SEZIONE VI.
SCIENZE AGRARIE E ALIMENTARI

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PROBLEMS OF OPTIMIZING THE STRUCTURE OF AGRICULTURAL LANDSCAPES IN UKRAINE AND THE WAYS OF THEIR SOLUTIONS

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The structure of agricultural land largely determines the ecological sustainability of the land use area in general, and of the agricultural landscape (agrolandscape) in particular. That is why the optimization of the structure of agricultural landscapes in modern conditions is extremely important for ensuring the harmonious functioning of the agrosphere [5, 10, 17].

According to G. Schwebs, agricultural landscapes should be understood as natural and economic territorial systems for agricultural purposes, which consist of a geographical envelope, which in turn is a set of natural elements with varying degrees of anthropogenic load, including with a different structure of agricultural land [6, 7].

In various scientific sources, there is no consensus on the optimal structure of agricultural landscapes and normative levels of plowing of the territory. According to many authors, in the most developed countries, the area of arable land does not exceed 20-35% of the total territory. Only in countries with a transition economy, this indicator is equal to 45-55%, and in relation to agricultural land – 60-80% [3].

According to specialists of the State Enterprise "Main Research and Design Institute of Land Management", arable land in the structure of agrolandscapes should make up 60%, natural lands – 12.5%, forested areas – 16%. As shown by previous studies of the Institute of Agriculture of the National Academy of Agrarian Sciences of Ukraine, in agricultural landscapes optimized for the structure of land, depending on the soil and climate zone, 50-60% of arable land should be accounted for. The rest of the land (40-50%) must be set aside for natural biocenoses (natural fodder grounds, forest plantations, etc.) [6, 14].

Experts who studied the state of agricultural land use in the Dnipro river basin believe that in general, the agricultural development of the territory can be 64%, and the plowed area – 49%.

According to the calculations of the institutes of the National Academy of Agrarian Sciences of Ukraine in our country, it is necessary to reduce the area of arable land by about 10 million hectares in order to reduce the level of plowing of the territory to almost 40%, to expand the area of forests, field protection forest strips, natural fodder lands, recreational areas, etc. At the same time, the ratio of ecologically dangerous lands (arable land, orchards, vineyards, etc.) to ecologically stable ones (forests, natural fodder lands) cannot exceed units [1, 2, 6, 22].

In the first approximation, if we consider the territory of a part of the landscape used in agricultural production as one whole, then it is divided into 2 parts: destabilizing landscape situation (arable land) and stabilizing (hayfields and pastures). In this case, arable land should not occupy more than half of agricultural land. That is, the maximum permissible ratio between destabilizing and stabilizing territories is 1:1. [14, 31]

The works of many scientists are devoted to the study of the scientific and methodological foundations of rational agricultural land use in modern conditions of transformation of land relations [4, 9, 15, 19, 20, 23, 26]. However, constant dynamic processes in the agrarian sphere of the country necessitate the specification of methodical approaches to the formation of ecologically sustainable highly productive agricultural landscapes at the regional level – in general, and the optimization of the structure of cultivated areas – in particular [3, 13, 30].

It is generally accepted that the solution of modern economic, ecological and social problems in the agrarian sector of the economy is possible only through the implementation of a set of measures provided for by land management [8, 15, 32]. One of the main tasks of land management is the creation of a favorable ecological environment and the improvement of natural landscapes [6, 14, 18]. The analysis of the structure of cultivated areas of agricultural crops during the period of land reform in Ukraine (1991-2021) showed that its transformation during the period of radical reform of the agrarian sector of the economy, changes in the forms of ownership of land and property, took place mainly under the influence of market conditions: significantly the area of technical crops increased (in particular, sunflower, which is one of the highest among the main types of agricultural products), and the area of fodder crops decreased significantly [3, 7].

Cultivation of intensive energy-rich crops (sunflower, rapeseed, corn) requires significant expenditure of material and energy resources (application of increased rates of organic and mineral fertilizers, pesticides, repeated inter-row tillage, etc.). Obtaining the harvest of these crops is carried out at the expense of realizing the potential fertility of the soil. Such phenomena occur quite often during agricultural production. As a result of such activities, such negative phenomena as dehumification, agrochemical degradation, and the manifestations of erosive and drought phenomena intensify [11, 12, 16, 21, 29]. Based on the standards for the return of sunflower to the previous place of cultivation (after 7-9 years), its share in the structure of crops cannot exceed 10-15% (at the national level, this indicator was exceeded back in 2003).

The same applies to other industrial crops, the area of which has increased by 3.7 million hectares (or by 98%) over the past 20 years without proper scientific justification.

Violation of scientifically based rotation of crops in crop rotations was facilitated by the parceling of agricultural lands as a result of reforming land relations [9, 10, 14, 25].

However, the concentration of large land allotments by agricultural holdings in one area not only creates threats of regional monopoly for the economy of the industry and the social development of rural areas, but also causes a further decrease in soil fertility due to the cultivation of highly profitable and export-oriented agricultural crops (grain and oil groups), which significantly deplete the land [7, 23, 28].

The decrease in the share of fodder crops in the structure of the sown areas of most farms worsened the quality of the precursors for winter wheat. In addition, it also negatively affected the fodder base for livestock, which greatly complicated the already insufficient production of organic fertilizers to optimize the agrochemical

properties of soils. With the high cost of energy carriers and fertilizers, perennial leguminous grasses could be the cheapest means of restoring soil fertility, due to the fact that they leave behind 70-80 t/ha of plant residues, from which 1.7-2 t/ha of humus is formed. Thanks to them, the intensification of the biological factor in increasing the productivity of agricultural land is ensured, the physical properties of soils improve, and their anti-erosion resistance increases [1, 5, 10, 24].

In the agriculture of Ukraine, significant energy losses of leguminous crops are observed, which is accompanied by the withdrawal of thousands of tons of biological nitrogen from the cycle, which allows solving the issue of increasing soil fertility with the least costs. Biological nitrogen fixation is carried out due to the energy of the Sun and is the most resource-saving source of atmospheric nitrogen entry into the agroecosystem. Despite this, as shown by the statistical analysis of the transformation of the sown area of legumes, their area decreased sharply during the studied period (by almost 995 thousand ha), and this process is currently continuing [6, 7, 27].

It should be considered that it is the set of crops in the crop rotation that determines the level of intensity of land resource use (rates of fertilizers, pesticides, amount of mechanical processing, etc.). At the same time, the relevant indicators should be established considering the data of agrochemical land certification and provide for the definition of agricultural crops, the cultivation of which is limited or prohibited, as well as technologies and separate agrotechnical operations for their cultivation.

On slopes with a steepness of 3 to 7 degrees, the placement of row crops, black steam, etc. is limited. Indicators of the intensity of agricultural land use are used in the process of drawing up project and technological documentation for the cultivation of agricultural crops [3, 8, 14, 17].

Conclusions. The listed negative aspects are complex in nature (they affect the ecological, economic and social spheres of life of the rural population), and therefore the measures to overcome them should have a systemic and complex nature. Based on this, in order to optimize the structure of cultivated areas both at the national and regional levels, it is necessary to take into account not only the market situation (economic factors), but also social factors and environmental factors.

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