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PECULIARITIES OF OPTIMIZATION OF THE STRUCTURE OF CULTIVATED AREAS OF AGRICULTURAL CROPS IN THE CONDITIONS OF TRANSFORMATION OF LAND RELATIONS

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Modern global trends in the development of agricultural land use convincingly prove the need to solve, along with the task of providing the population with food, the problems of environmental protection, preservation of biodiversity, reproduction of soil fertility [4, 10, 24]. That is why such systems of land use are formed, which prioritize not the maximum productivity of crops, but the preservation of functional connections between natural elements of the environment. Adaptive landscape systems of land use fully correspond to such directions, the main principles of which are environmental friendliness, adaptability, scientific capacity and biogenicity [2, 6, 11, 30].

Such principles make it possible to move from the concept of total intensification of land resources, the consequence of which is the degradation of the soil cover and the entire surrounding natural environment, to the concept of nature conservation adaptive landscape land use and ecologically balanced agroecosystems [5, 7, 26].

An important step on the way to the formation of adaptive landscape land use systems is the rationalization of the structure of crops, taking into account the geomorphological, soil and economic conditions of specific regions [1, 15]. Optimizing the structure of cultivated areas is the main, cheapest and ecological means of increasing the productivity of agroecosystems, ensuring more complete use of the bioclimatic potential of territories [5, 12, 28].

However, radical transformations in the agrarian sphere of our country are mainly caused by market conditions without taking into account the requirements of environmental safety, have led to a significant increase in the share of highly profitable technical crops and a decrease in the area of crops of the fodder group; in particular, perennial grasses, which form the basis of soil-protective crop rotations [4, 18]. Scientifically unsubstantiated expansion of the areas of intensive crops, as shown by the practice of the previous period and today, leads to the strengthening of degradation processes: erosion develops on sloping territories, dehumification and depletion of nutrients on plains; since economic entities on the land, in the vast majority, do not have the opportunity to compensate for the nutrients removed from the soil with the harvest of agricultural crops at the expense of organic and mineral fertilizers [1, 12, 14].

The aggravation of these environmental problems today can lead to even greater economic losses and social troubles in the future, related to the food security of the country and the normative state of the natural environment [11, 29]. Therefore, in order to ensure highly efficient, ecologically safe use of land resources, it is

necessary to optimize the structure of cultivated areas, taking into account new adaptive landscape approaches to the organization of the territory and the natural and economic conditions of the respective regions. Since the structure of cultivated areas determines not only the level of economic efficiency of the crop industry, but also the level of technological load on agricultural land [3, 9, 17, 21].

At the same time, dynamic processes in the agrarian sphere 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 sown areas - in particular [2, 8, 19].

It is generally accepted that the solution of modern economic, ecological and social problems in the agrarian sector of the economy is possible only by carrying out land management, the purpose of which is to create a favorable ecological environment and improve natural landscapes [18].

It is land management that ensures the organization of the territory of agricultural enterprises, institutions and organizations in order to create spatial conditions for the ecological and economic optimization of the use and protection of agricultural land, the introduction of progressive forms of land use management, the improvement of the structure and placement of land, acreage, crop rotation system, hay and pasture changes [13, 16, 20, 27]. That is why the improvement of the structure of land and cultivated areas at the regional level requires the development of land management schemes of administrative-territorial formations taking into account a complex of natural and socio-economic factors [9, 14, 32].

The analysis of the structure of the cultivated area of agricultural crops over the past 30 years proves 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: the area of industrial crops increased significantly (in particular, sunflower with the level of profitability of 236% in 1990 and 57% in 2018, which is one of the highest among the main types of agricultural products) and the area of fodder crops has significantly decreased [1, 4, 20].

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.) [5, 9, 31]. And if the harvest of these crops is carried out due to the realization of the potential fertility of soils, which is quite often observed in the practice of agricultural production, then dehumification, agrochemical degradation develops, the manifestations of erosion and drought phenomena increase [4, 15, 17, 22].

Violation of the scientifically based rotation of crops in crop rotations was facilitated by the parceling of agricultural land as a result of the reform of land relations (almost 85% of farmers farm on land plots up to 100 hectares in size), while the effective conduct of agricultural activities in market conditions in most cases can be ensured only by large-scale production. 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, export-oriented agricultural crops (grain and oil groups), which significantly deplete land resources [7, 11, 18, 23].

The decrease in the share of fodder group crops in the structure of the sown areas of most farms worsened the quality of precursors for winter wheat and undermined the fodder base for animal husbandry, which complicated the already

insufficient production of organic fertilizers to optimize the agrochemical properties of soils [2, 11, 15].

Due to 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 lands is ensured, the physical properties of soils improve, and their anti-erosion resistance increases. In the agriculture of Ukraine, significant energy losses of leguminous crops are observed, which is accompanied by the removal from circulation of thousands of tons of biological nitrogen, which allows solving the issue of increasing soil fertility with the lowest costs [4, 5].

Biological nitrogen fixation is carried out at the expense of the Sun's energy and is the most resource-efficient source of atmospheric nitrogen entry into the agroecosystem. Despite this, as shown by the statistical analysis of the transformation of the sown areas of legumes, their areas during the studied period decreased sharply (by 995 thousand hectares), and this process is currently continuing. In addition, it should be taken into account that it is the set of crops in the crop rotation that determines the level of intensity of use of land resources (rates of fertilizers, pesticides, amount of mechanical processing, etc.). At the same time, the corresponding indicators should be established taking into account 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. In particular, on slopes with a steepness of 3° to 7°, the placement of row crops, black steam, etc. is limited [2, 11, 12].

Indicators of the intensity of agricultural land use are used in the process of drawing up design and technological documentation for the cultivation of agricultural crops. The listed negative aspects are of a complex nature (they affect the ecological, economic and social spheres of life of the rural population), and therefore measures to overcome them should be of 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 factor), but also social and environmental factors. The real embodiment of this principle is the planning of areas of agricultural crops, taking into account the class of suitability of arable land for their cultivation.

The given data confirm the high adaptive potential of growing potatoes, flax, and winter rye (suitability class II) in Polish regions on sod-podzolic and podzolic soils. These cultures are tolerant to the acidic reaction of the soil environment.

Research conducted in the Kyiv agro-soil district shows that the yield of green mass of lupine on sod-podzolic sandy soils ranges from 334 t/ha under natural fertility to 449 tons·ha^{-1} with the combined application of fertilizers and lime, winter rye grains - 27 and 38, respectively, potato tubers – 79 and 225 centner·ha^{-1} [1, 4, 12].

Salt-resistant crops, in particular, sorghum, millet, burkun, are the most adapted to saline complexes in forest-steppe areas. To improve the physical properties of such soils, it is necessary to sow clover and alfalfa, which, having a deep root system, transfer calcium from the lower layers of the soil and parent rock and accumulate it in the arable layer. It is important to preserve and reproduce the fertility of soils in conditions of increased erosion danger is the expansion of crops of perennial grasses, which are the basis of soil-protecting crop rotations on slopes of 3-5°.

The current structure of cultivated areas both at the national and regional levels, which was formed during the transformation period, does not correspond to the

principles of rational nature management: a significant share of row crops causes a high level of technological load on the soil cover, which almost always exceeds its buffering capacity (ecological sustainability). which will have not only ecological, but also economic troubles in the future [9, 19, 21, 25].

In market conditions, the need to improve the structure of acreage on the basis of adaptive landscape approaches to the organization of the territory of agricultural formations with mandatory consideration of the resource provision of economic entities on land and the soil and climate characteristics of certain regions [12, 18] is indisputable. In the conditions of the Kyiv region, the principles of adaptive landscape land use will correspond to the expansion of the sown areas of winter rye, potatoes, flax, and lupine in Polish regions and the refusal to grow winter wheat and barley on medium and highly acidic soils [1, 22].

A particularly reliable scientific justification is needed to expand the sown areas of sunflower, rapeseed, and soybeans, the share of which in the structure of crops in forest-steppe regions should not exceed 10-15%, because today the ecological consequences of increasing the share of these, without a doubt, highly profitable crops, both for the natural environment, and land resources have not been thoroughly studied. Further research in this direction should be of a comprehensive nature with the involvement of specialists in land management, soil science, and agronomic profiles.

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