forests in the green economy.

The research aimed to study artificial woody plantations as a significant factor in improving the ecological environment for their further use, adhering to the paradigm of sustainable development in the Kryvyi Rih mining and metallurgical region.

During 2015–2020, we studied the natural forest ecosystems and the artificial forest plantations, which are located in contrast to environmental conditions. A forest woodland inventory was made a random sampling scheme. The 34 research plots (25*25 m) were established in natural forest ecosystems and artificial woody plantations.

It was established that at Natural forest ecosystems of the Gurivsky forest the values of stand density varied from 1100 to 1300 trees ha⁻¹, stem heights were 17–19 m, stem diameters were from 19 to 21 cm, stand basal area was from 44 to 48 m² ha⁻¹, stand volume was from 500 to 550 m³ ha⁻¹. It should be noted, that the vitality of the stand was very high and indicated to healthy forests of these ecosystems. In general, the characteristics of the Gurivsky forest were typical for the floodplain forests of Ukraine.

Instead, the values of stand density in plantations in areas with the most environmentally unfavorable areas varied. The most ecologically polluted territory includes forest protection zones of PJSC "ArcelorMittal Kryvyi Rih" and urban protected forests (city protection forests (Lisove and Sotsmisto forest tracts) are located in an ecologically unfavorable zone. These tree plantations develop mainly on relatively fertile soils with a low level of moisture and a high level of air pollution by gas and dust.

It was established that at these woody plantations the values of stand density varied from 1400 to 1500 trees ha⁻¹, stem heights varied from 10 to 12 m, stem diameters varied from 14 to 16 cm, stand basal area varied from 26 to 32 m² ha⁻¹ and stand volume varied from 150 to 250 trees m³ ha⁻¹. These values are very different from the control ($F > F_{critical}$, $p < 0.05$).

The viability of the stand with the most unfavorable environmental conditions was very low and indicated a partially healthy condition of these stands.

In our opinion, the biogeochemical parameters of each seasonal fallen tree leaves can be considered one of the promising markers that determine the viability, or in other words, the health of tree species, and predict the development of artificial woody plantations.

Keywords: forest plantations, analysis of the forest condition, woody plants of Kryvyi Rih district.