Landscapes of loessial islands in high Novgorod-Siversky Polissia

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Introduction

The territory of Polissia is characterized by natural conditions as a province of mixed forests, where soddy-podzolic soils of low fertility have formed on loamy sandy and sandy deposits. However, on the high plateau the Desna River valley right bank, there are Novgorod-Siversky and Ponorntsky loessial islands with fertile dark-colored soils (Opillia). They were formed in rather damp and cool conditions, which is natural for the forest zone. However, their landscapes by the property of the components have a forest-steppe nature. On the plateau, in the Novgorod-Siversky Opillia, elolian loessial is located, which led to the formation of dark gray podzolized soils and chernozems leached and podzolized mainly with a humus-degraded arable layer. On sufficiently large areas near localities Ponorntsytsya, Pokoshychi and Desnianske there was happened loessivation and silt-loam sandy. Fertile gray forest soils were formed here – a kind of Opillia region. During the large-scale survey and mapping of Ukraine's soils in 1957–1961, dark-colored soils of loessial islands were defined predominantly as dark gray podzolized. However, our recent studies have proved the widespread distribution of leached chernozems and podzolized opilsk chernozems. On strongly eroded slopes of the right-bank native shores, we have remnants of the suboak forest, which indicate the forest-steppe nature of the landscapes. In virgin areas, unlike sandy areas, a thick bean-grass-mixed grass cover, including indicators of forest-steppe. The Opillia area with chernozems and other dark-colored soils is a major agrarian resource of the region. But gray forest soils also belong to the most valuable land in Polissia. On gray forest soils, cereal crops are grown by 4–5 centners per hectare higher than those on typical of the Polissia sod-podzolic soils. Loessial islands are common in southern part of Novgorod-Siversky Polissia, in particular, on the Desna River valley right bank. Landscapes are diverse in properties of components – the nature of loessial species, geological foundations, features of soil cover and relief. They are united by forest-steppe features of soil cover, the presence in the central part of Opilia – fertile dark-colored soils, including chernozems with signs of relic steppe phase in their development, meadow-steppe composition of herbaceous cover on virgin areas and the presence of remnants of the suboak forest. These are large fragments of the Forest-Steppe in Polissia, which have a high natural resource.

Keywords: loess islands; landscape; Opillia; Novgorod-Siversky Polissia; Opillian podzolized chernozem with humus-degraded arable layer

Later, with the opinion about the chernozem nature of the soils of Opilia, the leading soil scientists B. B. Polinov and N. A. Afanasyev agreed. During the large-scale survey and mapping of Ukraine's soils in 1957–1961, dark-colored soils of loessial islands were defined predominantly as dark gray podzols. However, our recent research by S. V. Kanivets (2013) has proved the widespread distribution of chernozems leached and podzolized Opilia regions. Consequently, we believe that the information about the landscapes of loessial islands, which is dedicated to the article, will add new information on soils as one of the main components of landscapes, as well as contribute to addressing issues of geographical and agricultural zoning, land typology, generally rational use in agrarian activities, in particular, in land management.
Materials and methods

The landscapes of loessial islands with dark-colored and gray forest soils on the right bank of the valley of the Desna – Ponornitsky and Novgorod-Siversky rivers (Fig. 1) were investigated. All known components of the landscape were displayed – geological, climatic, soil cover, relief with absolute altitudes, hydrogeology, natural vegetation, human economic activity. We used a comparative geographic method with the use of various stock materials and the results of our previous laboratory and field research.

Results and discussion

Loessial islands are usually confined to the plateau of threigh-handed native coast of the rivers. In Novgorod-Siversky Polissia, on the Pridesnianskiy highland (190–221 m), the settled down Novgorod-Siversky and Ponornitsky loessial arrays lay. They formed in rather damp and cool conditions – hydrothermal coefficient in Pikoshichi under Novgorod-Siverskyi had 1.38, and the average rainfall was 682 mm, the average annual temperature of 7,3 ° (Kanivets, 2013), which is natural for the forest zone. However, their landscapes by the property of the components have a forest-steppe nature.

Thus, on the ledges of the plateau of the right bank of the river Desna River, are powerful classical loessia. Their capacity in the Novgorod-Siversky Opilia was up to 17 m, which led to the formation of dark-gray podzolic soils and chernozem mainly with humus-depleted arable layer. On some large enough areas there was loessivation and dusty loamy. Their powerful stratum was formed near the town. Pontornitsa, p. Pokoshichi and Desnianskoye – a kind of Opillі. Fertile gray forest soils were formed here. In our opinion, the loessivation of loessial and loamy and dusty-sandy loessial species occurred in the territory of their occurrence in the theory of L. S. Berg (1916).

In the central part of the light loams loessial islands there are usually dark-colored soils, mostly chernozems leached and podzolized. This part with fertile soils is called Opilia. It is bordered by gray forest soils on the glacial sandy rocks. Among the chernozems on the right bank of the Desna River, soil with a sufficiently deep humus-degraded layer (up to 30 cm) occurs everywhere. Decrease to humus, in comparison with the underlying part of the humus horizon, by 0.2–1, to 1.5% clearly manifests itself morphologically in the illumination of the ancient deeper arable layer. This happened in the past due to the high aeration caused by systematic deep plowing and, consequently, the active destruction of microorganisms of unstable humus. Afanasyev Y. N. (1914) noticed such a differentiation of the humus horizon at the beginning of the 20th century. The luminous layer clearly manifests itself even under seventy-year-old oak forest lines in a moderately humid Chernihiv Opil (Kanivets, 2018). So, the minimization of soil cultivation on the right coast of the Desna is relevant, as well as other measures that increase the content of humus and nitrogen.

The loessial islands with Opilia on the Pridesnianskiy tall are raised above the flood plain of the Desna River at 70–100 m. The flow of the river is almost meridian, therefore the slope of the indigenous shore is steep and, along with the valley plateau, is divided by deep ravines. On the slopes close to the surface is obtained chalk, which positively affects the properties of soils.

An important component of the landscape is the type of natural vegetation, which clearly defines the bioclimatic zone. On strongly crossed ledges of the right shores, we have remnants of the suidibrov, which testify to the forest-steppe nature of the landscapes. This was taken into account by producers when planting field-protecting forest strips, consisting mainly of oak ordinary (Quercus robur L.) 1–2 class bonitete.

In the typical Polissia, there are either pine forests on hidden-podzolic sandy soils or forest subpine on turf-podzolic sandy soils. Pine Pine (Pinus silvestris L.) is dominant, and the accompanying breed is the wart Birch (Betula verrucosa Ehrh.).

On virgin land, unlike sandy areas, thick legumes-cereal-grass covering, including indicators of the forest-steppe:

Fig. 1. Loessial islands on the Right Bank of the valley of the Desna River
Veronika siva (Veronica incana), Scabiosa pale yellow (Scabiosa ochroleuca), Festuca ovina, etc.

In general, loessial islands with chernozem and other dark-colored soils are a major agricultural resource of the region. But gray forest soils in the loessivation dusty loamy also belong to the most valuable lands in Polissia – a kind of Opilia. Analysis of crop yield statistics shows that grain of cereal cultures (on the background without fertilizing) on gray forest soils is 4–5 cent/ha more than that typical of Polissya turf-podzolic soils.

When forming the names of landscapes, it is important to reflect the main components so that the reader gets a complete picture of a particular landscape, from the smallest, most related, rank – facies or links – to the main rank – the type of landscape (Kanivets, 2016).

Conclusion

Loessial islands of Novgorod-Siversky Polissia are common in its southern strip, in particular, on the right bank of the valley of the river Desna. Landscapes are diverse in properties of components – the nature of loessial species, geological foundations, features of soil cover and relief.

They are united by forest-steppe features of soil cover, the presence in the central part of Opilia – fertile dark-colored soils, including chernozems with signs of relic steppe phase in their development, meadow-steppe composition of herbaceous cover on virgin areas and the presence of remnants of the suboak forest.

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