RECULTIVATED SOIL HETEROGENEITY: ECOLOGICAL ASPECT

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Extracting minerals by the open method leads to the removal of the rocks to the surface which significantly disturbs natural processes in biogeocoenoses. After remediation activities anthropogenic biogeocoenoses are formed. In this biogeocoenosis on the rocks man-made soils are formed under the influence of environmental factors. Such man-made soils are called technozems.

One of the characteristic properties of reclaimed soils is their high heterogeneity, which is the reason for the vegetation cover variegation. Determining the heterogeneity degree of the soil conditions on the technozems is necessary to solve the problem of their use in the national economy.

The objective of the work is to assess the heterogeneity of the reclaimed soil and to identify the connection with the environmental conditions.

The soil heterogeneity in the reclamation area of the Nikopol manganese ore basin (Pokrov, Ukraine) has been determined on the basis of the penetration resistance indices at a depth of 50 cm. The sod-lithogenic soil on gray-green clays was chosen as a substrate. Study has been conducted on a regular grid. The distance between the measurement points was 3 m. The test polygon consists of 7 transects of 15 points (21 m × 45 m). To determine the external parameters the phytoindication method was used.

It was established that the reclamated soil penetration resistance increases incrementally with depth. The data of the layer are most variable at 5–10 cm from the surface. Geostatistical analysis showed the average level of spatial dependence of penetration data. The radius of influence varies between 4.31 and 15.89 m.

Data clustering of measurement points has resulted in the allocation of three clusters. They differ in the form of the vertical soil penetration resistance vector. The same places are combined into clusters, which form morphologically homogeneous areas and form the spatial structure of the experimental test site. Differences in clusters by external features have been found. In order to achieve this, discriminant analysis has been used. The scales of soil solution acidity and of the nitrogen assimilable forms content have reliable coefficients of discrimination.

Places of increased penetration resistance are characterized by the lowest level of nitrogen assimilable forms and high acidity. The lowest penetration resistance indicators are accompanied by territories with a higher nitrogen content.

The results of the study show that the heterogeneity of recultivated lands is not accidental. After forty years of reclamation, the heterogeneity of the bulk substrate shows certain regularities. They are expressed in the connection between morphological features with soil and climatic conditions. The cause of these changes in gray-green clay was the process of soil formation. The substrate is involved by the means of external factors. The acidity and the amount of nitrogen in soil are probably the limiting factors for plants at the time of the experiment. Selected areas represent separate morphological formations. Their independence is confirmed by distinctive features. These features are of different nature, but they reliably distinguish the allocated areas.

Key words: Soil Heterogeneity, Soil Penetration Resistance, Recultivation, Phytoindication, Geostatistics