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IMPROVEMENT OF THE ANALYTICAL APPARATUS OF ECONOMIC EVALUATION OF AGRICULTURAL LAND REPRODUCTION

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Abstract

The available land resources and their reserves in the Russian Federation can be effectively used by agricultural producers to address the issue of eliminating hunger on a global scale. This will strengthen the country's political position in the world and ensure the economic stability of both foreign trade in food and the domestic positions of its producers. It is proposed to evaluate the reproduction of land used in agricultural production, using a comprehensive indicator of the effectiveness of their reproduction, taking into account the values of a number of major factors that have an unregulated and regulated nature. The article presents the results of the analysis of the efficiency of agricultural land reproduction in the Tambov region, which showed the unstable nature of this process. The reproduction of arable land forms a time-varying economic resource of agriculture. Its management is the implementation of a system of measures to improve the functional state of the soil in accordance with the strategic development plans of agriculture. In the long term, promising avenues for improving the management of agricultural land reproduction should be implemented, focused on increasing the investment attractiveness of agribusiness, introducing innovative technologies for soil maintenance, improving the forecasting and planning of the results of the use of land resources in the industry, in the short term it focused on the possibility of early recovery of the nutrient regime of agricultural plants, deepening the intensification of agriculture, using the potential of organic fertilizer production in the region.

Keywords: Agriculture, efficiency, evaluation, management, reproduction

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1. Introduction

Agricultural land is the spatial basis for the placement of agribusiness, as well as the main and unique means of production in agriculture. The Russian Federation has enormous land resources. The share of agricultural land in the structure of the total national land fund in 2018 was 22.4% (Shchutskaya, 2021; Sorokina, 2021). However, despite the presence of a significant resource, in the country in the post-reform period a holistic concept of land policy has not yet formed. The idea of a free transfer of land ownership rights to the most efficient business owners at any given time in the period of the 90s of the twentieth century seemed fair. But in the conditions of violation of the proportions of inter-sectoral exchange, which have resulted from unregulated price liberalization in various sectors of the national economy of the country, and the outflow of capital from agriculture, land and labor have turned out to be productive resources in excess. This, in turn, led to a reduction in the area of agricultural land involved in economic turnover. This decline has particularly affected the most productive land-arable land (Volkov et al., 2019).

Over the period 1990-2018, its area under cultivation decreased by 16.1 million hectares, or 12.2%. Even the commissioning of fallow land, which began in 2013, could not significantly slow down the trend of reducing productive land (Ulezko et al., 2014).

According to the Ministry of Agriculture of the Russian Federation, the economic turnover of agricultural producers in 2018 there were 197.6 million hectares, which accounted for only 51.7% of the available land area suitable for agricultural production. But even with the incomplete use of land resources in the country's agriculture, from 2012 to the present, the needs of the national agri - food market are fully met for the main food groups, except for fruits and cattle meat-the most resource-intensive types of agricultural products (Chekmarev & Lukin, 2017; Klimentova et al., 2019).

It should be noted that the issue of ensuring the economic growth of agricultural production should be based on a comprehensive solution to the issue of putting into operation abandoned and virgin lands, as well as increasing the fertility of soils, lands involved in the economic turnover of agricultural producers.

Extensive expansion of agricultural land areas in the conditions of physical availability of this type of production resource is an option for further development of the industry. A prerequisite for maintaining the achieved level of agricultural production is the timely replenishment of nutrients in the soils of agricultural land at the minimum level of the amount of nutrient removal from the crop yield, with the restoration of humus as the most important condition for ensuring food access to agricultural plants (Pakhomya & Tatarintsev, 2004).

Currently, the predominant way of such reproduction of soil fertility is the application of mineral fertilizers.

In 2018, agricultural organizations of the Russian Federation contributed 56 kg of tuks per 1 ha of sown area, which is 36.4% less than in 1990 - the last year of the pre-reform period. The volume of technological work on the introduction of mineral fertilizers was carried out only on 59% of the arable land compared to 1990.

In the conditions of shortage of organic substances and increasing mineral load on the soil, agricultural producers faced the problem of soil acidification. According to the Ministry of Agriculture, in

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2018 in the Russian Federation, this problem affected more than 30% of the arable land (35.1 million hectares), which resulted in a shortage of at least 12 million tons of agricultural products in grain equivalent. In the agricultural regions of the Central Chernozem Region, this problem has become acute. The share of acidic soils in the Belgorod region is 44.3%, in the Voronezh region it is 28.2%, in the Kursk region it is 68%, in the Lipetsk region it is 73.8%, and in the Tambov Region it is 76.0%. In all these regions, soil liming works are being carried out, the Belgorod Region was the leader in land reclamation works in 2012-2016, and the Voronezh Region was the outsider. In the whole country, the volume of work on chemical reclamation throughout the entire period under study was insufficient. For example, in 2018, it accounted for only 0.9% of the total demand.

The commercial activity of any agricultural commodity producer is aimed at ensuring high efficiency of agricultural production, in turn, this becomes possible only if the productive capacity of agricultural land is high. In this regard, the issue of the reproduction of land fertility in the expanded type, taking into account the conservation of biodiversity and the ecological balance of agricultural landscapes according to the criterion of the value of the anthropological load, is of particular relevance.

The reproduction of arable land should have an improving character of renewal of the main means of agricultural production, leading to an increase in soil fertility. This is a condition not only for modern efficient land management based on the principles of economic and market balance, but also for the formation of the basis for ensuring food security for future generations.

This becomes possible only when the effective management of soil fertility is carried out within the framework of its modeling. It involves carrying out a system of measures to improve the functional state of the soil in accordance with the strategic development plans of agriculture (from setting tasks for the desired functional state of the soil to its control at the stage of changed fundamental properties of the soil).

Reproduction of agricultural land is a complex process of updating the qualitative composition of soils by encouraging all participants in land relations to fulfill their obligations under the terms of authority related to the use, redistribution and protection of land resources through the recovery, preservation and accumulation of soil fertility of land plots involved in the economic turnover of agricultural producers.

Within the framework of the reproduction cycle of land resources, biological, technological, organizational, economic, and managerial processes are intertwined. The continuity of the stages of production and consumption of agricultural products generates the continuity of the process of reproduction of soil fertility.

The reproduction of arable land forms a time-varying economic resource of agriculture. Depending on the approach used to increase its production potential as a basic element of nature, it can be considered from the tactical and strategic positions of its management.

Land reproduction in the short term provides for the recovery of the food regime for plants after the removal of the main nutrients with the crop yield. As a rule, it is achieved through the chemicalization of agriculture. Unfortunately, along with obtaining a rapid economic effect, there is an accumulation of unused compounds in the soil, leading to their acidification and a decrease in the productive potential in the future. The problem of reducing soil fertility with high chemicalization of agriculture is faced by

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agricultural producers in China, and it may become acute in Russia while maintaining the focus on full chemicalization of the industry in the long term.

The strategic horizon for the formation of a high potential of arable land is based on the possibility of bringing the technological aspects of agricultural production closer to the natural basis for replenishing soil opportunities. Currently, two directions of agricultural production have been formed, which have diametrically different views on approaches to improving the efficiency of agricultural production:

1) intensification of agriculture on the basis of chemicalization;

2) biologized agriculture, based on the use of a system of biological means of protecting agricultural plants.

The choice of one or another type of farming by agricultural producers is based on the analytical base formed at the management level of a particular agribusiness.

2. Problem Statement

One of the tasks of the strategic development of the agro-industrial complex is to maximize the supply of food in the consumer food market, which requires a corresponding increase in the volume of agricultural production. Currently, the main reserve for such a build-up and increase in the efficiency of agricultural production, ultimately, is to improve the resource base of agribusiness and, above all, land as a unique productive factor. The results of the research of the reasons influencing the efficiency of soil fertility reproduction are of great scientific and practical interest. This article presents the methodological basis for calculating the complex indicator of the efficiency of reproduction of soil fertility.

3. Research Questions

The scientific hypothesis of the research consists in the presence of a complex influence of a number of factors, regulated, conditionally regulated and unregulated, on the level of conservation and increase in the economic fertility of soils.

In the course of the research, the following tasks were solved:

- an evaluation of the trends in providing agricultural production in the Tambov region with land resources has been given;
- the author's method of calculating the complex indicator of the efficiency of reproduction of soil fertility has been presented;
- the main directions of increasing soil fertility has been developed.

4. Purpose of the Study

The purpose of this research is to develop an indicator that most fully and objectively reflects the quality of reproduction of soil fertility from the standpoint of the biotechnological criterion and to determine the directions for increasing the intensity of the resumption of agricultural production processes in the following economic cycles.

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5. Research Methods

The research involved the use of monographic, abstract-logical and computational-constructive methods. The reliability of the source materials and the use of a set of methods of economic research that mutually confirm the results obtained ensure the credibility and validity of the conclusions made.

6. Findings

In the Tambov region, the chemical-technogenic intensive system of agriculture has gained a predominant distribution, which has provided an increase in crop yields due to the introduction of resource-saving technologies, the use of high-performance equipment, high-yielding varieties and hybrids, and the application of mineral fertilizers. It does not provide for an increased accumulation of plant residues in the form of straw, manure, and siderates. The economic evaluation is carried out, first of all, in terms of the return on additional investments. But at present, an alternative method of economic evaluation of production intensification based on the calculation of a complex indicator of the effectiveness of obtaining the results of this process is gaining the right to exist. In this case, we conducted research on the process of reproduction of agricultural land (arable land).

The methodological basis for research on the efficiency of arable land reproduction was the complex indicator of the same name, calculated on the basis of the integral approach.

$$K = \frac{\sum \alpha * \overline{F_i}}{n} \quad (1)$$

where $\overline{F_i}$ is the average value of the group of indicators-factors belonging to the i-th group;

α is the weight of the group in the total influence, shares;

n is the number of groups.

It is advisable to distinguish three groups of factors: unregulated, conditionally regulated and absolutely regulated. Among the unregulated factors, we should mention the bioclimatic potential, the availability of land resources and the suitability of land for agriculture; conditionally regulated factors are the level of soil fertility; regulated factors are energy and labor security, the volume of agricultural production, the degree of compliance with the norms of the structure of crops (the share of crops of perennial and annual grasses), the percentage of nutrient recovery, the level of accumulation of root crop residues, the share of employed vapors in the structure of arable land, the level of production costs and state support for agriculture per 1 ha of arable land.

In this case, the form of partial indicators should be achieved, allowing the addition of different quality values. From a mathematical point of view, this is achieved by calculating the relative values (coefficients) of the level of achievement of their planned values.

It should be noted that this method allows the inclusion of particular indicators used in calculating the average value of a group of factors that reflect the main characteristics of all types of farming systems. This makes it possible to ensure dynamic comparability of the values of the integrated indicator of the efficiency of agricultural land reproduction, regardless of the type of farming system used. In this case,

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the weight values of the influence of groups of particular indicators are set as constants by the expert method or the method of multiple regression.

The dynamics of the values of the integrated indicator of the efficiency of reproduction of arable land in economies of all categories in the Tambov region in 2014-2018 are presented in Figure 01.

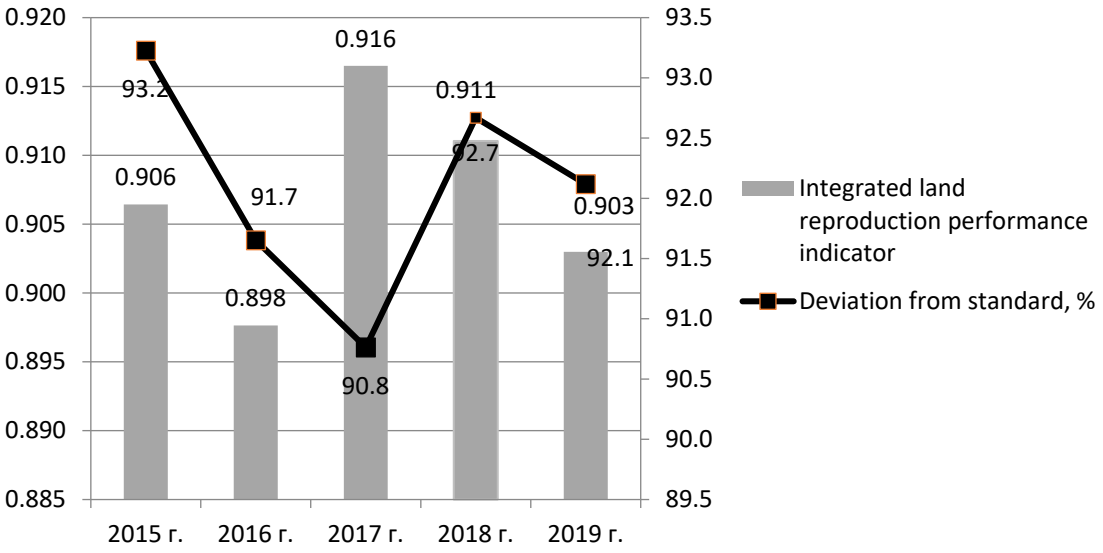

Figure 1. An integrated indicator of the efficiency of reproduction of arable land in economies of all categories in the Tambov region in 2015-2019

It should be noted that the efficiency of reproduction of land used in agriculture over the study period decreased from 0.906 to 0.903 and "approached" the border of full recovery (single value). However, the reproduction of agricultural land has a narrowed type, that is, every year the potential of the main means of agricultural production is lost by an average of 3.2%.

Based on the analysis, it is possible to determine the main directions for improving the process of reproduction of land involved in agricultural turnover, implemented within the framework of its management. It is the implementation of a system of measures to improve the functional state of the soil in accordance with the strategic development plans of agriculture. Among the strategic directions of land reproduction in agriculture should be mentioned:

- increasing the investment attractiveness of agribusiness using modern farming systems;
- increasing the efficiency of the use of arable land through the introduction of modern technical and technological solutions;
- improving the quality of forecasting the economic opportunities of agricultural producers by increasing the efficiency of using modern technologies to increase soil fertility.

In the short-term planning horizon, measures should be implemented to:

- to deepen the intensification of agriculture based on the introduction of its agrolandscape type, improving the structure of crop rotations, precision farming technology;
- improving the quality of the nutritional regime of agricultural plants by applying organic and mineral fertilizers;

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- use of the potential of rural areas for the production of organic fertilizers as a by-product of large livestock organizations, in particular, poultry farms and sugar factories

7. Conclusion

The practical application of the proposed methodology for evaluating the efficiency of arable land reproduction can be carried out within the framework of land management. In particular, it can be used at the stages of planning, analysis and quality control of the implementation of reproduction processes.

Thus, being a complex process involving a large number of heterogeneous aspects of its implementation, the reproduction of arable land cannot be objectively evaluated only through indicators of the recovery of soil quality characteristics. The proposed method for calculating the integrated indicator for evaluating the efficiency of arable land reproduction eliminates this disadvantage. In this regard, it will be more informative to reflect the overall picture of the situation of the effectiveness of the use of certain agricultural systems in the light of the reproduction of soil fertility and to identify priority areas for improving its management.

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